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OF

# NATURAL AND GEOGRAPHICAL SCIENCE.



UNDER THE DIRECTION OF

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## GENERAL LIST OF ERRATA IN VOL. II.

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Pages 22—23. The tables of "the relative strength of the Ipecacuanhas," to follow the table of "false or bastard Ipecacuanhas."

| | | |
|---|---|---|
| Page 74. | Line 21. | *for* autuor *read* autour. |
| 87. | 20. | *for* 40 *read* 10. |
| 131. | 4, 6, 9, 17, 23, 26, 27, 30, 36. | *for* Ingouch *read* Ingouches. |
| 139. | 27. | *for* according as *read* maintaining that. (French erratum.) |
| 156. | 33. | *for* Munro *read* Monro. |
| 272. | bottom line— | Vide correction at p. *354. |
| 300. | 34. | *for* observation *read* occultation. |
| 307. | 16. | *for* Hancock *read* Hibbert. |
| 331. | 4. | *for* Irvile *read* Troile. |
| 338. | 32, 35, 39. | *for* muscle *read* mussel. |
| 339. | 6. | *after* satisfactorily *insert* explained. |
| 372. | 30. | *for* Divipa *read* Dwipa. |

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DIRECTIONS TO THE BINDER.

*Insert the Plates in Vol. II. to face the pages to which they refer.*

| | | | |
|---|---|---|---|
| PLATE | I. | to face Page | 1. |
| | II. | —— | 99. |
| | III. | —— | 95. |
| | IV. | —— | 165. |
| | V. | —— | 175. |
| | VI. | —— | 249. |
| | VII. | —— | 334. |

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APRIL 1830.

## ORIGINAL COMMUNICATIONS.

ART. I. *Description of some New Mosses discovered in South America by Dr. Gillies; with a Plate.* By ROBERT KAYE GREVILLE, LL.D. F.L.S. F.R.S.E. &c.

I. *Anictangium orthotrichoides*, GILLIES' MSS.

A. caulibus subsimplicibus elongatis cæspitosis, foliis attenuato-lanceolatis acutis carinatis nervo percurrente, capsula rotundato-ovata brevissime pedicellata, operculo convexo rostro subulato, calyptra basi laciniata primo totam capsulam obtegens. TAB. I.

HAB. On moist banks near Mendoza, 3000 feet above the level of the sea.

*Plant* growing in dense tufts, of a yellowish-green colour. *Stems* mostly simple, half an inch or more in length. *Leaves* numerous, inserted on all sides, spreading, (when dry much curled and crisped,) lanceolate, attenuated to a point, carinate, entire and slightly waved at the margin, the nerve strong and reaching to the apex. *Fruit-stalk* terminal, scarcely a line in length. *Capsule* erect, roundish ovate, even, pale yellow-brown, reddish at the margin of the stoma which is naked. *Lid* convex, with a straight subulate beak. *Calyptra* mitriform, striated, at first completely concealing the young capsule, enveloping it and embracing the fruit-stalk beneath, at length expanded and laciniated at the base.

When this moss was placed in my hands, I was led to expect, from the appearance of the calyptra and general character of the stems and foliage, that it would prove to be allied to the *Orthotrichoideæ,* and perhaps constitute a second species of *Glyphomitrion*. It was with no little surprise, therefore, that I found it to be totally destitute of peristome. According to the principles upon which the genera of mosses are formed, it must be regarded as an *Anictangium*, (or *Schistidium* of Bridel;) but it must be confessed that natural habit is opposed to such an arrangement, and that the calyptra is altogether similar to that of some *Orthotricha.*

Fig. 1. Portion of a tuft, *natural size.* 2. Leaves. 3. Young capsule enveloped by its calyptra. 4. Capsule with operculum. 5. Capsule after the lid has fallen. 6. Mature calyptra, *magnified.*

II. *Didymodon reticulatum,* Gillies' MSS.

D. caule brevi, foliis oblongo-ovatis apiculatis reticulatis carinatis margine arcte recurvato nervo superne incrassato, capsula ovato-cylindracea. Tab. I.

Hab. On moist banks at the base of the mountains near Mendoza, 4000 feet above the level of the sea.

*Plant* somewhat tufted. *Stems* two or three lines in length, in my specimens imbedded in soil to the very summit. *Leaves* imbricated on all sides, of a lurid green or brown colour, somewhat rigid, (incurved and very rigid when dry,) erecto-patent, ovate-oblong, apiculate, deeply hollowed in the upper part, and carinate on the back, the margin entire and much recurved; nerve passing to the summit, where it forms the apiculus, strong and incrassated upwards. The substance of the leaves is pellucid and reticulated, especially in their lower half. *Fruit-stalk* two or three lines in length. *Capsule* ovate-cylindrical, but variable in length, erect, of a dark-red colour; the *lid* shortly and obtusely rostrate. *Peristome* composed of thirty-two pale slender teeth approximated in pairs, the whole united at the base by a narrow reticulated membrane of a thinner substance than the teeth themselves.

The only other known species of *Didymodon* with which the present plant has any relation, is the British *D. nervosum.* Both are distinguished by leaves wider than those of their congeners, and by a strong nerve which is considerably thickened in its upper part. *Didymodon reticulatum* is well marked by the greater length, the carination, the recurved margin, and reticulated pellucid substance of the leaves, and the cylindraceous form of the capsule. I have not been able to obtain a perfect peristome among the specimens brought home by my friend Dr. Gillies, but what remains is amply sufficient to determine the genus.

Fig. 1. Plants, *natural size.* 2. Leaves. 3. Capsule. 4. Summit of a capsule, with remains of the peristome. 5. Portion of the peristome, *magnified.*

III. *Tortula carinata,* Gillies' MSS.

T. caule elongato ramoso, foliis oblongo-ovatis carinatis margine revolutis, nervo in pilum desinente, perichætialibus acutis vaginantibus, capsula cylindracea, operculo longe subulato. Tab. I.

Hab. On moist rocks and banks near El Puente del Tollo, in the valley of the Maypu, Chile, 3368 feet above the sea.

*Plant* growing in tufted masses of a reddish-brown or green colour. *Stems* an inch and a half, or two inches long, much branched, branches elongated. *Leaves* numerous, of a brownish green colour, closely imbricated on all sides, erecto-patent, somewhat recurved at the apices, oblong-ovate, carinate, entire and revolute at the margin, furnished with a strong reddish nerve, which is prolonged beyond the summit into a pellucid hair. *Perichætial leaves* few, involute, and closely sheathing the fruit-stalk, ovate-oblong, attenuated into a sharp point, the nerve scarcely reaching to the extremity. *Fruit-stalk* about half an inch in length, often lateral in consequence of innovations. *Capsule* cylindraceous, dark red, the *lid* long and obliquely rostrate. *Peristome* long, composed of twisted teeth free nearly to their very base.

The species of *Tortula* hitherto known furnished with perichætial leaves, are *convoluta, revoluta, calycina, flexuosa,* and *pilifera.* Of these the last is the only one which bears any resemblance to the plant under consideration. *Tortula carinata,* however, is well distinguished by its more ovate, recurved, and carinate cauline leaves, and by the absence of the long narrow extremity in the perichætial ones. The habit of the plant is also different; the stem is not divided into a number of small branches, in a bushy manner, as in *T. pilifera,* but into several long branches mostly given off towards the base, and generally even at the top. From the appearance of the specimens, I should conjecture that it was very similar in its mode of growth to our own *Tortula ruralis.*

IV. *Bartramia fontanoides* Gillies' MSS.

B. caule fasciculato, ramis æqualibus erectis, ad apicem uncinatis, foliis secundis lanceolatis acutis denticulatis subfalcatis reticulatis glaucis, seta subradicali, capsula subglobosa subsulcata. Tab. I.

Hab. On moist banks and sides of ditches at Buenos Ayres.

*Plant* tufted, delicate. *Stems* about three-fourths of an inch in height; branches very numerous, erect, given off in a fasciculated manner near the bottom, very slender, of a pinkish-red colour, and level at the tops, which are always uncinate. *Leaves* pale glaucous green, rather scattered, inserted on all sides in a lax manner, but pointing more or less in one direction, somewhat falcate, lanceolate, pellucid, reticulated, their upper half denticulate, the superior ones gradually attenuated to a long point. *Fruit-stalk* about an inch in length, rising a little above the tops of the branches, slender, flexuose, yellowish red. *Capsule* subglobose, slightly sulcate, the orifice scarcely oblique, *lid* between convex and conical, obtuse.

From the immature state of the specimens of this moss, I have not been able to obtain a peristome for examination. Neither am I quite certain in regard to the sulcation of the capsule, which, having collapsed while green, I have not succeeded in restoring. The principal characters upon which the species will rest, are the secund, more or less falcate, denticulate, glaucous leaves. The most nearly related plant in external habit, appears to be *Bartramia uncinata* of Schwagrichen, (*B. scabrida* according to the plate,) a species found in Guadaloupe and Martinique; but in that moss the fruit-stalk rises high above the branches, and the nerve of the leaf terminates in a long subulate point. It is also near some varieties of *Bartramia fontana,* and may possibly not be distinct from that extremely variable species. It belongs to Bridel's genus Philonotis, so named (*a φιλος et νοτια*) on account of the moist situations in which the species are found. I do not, however, conceive that there are sufficient grounds for separating *Bartramia,* as Bridel has done, into two genera.

Fig. 1. Plants, *natural size.* 2. Leaf from the lower part of the branches. 3. One of the upper leaves. 4. Summit of a leaf. 5. Capsule, *magnified.*

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## ART. II. *Account of some Fossil Remains found in the neighbourhood of Kilmarnock.* By John Scouler, M.D. F.L.S. Professor of Nat. Hist. in the Andersonian University of Glasgow.

Although the remains of the fossil elephant have been found in almost every country and in every condition, from that of the entire carcase preserved in the eternal ice of Siberia, to the scattered fragments of teeth and bones imbedded in diluvial soil, still the occurrence of a new habitat is worth recording, especially in this country, which, from its geological structure, must be always meagre in those interesting relics of former worlds.

The remains of the extinct elephant which have come under my notice, were found at a quarry within half a mile of Kilmarnock. The whole surrounding country belongs to the coal formation, and in many situations the junction of the sandstone with the carboniferous limestone is beautifully seen. The limestone contains the usual characteristic shells and zoophytes, as Producti, Encrini, &c. and the sandstone abounds in casts of fossil plants, especially those which are thought to resemble the Lycopodiaceæ and Equisetaceæ of botanists.

The quarry where these remains were found, affords a fine-grained sandstone, used for making tombstones and similar purposes. This sandstone is in some places covered by a compact clay, which affords fine impressions of the fronds of ferns, whose genus it is difficult to ascertain.

The fossil bones with which we are more immediately interested, were found about twenty-five feet below the surface of the ground, and a few feet above the sandstone, in a tenacious clay of considerable thickness, and mixed with rolled and rounded stones of various sizes, many of them consisting of limestone, although there are no limestone rocks nearer than six or seven miles.

The remains consist chiefly of tusks of the elephant, and of these at least five have been found at different times, so that they must have belonged to three different individuals. These tusks are generally in very good preservation, and the ivory is in some instances as fine as when the animal lived. The external crust of the tusks is in general more or less decayed, and of a black colour, and easily separable from the body of the tusk. Besides these tusks several ribs were found a few years ago; but they have been dispersed among several individuals residing at a distance. When I visited the place, most of the specimens had been distributed, but I was so fortunate as to obtain a grinder, the only one that was found: probably they were more abundant, but had not attracted attention, and had been neglected. The crown is broken off, but the disposition of the narrow bands of enamel is so characteristic, that there can be no difficulty in assigning this grinder to the fossil elephant, even although we had not the aid derived from the circumstance of the tusks being found in the same place. The unrivalled work of Cuvier is always a sufficient guide in these investigations.

The horns of the fossil elk have also been found in the same situation, and at the same time; and this is an interesting occurrence, as they are not generally associated with the bones of the elephant. Of the occurrence of horns in that situation, there can be no doubt; and in all probability they belonged to the elk, although I am sorry I cannot speak decidedly on this subject, as I have not had an opportunity of seeing and examining them.

These bones were not all found at the same time; but almost every year a tusk is found, as they make progress in removing the earth from the surface of the sandstone. This season a tusk and the elk's horns were found, and the grinder which I have already mentioned.

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## ART. III. *On the Native Forests of Aberdeenshire.* By the Rev. J. Farquharson, F.R.S.

(Communicated by W. J. Hooker, LL.D. F.R.A. & L.S. &c.)

The following queries respecting the natural forests of fir, (*Pinus sylvestris*,) in the upper parts of the valley of the Dee, having been submitted to the Rev. J. Farquharson of Alford, Aberdeenshire, that gentleman most kindly communicated the result of his own observations and inquiries, in a memoir which we think deserving the most serious and attentive consideration of the naturalist, as well as of the planter.

The queries were as follows:—

1. "What is the greatest elevation above the level of the sea which the *fir-trees* of the forests of Braemar attain upon the mountains?"

2. " At what elevation above the sea may be the bases of these forests ?"

3. " What do you suppose is their extent ?"

4. " Do you consider that they may formerly have extended down the vallies almost to a level with the sea ?"

5. " Is the wood more valuable than that of the cultivated fir ?"

6. " Have you any idea of what may be the age of the finest of those trees ?"

1. To the first of these inquiries, a resident gentleman whose acquaintance I enjoy, will probably, at a future time, furnish an answer. In the meantime, I may state that I have just now conversed on the subject with a very intelligent person, in my neighbourhood, who had occasion to be in that country twenty-four years ago, and gave me then an account of some remarks he had made on those forests, which he now confirms. His estimate was that the trees did not rise more than 600 feet above the river, which we know from other sources to be about 1000 feet above the sea; so that by this estimate the highest trees would be 1600 feet. He remarked that what he considered the highest trees of the forest of Mar Lodge, were large serviceable trees; but these were, at their upper side, bounded by a morass, into which they could not extend. Had the soil fitted them, the vigour of growth showed that they might have gone higher. The region of this, which is the upper forest of the Dee, consists of a mass of moderately sized mountains, penetrated by deep glens, in which flow the Dee, and several of its tributaries; and the whole bounded and sheltered on the west, north, and south sides by still loftier mountains, some of which, as we learn from Dr. Keith's survey, attain an elevation of 4000 feet. The finest trees are found in the edges of the most sheltered glens. *

2. There is a valuable native forest, that of Glentanner, on a tributary of the Dee, much nearer the coast than Braemar, about 35 miles from Aberdeen, while Braemar is 60 miles. It is the property of the Earl of Aboyne. I am somewhat acquainted with that district, and am disposed to estimate the elevation of the lowest trees at 600 or 700 feet.

3. Although these forests may be deemed extensive when compared with any other native forests in Scotland, and are a source of much wealth to the owners, yet when we view them in reference to any supply of timber needed in this kingdom, that which they could furnish is very trifling. The forest of Mar Lodge has been

* A very remarkable circumstance attends the upper boundary of these trees in the aged forests. They form a full wood of large serviceable timber close to that boundary, and do not gradually dwarf out like the birches. I had several opportunities of observing, in plantations on very elevated ground, how this is to be accounted for. The young trees planted in a region too elevated for them, had yet struggled on for many years, and then died off altogether in broad masses, probably during some unusually severe season, leaving those lower down of good sizes immediately contiguous to the dead trees.

deemed one of the most considerable of them, yet when offered for sale a few years ago, after a survey, it was announced as containing a million and a half of cubic feet of wood.

4. I consider it impracticable to return any complete answer to the fourth question. Yet on this subject we may arrive at some degree of probability. The informant to whom I have referred, in the answer to the first query, states that he remarked, much to his surprise at the time, that the Braemar forests were in the course of extending themselves only eastward and down the courses of the streams, all the young trees being in that direction; and as he saw no impediment to their extension westward, to some open ground lower than many points covered with trees, and yet perceived no young plants on that side, he was very inquisitive of the natives and foresters with regard to what they might conceive the cause of this, he himself conjecturing that it might be owing to the prevailing power of the west wind to disperse the seeds eastwardly. He learned in answer from one of the foresters that this could not be the cause. This man was acquainted with some remains of fir forests farther west, where the descent of the land and course of the streams was towards the west sea, and there the young trees were springing in that direction, in opposition to the course of the west wind. In consistency with these facts, I have learnt that the progress of the young trees of the Glentanner Forest, has been for a long time towards the east, both as to ground at an equal elevation with the old trees, and to that at a lower level. The planted fir-woods of this valley, (Alford,) where they are old enough to perfect their seeds, are on all sides, when they are bounded by uncultivated ground, margined by a vigorous growth of young fir trees. All these facts show, that there is nothing in the nature of the tree, or the soil of the particular localities, to confine the fir to our present native forests; and that it would probably, in the course of a few ages,* if not checked by the operations of man, extend itself over a great part of the country.

* Some years ago, when there existed an open moor, (since planted,) of several hundred acres in the lower part of this valley, bounded on the west side by a fir plantation producing seed, many acres near the plantation were so well filled with native plants, as nearly to resemble newly planted ground. Some of the young plants were found at three quarters of a mile from the old trees, and I felt much difficulty at the time to conjecture by what means the seeds could be so widely disseminated. They could not be driven by the wind over a surface covered with heath, unless that were covered with snow; and when the snow-storm came from the quarter of the old plantation, as that formed a broad and deep mass of trees, there was so much shelter on its lee side, that the snow remained there undrifted, and covered up the fir cones with which the ground under the fir-trees was strewed. I have since observed that the rooks (*Corvus Frugilegus*) have the habit of carrying off the fir cones, in the open weather of winter and spring, and burying them in any loose waste ground. Whole rookeries may be seen at times employed in this operation, which is probably connected with their obtaining a supply of food from the seeds. Some persons with whom I am acquainted, are aware of this habit of the rooks; but it has not occurred to me to see it stated in any publication.

But independently of the probability arising from these facts, which might be referred backward to past ages, as well as to the future, there is abundant evidence that, at some former period, the Scotch fir grew in many places where it is not now found, and that in situations much lower and nearer the sea than our present native forests. This evidence exists in the many trunks of that tree, in a state of high preservation, that are in many places found in the peat-mosses. There is one moss in particular with which I am acquainted, in the parish of Coldstone, where they have been found in such numbers as to prove that a close-growing forest has been here overturned, and I have witnessed the raising of several of the trees. They lie buried under a covering of recent moss, of from 4 to 10 or 12 feet deep. Some of them have been overturned with the root, and others broken off, leaving the root in the position in which it originally grew. The moss, in extent I conjecture about 100 acres, is situated at the bottom of a very shallow basin, drained by a narrow gorge, where the water has probably been interrupted by the overthrown trees, and a lake adapted for the growth of mosses by this means formed. The basin occurs in the bottom of a large valley of six or seven miles each way. Towards the centre and deeper part of the basin, indeed, a shallow layer of moss has evidently been formed on the surface before the trees established themselves there, for it is found below their unmoved roots; but the much larger proportion of the moss has grown since the fall of the trees. The wood is that of very old trees, containing a great deal of turpentine. The sapwood had rotted off, and the bark, much of which is quite firm, has been crushed or has fallen downwards; but the heart-wood is quite fresh and highly serviceable, and of unusual toughness. It has been part of the employment of the neighbouring cottagers for many years past to dig for this wood, and sell it over a considerable extent of country, where it is used in small splits for sewing the common straw bee-hives, aud also burnt to give light. For the latter use it is now generally superseded by a whale oil lamp.

The trees in this moss are generally prostrated towards the east, and it is more than probable that they have been uprooted and broken by a heavy storm coming from the west. I shall have occasion, in answer to another of the queries, to refer to a storm which produced a similar effect within the memory of the present generation.

This moss is nearly parallel to the native forest of Glentanner,

Although not strictly connected with this subject, I am tempted to state here another singular provision of nature for disseminating the *Salix alba*. During the months of October and November, and again in March, the shoots of the side branches of this tree, of two and three years growth, become extremely fragile, and snap off with every gale in great numbers. The half of the thickness, next the wind, is as smoothly broken as if cut with a sharp instrument; the other half at a short angle. Every branch so broken off, is ready to become a new tree if accidentally trampled into the ground.

but on the opposite side of the Dee, and at a considerably lower elevation. But there are other mosses, much nearer the coast, where fir-trees are found, although not in such numbers as here. I cannot state the most eastern limit at which they have been found. In the valley of Alford the few mosses that occur, do not, as far as I have seen or heard, furnish any fir-trees. The wood found in them is birch, alder, some species of willows, hazel, and I think the mountain-ash, all in a state of extreme decay. The oaks that I have seen found here, were not in mosses, but buried under the common vegetable mould, in soft ground, in the neighbourhood of springs.

On the whole, although the relics of our former forests do not, perhaps, entitle us to conclude that the *Pinus sylvestris* was disseminated over the whole country, when it found a suitable soil, or extended down to the coast; yet there is complete evidence that it existed, in a native state, much more extensively than it does now, and at elevations greatly lower than its present native forests.

5. Is the wood of the native forests more valuable than that of the cultivated fir? The answer to this query will involve the discussion of some collateral questions, of much curiosity, and of great practical interest, and I believe that what I have had occasion to witness going on around me, will furnish the ground of a satisfactory answer to them.

There is no question that the wood of the aged trees of the native forests is highly valuable, equal to the best Baltic and Norway wood, both for strength and durability. A remarkable proof of its durability has been stated to me by the informant to whom I have repeatedly referred. He tells me that, in the month of January 1779, a severe westerly storm overturned a great many trees in the forest of Mar Lodge. A short time previous to his being there in 1804, twenty-five years after the storm, it had been discovered that these trees, which, owing to their relatively inaccessible situation, and the little demand for wood in that quarter, had been permitted to remain where they fell, were quite fresh, and furnished wood of a highly valuable quality, although appearing rotten or charred on the outside. He was a witness to many of them being cut up and sawn into deals; and the only objection which the purchasers made to them was, that on account of the unusually great quantity of turpentine which they contained, the saw became so coated with it as to render the manufacturing of them a matter of difficulty. Many of these trees were of large dimensions. Some of them which he had the curiosity to measure were 5 feet in diameter. Single trees had been overturned in all parts of the forest; and in some places many trees and whole clumps were prostrated together, and the trunks, as they lay, were every where exposed to the full influence of the weather. Here then we have an incontrovertible proof of the great durability of this wood. If any other were necessary, it might be found in the roofs and fittings-up of several houses, fabricated of this wood many years ago, exhibiting no symptoms of decay, and notoriously free from the fatal influence of the dry rot, in all cases where no foreign wood has been employed along with it.*

Such is the value and durability of the wood of the aged trees; but I have occasion to know, from the experience of some of my neighbours, that the wood of the young trees of these native forests, is not in the least more durable or more strong than that of cultivated fir of equal age. The cultivated fir, however, through the numerous and extensive plantations which have been made of it, as for instance in this valley of Alford, within the last 60 or 80 years, is rarely seen to live to any great age; the great bulk of it, indeed, not surviving a period of from 40 to 60, or in rare cases 70 years, so that its wood cannot compare with that of the native trees, which attain an age of 200 years and upwards.

Is it possible to ascertain the cause of the early death of the cultivated fir, or find a remedy for this notorious evil? These are questions which have been anxiously put by many whose interest is deeply concerned in discovering a correct answer to them; and they are surely questions of a rational curiosity. I shall not stop to discuss the merits of several conjectures upon this subject; as for instance, that the cultivated fir loses an essential tap root, by being transplanted from the nursery,—a supposed evil, which it has been attempted to remedy, but without success, by sowing the seeds in the place of their final destination; or that we have got in the nurseries an inferior variety of the fir,—another supposed evil, to which a remedy equally in vain has been applied, of getting seeds from the native forests;† or that there are destructive matters lodged in

* Is the dry rot a fungus originally peculiar to America? It was never heard of in this valley so long as our supply of wood came only from our own forests and plantations, or from the Baltic or Norway. American wood has been recently employed in buildings for some of the finer finishings, and the dry rot is now not unknown, for one gentleman's house has suffered considerably from it. If this be its origin, a very trifling incident may introduce it. A packing-box of American wood left in a cellar, or the American deal of a common trunk, may bring the first seeds of the destructive fungus, which when once established creeps over all the wood within its reach. It began first in a cellar in the house to which I have referred, and spread into the neighbouring door-posts and lobbies, not sparing the Braemar wood, of which the house is partly constructed.

† We would request the attention of those who wish to prosecute this inquiry, to a valuable paper on the Varieties of the Scotch Fir, by Mr. Geo. Don, in the Caledonian Hort. Mem. Vol. I. p. 121, which seems to have been overlooked by more recent writers. Mr. Don has been led to distinguish at least *four* varieties of the *Pinus sylvestris*, " one of which is of so fixed and marked a character, that it may probably be entitled to rank as a species," distinct from the common tree, whose branches form a pyramidal head; and he proposes the trivial name of *horizontalis*, from the horizontal and drooping direction of its boughs. In this tree the leaves are broader than in the common variety, and serrulated, nor marginated, and they are distinguishable at a distance by their lighter and beautiful glaucous colour. The bark of the trunk is not so rugged, and its cones are generally thicker, not so much pointed, and smoother than in the common Scotch

the subsoils of the plantations, which occasion the death of the trees when the roots have become large, and have gone deep enough to reach them, although some of these plantations are contiguous to ground where the noble remains of former forests of fir are still found. Nor is it necessary to dwell on these conjectures farther, because I conceive a path is open for us to arrive at the secret with certainty.

Are there any examples of the cultivated fir surviving the ordinary period of its life, and still continuing healthy and vigorous? And can any peculiarity in the culture and management of these examples account for the circumstance of their doing so? There are, in the immediate neighbourhood of my residence, a sufficient number of such examples to serve our present purpose, and the peculiar circumstances of their culture, admit of no doubt regarding the causes to which we must assign their present thriving condition, after they have passed, by many years, the common period of the duration of planted trees. My attention was directed to these trees two years ago, when, upon occasion of enlarging the parish church here, the proprietor of them, John Farquharson of Haughton, the principal heritor of the parish, to whom the great superiority of their wood had been for some time known, proposed employing them in the additional building. Some of them were accordingly so employed, and I had an opportunity of seeing the excellent quality of the wood, which, in the opinion of the architect and workmen, approaches nearly to the best, and equals much of the ordinary run of the native wood of Braemar, the trees there being of very various ages, and consequently different qualities. It was natural to be inquisitive into the cause of this unusual excellence of planted fir wood, which immediately became apparent on examining the situation of the growing trees. They consist of a few hundreds of trees, dispersed over several acres of ground, and generally standing remote from each other, a few only being found, here and there, in small groups of five or six together, within a distance of six or seven yards. The intervals between them have been

fir. Mr. Don also remarks that it seems to be a more hardy plant, being easily reconciled to very various soils and situations; and conjectures that the fine woods which formerly abounded in Scotland, and the trees of which arrived at a large size, were of this variety or species, whilst he has observed that the greater part of the fir woods of the present day, and which are so much complained of, are of the common variety. In this way Mr. Don would account for the supposed decline of the Scotch fir in this country, for two reasons; 1. because the former variety still retains all the good qualities ever ascribed to the Scotch fir; and 2. because, as the common variety produces its cones much more freely than the other, the seed-gatherers, who were only to be paid by the quantity, and not by the quality, would seize upon the former and neglect the latter. "The evident remedy for this defect in our plantations of Scotch fir," concludes Mr. Don, "is therefore the cultivating exclusively this second and well marked variety." Of the other two varieties noticed by the author, one is more common than the "*horizontalis*," and is also a good tree, whilst the other is scarce, Mr. Don not having seen more than three or four specimens. Ed.

partially filled up, evidently at different times, long posterior to the planting of these trees, by spruces and larches, and some other species; but no trees on the ground are of the same age with themselves, excepting birches and a few oaks, whose appearance clearly shews them of the same date with the firs, with which they are every where regularly planted in rows. The oaks are for the most part stunted and decaying trees, but the case is the reverse with the Scotch firs. They are trees of good growth, some of them upwards of six feet in circumference, and have an uncommonly healthy and vigorous aspect, exhibiting in their branches and tops the bright yellowish-brown bark, and dense healthy foliage, which marks good specimens of the native fir. None of them have been known to die for years past, and every thing in their appearance betokens the probability, that they may live to the ordinary period of the trees of the native forests. Their present age is proved, by the annual rings of growth, to be about 90 years.

There is nothing in the soil where these trees are found to account for their excellence; for it is a rather poor clayey shingle, of the very same nature with the soil of many other much more recent plantations in the immediate neighbourhood, where the trees are dying in great numbers. The peculiarity which has insured their long life and superior vigour, evidently exists in the circumstance that they have had ample room to establish themselves in the soil, and to occupy spaces proportioned to the natural size of their species, free from the encroachment of other competitors of their own kind. They have stood thin on the ground as long as they are remembered; and the circumstance of their being found, in some places, in regular lines with the birches and oaks, indicates that they and the birches had been scattered here and there through a plantation of oak trees, no doubt with the view of affording them shelter; and as the oaks do not appear to have thriven well, and the birches are naturally of much less size, these have presented no impediment to the more vigorous growth of the fir.

Our fir plantations, which are almost universally visited with an early and entire destruction, are planted in a very different way. Two or three thousand plants, and frequently more, are crowded into a Scotch acre, leaving only 1½ or 2 square yards to each tree. These, in the course of a very few years, begin to encroach on each other, and being all of the same age, and nearly equal vigour, they go on for some time maintaining a mutual struggle for existence. In the meantime, while each of them sends up a slender and tall top to reach the free air and sun, their roots are mutually checked by each other, so that not one of them gets any firm hold of the soil. The destruction at last commences at some point or other; for it is impossible that so many trees, of such large natural growth, can go on together in such limited space. The rotting and fall of some of the trees, leaves the neighbouring ones exposed to the influence of every storm, which they are unable to resist, owing to their unnaturally tall growth, and the feeble hold their roots have got of the ground. A breach being once thus made in the thicket, a constant additional destruction goes on from year to year all round it; and it is impossible to enter one of these plantations where this mischief has commenced, while even an ordinary gale is blowing, without becoming immediately sensible of the nature of it. The ground for several feet round every tree in the neighbourhood of the breach, is in a constant state of great agitation, being tossed up and down by the slender and almost superficial roots, yielding with every gust of wind that reaches the top; and even where the trees are not immediately overturned, a circumstance which happens to many of them in the harder storms, the roots are yet so much disengaged from the soil, and so injured in their smaller radicles, that every spring multitudes of them are found entirely killed by the storms of the preceding winter.

*(To be continued.)*

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## ART. IV. *Notices of the Chactaw or Choktah Tribe of North American Indians.* By F. B. Young, Esq.*

The Chactaw Indians are the most savage of all the southern tribes, and are situated between 32° and 33° north latitude and 89° west longitude. They were computed to have about 4000 warriors in 1820, and were then governed by three kings, viz. Pucksinubee, Mushilatubee, and Pushamatahaw. This tribe, unlike their neighbours the Cherokees, have as yet made but little progress towards civilization. Even agriculture, the most useful of the arts, is scarcely known, or but sparingly practised.† The only method on which they depend for acquiring the necessaries of life, is hunting the wild animals. The wild bee, for the sake of the wax, is sought after, and is an article of commerce between them and the whites. The little agriculture of the maize or Indian corn, is exclusively left to the women. The exercise of the chase, which among them is a most serious and laborious employment, gives a strength and activity to their limbs unknown to the whites. The same cause, perhaps, renders their bodies in general uncommonly straight and well proportioned. Their muscles are firm and strong. Their bodies and heads flattish, which is the effect of art during infancy. They have long black hair, straight, and extremely coarse, nearly as coarse as horse hair,—dark small eyes,—prominent cheek-bones. They have a firm erect walk, and not unfrequently a dignified appearance. The women are low in stature, ungraceful in their movements, and generally coarse and corpulent. Their

* Read before the Royal Physical Society, Dec. 1829.

† One of their kings attempted to rear the cotton plant, but hearing of the death of his son, (who was on his return from one of the colleges in the northern states,) he neglected his crop at a critical period, and thereby lost it. From this circumstance he concluded that none but the whites could rear it.

faces are rounder, and their cheeks higher, than those of the men. At the age of from 30 to 35, their foreheads become wrinkled, their skin loose and shrivelled, and their whole appearance rather disgusting. The long hair observable on the heads of the men, is usually decorated with trinkets. They invariably shave the hair from the temples, and pluck it from their beards before they arrive at the age of manhood. The women do not deprive themselves of any of the natural covering of the head, but wear it plaited behind, and divided in the middle of the forehead, and paint the skin on the line of separation with a streak of vermilion. Their dress is generally a blanket or blue cloth for the covering of the body. Their shoes or mocassins are made of deer-skin, deprived of the hair, and exposed to the smoke of a wood fire, till it attains a deep brown colour. The mocassin is formed of a single piece of this leather, with one seam behind, and another from the instep to the toe. A flap of about two inches is left round the place where the foot enters, and this flap, together with the seam, is fancifully decorated with beads and porcupine quills dyed blue and red. If worn by a man it is edged with scarlet hair,—if intended for a woman it reaches to near the calf of the leg, and is ornamented with red binding or ferret: a mocassin of plain leather is worn in common. Above this mocassin the men wear Indian leggings, composed of buckskin, something similar to pantaloons, but the seams are on the outside. These leggings, with their mocassins, two small aprons suspended from the waist, a girdle, a tobacco-pouch, breach-clout, scalping-knife and tomahawk, blanket and rifle, compose the whole of their ordinary hunting-dress. Their ears and noses are pierced and decorated with large pieces of metal, and their faces painted in the most hideous manner with red, black, and white. The dress of the women is nearly similar, except that they do not wear leggings, and the necks are adorned with large quantities of red and white beads. There is established in each society a certain form of government. It may be observed that, without arts, riches, and luxury, the great instruments of subjection in polished societies, the Chactaw Indian has no method by which he can render himself conspicuous among his companions, but by a superiority in personal qualities of body and mind. Liberty is the prevailing passion of these savages, and their government, under the influence of this sentiment, is perhaps better secured than by the wisest political regulations. I must remark, however, that they are very far from despising authority of every kind. They are attentive to the voice of wisdom which experience has conferred on the aged, and enlist readily under the banners of the chiefs and the head men, in whose valour and military address they have learned to repose their confidence. Their power is persuasive rather than coercive. Their government may be regarded as monarchy mingled with aristocracy. A chief (stiled "the little leader") acquired such popularity from his oratorical powers and military address, that General Jackson found great difficulty in treating with this tribe for a portion of their land, mainly from the opposition of this man. Some years ago, he proposed to his king Pucksinubee to take as many warriors as would follow him, for the purpose of gaining possession of the province of Texos. But the king refused his consent, fearing that they might come in contact with the government of the United States. This chief was of great service to General Jackson when he subdued the Creeks and Seminoles.

Their habitations are constructed of poles, joined at the top, and covered with the bark of the elm tree. The fire is placed in the centre, and an opening is left at the top to permit the smoke to escape. They always erect their dwellings on the bank of some river or bayou. The ground in the inner side of these tents is covered with bear skins and buffalo hides. They always sleep with their feet to the fire; and these habitations are changed according to the plenty or scarcity of game. Their food consists of bear meat, venison, buffalo meat, and Indian corn pounded into coarse hominy. They have a dish which they call *Tom-foola,* resembling the Scotch haggis, from its being boiled in the paunch of the deer. It is eaten with horn spoons.

*Marriages.*—They marry at an early period: the man usually demands the woman from the uncle. The ceremony is merely an exchange of presents between the parties. The man presents a piece of bear meat or venison: the woman, if she excepts the present, in return presents an ear of Indian corn. By this is meant that he engages to supply her with meat, and the woman to keep him in bread. Their courtship is frequently carried on by dancing. They form themselves into two lines, and dance up to each other. This dancing is accompanied with gestures, and singing alternately in concert. Concubinage is allowed among them. I knew a Chactaw who had ten wives, one of whom did not seem to be more than seven years of age.

*Funerals.*—I once witnessed the funeral of a warrior, which was conducted in the following manner. The body was doubled up in a blanket, and the mourners formed themselves in a sitting posture around it in a circle; their heads were all covered with blankets. The wife of the deceased began the lament, by repeating the words *knokena kene a ta ha,* signifying "the man is gone away." This was followed by the most melancholy, and, I may add, wild and terrific yelling or howling that ever I heard. They fixed upon an elevated spot of ground for the grave, which was dug about 3½ feet in depth, with an off-set near the bottom, to allow of covering the body with pieces of elm bark. They deposited with it a bottle of water, a pan of meal, all his instruments of hunting, and all his bear skins and deer skins. I inquired of one of the old men the meaning of this. He replied, they believed that after death they existed in a human form, and that they either went to a good or a bad hunting-ground, according to their state in this life, and these deposits were made in case of necessity. They mourn during six moons, and frequent the grave every morning. The friends were hired to lament on this occasion.

In 1820, I witnessed the war-dance of this tribe. A party had returned from the west bank of the Mississippi, from an engagement which they had with the Osages, (called Wasashe by them;) they had twenty scalps with them as trophies of their victory. It happened that a number of the tribe were at the Walnut Hills, where I then resided, so that I had an opportunity of seeing this ceremony, which was performed principally by the women. They each held in their hands a cane three feet in length, with the scalps of their enemies attached to round pieces of buffalo hide, the whole fastened to the canes. From them a number of pieces of red binding or ferret were suspended. An Indian was placed in the centre of the women, in a sitting posture, having an iron pot with raw hide stretched across it, like a drum. Upon this he beat and sung the war tune, the women dancing and singing around him. The women were arranged according to their ages: the men formed themselves into a line. The chief related in a low tone of voice a circumstantial detail of the battle. When he mentioned the names of those who had fallen, the shrieks of the women were wild and terrific: a hideous howling to lament the friends they had lost succeeded. This war-dance continued for three days,

The language of the Chactaws has been termed Floridian, differing only in dialect from that of the Cherokees, Chickasaws, Creeks, and Seminoles.

It may be noted that they express a great deal by signs. For instance, by pointing to the rising and setting sun, they mean a period of one day. They cannot enumerate more than ten, or rather they have not words to express more than that number. Their language is transposed, like the Latin.

| | | |
|---|---|---|
| Chaufa | signifies | One. |
| Tuckelo | ... | Two. |
| Touchena | ... | Three. |
| Ousta | ... | Four. |
| Tushlaba | ... | Five. |
| Senale | ... | Six. |
| Wanale | ... | Seven. |
| Chuckale | ... | Eight. |
| Enale | ... | Nine. |
| Pecole | ... | Ten. |

They then multiply, by saying *oua chaufa,* ten and one is eleven, and so on to a hundred.

| | | |
|---|---|---|
| Knockena | signifies | a man. |
| Tike | ... | a woman. |
| Hock suma | ... | tobacco. |
| Shoukaba | ... | a blanket. |
| Pouska | ... | bread |

| | | |
|---|---|---|
| Pouskus | signifies | an infant or child. |
| Nan-ta-ho | ... | what is it. |
| Sub-un-nah | ... | I want some. |
| Babeshela | ... | a friend. |
| Knockfish | ... | a half brother. |
| Tobobesa | ... | an own brother. |
| Tale | ... | metal. |
| Taleholiso | ... | silver or money |
| Nanichehaw | ... | mountain or hill. |
| Luac | ... | fire |
| Pene-luac | ... | steam-boat, fire-boat. |
| Ouka-homa | ... | whisky, or strong water. |
| Koupissa | ... | winter, or cold weather. |
| Chickamaw | ... | good. |
| Fena | ... | very. |
| Mahoba | ... | I think. |

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ART. V. *Observations on the Roots which yield the Ipecacuanha of Commerce.* By John S. Bushnan, Esq. President of the Plinian Society, Member of the Royal Medical, Caledonian Horticultural, and Royal Physical Societies of Edinburgh.

The discovery of this valuable medicine is due to the Brazilians, who ascribe it to the agency of a species of dog infesting the environs of Guaratingueta, said to feed on the root and stalks of the plant when not in health. Marcraff and Piso were the first who made it known to Europeans, but it is to Helvetius, who flourished under the patronage of Lewis XIV. that we are indebted for bringing it into general use. Previous to him, however, a Brazilian, Michael Tristam, speaks of its medicinal virtues, and probably from his essay Helvetius obtained his knowledge. A translated copy is to be found, among other curious papers, in Purchas's Pilgrims, a very rare and valuable work.

To this plant many synonymes have been given, as the *Ipecacuanhæ Radix, Radix Brasiliensis seu antidysenterica,* the *American* or *Peruvian antidysenteric, Beconquille, Mine d'or, &c.* Decandolle states that the word *ipecacuanha,* implies, in South America, *vomiting root.* But M. Aug. de Saint Hilaire asserts that it implies the bark of an odorous, and, to use his own expression, a *rayée* plant, derived from *ipe* bark, *ca* a plant, *cua* odorous, *nha* rayée.

*General History.*—The accounts and figures of the plant, published by Marcraff in the *Historia rerum naturalium Brasiliæ,* and Pison in his work, *De Medicina Brasiliensi,* were too vague and uncertain to enable the botanist to determine either the genus or the species to which it belonged. Ray thought it to be a species of *Paris;* Linnæus at one time, with Morison and others, supposed it was a *Lonicera;* and others a species of *Viola.* The fraudulent intermixture of the roots of very different plants, all of which were sent to Europe under the general name of ipecacuanha, still further increased the uncertainty, and for many years the powdered root was given without its being known from what plant it was obtained. In 1764, Mutis, director of the botanical expedition at Santa-Fe de Bogota, sent to Linnæus a description and figure of the plant yielding the ipecacuanha in New Grenada, (now the republic of Columbia,) and in 1781, the younger Linnæus, in the supplement to the *Species Plantarum* of his father, published the description of the plant, under the name of *Psycotria emetica,* supposing it to be the same described by Piso and Marcraff. In 1802, Brotero, professor of botany at the university of Coimbra in Portugal, described and figured in the 6th vol. of the Linnean Transactions, the plant yielding the ipecacuanha of the Brazils, and which he termed the *Callicocca ipecacuanha.* This account was found to agree with that given by Piso and Marcraff; but as the genus *Callicocca,* made by Schreber, was identical with the *Cephaëlis* of Swartz, later botanists, as Willdenow and others, have united the two under the later name. From the statements of Mutis and Brotero, it appears that the term ipecacuanha is applied to a different root in Columbia to what it is in Peru; and in 1802, Decandolle* stated that the name was applied to several roots, and he particularly noticed the *Viola parviflora,* a statement confirmed by Humboldt and others. In 1801, Gomez stated that the white ipecacuanha of Piso and Bergius, was the root of a species of *Richardsonia,* to which he gave the specific name of *Brasiliensis.* M. St. Hilaire† has confirmed this statement, and added to the lists of roots the *Richardsonia rosea.* I shall therefore endeavour to describe the various roots known in different parts of the world, under the names of the true and false, or bastard, ipecacuanha; and first of the *Cephaëlis ipecacuanha,* the true root.

*Botanical History.*—*Cephaëlis ipecacuanha,*‡ Sprengel, Syst. Veget. G. 794. Sp. 6. Willd. Sp. Plant. I. 977.—*Callicocca ipecacuanha,* Brotero, Trans. Linn. Soc. Vol. VI. p. 135.—*Poaya do moto,* Pharm. Lond.—*Poaya da Botica,* St. Hilaire.

Cl. V. Ord. 1. Nat. Ord. *Rubiaceæ,* Juss. *Aggregatæ* Linn.

*Generic Characters of Willdenow.*—Flowers in an involucred head. Corolla tubular. Stigma two parted. Berry two seeded. Receptacle chaffy.

*Spec. Characters.*—Stem ascending somewhat shrubby, sarmentous. Leaves ovate, lanceolate, a little pubescent; leaflets rather heart-shaped. Corolla five-cleft, chaffy. Bracteas large.

* Memoires de la Societé Medicale d'Emulation, tom. i.

† Des plantes usuelles des Brasiliers.

‡ The genus *Cephaëlis* of Swartz is synonymous with the *Tapogomea* of Aublet, and the *Callicocca* of Schreber.

It is a perennial plant, growing in shady moist situations in the Brazils, and other parts of South America, and especially, according to Humboldt, near the Badillas in Columbia. It flowers from December to March, and ripens its berries in May. The root is fibrous, three or four inches long, and two or three lines thick, marked with prominent and closely set rings. The stem procumbent at the base, rising to the height of from five to twelve inches, simple, leafy towards the apex, where it is slightly pubescent. The leaves are opposite, six or eight in number, ovato-acuminate, entire, downy, two or three inches long, supported on very short petioles, furnished at the base with sessile stipules. The flowers are small, white, funnel-shaped, and disposed in a small terminal head, surrounded at the base with a four-leaved pubescent involucrum. The fruit, a small black ovoid berry, one-celled, and containing two oval seeds.

2. *Psychotria emetica*, Sprengel, Syst. Vegetab. G. 792. Sp. 7. Class 5. Ord. 1. Nat. Ord. *Rubiaceæ.*

*Generic Characters.*—Calyx pitcher-shaped; five-toothed, persistent, entire. Corolla funnel-shaped. Throat bearded. Limb five-cleft. Stamina protruding. Stigma two-cleft. Drupe two seeded, furrowed.

*Specific Characters.*—Stalk simple, somewhat shrubby, erect, hairy. Leaves oblong, lanceolate, acuminated, ciliated, pubescent underneath. Peduncles axillary, subracemose.

This plant, which resembles the former, grows in Columbia, Peru, and probably other parts of South America. The root is fibrous, about the thickness of the little finger. The stalk twelve to eighteen inches high, cylindrical, and finely pubescent. The leaves are opposite, lanceolate, acute, narrowing at the base, smooth on their upper surface, pubescent underneath, supported on a short petiole, and having two stipules, The flowers are in clusters, axillary, small and white. Fruit, an ovoid bluish berry.

3. *Richardsonia Brasiliensis,* Gomez, Mem. sol. el Ipec. 1801, p. 31.—*Rich. scabra,* St. Hilaire, Pl. Brazil. 2 liv. *Richardia Brasiliensis.*

Class 6. Ord. 1. Nat. Ord. *Rubiaceæ* Juss.

*Generic Characters.*—Calyx superior, from six to eight cleft, divided. Corolla funnel-shaped. Stamina protruding. Style sub-three cleft. Capsule with three elastic seed vessels, each holding one seed. Calyx crowned.

*Specific Characters.*—Stalk procumbent, flowers capitate, involucre four cleft.

M. Aug. de St. Hilaire mentions also another species of *Richardsonia,* the *R. rosea,* which, as well as the *R. Brasil,* furnishes the white or undulated ipecacuanha of Piso. The latter, he says, is the best.

*Physical properties and varieties.*—Ipecacuanha is brought to this country in bales. Many kinds are described; some of which are called *true,* others *false* or *bastard* ipecacuanhas.

## 1. True Ipecacuanhas.

For a long time ipecacuanhas were distinguished from each other by their external colour. But the characters drawn from this source, being subject to great variation, gave rise to much confusion. Richard* proposed to distinguish them by fixed characters, principally drawn from their organization. This is by far the best method, and I shall, accordingly, adopt it. Three species of ipecacuanha may, in this way, be discovered, viz. the annulated, the striated, and the undulated; all belonging to the family of the Rubiaceæ. The annulated and undulated species are brought to this country in bales from South America.

1. *Annulated Ipecacuanha.*—This species is the root of Cephaëlis, and is met with in pieces three or four inches long, and about the thickness of a writing quill, variously bent and contorted, simple or branched, full of knots, with deep circular fissures about a line in depth, reaching down to a ligneous cord, giving the idea of a number of rings strung upon a thread—hence its name of annulated ipecacuanha. These rings are unequal in size, both with regard to each other, and also in different parts of the same ring. The substance of the root consists of two parts; a thin yellowish-white woody cord, called *Meditullium,* running through the centre, and a cortical layer of much greater thickness, brittle, and of a greyish or brownish colour; it is in the latter part that the largest portion of the active principle of ipecacuanha resides. The taste of this root is acrid, aromatic, and slightly bitter; its odour slight, but nauseous and peculiar. The cortical portion pulverises more easily than the *Meditullium.* As the latter is comparatively inert, it should be removed, which may be done by bruising the root, which should be kept in well stopped bottles. The colour of this root varies, and hence three varieties have been made known; the *brown,* the *red,* and the *gray,* all of which are produced by the same plant.

Var. *a. Brown annulated ipecacuanha* of Lemery and Richard; the *gray* or *annulated ipecacuanha* of Merat; the *blackish gray annulated ipecacuanha* of Guibourt; the *black ipecacuanha* of some writers. This is the most common and best variety. Its epidermis is more or less deeply brown; sometimes even blackish; its fracture gray or brownish; its powder gray.

Var. *b. Red annulated ipecacuanha* of Richard: *red-gray ipecacuanha* of Lemery and Merat; *reddish-gray ipecacuanha* of Guibourt. This is very similar to the former, and, next to it, is most frequently met with. The colour of the bark, however, is less deep, and reddish; its fracture resinous, and of a more or less roseate hue. Commonly it is horny, and semi-transparent; but sometimes the section of this bark appears opake, dull, and farinaceous, in which case the root is generally less active.

* Bulletin de la Societé de la Faculté de Medecine, 1818.

Var. *c. Gray annulated ipecacuanha* of Richard; *grayish-white* or *amylaceous ipecacuanha* of Merat; the *larger annulated ipecacuanha* of Guibourt. The epidermis is grayish-white; the rings are less prominent, not so irregular or numerous, and the roots larger. Its fracture very resinous, and its bitterness greater than in the first variety. This kind is seldom met with in commerce. Richard thinks it to be but a more mature root. Guibourt has met with a variety, having all the characters of this one, except the colour which was red. He calls it the *red annulated* ipecacuanha. He thinks it was grown in a better soil. In choosing ipecacuanha, we should select the larger and more compact roots, breaking with a resinous fracture, and having a whitish-gray, somewhat semi-transparent or horny appearance on the inside of the cortical part, with a pale straw-coloured medullary fibre.*

2. *Striated ipecacuanha* of Richard and Guibourt; the *striated* or *black ipecacuanha* of Merat; *black ipecacuanha* of most authors; *the ash-grey glycyrrhized ipecacuanha* of Lemery. This is the root of the *Psychotria emetica*. It consists of cylindrical roots, not so thick as the other species; it is not annulated, but striated longitudinally-fusiform. It has deep circular intersections at distances from each other, giving it the appearance of being articulated; and, when a force is applied, it fractures at this part. Externally it has a dirty reddish-gray colour, acquiring a blackish tinge as it becomes old. Its fracture is resinous, less compact than the *Callicoccas*, of a grayish-black internally, especially when moistened with the saliva. The central ligneous cord or *Meditullium* is yellowish, and not so thick as the cortical layer, which is soft; may be penetrated by the nail, and easily separated. The *Meditullium* is perforated by numerous holes, visible by the aid of a glass. Its smell and taste is feeble, its powder deep gray.

3. *Undulated ipecacuanha* of Guibourt; *white ipecacuanha* of Merat, (NOT the *white* ipecacuanha of Lemery.) This, according to Gomez, is the root of the *Richardsonia Brasiliensis;* but Aug. de St. Hilaire and Martius have rendered it probable that other species of *Richardsonia* furnish it. The thickness of the root is about the same as that of the *Callicoccas*, and generally less than that of a goose quill, tortuous, attenuated at its extremities. It is of a grayish-white colour externally. Dr. Duncan states that it turns brown by drying. Like the annulated species it consists of two parts, a thin medullary cord (*Meditullium*) and a cortical portion. The latter at first appears to be annulated; but, on examination, it is found that the grooves are only semi-circular, and do not completely surround the root. Dr. Duncan informs us that these rugosities are larger than in the *Callicocca*. When broken, this root has a farinaceous, not at all a resinous appearance, and is of a dull white colour. If we examine the fractured surface in a strong light, we observe, particularly towards the circumference, numerous shining pearly spots, which through the glass appear ele-

* See Murray, Mat. Med.

vated and micaceous, and have been thought to consist of starch, which Pelletier has found existing in large quantities in the root. It has a musty odour, (supposed not to be accidental) not at all irritating, and very different from that of the *Callicocca.*

## 2. Of the False or Bastard Ipecacuanhas.

As I have before mentioned, the term ipecacuanha is applied, in different parts of the world, to the roots of very different plants, which, with the exception of those before alluded to, have all been termed *false or bastard* ipecacuanhas. They are obtained from the three following families; *violarieæ, euphorbiaceæ,* and *apocyneæ.* An account of them I have condensed in the following Table:—

*Relative Strength of the Ipecacuanhas, according to Decandolle.*

| | | | | |
|---|---|---|---|---|
| Decand. | Cynanch. Ipecac. | - | - | 22 grs. |
| Decand. | Psycotria Emet. | - | - | 24 |
| Decand. | Viola Calceolaria, | - | - | 60 to 72 |
| St. Hil. | Rich. Brasil. - | - | - | 24 |
| Decand. | Viol. Ip. - | - | - | 60 to 180 |

*Relative Strength determined*

| By Experiment. | Names. | By Chemical Investigation. |
|---|---|---|
| 20 | Callicoc. Ipecac. Brown, | 16 |
| | Callicoc. Ipecac. Red, | 14 |
| 24 | Psycotria Emet. | 9 |
| 24 | Richards. Bras. | 6 |
| 60 to 180 | Viol. Ipecac. | 3,5 |
| 60 to 72 | — Calceol. | — |
| 22 | Cynanch. Ipecac. | 5 |
| 5 to 10 | Euph. Ipecac. | — |

TABLE, &c.

# TABLE OF FALSE OR BASTARD IPECACUANHAS.

| Commercial Name. | Botanical Name. | Physical Properties, &c. |
|---|---|---|
| 1. *False Ipecacuanha of the Brazils.* Ipecacuanha blanca, (*Pison.*) Poaya de praya, Poaya branca. *Bras.* | *Ionidium Ipecacuanha,* Ventenat. Pombalia Ipecac. *Vandelli.* Viola Ipecac. *Linn.* *** Several other species of Ionidium yield equally powerful roots; as the *Ionid. parviflorum.* Humboldt saw the *Ionid. Itoubou* cultivated at Peru. | Root six or seven inches long; of the thickness of a goose-quill, fibrous, tortuous, bifurcated at the extremities: colour *pale white or yellowish gray;* wrinkled longitudinally, with small semicircular furrows. The central cord is *thicker* aud yellower than the cortical part; fracture of the root somewhat resinous, showing numerous small holes. |
| 2. *False Ipecacuanha of Cayenne.* | *Ionidium Itoubou,* Vent. Viola calceolaria, *Linn.* Viola Itoubou, *Aublet.* *** Decandolle does not consider this a distinct species from the Ionid. Ipec. but only a variety. | The roots are very similar to the above. They are said, however, to be shorter, more tortuous, of a deeper gray colour externally, but whiter internally. They are found in commerce mixed with leaves and stalks. |
| 3. *False Ipecacuanha of the Isle of France,* Sonnerat. According to Merat it is the *White Ipecacuanha* of Lemery and Geoffroy. | *Cynanchum Ipecac.* Willd. Rich. Cynanch. vomitorium, *Lamarck.** *** Guibourt considers this plant to be synonimous with the *Asclepias Asthmatica* of Linnæus; but by others the latter is supposed to be a variety. | According to Lemery the root is white; neither tortuous nor rough. It resembles very much the root of *Asclepias vincetoxicum.* |
| 4. *False Ipecacuanha of North America.* Ip. Virginian. (see Chapman.) Ip. Pseud. (see Murray.) | *Euphorbia Ipecac.* Linn. *** At Virginia they use the *Spiræa trifolia,* which is well known by the name of Indian physic. | The root has no resemblance to true ipecacuanha, and is not imported. It is fibrous, cylindrical, whitish, and more active than the annulated ipecacuanha. |
| 5. *False Ipecacuanha of the Isle of Bourbon.* | *Periploca Mauritiana.* | Root white, ligneous, of the thickness of a little finger, with filiform rootlets. |
| 6. *False Ipecacuanha of the Antilles,* (Caribbean.) | *Asclepias Currasavica,* Linn. | Used by the Negroes for ipecacuanha. It is but little known. |

* In the Oriental Herald for March 1824, it is stated on the authority of Lemaire Lisancourt, that at Calcutta the white ipecacuanha in most esteem, is the *Cynanchum lævigatum* of Vahl.

## SCIENTIFIC REVIEWS.

*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 Henry Lister Maw, Lieutenant R. N. London. Murray. 1829.

We are somewhat late in noticing this interesting work; but though the press of materials may have made us tardy, it was of too much importance to have ever been entirely neglected. Mr. Maw is the first Englishman who ever descended the course of the Maranon, through its windings of 3000 leagues, and at the time of the attempt was not aware of its having been in part accomplished by the French academicians Bouguer and Condamine. Few travellers can therefore be traced through a more novel, and, from the characters and productions of the country, more interesting tract. Step by step we recede from the light of civilization, to pass to people little advanced from a state of savage wildness; amongst whom the utensils they need, or the ornaments they admire, are received in payment for natural productions, or for personal services —whose vices are those only of savages. We then arrive at marks of civilization, not, as our author says, marks of European civilization, but of European demoralization, where the uneducated, unenlightened branco, finding himself unchecked by those laws and authorities that existed in the country he has left—finding himself amongst a people inferior to his countrymen, and not comprehending the advantage or necessity of restraining his inclinations, assumes arbitrary power, and commits uncontrolled enormities; whilst the unfortunate wretches amongst whom he fixes suffer from his tyranny, and acquire his vices, till slowly and with difficulty we pass through this state of things, to meet with a more general commerce, and to experience the benign influence of social order.

Peru, in the direction which our author crossed it, he says consists of three distinct territories. From the coast to the first cordillera may be termed the mining district. From the first cordillere to the Montana, or woods on the eastern side of the Andes, is a district that not merely appears capable of agriculture, but which has evidently at some period supported a considerable population, as is proved by numerous traces of old Peruvian cultivation. At present it is comparatively uncultivated and depopulated.

From the commencement of the Montana to the frontier is a district naturally rich in vegetable productions, gums, balsams, dyes, and medicinal plants, also various tropical fruits, including cocoa, and there are said to be some spices; and if cultivation was carried on, and a demand commenced, it is said to be capable of raising flax or hemp, cotton, coffee, sugar, rice, with various other productions.

The journey up that acclivity of the Andes which pours its waters into the Pacific Ocean was accomplished without material obstruction. Towns are met with at moderate distances, and some at a considerable elevation. The pampas in parts nearest to the cities are oftentimes divided by hedges or rows of trees, whilst herds of cattle may be seen feeding on the more distant and open parts. The houses of the city are tiled and white-washed, and built in quadras, and give to the whole an effect of European scenery.

From the mouth of Coppermine river to Terra del Fuego, bridges of stone are very rarely to be met with, and on the Andes of Peru, as on the Rocky Mountains, or in the virgin forests of Brazil, the streams and torrents are traversed by a few trees, oftentimes thrown across ravines of immense depth. Difficulties of this kind, which our author met with, were counterbalanced by the effect of these situations; the rocky glen clothed with vegetation, the vast sea of mountains, and the condor, the magnificent vulture of the Andes, hovering about the rocks, on which they build their nests, render the scenery very striking; but to count the numberless beauties contained in the contrasted magnificence of the organic and inorganic world of the Andes of Peru would strain the eyeballs of any lover of the picturesque, and could only be felt in detail by the observing and contemplative natural historian.

There is, however, another source of reflection. On these high plains evident and extensive marks of old Peruvian cultivation are found, the furrows or ridges of which have rather the appearance of the crops having been lately reaped, than of having lain dormant for ages. It is, our author states, well ascertained that the Spaniards, having driven the Indians from this and other agricultural districts, reduced the population of Peru from about ten millions to its present estimate of two millions; and this fine district must at some period have supported many thousands of inhabitants, whilst at the present day all is desolate. Thus, Colchica, which once was covered with cities, and engaged in an immense commerce, has for many years back been a vast forest, where a few weak and miserable tribes wander without a home. Thus the flourishing nations of Hircania and Bactriana have disappeared, undermined by vicious institutions, or falling before the arm of power, losing their independence, and becoming the provinces of states, themselves destined, in their subjugation, to mark the frailty of human things.

But we are not eclectic; and while we think that the causes of the ruin and extinction of nations cannot be too much studied, we think that the progressive march of science will do more towards elucidating the history of nations than the intellect of man can ever accomplish from the unassisted study of the traditions or the dogmas of his ancestors, or of his contemporaries.

Mr. Maw crossed the ridge of the Cordillera from Chacapoyas to Toulea by night. His course was along a valley, which gradually contracted into a glen, and shortly afterwards into a ravine, down which the river, changing into a powerful mountain torrent, foamed with considerable noise. Whenever sufficient earth allowed trees to grow, they bent over the path, whilst the brilliant sparkling of numerous fire-flies, and the clear pale light of the moon, gave additional effect to thc rugged mountain landscape. Here our traveller and his horse were near terminating their career in the rocky bed of the torrent, falling over a flight of steps; but the horse luckily descending on his feet, his rider was enabled to make him wheel, and stand athwart the path.

The dogs of Peru are taught to suck the flock to which they are afterwards to belong as guardians; and, being brought up in this manner, when grown to the full size, they continue to attend the flocks, going out with them in the morning, remaining during the day, and bringing them home in the evening, without the necessity of herdsmen. They generally attack their enemies in packs of two or three together.

The condor's quill is used as a pen by the natives: a little Peruvian, writing with a quill about two feet four inches in length, and near an inch and a half in circumference, must partake of the picturesque.

The district of Toulea may be considered as the commencement or extremity of the Montana woods in the eastern side of the Andes. The wild luxuriance of the trees and flowers in the Montana is excessive; scarcely a cleft in the abrupt rocks that occasionally show themselves, is left unoccupied. Streams become more numerous, and the notes of the organ bird are heard.

Mr. Maw proceeded on foot from Moyobamba to Balso Puerto. Beyond the Montana, the last traces of the cultivation of the descendants or subjects of the Incas, retreating to avoid the Spaniards, were visible on the steep sides of the Andes. Furrows were made in arches, one above another, so that the rain falling on the uppermost of these arches, descended down its sides into the tops of those immediately below it, and again down their sides into the tops of others, until the water was all soaked up, or at least had passed through all the arched furrows. If the Pampa or level at the bottom of the steep was cultivated, and the water had not been entirely expended, it was still applied in a manner likely to afford the greatest benefit for irrigation, by the furrows being twisted interminably.

At Balsa Puerto our traveller embarked on one of the tributary streams of the Maranon, bringing to at night on playas, or dry banks of sand, on which the crew cooked their suppers, and the Indians slept under small tents made of tucuya, which they suspended to sticks fixed in the sand, to keep off musquitoes and more formidable wild animals. They had a belief that, if no part of the body, as a hand or foot were exposed from under the canopy, tigers would come down and walk round, without attempting to molest the sleepers; but if any part of the body made its appearance, the result would probably be otherwise. Mr. Maw and his companion, Mr. Hinde, slept in the canoes.

The navigation down the river to Tabitinga, which is the frontier post of Brazil, was accomplished without much aggravation of difficulties. Mr. Maw throughout the whole course made soundings, took the bearings of the compass, made rough guesses at the length of the reaches and breadth of the river, and such occasional remarks as were connected with these subjects, which he has embodied in some interesting tables. These observations he carried on at a time when perseverance must have been a real virtue.

At Tabitinga they presented their passports and credentials to the *commandante* of the frontier, and received assurance of their passage being facilitated. The accounts given at this place of the ability and indefatigable perseverance of Drs. Spix and Martius, even surpass what we have heard of the exertions of these naturalists.

In their passage from this place to Egas they were deserted by their crew of Indians, and were obliged to take the whole duties of the boat upon themselves to the latter place, when they again obtained some boatmen.

At Santarem the regular progress of our travellers was stopped by the arbitrary and foolish interference of a "commandante militar," who, upon the slightest and most unjustifiable pretences, arrested Mr. Maw and his friend, neglected his credentials, and subjected him to contemptuous and unmannerly treatment. We cannot refer to this part of the transaction without a degree of pride in the independence and determination which never fails to characterize the conduct of our countrymen, and more particularly of our naval officers, under similar difficulties; and throughout this trial of his patience, Mr. Maw always behaved himself in a manner truly worthy of the government under which he holds a commission. It is almost needless to mention that on his arrival at Para he met with ample satisfaction, and the *commandante* was dismissed from a situation in which he could abuse an ill-merited power.

Of the immense province of Para, our author thinks it is scarcely possible to say more than the Brazilians themselves say of it, that it is "muy, muy rico," very, very rich; adding that there is, perhaps, no part of the world, certainly no part of any Christian government's territory, in a more barbarous condition. "The branco system," Mr. Maw remarks, "as far as concerns the Indians, is a system of horror, and tends greatly to detract from the merit of that character for enterprize which otherwise confers honour on the Portuguese name in more than one quarter of the globe, and most especially in Brazil. From the limited population of Portugal, the manner in which the Portuguese colonies are said to have been first established, namely, by turning convicts adrift amongst the natives, was not likely to improve the moral character of the Indians; and the horrible effects of a corresponding system, although I do not mean to say that the present brancos were convicts, is now felt in the province of Para. On every account,—justice and humanity to the wretched Indians,—interest to the brancos,—safety to the government,—and the improvement of mankind generally, it is, I am confident, most desirable that such a system should cease to exist."

Upon the whole, we are inclined to think highly of Mr Maw's work; there are some loose statements on points of science, and some errors in natural history, as "many black bears are said to infest the neighbourhood of Chachapoya," (p. 55,) and "tigers are said to grow near to the size of an ox," (p. 274;) but as a pioneering excursion down a river, and across a country very little known, it is of so much importance that no collection of travels should be without it.

The vast cordillera of the Andes gives rise on both acclivities to innumerable streams and rivulets, which, owing to the irregular situation of these chains, are immediately lost in the Pacific on the one side, but on the other traverse many thousand leagues of a flat country, are enriched in their course by the water of many thousand rivulets and streams, and carry in their bosom the soil of vast uplands, which, deposited near their mouths, leave a few hundred square leagues of land rich enough in its own produce to nourish the dispersed population of either of the two Americas, and lay the foundation of a populous and commercial nation.

The physical character of the southern continent depends upon this geographical distribution of its mountains and rivers. The coast of Peru, and the greater part of the coast of Chili, Mr. Maw decidedly states to be, with a few exceptions, little more than a waste of rocks, sand, and saltpetre, its sterility proceeding principally from the want of rain, caused by the continued easterly wind, which he supposes to be a continuation of the south-east trades, blowing across the continent of South America, and bringing the clouds to the higher ranges and cordilleras of the Andes, by which they are broken, and the rain falls before reaching the coast. The exceptions to this sterility are a few occasional valleys, through which small streams run towards the Pacific, but even in these exceptions there is not that excessive luxuriance which some of their names import.

On the nature of the Montana, or woody country of the other acclivity, we have already remarked; and, a little beyond, the confluence of rivers already brings a soil rich in vegetation, and harbouring the snakes and reptiles of abandoned lands, and the varied forms of animal life, which abound in the woods and plains untenanted by man. In the same latitudes in South America the deserts of dry sand, of rock, and clay which occur in Africa, are scarcely to be met with, and the same causes that influence vegetation produces its anomalies in the colour and characters of man: the woolly hair, thick lip, and deep black colour of the negro, are not met with on the rich banks of the Brazilian and Columbian rivers, nor under the shelter of the most gorgeous vegetation in the world.

The ancient civilization of the Peruvian is gone by—and imperfect architectural designs, roads of extraordinary length, and mining operations at unexampled elevations, attest an infant state of the arts, but a perseverance and industry, not surpassed at the present day; and, traditions subsequent to their subjugation, inform us of their riches and their magnificence; but, in future days, the plough and the steam-engine will probably do more towards ensuring prosperity and a name among nations, to a people who, leaving the mountains, shall descend to cultivate and build cities on the banks of the Maranon and its tributary streams, than the search for diamonds or the toil for gold; and the pages that record the existence and dissolution of mighty empires in the east, that contain the rise and fall of the islands and littoral countries of western Europe, may be read, in future times, in European languages, by a crowded population on the banks of the Orinoko, the Plata, or the "Maranon," that which "is not the sea."

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*Illustrations of British Entomology.* By J. F. STEPHENS, F.L.S. &c. *Nos. I—XXXI.*

In remarking upon the study of those classes of plants which possess an incomplete organization, we were led to consider how much the success of such minute branches of study depended on the resolute enthusiasm with which some superior men have devoted themselves to their pursuit. In England, and we are sorry that we cannot say in Great Britain, the last few years have marked an era in entomological science—its elements have been exposed in the most alluring, and, at the same time, most lasting manner—a philosophy, which originated in considerations on the affinities of insects, has been so lofty as to affect other more important branches of natural history, and in contemplating these gigantic strides of an infant science, or reviewing the innumerable additions made to our indigenous list, and the clear systematic arrangement which they have undergone, we are tempted to think that the wheels of science, like those of travelling vehicles, are fast quitting the rough roads rolled over by their predecessors, to glide forward with the speed and intensity only attainable from the combined power of rail-road celerity and fatigueless steam. It only now remains for the industrious entomologist to continue the impulse given by extending the boundaries of discovery in every possible direction, and increasing its conquests, by disseminating information, and rendering the facts more easily accessible, that its progress may be better appreciated. Eminently calculated for this object is Mr. Stephens's "Illustrations," affording every facility to the student of British entomology, and every way adapted to keep the science in that elevated rank which the labours of our own countrymen, and the no less successful energies of the talented continental entomologists, have deservedly placed it. The work further affords excellent data for the few remarks we have made upon the additional number of indigenous species, which came to our knowledge, as a natural result of the new attention which was given to a science at which some, who could not understand, had learnt to laugh, and have lived to see their sneers despised, not by one enthusiastic lover of nature, but by every well educated person.

In the Entomologia Britannica of Marsham, published in 1802, nearly 1300 species of indigenous Coleoptera are described, but in the catalogue of Stephens they are increased to 3000, although no order of insects was then, nor perhaps is yet, more investigated and better understood than the Coleoptera. In the old genus, Carabus, Marsham describes 109 species; the Illustrations of Stephens contain descriptions of 400 Coleoptera Geodephaga, a section corresponding precisely to the Carabi of Marsham, after excluding the Cicindelidæ and Elaphridæ; of these, ten are described in an appendix as new species, seen by Mr. Stephens since the publication of his earlier numbers, with a notice of several more. Even in the conspicuous tribe of diurnal Lepidoptera, or butterflies, we find an addition of 30 species, not marked as indigenous in Turton's translation of the Systema Naturæ, published in 1806, being one-third of the whole now on record, as natives of Britain, several of them quite new discoveries, or, at least, never before discriminated by authors from allied species. In giving our opinion of the "Illustrations," we may observe, that the work is quite worthy of the present advanced state of entomological knowledge in this country, and to the student of species far exceeds, in utility, any other on British entomology; nor can we be surprised at this, when informed that its indefatigable author is in possession of the best cabinet of indigenous insects, containing upwards of 10,000 species, "two-thirds of which are unrecorded as British, and of these more than one-half being nondescript;" and, in addition, that his descriptions are not mere compilations from other authors, but drawn up from his own original materials, except in some instances where specimens of very rare insects are not in his cabinet. These advantages, combined with the great entomological skill of the author, and, in general, with finely executed figures, render the Illustrations an acquisition of the greatest importance, and, indeed, quite indispensable to the British entomologist: we say, *in general* well executed figures, because, in a very few instances, we detect considerable imperfection in the colouring; for example, the *Leistus montanus* (Plate IV. fig. 5) quite fails in representing the silky *green*-blue tint of the living insect; but to these more delicate touches of her pencil, the poet's exclamation is peculiarly applicable, "Who can paint like Nature!" Our author has done much service to the study of geographical entomology by the care bestowed in distinguishing those species, erroneously ranked among our natives, on account of exotic specimens fraudulently palmed on collectors as captured in Britain, or which, though taken alive, there is good reason to believe have been imported with timber or merchandize. The chief, and almost the only fault we find with the author, or his work, is for irregularity. Instead of fulfilling his promise of monthly numbers, we find the three last dated respectively, August 1st, September 30th, and January 31st, with the promise of a fourth on the 31st of March. Thus, in the space of nine months, between the date of No. 28, and that promised for March 31st, we have only three, in lieu of eight numbers.

We would not make this remark, but that we, with several of our friends, are eager to see the work, as one of reference, rendered useful by being completed. If Mr. Stephens has not yet well determined the affinities of some of his new species, let them be published in a supplement, but do not let the public want their systematic work.

We terminate, after this gentle admonition, by expressing ourselves generally satisfied with the execution of the work, wishing it every success, and, if necessary, recommending it to our entomological friends.

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*Des Caractères Physiologiques des Races Humaines considérés dans leurs rapports avec l'histoire;* par W. F. Edwards, D. M. &c. 8vo. Paris. 1829.

*Review of* M. Edwards' *Work;* by M. Decandolle, Bib. Univ. Littérat. Tom. 41. p. 175.

The physical history of the human race forms a page in the book of nature, which no man has hitherto been able to peruse; and yet the pruriency of the age has already sought to apply the scanty and unconnected knowledge we possess, in elucidation of historic facts, and in proof of traditional rumours.

The study of the physiological characters of man has sprung up amongst the novelties of our own day.—Blumenbach, the father of the science, is yet alive,—and the validity of his propositions are yet open to dispute. It appears, then, to be dangerous to attempt the corroboration or refutation of opinions, founded on tradition or on written documents, by speculations drawn from a young and uncertain science.

That the natural history of man is yet undetermined, the works of Blumenbach, of Desmoulins, of Bory St. Vincent, of Prichard, of Lawrence, of Virey, of Lacèpéde, of Smith, and numerous others, sufficiently attest; and so long as there are men of high repute, who contend that the permanent varieties of the human race possess characters sufficiently distinct to establish their specific difference,—so long as there are those who can, with show of reason, support the opinion that the human race is not the produce of a single pair,—who believe that the inhabitants of the South Sea Islands could not possibly have wandered to their abodes from the summits of the Caucasus, and that the Jews, who are said to have preserved their structural peculiarities for ages, could never be changed into the Ethiopian type,—whilst others with confidence assert the unity of origin, and identity of species,—there is much reason for exceeding cautiousness in the application of the principles we at present recognize.

It appears to us, that, though history may possibly, in many instances, receive no contradiction from the physiological characters of the races of which it treats, no certain results can be expected in the study of the distribution of man, from the physical peculiarities which the varieties may be found to present. History will assist the researches of the naturalist, but the historian may indulge but little hope of mutual aid.

But our countryman, Mr. Edwards, is of a different opinion; and, in the form of a letter to M. Amédée Thierry, author of the History of the Gauls, he has produced a most interesting and ingenious little volume in support of his views. And if Mr. Edwards, under the guidance of the historical facts detailed by M. de Thierry, fancies that he can distinguish, in France, two types, or sub-varieties of men, possessing peculiarities of complexion and countenance which may be supposed to have belonged to the Gauls and the Cymri, it is a pleasant corroboration of our previous knowledge; but if he had not been able to observe them, the history of that country would have rested on a basis equally secure.

We do not, however, believe that, by means of our present knowledge, the original types can be distinguished in the population of mixed nations; and upon this question the value of physiological characters, as illustrative of history, entirely depends. It would first be necessary to show that the physical characters of a race are constant for ages, and not altered by change of climate, by intermarriages with other tribes, or by the progress of civilization and other causes, before we assume a power of discovering the early inhabitants of a district, amidst the striking confusion of types which pervades the population of most European countries. If the characters of the organization become adapted to the climate to which love of spoil, or hope of superior agricultural advantages, or a wild religious enthusiasm, has led the erratic steps of a restless or overpopulated tribe, we cannot expect to trace the relation with the inhabitants of the countries which they have abandoned. And, in the case of examining the inhabitants of two districts under the influence of similar climate and circumstances, we might fall into the error of supposing that a connection had once existed between them.

Mr. Edwards, seeing the necessity of these preliminary considerations, examines, in a cursory manner, each of the causes which might be supposed to have had an influential power over the characters of races.

The differences of temperature and light between the equator and the poles, have, from the apparent relation of the distribution with the colour of the human race, generally been supposed to be the main agents in producing the varieties of tint. And if capable of originally producing them, it was a reasonable conclusion that they would continue to possess the power of altering these characters. Black seems to be the prevailing colour of warm climates, whilst white is equally general in cold regions; and most of the intermediate shades are met with in intervening latitudes. But there are many striking exceptions to such a generalization; for instances occur of dark-coloured tribes in cold climates, and of lighter shades in warmer countries, and, what is still more remarkable, of the same tint over an immense tract of continent; and, forming their ideas from these facts, physiologists seem now to be generally agreed that the colour of the skin is not to be attributed to the heat or light of the sun. M. Edwards, to whom this opinion was necessary, for the validity of his application of physiology to history, repeats the instance of the Jewish tribe, who, it is said, though scattered over the earth for many centuries, have in every latitude preserved their primitive colours unchanged. But we know not the function of colour; and how absurd is it to attempt the determination of the influence of physical agents over any character, before we have discovered with what agents it holds relation.

In the individual, we certainly observe a minor degree of variation in colour by change of climate; and we are too ignorant of the nature of hereditary character to affirm that this alteration may never become permanent in the race. There certainly appears to be a power in organized bodies to adapt themselves to the new circumstances in which they are placed, whether that power be reduced to a principle of habit, or be attributed to any ultimate law of organization; and if there be any necessary relation between colour and climate, we may easily conceive, though evidence is wanting, that in long process of time, the one may become adapted to the other.

But it has been found still more difficult to account for the origin of the differences in the structure of the hair, and in the configuration of the head and face, so striking in many nations. For, though in many instances, the diversified forms of features may be traced to the hand of art, there are innumerable congenital peculiarities in different races, which are indubitably the result of nature's work. Thus, the thick lips and dilated nostrils of the negro, the receding forehead of the Papuas and New Hollanders, and, under our own eyes, the high cheek-bones of the Scots, are uninfluenced by known causes, and are permanent in the race.

The views of Mr. Edwards would lead him to consider the varieties of the human race to be *specifically* distinct,—implying thereby an original difference and constant transmission of the characters they now possess; and, according to his principle of elucidating history by physiological aid, the same law must be applied to the lowest sub-variety in which a permanent and transmissible character can be found. We need not say that we disagree with Mr. Edwards, though, from want of data, the question is still debateable. For, unless we know the origin of the difference, we cannot distinguish a species from a permanent variety. It is easy to say that the porcupine family, or the family at Iver, the individuals of which, for nine generations, had only the first phalanx of each finger, and the first and second of the ring finger of the left hand,* were mere varieties; but if the origin of these peculiarities had not been known, they must have been considered as indicative of an entirely different species. We see, moreover, from these instances, that the organization is susceptible of changes, which most probably last as long as the exciting cause; and it is not, as we think, compatible with the principles of philosophy to assume that the indefinite shades of variety in the colour and complexion of the human race, may not also have sprung up under the influence of physical agents, whose operations are yet unknown.

A principal feature in the work of Mr. Edwards is a new law which he has laid down respecting the mixture of races. If, when two tribes intermarry, the offspring were to perpetuate characters different from those of their parents, it is evident that we should in vain seek amongst them for the record of their origin. But Mr. Edwards attempts to remove this objection to the elucidation of history from physiology, by assuming that, though between very distinct varieties, the offspring partakes of the characters of both parents, (as in the mulatto from the negro and the white), between *sub*-varieties, (as the Gauls and the Cymri, the Pelasgi and Hellenians, the Sclavi and Germans), the characters of the child are principally determined by the father or the mother alone, and thus the paternal or maternal peculiarities are preservedin the race. And he combines with this opinion, the fact that the characters of a mixed product breed out in a few generations by intermarriage with the primitive stock. Thus, he concludes, that if a tribe of a very well marked variety invade or colonize a district, and intermarry with the natives, the types will be multiplied, but not confused; if the new people be equal in number to the natives, a mixed type will be added, but the old ones will remain. If, on the other hand, the numerical proportion of the invaders be inferior, as is generally the case, their characters, by admixture with the natives, will disappear in a certain number of generations, or leave but faint traces. "A few individuals," says Mr. Edwards, "may come and change the manners, laws, and language of a people, but they cannot alter the physical characters of the race." If the varieties be more nearly related to each other, there will not, according to Mr. Edwards' views, be a single generation with mixed characters; for the peculiarities of the father or mother alone will be transmitted to the offspring. But do these speculations accord with the facts? M. Decandolle justly designates it "une observation, qui peut-être a besoin de nouvelles observations, soit quant à sa constance, soit quant au degré de généralisation qu'elle comporte, mais qui a sûrement de la vérité, et par conséquent de l'importance."

Every one has observed, within the limits of single families, a marked preservation of the hereditary peculiarities which belong to the father or mother alone; thus, the colour of the hair, the con-

* Vide Edin. Med. and Surg. Journ. IV. 252.

tour of different features, and even the general expression of the countenance, seem frequently to be impressed upon the offspring almost exclusively by one parent; and they sometimes, like hereditary diseases, after sleeping for one or two generations, appear at intervals with their original distinctness. But has not every one equally remarked the constant occurrence of the united characters of both parents, the father's hair and eyes, and the mother's nose and lips, the paternal forehead, and the maternal high cheekbones? Such conjunctions have often fallen within the sphere of our observation; and we think that Mr. Edwards has generalized a series of facts, which will be found to be opposed by an equal number of objections. And if it be true, as we believe, that, in mixed races, hereditary characters preserve no regularity, but, on the contrary, are liable to the greatest confusion, (of which let this island serve as an example,) we shall in vain expect to trace amongst the population, the form and colour of the primitive stocks.

The influence of progressive civilization, on the forms and complexions of the human race, is important as a cause of change, and probably is not so "absolutely unknown" as Mr. Edwards would assume. Who has not observed the changes which take place in the boor, when translated from the rude society of his village to the civilized atmosphere of cities? His colour becomes lighter and more delicate, his features refined, and the rudiments of deeper changes are apparent in his altered form. The domestication of animals, analogous to the civilization of man, has produced still more marked differences, till the original types of the horse, the ox, the dog, are lost in the numerous varieties, whose production is attributable to this source alone. Mr. Edwards admits, that the removal from a savage to a civilized state may develope a new character, or destroy one previously existing; "but this question," says he, "does not relate to our inquiry, since it refers to a period so distant and obscure, that it lies beyond the limits of history," (p. 35.) He has, however, found himself under the necessity of admitting the power of organization to adapt itself to such a change.

We think then that, on examination, the principles which the author of this essay would deduce from our present confined knowledge of the physiological characters of raecs, and apply to the determination of historic doubts, will be found too unsettled and hypothetical to warrant their admission amongst the axioms of science. He has, however, with the same talent for which he is renowned in other branches of natural history, applied his views to the investigation of the sub-varieties which are spread over certain parts of France, Italy, England, and a portion of Switzerland, and the countries of Eastern Europe; and though it would be uncandid to oppose any *a priori* arguments to the statements which he makes, there is reason to believe that the results of his observations depended essentially on the histories which he had perused.

The subject is, however, open to inquiry, and requires the corroboration of many observers. This it has received, in a considerable degree, from M. Decandolle; and though it may appear unusual to associate a review with the original work which is under our attention, his paper, departing from the ordinary character of a critique, contains a number of original observations, which may not be neglected on account of the form in which they are presented.

M. De Candolle had long observed the physical differences of nations and tribes, and had often thought of the importance of this study in the elucidation of their origin; but his researches were too far removed from the ordinary course of his studies to permit of his making them public, till the work of Mr. Edwards gave reason for his exposing the general results at which he had himself arrived. That they are corroborative of the opinions of Mr. Edwards we have already stated; but the very number of precautions which, from long experience, he has found necessary to observe in comparing the characters of nearly allied varieties,—in obtaining an idea of the mean of the inhabitants of a country, and in ascertaining the limits of the type,—prove, at the same time, how much the result must depend upon the observer, and how many fallacies attend such a mode of inquiry.

Thus, 1. It will be necessary, as much as possible, to fix the attention on the inhabitants of villages, and not of cities and towns, and especially not of commercial cities.

2. The observer must carefully avoid inductions from the accent, dialect, customs, gesture, and corporeal habits which individuals of the same country or state often possess, in a remarkable degree of resemblance; physical characters must alone be employed.

3. Exercise and habit are required to perfect the eye for the study of resemblances. A most advantageous method of obtaining the type is by comparing a fat figure with a lean one—the common characters are distinctive of the race.

4. Individuals of the same age and sex must be compared.

5. To judge well of the physical characters of a people, they must neither be known too little nor too well.

Thus, the conditions of observation, in this as in similar inquiries, even allowing the accuracy of the principles on which it is founded, are so perplexing as considerably to lessen the value of the means, and afford reasonable ground for doubt as to its practical utility.

But the speculations contained in these essays are highly ingenious, though the data require confirmation; and they are worthy of their talented authors. They, however, who know any thing of the natural history of man, know that it is a subject which is yet in its very infancy, and which affords one of the finest fields for the labours of the zoologist, Let the facts, then, be collected, and the mysterious relations between organization and physical agents be explained, and there will then be some foundation for a superstructure, which is at present a baseless vision, and only entitled to respect from its association with the names of Edwards and De Candolle.

*Review of the recent Discussion, before the Academy of Sciences in Paris, on the "Unity of Organization."* Part I.—BARON CUVIER'S Views.

The proposition, that the organization of the higher animals can be reduced to an uniform type, supported by Mr. Geoffroy St. Hilaire, depends on the "theory of analogies," the "principal of connexions," what the author calls the "elective affinities of the organic elements," and the "balancing of organs."

The first of these principles constitutes the basis of the doctrines of Aristotle, but having to depend, for its existence, rather upon reflection than demonstration, it was not applied to practical purposes, till regenerated by St. Hilaire, who asserted that it is not always the organs in their totality, but the materials of which each organ is composed, that may be reduced to identity. Considering that form was fugitive among animals, and therefore not a true ground for analogy, the same zoologist made all his researches bear upon the mutual, necessary, and consequently invariable dependence of parts,—which he named the "principle of connexions." The principle by which the materials of organization group together to form an organ, he expressed by the term "elective affinity of organic elements;" and the law, in virtue of which no normal or pathological organ can acquire an extraordinary developement, without another in its system or its relations suffering in the same ratio, is the "balancing of organs." It was upon the extension of a lofty philosophy, founded upon mere anatomical considerations, that Geoffroy St. Hilâire established his views of the structure of the organs of respiration, and of the vertebral column, and subsequently traced an unity in the most disorderly and the most anomalous organization, that of monsters.

M. St. Hilaire having given a favourable report to the Academy of Sciences on a memoir of Messrs. Laurencet and Meyraut, tending to prove, that the organization of the crustacea, and more especially that of the mollusca, offers nothing that is not in harmony with what is presented by the remainder of the animal kingdom, Baron Cuvier took occasion to state that he had not changed his opinion on the manner in which the animals in question should be considered. Admitting the approximation of the mollusca to the vertebrated animals, in number and diversity of parts, he continued to oppose the idea that their organization is composed in the same manner, or arranged according to the same plan.

On entering more at length on the examination of these views, M. Cuvier, in the first place, exposed the circumstances which led to this discussion, and then stated his objection to the theory of M. St. Hilaire.

It appears that two young and ingenious observers, in studying the respective position of the viscera of the Cephalopoda, have thought that one might find between these viscera an arrangement like that which occurs among the vertebrated animals, if we represented a cephalopodous molluscum to ourselves as a vertebral animal, whose trunk had been bent back upon itself to the height of the umbilicus, so that the pelvis should come in opposition with the neck. "One of our learned brethren," said M. Cuvier, "seizing with enthusiasm this new view, announced that it completely refuted every thing I had said upon the distance which separates the mollusca from the vertebrated animals. Going even much farther than the authors of the memoir, he concluded from it that zoology has, to the present day, had no solid basis,—that it has been an edifice constructed only on sand,—and that its only indestructible base will be a principle which he calls the 'unity of composition.'

M. Cuvier, determined to discuss the reality of this principle, began by examining the question in its particular relation with the mollusca.

"But before every thing," said he, "it is necessary to define the terms clearly, and to determine what we understand by the expressions 'unity of composition,' 'unity of plan.' If we took the words in their most rigorous acceptation, we could only say that there is unity of composition in two kinds of animals, when they are composed of the same organs; and to prove that there is unity of plan in their organization, it would be required to show that these identical organs are disposed in the same order in both of the animals.

"Now, it is impossible to suppose that the naturalists who speak of unity of composition and of unity of plan, in the whole animal kingdom, have thus understood things, or that they wished to assert that all animals are composed of the same organs, arranged in the same manner.

"The terms thus defined, the principal of unity, restrained as it ought to be, appears an incontestable truth, but is far from being new. It forms, on the contrary, one of the bases upon which zoology has reposed from its origin,—one of the principles upon which Aristotle, its creator, founded it,—a basis upon which all zoologists, worthy of that name, have sought to enlarge, and to the establishment of which all the efforts of anatomy have been directed.

"Thus every day we can discover in an animal a part with which we were not acquainted, and which allows us to seize upon some further analogy between that animal, and those of the different genera and classes. It may be the same with respect to connexions of the relations newly perceived. Labours undertaken in this direction are eminently useful, and those of Mr. Geoffroy St. Hilaire, in particular, are worthy of the esteem of all naturalists. When, for example, he discovered that in comparing the head of a fœtus of a quadruped with that of a reptile or an oviparous animal, relations may be remarked in the number and the arrangement of pieces, which could not be perceived in adult heads,—when he proved that the *os quadratum* in birds, is analogous to the *tympanum* in the fœtus of mammiferæ, he made real and important discoveries, to which I have been the first to do justice in the report which I gave of them to the Academy. There are, further, features which he has added to the different degrees of resemblance which exist between the composition of different animals; but he has only added to the ancient and well known bases of zoology, he has not changed them in the least.

"Thus all naturalists knew, for a long time, that the *cetacea* have on the side of the anus two little bones called the rudiments of the pelvis. There is then, in this case, and it has been known for centuries, a slight resemblance of composition; but nothing can make us believe that there is unity of composition, when this ves- of a pelvis gives support to none of the bones of the lower extremity.

"In one word, if by unity of composition they mean identity, they say a thing contrary to the testimony of the senses.

"If by it they mean resemblance, analogy, they say a thing that is true in certain limits, but as old in its principle as zoology itself, and to which the most recent discoveries have only added, in certain cases, more or less important features, without altering any thing in its nature."

Further, in this important and ancient principle, Mr. Cuvier, and it is more particularly herein that he differs from the naturalists whose opinion he combats, is far from considering it as a single principle; on the contrary, he only sees a principle subordinate to one more elevated and much more fruitful—*the conditions of existence, the conformity of parts*, and their *co-ordination for the place which the animal is to fill in nature.* Such, he considers, is the true philosophical principle from which the possibility of certain resemblances may flow, and the impossibility of others. Such is the rational principle whence that of analogy, of plan, and of composition, is deduced, and in which, at the same time, it meets with limits which we vainly attempt to overlook.

The reality of a certain analogy of composition and of plan being known, naturalists have nothing else to do, and they in fact do nothing else, than examine how far the resemblance may extend,—in what cases, and on what points it rests, and if there are beings where it is so far reduced as to be said to be absent. It is the special object of comparative anatomy, which is far from being a modern science, since its first author was Aristotle.

Mr. Cuvier entered into the details of the discussion in the point of view announced by Messrs. Laurencet and Meyraut, wherein the mollusca are considered as species of vertebrated animals, bent backwards at the umbilicus, so that the two portions of the spine of the back come in contact. To appreciate the justice of this view, Mr. Cuvier took, on the one hand, a vertebrate animal, in which he bent, as was required, the pelvis towards the back part of the neck, and lifted away the integuments of one side, to expose the internal parts in that situation. On the other hand, he took a cuttle-fish, placed it by the side of the vertebrated animal, and examined the relative situation of the prts.

"Passing successively in review the respective position ofthe head and of the different parts which it contains, the larger vessels, and the organs of generation, the author concluded, from a very detailed comparative examination, that the analogy which the authors of the memoir thought that they had observed, is every where illusory.

"He thought that it would even be easier to establish some analogy of situation, by supposing the animal to be bent in an opposite direction to the hypothesis; then, indeed, the brain, liver, œsophagus, stomachs, and the great artery, would remain in the same respective position as in vertebral animals; but the hearts, vein, branchiæ, and organs of generation, would always be differently disposed, and the problem would not be resolved.

"How, I ask," said M. Cuvier, after having demonstrated the striking differencés which were apparent in the structure of these animals, "how can any one, after seeing these numerous and important distinctions between the cephalopoda and the vertebrata, say that there is an identity, a unity of composition, without perverting the terms of language from their most manifest sense! I shall reduce the facts to their true expression, when I state that the cephalopoda have many organs which are common to them and the vertebrata, and which perform similar functions in each, though these organs are differently disposed, and often constructed in a different manner in the two classes;—that they are accompanied by many other organs which the vertebrate animals do not possess;—whilst the latter have also many organs which are not found in the cephalopoda."

Such are the opinions of M. Cuvier on this important question in philosophical anatomy. His objections have, however, been met by M. St. Hilaire, whose answer we shall give in our next number, and then compare the results of a controversy which has arisen between the two first zoologists of the age.

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# GEOGRAPHICAL COLLECTIONS.

## *Descriptive Notice of Holy Island.*

HOLY ISLAND is situated on the eastern coast of England, forming part of the detached county of Durham, and presents in its physical characters many striking and interesting features.

Its population is not great, and, with the exception of the tenants of the castle, is almost entirely concentrated in a village, which appears in former times to have originated in the dependencies of the monastery attached to Lindisfarne Abbey, and which in the present day, from the returns of 1821, would contain about 500 inhabitants. These consist of landed or house proprietors, innkeepers, a few tradespeople, and fishermen. The latter, with their wives and children, constitute the great bulk of the population, and there are a few of them who, having made a small income, have retired from business, and now pass their time in gazing with an old spy-glass on the former scene of their labours. The fishermen have two kinds of boats; one a light narrow craft for cod, turbot, whiting, and haddock fishing; the other, a larger and stronger built boat, which is used for the herring-fishery. Each boat is manned by four men, who are fearless of the ocean, following their employment to great distances out at sea, and, when required, always ready to pilot a strange vessel into the harbour.

Holy Island, when we look upon it from the mainland, exhibits a range of sand-hills only separated from the shore by sands which are dry on the recess of the waters, extending from the north towards a range of millstone grit, or the sandstone which accompanies the coal measures, and which faces the more boisterous seas of the north-east. From this there is a very gradual slope to the augitic rocks on which the village is built, and which are separated by a navigable inlet from a range of sand-hills which advance around the bay, formed in part by the island, and which undoubtedly owe their existence to the sheltering influence of the castle and village rocks.

Higher on this ridge, and in front of the village, stand the ruins of fallen monachism, well known to our readers as the Abbey of Lindisfarne.

This ridge is separated from the isolated mass of columnar augitic rocks on which the castle nestles, by a bay that enters inwardly from the first ridge, and sweeps round with a stony bottom, though sandy beach, on which the villagers dry their haddocks and skate, to the transported debris and rolled masses of rock which lie at the foot of the castle-hill, and stretch to its eastern end. Here the carboniferous limestone, lifted up by the trap rocks, makes its appearance, abounding in organic remains. The vegetation of the castle rock is luxuriant in spring time; the northern aspect is covered with crops of the common wall-cup, (*Arabis Thaliana,*) while on the southern aspect blossom several composite plants. A little *Lathyrus* tinges the ground with purple, and the *Geranium pratense* and *G. molle,* (the latter presenting varieties with white flowers,) the *Saxifraga granulata,* the sweet-scented violet, and the more brilliant sea-pink, shed their bright influence around.

From the platform of the castle a fine prospect is obtained. On the one side, the fair island with its sleepy lake and rocks dark with age, its proud crumbling ruins and busy hamlet, terminating in a range of sandy hillocks, whose cliffs reflect in silver the bright red beams of a setting sun: on the other, the plains of chivalrous Northumberland, stretching round almost on the horizon's verge, and lifting Bamborough Castle above the long sea. Further, in the deep bosom of the water, a few islets lie,—in calm weather like the nests of some bird, in the storm like fragments of a wreck, and beyond is the haze of a boundless ocean.

The shore between the easterly end of the castle rocks and the most south-easterly point of the island, forms a small and generally tranquil bay, with a sandy beach. This bay is succeeded by piles of rolled pebbles which form the headland, and continued to the north, constitute, except when interrupted by the bare rock, the characteristic feature of this part of the shore, as far as to the most northerly point, and it is here that the low beach is exposed to a violence of action more continuous than elsewhere, and to a sea which, proud of its own strength, seems ever angry at the first resistance that it meets. At first the shore is shallow, and the small pebbles advance inland in successive ranges, some distance beyond the line of high water. They are succeeded by beds of alluvial clay, which overlay strata of large-grained quartzose sandstone and friable grit, much acted upon by external agents, and alternating with bituminous shale. Portions of millstone grit also present themselves jutting out into the sea, either as angular portions of protruding crags, or the horizontal surface of an exposed stratum. Towards the north-easterly point, or Immanwell Head, sands overlay the sandstone, and the shores present a different aspect; at the extreme point a stone pyramid was erected as a landmark during the late survey of Lieut. Johnson. From this headland a ridge of stones, bare at low water, advance in a westerly direction into the sea, while another ridge, consisting principally of millstone grit and boulder masses, advances from the shore at right angles to the former: the two nearly join, and form natural breakwaters, which impede very much the scooping effect of the currents. The shore circularly disposed between the point marked by the pyramid and the next westerly headland, called Ness End, where the rocks become more prominent, is sandy, level, and slightly inclined, and backed by a low range of sand-hills, varying in their breadth, and retained by bent grass: they are burrowed by numerous rabbits, and are more continuous in the vicinity of the ocean. Beyond this the naked rock shelves into the water, or breaks off in huge angular masses, abounding in rock fish, *Gunnellus vulgaris, Gadus mustela, G. tricirratus,* and the remarkable *Syngnathus æquoreus.* In the stomach of the former may be found sea-weeds, limpets, and periwinkles, with unchanged shells. The succession of strata forms, on the western side, stairs, whose regularity is only interrupted by the breaking off of huge portions, which lie below piled upon one another; but, at the confines of the shore, the strata are cleft perpendicularly, forming cliffs, whose bases the ocean's waters have gradually washed away, leaving on their recess dark and yawning caverns. Of these there are four or five distinctly marked, and appear most decidedly to take their origin in the partly chemical and partly mechanical action of the waters. The first or most easterly is about ten yards wide at the entrance, diminishing at the end to a width not exceeding twelve to fifteen feet—a stratum of bituminous shale, nine inches in thickness, forms the upper part of the sides, but has given way at the tectal surface, leaving large sandstone blocks to form the roof. This cavern opens into another by an aperture that originated in a cleft in the rock, subsequently widened by the action of the waters.

The second cavern has three different entrances—the first two formed by the interruption of an irregular pillar, which supports part of the roof. The first entrance is eleven fect in width, and was opened by causes, the traces of which are now worn away. Its roof appears to be portions of strata remaining after the fall of the rest. The second or central entrance is more lofty, and nearly fourteen feet in width. The roof is formed by the sandstone stratum which succeeds the bituminous shale as in the first cavern, and the same stratum forms the whole of the roof. This entrance was, therefore, the original one; and the mass of strata piled in columnar form between this and the first mentioned entrance, and marked in a concave form on both sides, will probably soon be swept away. The base of the third entrance is not upon the same plan as that of the two former, being elevated by the interception of a huge block of sandstone, and affording a mere exit for the waters, when at a certain height. The width above this stratum is a little more than five feet; nor is the point at which the cleft, which originally gave rise to the opening, becomes contracted, washed by the ocean, at least during ordinary tides. The whole cavern is about 13 yards wide, by 22 long.

The third cavern which is met with is an expanded hollow, with a very wide opening when compared with the others, a short distance beyond which, occurs a pile of disjointed strata, supporting the roof, and allowing on each side the passage of the water, to where the sides approach so as to leave only a few feet in width; beyond this the cavern widens again, forming a chamber of unequal dimensions, whose floor is strewed with sea-weed and rolled pebbles. There are two more caverns, mere indentures in the rock, or widenings of clefts in the strata —one of them is deep and narrow, having in its course several successive contractions. The relation of its aspect to the dip and direction of the strata is also different to that of the larger caverns, which fact, however, does not appear to have much influence upon its form. The bituminous shale, after becoming more carboniferous in the succession of caverns, soon presents the appearance of a bed of coal, and is attended by others of a similar nature, coursing in a parallel direction. In the last cavern sandstone is found forming the roof in an irregular and angular mass beneath this bed of coal. The bay contained between the caves and the next westerly headland, known by the name of Snipe Point, though possessing a sandy beach, has everywhere a flat and pretty level stony bottom, the strata forming it consisting generally of bituminous shale, interrupted sometimes by sandstone, which, in one or two spots, is fractured into pretty regular polygonal compartments. Snipe Point is constituted by a succession of boulder stones and jutting rocks, which form islands at low water, and are the abode of many marine animals. The shore now stretches out in one continuous line to the Snuke, or more westerly point of the island—and, with the exception of a small fresh water pool near the extreme point, the whole of this part of the land is composed of varying plains and transitory hills of sand. At first, its breadth, that is to say, the distance from the sea to the inland bay is very insignificant, not exceeding in its narrowest part a distance of 500 yards. The hills are, however, pretty stationary, and generally covered with a luxuriant crop of bent grass. The manner in which this grass operates, though, often alluded to, has never been perfectly described; and it is owing to this fact that such conflicting opinions on its efficacy in stopping the progress of sands have arisen. Like most monocotylodenous and many dicotyledonous plants, it possesses the property of always shooting out, to overtop the accumulation of sand or soil that may be deposited round its stalk, the buried part becoming blanched, like all vegetable structures deprived of light. If the quantity of sand deposited by the action of the wind does not exceed the growing power of the grass, which, overtopping the flood, can stop it in its progress, flowering amidst new hills and plains, scattering its fertile seeds to assist in binding them down, and staying their mischievous advances, its adaptation must be attended with the greatest success; but when the ocean, as in the Bay of Biscay, brings on the shores great quantities of sand, that, rapidly dried, move with giant strides across a land tributary to their power, where, in a short lapse of time, they can in their progress bury forests, or destroy the monuments of art and industry—such feeble means of opposition become perfectly useless, and the plans that are put in force must be adapted to the great extent and influence of these powerful agents.

Certainly there are no parts of the coast of Great Britain better adapted for the growth of the fir-tree than the northern shores of Holy Island; and where, at the same time, their plantation would be attended with more benefit, and, finally, with more profit to the proprietor; the quantity of land which, by a little industry, might be gained is very great; and many advantages to the climate, vegetation, and soil, would flow from a change in the geographical relations of the island. We hope that our having mentioned the practicability will call the attention of others to the execution.

From the augitic rocks on which the town and castle are built, and which form the northern extremity of the island, the outline is formed of rocks, headlands, sandy beaches, and cavernous cliffs, in succession, till we arrive at where, branching from the rocky formations, the sands advance in a prominent point, as if in progress to join the shores of the main land. This is a profitless uncultivated part of the island, covered with bent grass, waving its slender leaves in the wind, and its sea-green carpet broken by the more gaudy colours of a few flowering plants, the viper's bugloss, the silver weed, or the violet. A walk among those hillocks, on a summers afternoon, is lonely but beautiful; the departing beams gain a richer glow, playful rabbits start from every plot of grass, and the disturbed pewitt flutters above, uttering cries of distress, and sweeping, in half circles, to draw the stranger from its nest; groups of grey sanderlings course along the level sands, advancing at times into the slow moving wave, now and then a solitary heron is seen, with wings that fold over its body like a cloak, preying on the unwary fish, which its own radiant breast has brought around. Cormorants stretch their long necks from occasional headlands, and with an undetermined look wend a lazy flight across the ocean; the male eider whistles on its wing, followed by a brown uncomely mate, and, at intervals, the plaintive note of the ibis-billed curlew is re-echoed along the coast.

From the most westerly point, back again to the range of augitic rocks, the shore bounds the inland bay in an hemispherical line, uniform and level. The sands are here bare at less than half tide, and are covered with a pan of muddy deposit, which is ploughed by innumerable sea worms. This pan is very treacherous, as the sands are sometimes broken beneath, and the surface has been known to give way. This, combined with the unseen channels, and very uniform level of these shores by which the advance of the water is both rapid and unexpected, often gives rise to serious accidents, and to loss of lives and of property. Not only are accidents occasioned by this disposition of the sands, by which, but lately, three young women lost their lives, but the water eddying round the reefs, in deep and rapid gullies, oftentimes in the very neighbourhood of the shore, surrounds the traveller. We have heard of an individual who had been thus deceived, treading over these desert sandy wastes, late in the evening, a deep and dense fog had led him from the direct path, and after losing much time, he had unexpectedly found himself surrounded on all sides by rushing water, eddying in circles round the sands on which he stood; unable to swim, without any succour near, the calm and sullen waves seemed the moving inlets of a dreadful abyss, and their deep heaving disclosed at every moment a sight of his living grave; wave after wave, the water gradually advanced, encircled the small space on which he stood, and soon washed his limbs, trembling in the agony of an approaching death—but they had reached their height; and, after playing round their victim, they retired as they came, and the wanderer found himself relieved from his very singular situation.

The passage which occurs between the greenstone rocks and the opposite sand hills is from eight to fourteen fathoms deep, at high water, and the inhabitants of the island are not at all anxious that this should get blocked up, as during hard weather it affords one of the best and safest harbours for many miles along the coast; and thus, in cases of distress, vessels often put into this bay, and obtain supplies from the villagers.

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*Letter from M. Boblaye, Captain of Engineers in the French army in the Morea, to Baron de Ferussac.—Modon, 18th September,* 1829.

The friendship with which you honour me, and the desire of placing the fruit of my researches in hands which will render them useful to science, induced me, on leaving home, to promise to reserve for you a great part of my collections. While I expect to be able to fulfil my engagement, I am desirous of letting you know what I am doing in geography and natural history. I should, above all, wish to be able to send you news of Colonel Bory, but having been separated from him since my arrival, for the purpose of devoting myself exclusively to geodesical operations, I have had few opportunities of seeing him. The journals, I presume, will in part make up for my silence.

Permit me, then, to present a brief exposition of the object and result of my principal researches. However imperfect they are, they cannot fail to be interesting to you as a geographer and geologist.

Captain Peytier and myself having been charged with the geodesical and astronomical operations of the map of the Morea, we have finished together the triangulation of the Argolis, and commenced that of the neighbouring provinces. I have explored the whole of its southern part, from the Arachnean mountains to the sea, and have examined the numerous islands of the gulfs of Ægina and Nauplia. The position of Megara, the Parthenon, and Mount Hymettus, are connected with the Argolis, and we hope that ere long Attica will be open to us, and that we shall be able to complete these last observations. During the months of June and July I discovered Magna and Messinia, and erected numerous signals on the most remarkable summits, such as Taygetus, Hekenitza, Lycæus, Ethoma, &c.

We made this discovery under guidance of M. Lapie's map. This map, which has been keenly criticised by those who think a map of Greece can be made with as much ease as a view of Paris from Pontoise, excites the surprise of those who know the imperfect nature of the materials which he could employ.

The excessive heats of the month of August (28°, 29°, and even 33° and 40°, at Monembasie, under our tents) condemned us to idleness; but already the nights are cooler; we perceive light clouds forming on the horizon at sunrise and sunset, and before the equinox we shall, in all probability, have a more supportable temperature, and be able to resume our labours.

The Morea and its shores are equally poor in respect to conchology. I have not perhaps gathered twenty species of fresh water and land shells. How should it be otherwise? Seven months have passed without a drop of water to moisten the ground or cool the air. All vegetation has long ago disappeared; the beds of the torrents are dried up, Alpheus and Eurotas alone having retained a little water. The numerous lakes marked on the map have all evaporated, with the exception of Phonia, whose waters are rising every day, in consequence of the blocking up of its gulf or *Katabathron*, while, in a few days, continued and almost tropical rains will render each of these rivers an impetuous torrent, and will sweep the rapid slopes of the continent. These circumstances, together, seem to render the existence of numerous fresh water or land species impossible.

However, I have gathered some in privileged situations. Here, as in all limestone countries, several powerful springs are met with, which at their origin give rise to currents of nearly undeviating temperature and size; and in these I have found some univalves.

As I do not belong to the commission in quality of naturalist, I have often found it necessary to sacrifice geology to geography, and to devote only my spare moments to it. However, I have endeavoured to solve some questions, and I believe have collected materials which will not be without interest. Of this you may judge from what I shall now briefly state.

The enormous compact limestone formation (zechstein?) which covers three-fourths of the surface of the Morea, has afforded me the most favourable opportunity of determining its topographical characters. Its nature, and the revolutions which it has undergone, revolutions which are not merely hypothetical but are proved by the stratification, partly account for the general configuration of the peninsula, the existence of its numerous basins without issue, the scarcity of water, &c.; in a word for all which its peculiar physiognomy presents.

You will, perhaps, recollect that the examination of the general stratification of Bretagne (*Annales du Museum*, May 1827,) led me to this result, that that extremity of our continent was the point of junction of two great systems of stratification of ancient rocks, nearly perpendicular, of which the one comprehends the mountains of Scandinavia, Scotland and England, the other those of the interior and south of France. This very examination has led me to discover here the traces of two great and ancient catastrophes, one of which has acted nearly in the direction of from east to west; and the other, perpendicular to the first, fracturing the crust of the globe in the direction from N.W. to S.S.E. has impressed its most marked features upon the Morea, as upon the whole of Greece, and, doubtless, upon Italy also. I have endeavoured to extend to these catastrophes the ingenious observations of M. Elie de Beaumont, by determining their epoch in the chronology of formations.

The island of Ægina which, in a small space, presents nearly all the formations of the continent, and, moreover, volcanic deposits, has appeared to me to merit a very particular examination, and I have traversed it in all directions.

In the plutonic revolutions which they have undergone, at least three very distinct epochs are recognized. The most recent has probably taken place within the period of historic records, and was contemporaneous with the eruption of the volcano of Methana. Its effects are limited to numerous fractures.

The second took place at the middle of the tertiary period, between the deposition of the clays, and that of the coarse limestone. There may be mentioned among its products, at the centre of the island, a small dome of trachytic conglomerates, evidently formed by upraising; and, in the low parts, numerous beds of trachytic sands and conglomerates, with limestone cement, existing in the heart of the tertiary formation.

Trachytes, porphyries, and leucostines, form a vast expanded deposit, which extends as far as the peninsula of Methana, and the island of Poros, and characterizes a third epoch.

We discovered in Magna, in the midst of the small chain of Lyco-Vouno, the deposit of the antique green porphyry or ophite, employed in the decoration of all the temples of the Morea. It belongs to the porphyries of the coal formation.

The compact limestone contains as subordinate beds white granular limestones, red and green marbles, ophicali, and cipoline limestones. This fact, which I should not have imagined, is well proved. May this also be the case with the Parian and Pentellic marbles? After many fruitless inquiries, I have succeeded in finding a few fossils in this formation. They will be useful to decide the place or age which ought to be assigned to them; a question so much the more difficult, as enormous vacuities exist here in the succession of the formations.

The upper sedimentary deposit extends over the whole shore district, and, perhaps, stretches pretty far into the large and deep valleys of the Pamisus, the Alphæus and the Eurotas. It has formed the isthmus of Corinth, and the rich plains of the Elide, and formerly filled up the gulf of Athens, in which it has left on all the islands, shreds which attest its existence and its destruction.

Its simplicity is such, that its study presents few difficulties. It contains, in some parts, numerous fossils in a fine state of preservation.

The observation of limestone beds, in their regular position, perforated at different heights with numerous cavities formed by boring shells, seems to give countenance to the opinion of a gradual retreat of the waters.

I am examining the present deposits of the shore districts, as being intimately connected with those which have preceded them, and as being calculated to throw much light upon the phenomena of this epoch which is still so obscure.

The examination of the action of the seas upon its shores, and particularly on the compact limestone, has led me to discover a compact substance which appears to me new. It is of a brown colour, mammillated, hard, compact, and always occupies the upper limit of the wave at the surface of the limestone.

The decomposition of the rocks in the monuments of different ages, the alluvia which have swallowed up temples to the level of their capitals, and especially conglomerates, having all the hardness of the oldest rocks, and containing tiles and fragments of pottery, shew that the works of men at length acquire a place in the materials of the globe which we inhabit, and enter into the domain of geognosy.

I hope that before leaving Greece I shall be able to visit the Archipelago, in which case I shall have the honour of communicating to you the new observations which I make there. My materials are as yet in a scattered state, and it is only in Paris that I should be able to arrange them. I should be happy were I to receive your advice, and to be enlightened, with reference to my own investigations, by those new and profound views which you give out in all your works.

*Annual Notice of the Labours of the Geographical Society, read at the Public Meeting the 11th December 1829; by* MR. DE LARENAUDIERE, *General Secretary of the Central Commission.*

GENTLEMEN,

During the year which has just elapsed, your history has again mingled itself with that of science: you have associated yourselves by noble encouragement to great geographical labours. The prize founded for the most important discovery, has been accorded to one of the most useful and happy enterprizes of modern times. Two posts had been placed by Hearne and Mackenzie on the hyperborean shores of America. Captain Parry had, on his side, surveyed the former discoveries of Bylot, of Baffin, of Middleton, and of Fox, as well as a part of Melville peninsula; but immense blanks remained to be filled up. Captain Franklin and Dr. Richardson, thanks to their zeal and their talents, did much towards marking out the coast of North America, which from Point Beechey to Cape Turnagain is now traced on our maps. In giving to the first the medal, and to the second the most honourable mention, you have appreciated in a worthy manner such results, whose interest is increased by numerous scientific observations: your suffrage has been united to that of the two worlds.

More modest labours have been presented to your examination. Three memoirs on the levelling of an hydrographical part of France, have been submitted for prizes. One of them, having for author M. Lepeudry, and for subject the levelling of the course of the river Aisne between Evergnicourt and the Oise, deserved your suffrages.

To the different prizes which you had already proposed, and which have remained on the list, you have added one of high geographical importance, being destined for the first traveller that shall reach the place marked in the maps of Africa under the name of Marawi. Precise observations are asked of this traveller. There are great dangers to be met with, and great conquests to be made in those countries. Do not let us despair that one of our countrymen should accomplish this difficult task. France is in a vein of good luck. When one has succeeded in penetrating to Timbuctoo, obstacles are no longer taken into consideration, and the most inaccessible parts of Africa appear to remain for courageous perseverance.

Your curiosity will be excited by the name of Timbuctoo, which associates itself intimately with that of Mr. Caillé, and it shall soon be satisfied. The relation of this courageous explorator is on the point of appearing. Some days more, and you will be enabled to traverse Africa with him, and follow him upon a soil that European feet have not yet trodden.*

Land and people, manners and language, many things will be new in this journey, which unites the attraction of the marvellous to the interests of science. This last is not forgotten. The relation of Mr. Caillé is accompanied with notes, which serve to throw light upon more than one difficulty. They are due to Mr. Jomard, who has made a special study of Africa.

Other Mahometan countries, of easier access, have been explored by several of our colleagues. Mr. Rifaud has a long time inhabited and explored Egypt and Nubia with a scientific aim. He has followed the banks of the Nile, from its mouth to above the second cataract. He has resided on the shores of the Red Sea, and explored the desert that borders the Delta and the Thebaic basin on both sides. The riches of nature, and the remains of a civilization which dates back to the first ages, appear exhaustless in these spots. The abundant harvests made by skilful travellers, and more especially by that immortal expedition of

* Caillé's travels have already appeared in London, and Jomard's Paris edition is just published. We shall take the first opportunity of noticing the two works.

Egypt, the honour of France, have not prevented Mr. Rifaud from collecting the materials of a great work. At once examining the civil and religious institutions of the country, the manners and customs of its inhabitants, and the ancient monuments, he brings back with him more than six thousand drawings, of which a part relate to the modern state of Egypt. A great number of his drawings have the merit of making us acquainted with things quite novel. Antiquities and natural history will more especially gain by the publication of his labours.

Those of Mr. Fontanier have more than one title to your interest. They are especially geographical, and they frequently answer the questions whose solution you had entrusted to him. In his successes you will find some of your workmanship.

The itinerary of Mr. Fontanier led him into countries whose geography is far from being complete. He visited the Russian provinces beyond the Caucasus; he went into the pachalick of Bagdad, by Hamadan and Kermanchah; he made observations in Guriel and in Mingrelia, and from Erzeroum he worked his way to Constantinople, by a road the least frequented and the worst described. From him you have learnt that the chain of the Elvend and the position of Kengawer, are not more exactly marked on our maps than the direction of the mountains which join that chain to the Zagros hills. From Bagdad to Bassora he carries the course of the Tigris more to the east, and this brings the mountains of Lourestan nearer. In Turkey in Asia, a very great part of what concerns the coast of Lazzes, Erzeroum and its environs, Sivas, and the country of the Curdes, is distinguished by interesting details. Ancient geography will profit by some of his observations, as physical geography will be indebted to him for useful information. Let us add that Mr. Fontanier has merited the gratitude of his successors, by tracing the plan of a scientific journey in the countries which he has visited.

Other travellers in the east, have given interesting specimens of their researches. Mr. Vidal has led us over the arid deserts which separate Damas and Aleppo from the city of Bagdad, over some parts of Babylonia and of Mesopotamia, as well as a part of the banks of the Tigris. Mr. Charles Guys has conducted us into the most picturesque and unfrequented parts of Liban. We have followed Mr. Jouannin upon Mount Olympus, shaded with forests, and decked with the remembrances of fable and of history. We have stopped with him in the town of Prusias, with its ancient walls, its smiling vegetation, and its thirty-two mosques. We have accompanied him in the fertile plain of Broussia, rich in its mulberry trees, its silk-worms, and its numerous hot-springs, where the Christian and the Mussulman, re-united by the same wants, forget their religious antipathies under the laws of the most affecting hospitality.

*(To be concluded in the next.)*

*Breadth of the Sound.*—The frozen state of this great inlet suggested, a short time ago, to the citizens of Elsinore to make an exact measurement of its breadth, when it was found to be 6665 Swedish ells, (above four miles,) at the narrowest part, viz. between the stone halls on the Swedish side, and the extreme point of the fortress of Kroborg on the Danish. But from the opposite harbours, Elsinore and Helsinborg, the distance is greater, viz. 7395 Swedish ells, or fully five miles. We need not thus wonder that the passage of the Sound should have been twice effected by our fleets without loss from the fire of the Kroborg batteries, viz. by Sir John Norris, a century ago, and by Sir Peter Parker in the year 1801.

*Scientific Expedition in the Asiatic Provinces, lately conquered by Russia.*—An imperial librarian has been sent, with naturalists and artists, into the Turkish countries conquered by the Russian army during the late war, to collect geographical documents, and to copy the most remarkable inscriptions and monuments. The winter before, an antiquary had been sent to Odessa in search of antiquities, along the banks of the Danube as far as Sizeboli.—*Bull. de la Soc. de Geog.*

*Proposals for a New Scientific Expedition in New Holland.*—We some time since mentioned that Dr. Lhotsky of Vienna, had proposed to travel in the unknown regions of New Holland, for the purpose of collecting objects of natural history. Those who are desirous of obtaining shares, are now invited to subscribe.

The imperial cabinet of natural history of Vienna, has already directed M. Lhotsky to make collections in all the kingdoms of nature, and the royal museum of Berlin is also amongst the subscribers. The counsellor Reichenbach has promised to take a set of zoological specimens for the museum of Dresden, and many naturalists have subscribed for the lichens and the petrifactions.

The collections will not be exposed to the vicissitudes of a journey which must occupy many years. They will be sent to their destination in proportionate lots, on the first favourable occasion; an approximate value being previously placed upon them.

The following is a sketch of the objects which these collections will comprize: Liquid chemical objects, mineral waters, volcanic productions, minerals, petrifactions, plants of every species, fossil animals, fruits, seeds, skins of animals and of birds, lizards, serpents, frogs and toads, fishes, specimens of skeletons in alcohol, insects, crabs, tortoises, shells of all kinds, worms, seals, whales, bones, joints, eyes, organs of hearing, intestines, fœtus, human skulls, all the products of nature which are applied to the cure of disease, &c.

The subscribers must defray the expenses of carriage and of insurance from the place of departure to the destination.

Each subscriber must name a mercantile house, which will address to its correspondents in England or at Hamburg, a circular requesting them to receive all packages which arrive from New Holland in a sea-port, and to forward them according to their directions. Dr. Lhotsky will insure the packages till their arrival in Europe; but after delivery to the commercial houses, they must be responsible for all injuries or averages that occur. Three days after the landing of the collections, two proper persons will examine whether they are in good condition, and fit for their respective uses: the subscribers must then pay the freight.

If Dr. Lhotsky should die before the completion of the collections, the subscribers will only be considered answerable to his executors for three-fourths of their subscription; on the other hand, if one or more of the subscribers decease, the heirs must pay their whole subscription.

*Projected Canal between the Rhine and the Danube.*—By means of the rivers and canals of Holland, and of the junction of the Rhine and the Danube, which traverse the most fertile portions of Europe, and form an immense internal navigation, the traveller who embarks from the Tower stairs of London, may go to Constantinople without putting his foot on land: he may even advance by water to the confines of Ethiopia, crossing the whole of continental Europe; so that the east and west will be brought into almost immediate contact. In commercial points of view, the utility of this project is pre-eminent: by this means we shall avoid the circuitous and perilous navigation of the Mediterranean, to arrive at the shores of the Bosphorus and of Asia Minor. The packet which leaves the Tower may wind along the coasts of the Euxine; and if the Russian government make a canal between the Black Sea and the Caspian, we may sail to the foot of the Himalaha mountains.

According to the principal arrangements of the proposed plan, the course of the Danube would be enlarged and freed from the obstacles which exist between Ulm and Stuligen: the navigation would then be prolonged by a canal which would traverse the Black Forest, in the direction of Kintzig: and lastly, the Kintzig would be made navigable to the place where it empties itself into the Rhine, near Kell. The greatest difficulty will be experienced in the Black Forest, where it will be necessary to cut a tunnel.

In the interval of the realization of this great project, adds M. Sueur-Merlin, (Bull. de la Soc. Geog. Dec. 1829,) the steam navigation is making astonishing progress, and is becoming a powerful agent in the commercial relations of the two worlds. The government of the Netherlands has permitted the construction of a steam-vessel, which will exceed in size all those hitherto known. It will be 250 feet long; it will have 3 decks, 4 masts, and an engine of 300 horse power. The expenses are estimated at 800,000 florins of Holland, (upwards of L. 70,000.) When fully laden, this vessel will draw 16 feet of water. It is intended to facilitate the communication between Holland and the East Indies. It is supposed that it will make the voyage from Texel to Java or Borneo in about 40 days.

*Scientific Expedition of the two sloops Moller and Seniawin.*—The two sloops commanded by Captains Stanikowitch and Leitke, have arrived at Cronstadt, after an absence of three years on a voyage of circumnavigation. The results of this expedition are not without importance in a scientific point of view. The exploration of the coasts of the peninsula of Aliaska, has been conducted by Captain Stanikowitch, whilst Captain Leitke has surveyed with scrupulous exactness the space between Behring's Straits and Kamtschatka. Captain Leitke has moreover explored the great archipelago of the Caroline Isles, and has discovered many groups which have escaped the notice of preceding navigators. The naturalists who accompanied these two vessels, MM. Mertens and Kastalsky, have made rich collections of objects from the three kingdoms of nature, and the two painters, MM. Postels and Mikhailoff, have their portfolios filled with interesting drawings. The crews have enjoyed good health during the voyage.

*Geographical Intelligence.*—M. de Engelhardt made a tour of natural history and geography in the Oural in 1827; and MM. Ledebuhr, Meyer, and Bunge, in the Altaï in 1826.—(*Hertha*, Vol. II. *Gaz. Geog.* p. 17.)

M. Klipstein of Darmstadt, in conjunction with M. Covelli of Naples, De Cristofori of Milan, and the German geologists at Mexico, intend giving geological sections of certain volcanic districts of Germany, Italy, and Mexico.

M. Schmidt of Siegen, a distinguished engineer of mines, has set off for Mexico. He has been sent out by the Mining Company of Elberfeld, and will remain a year and a half to explore the mines of Mexico.

M. Stifft, a well-known geologist, is returned to Wiesbaden from Curaçoa and the island of Aruba, where he had been sent by the King of the Netherlands. He is about to publish a geological map of this auriferous island.

*M. de Humboldt.*—On his return from Russia, M. de Humboldt accepted an invitation from the members of the university of Dorpat. He proposed a toast to the prosperity of the university, "which diffuses," said he, "with so much success the literature of Germany over the soil of Russia. MM. Engelhardt and Ulprecht presented to the traveller a collection of rocks and minerals from Esthonia and Livonia, with a map and geographical description of these two provinces. This work, it is said, furnishes data for new opinions on the relative age of formations. At the observatory, the learned Struve showed M. de Humboldt some new observations on the double stars, and the result of calculations on the observations made during the second voyage of Kotzebue. These calculations definitively fix the position of many places in America. We only regret that the results are so long in coming before the scientific world.

*Assassination of Dr. Schulz.*—A letter from Tiflis, of the 1st ultimo, announces the assasination of Dr. Schulz, professor of the University of Giessen, who had been sent out at the expense of the King of France to visit Asiatic Turkey and Persia for scientific and literary purposes. The melancholy event occurred in Kurdistaun, on the frontiers of Inal-Huerile, between the villages of Bash Kullah and Perihan Nichin. Two servants, a soldier and a Persian serjeant, who accompanied the unfortunate gentleman, were likewise assassinated. Colonel Macdonald, at whose house the doctor had received the warmest hospitality during his stay at Tauris, immediately sent off a confidential person for the purpose of collecting, if possible, the papers and effects of M. Schulz, and, in concert with the Russian ambassador, took the first steps towards the discovery of the assassins.

# NATURAL-HISTORICAL COLLECTIONS.

## BARON CUVIER'S *Lectures on the History of the Natural Sciences.*

LECTURE III.—EGYPT.—Egypt presented numerous circumstances favourable to the developement of the sciences, of which it had received but a very imperfect germ from India. Owing to the extreme fertility of the country, the inhabitants had abundant leisure which they could apply to study; and the inactivity to which they were condemned, so long as the river kept them pent up in the towns, could not fail to lead them to contemplation.

The inundation itself, by rendering the Egyptians liable to wants unknown to other nations, put the activity of their mind into play, and led them to a multitude of useful discoveries. The necessity of retracing the boundaries of their lands, after the river had retired within its limits, led them to invent surveying; and the necessity of facilitating the retreat of the waters taught them the art of digging canals. They necessarily engaged, at an early period, in the study of the celestial phenomena, which alone afforded them the means of foreseeing the motions of the Nile; and as the extreme purity of the air was favourable to this study, they made greater advances in astronomy than any other people.

The Egyptians, further, made great progress in architecture; for having, at an early period, been induced by motives, of which we shall presently speak, to employ a great part of their riches in erecting edifices, they possessed abundance of excellent materials, which the river enabled them to transport with ease.

Religion did not in Egypt, as in India, form an obstacle to the progress of the natural sciences; on the contrary, it imposed a kind of obligation to cultivate them. In fact, not only did it borrow a great number of its emblems from the animal kingdom, but it also necessarily directed the observation to such animals as it taught the people to hold in especial regard.

This part of the Egyptian religion did not come from India, but originated in Ethiopia. It is probable that the Ethiopians, previous to the arrival of the Indian colony, were addicted to fetishism, as all the tribes of the negro race generally are, and that they did not adopt the new religion without mingling with it some of their ancient superstitions. But however this may be, it is certain that the priests attached at least one animal to each divinity. The hawk was consecrated to Osiris, the ibis or the cow to Isis, and the crocodile to Saturn. In each of the temples where these divinities were worshipped, there were kept several of the animals which were dedicated to them, and these animals themselves participated, in some measure, of the divine honours paid to their patrons. Opportunity was, therefore, constantly afforded of observing their external forms and their habits. There was even opportunity afforded of observing the details of their internal organization, as it was a duty to embalm them after their death.

In Egypt the same horror was not manifested towards dead bodies as in India. Not only were the bodies of the sacred animals embalmed, but also those of men. Now this practice could not fail to afford the persons who performed it some degree of knowledge respecting the form and position of the organs. It was also indisputably in Egypt that anatomy originated. To that country the Greeks went to study it; and Galen made a journey thither for the express purpose of seeing the representation in bronze of a human skeleton.

So much for the observation of animals. As to minerals, they, in some measure, presented themselves to scrutiny, since in Egypt they are not, as in most other countries, deeply buried in the ground. They were accordingly known not only by their external characters, but also by those which are, at the present day, named their chemical characters; and it may here be remarked, that the word chemistry itself is derived from *Chimi*, which was the ancient name of Egypt. As to what was afterwards called the science of Egypt, the hermetic art, the art of transmuting metals, it was merely a reverie of the middle ages, and was entirely unknown to antiquity. The alleged books of Hermes are evidently supposititious, and were written by Greeks of the lower empire.

All the books of the Egyptians are lost; and thus, in tracing the history of the sciences among them, we have perhaps still fewer resources than in the case of the Indians. There remains a catalogue of the sacred books of Hermes, which Clement of Alexandria has preserved to us in the sixteenth book of *Stromata*. The books of Hermes were held in great veneration in Egypt. They were carried in procession at the religious festivals, and each priest was obliged to have by memory at least the part which related to the offices of his order. These books treated of religious rites, arts, medicine, and several other sciences; but it is remarkable that there was none that related to history: so that it would appear as if the Egyptian priests had the same repugnance as the Brahmins to preserve in writing the memory of the events of which their country was the theatre. We have, therefore, no annals of Egypt. We have, however, several lists of their kings, preserved by Eusebius and other writers. These lists agree very ill with each other. They may, however, be useful to be consulted, provided the cause that probably introduced confusion in them be not forgotten; for it would appear that, in ancient times, Egypt was divided into a number of independent states. The names of the sovereigns of all these small kingdoms were preserved; but in place of presenting them in parallel series, they were placed in a single line, as if there had been a regular succession from the one to the other. This circumstance has led several modern writers into error, and has induced them to refer to a very remote epoch, the origin of the Egyptian nation.

The conquest of the shepherd kings abolished all the little principalities, and subjected Egypt to a single domination. After the expulsion of the conquerors, the victorious dynasty became in its turn sole mistress; and from this period the union was definitive. By this union the Egyptian nation became really powerful, and after this period only could it undertake great works. Of this the labours of M. Champollion furnish an irrefragable proof. Having learned to read the names of sovereigns written on the monuments in hieroglyphic characters, he found none that was anterior to the seventeenth and eighteenth dynasties, that is, to those which expelled the nomadic invaders; and it is even probable that most of the buildings which bear the name of these princes, and which appear to have been erected in honour of them, were not built until long after their death.

As, in the defect of books, it is especially in monuments that we can hope to find some particulars respecting the history of a nation, it becomes of importance to determine their age, at least, in a relative manner. This can be done by comparing the style of their architecture, which from being simple and rude in ancient times, acquires elegance as we approach a more recent period.

The pyramids, those imposing monuments, which yet evidently belong to the infancy of art, are certainly anterior to the columnar edifices possessed of elegant proportions. Now these pyramids, even according to Manetho, were not built until after the reign of Sesostris, the vanquisher of the shepherds. It is at least certain that they did not exist at the time of the Jewish migration, for the Scriptures make no mention of them. It would even appear that, at this period, the Egyptians used brick in their public buildings, as they employed the Jews in manufacturing enormous quantities of them. Nor did the pyramids exist at the time of the migration of Cecrops and Danaus, as the Greeks never imitated their form. The first allusion to the splendid edifices of Egypt occurs in Homer, who speaks of the hundred-gated Thebes, and, by the expression, undoubtedly designates the gigantic propylda placed before the temples, of which that city contained a great number.

Most of the edifices with which we are acquainted must have been built subsequently to the year 1000 before Christ. That, in fact, was the period of the greatest prosperity of Egypt. Nevertheless, an exaggerated idea would be formed of this country, were we to judge of it only by the number and magnificence of the monuments which it has left to us. It must be considered that there was a progressive accumulation of them for ages; for, in an always equable climate, buildings made of granite, last until they are purposely destroyed. It must be remembered, that Egypt being mistress, by her position, of the commerce of Africa, must have acquired immense riches, and that all these riches she must have employed in the valley of the Nile, as beyond it there was nothing but sand. Being thus unable to extend her territory, she covered it with palaces. A like union of circumstances produced similar results at Palmyra, which is a green oasis placed in the midst of the desert. It possessed no other advantage than that of having a few springs; but this was enough to bring to it, in their passage, the caravans which travelled from the Euphrates to the Mediterranean. These caravans came laden with the valuable productions of the East; and during their short abode in the oasis, they left there much gold, of which the inhabitants could have made no use, had they not employed the greater part of it in raising temples and palaces.

In modern times, Genoa, in like manner, enriched by commerce, and confined in her territory by the sea and the Appenines, has, in some measure, reproduced the wonders of Palmyra and Egypt.

Egypt, during the whole time of her prosperity, remained shut to strangers; but about the sixth century before our era, disturbances having arisen, and having brought on a civil war, the weaker party sought assistance from without, and Psammeticus was the first who brought auxiliary troops from Asia Minor. It was then only that the Greeks were enabled to profit by the advances which the Egyptians had made, and that Thales and Pythagoras, and perhaps several other sages, whose names have not been preserved, went to be instructed in the school of the priests.

To judge of what the Greeks must have gained by this communication, it is necessary to know what was, at this period, the state of science in Egypt. Let us, in the first place, see what progress had been made in the mathematical sciences.

It is certain that the Egyptians had some knowledge of hydraulics, since they were expert in the art of digging canals; that they had ideas of mechanics, since without very powerful machines it would have been impossible for them to erect their obelisks, and to raise the enormous blocks which some of these monuments present. It is certain that they had pretty accurate procedures in stereometry, of which a proof is to be found in the shape of the stones of their buildings. We know, further, that they were expert land-surveyors. All this would lead us to believe that they had advanced considerably in the mathematical theories. But on the other hand, if it is true that it was Thales who first taught the priests to calculate by the length of the shadow the height of one of their pyramids; if it is true it was only after returning from one of his journeys that Pythagoras discovered the theorem or the square of the hypothenuse, it must be admitted that the geometry of the Egyptians was still in its infancy, or at least that it was purely practical.

At the period when the first emigrations to Greece took place, astronomy had made very little progress in Egypt, as the lunar year alone was known there. But as this science, as we have said, was very necessary to the Egyptians, they applied to it with great perseverance, and made rapid progress in it, so that, when the communication was re-established with the Greeks, in the reign of Psammeticus, they had already adopted the solar year of 365 entire days. Soon after they even made addition of a fourth of a day, and thus came much nearer the true duration. This reformed solar year was employed for civil uses. As to the religious year, it having been regulated at an earlier period, it remained with its 365 complete days, without its being permitted to be changed in the least. There resulted from this that the festivals were gradually displaced,—that they no longer corresponded to the same sideral periods as at the time of their institution,—and that, to come back to them, they had successively passed through all the seasons. This period, at the end of which all came back to the original order, was what the Egyptians named the great year, or the year of Syrius.

It is probable that it was only by the heliacal rising and setting of the principal stars, that the Egyptians thus approximately discovered the length of the year; for their means of observation were very imperfect, and it is not believed that they had any other instrument than the gnomon for measuring the heights of the sun.

We might be induced to think that the Egyptians had made very little progress in general physics, if it be true that they considered fire as an animal which devoured the bodies that were presented to it; but perhaps this was only the vulgar opinion, and not that of the learned caste.

The Egyptians had very correct ideas respecting several points of geology. They had accurately observed the laws of alluvial deposition, and at the present day we cannot more correctly account for the formation of the Delta than was done in the time of Herodotus. They had discovered the existence of solids, not only in the transported deposits, but in rocks. Thus it may be believed that when Thales presented water to the Greeks as the first principle of all things, he merely gave a new form to the theories of the Egyptian priests, who asserted that the land had arisen from the waters.

The properties of minerals were pretty correctly studied. The country afforded every facility for this. The mountains which formed the walls of the valley of the Nile, exposed, with all their native lustre, various species of rocks. Egypt was in a manner a mineralogical cabinet ready open. The necessity of passing through the small valleys which direct themselves towards the Red Sea, gave rise to the discovery of other minerals, which did not occur in so great masses. It was in one of them that the mine of emeralds was found which furnished all those of antiquity.

The manner in which the Egyptians wrought the fine stones, porphyry and granite, shows that they had the use of very sharp instruments, and that they therefore were very well acquainted with the art of tempering. It is true that but little iron has been found in their tombs and cities; but this depends upon the circumstance that this metal is easily destroyed. Besides, there have been found in them various other metals, among others bronze and gold of extreme purity. We find that they knew all our enamels and porcelains,—that they could form the most brilliant and solid colours, and even ultramarine; in a word, that in the chemical arts they were infinitely more advanced than the Greeks and Romans ever were.

We have said that the habit of keeping sacred animals in the temples, had afforded opportunity to the Egyptians of studying the manners of these animals, and of carefully observing their forms. They also represented them in sculpture and painting with perfect accuracy. On their monuments we find more than fifty species of animals so recognizable, that even when the figures are of small dimensions, and merely given in outline, it is impossible not to know them. Thus we distinguish in their sculptures the great antelope, the oryx, the giraffe, the long-eared hare, the sparrow-hawk, the vulture, the Egyptian goose, the quail, the lapwing, the ibis, &c. Gau, in his work on Egypt, gives a copy of a painting which represents the triumph of an Egyptian monarch, and in it there are seen the different vanquished nations presenting to the conqueror, animals peculiar to their country. There are distinguished the hunting tiger, and an animal unknown in Europe thirty years ago, the aspic, (*Coluber haje*,) the crocodile, &c. Although in their representations the zoological characters may not have been expressed, yet the general appearance is so well given, that a naturalist can always without difficulty make out the animal, even when the figures are of insects and fishes. In a painting brought from Egypt by M. Caillaud, and which represents people fishing, there occur more than twenty species of fishes. There are seen *siluri*, *cyprini*, and other species of singular forms and peculiar to Egypt, all so faithfully expressed that they may be recognized at first sight.

It cannot be supposed that a people who engaged with so much success in the observation of nature, confined themselves to the collection of facts, without trying to connect them by theories, and ascending to principles. It is therefore to be believed that there was, at a certain epoch in the colleges of priests, not only the knowledge of philosophical and religious doctrines, but also that of particular scientific theories. These theories are no doubt lost in consequence of the oppression to which the sacerdotal caste was subjected at the time of the conquest of Cambyses.

The heads of the colonies which went forth from Egypt, possessed in general but a small part of the knowledge of which this privileged caste was the depository. They only carried with them the practical results. This was not the case with the legislator of the Hebrews. He had been educated by the Egyptian priests, and knew not only their arts, but also their philosophical doctrines. His books show us that he had very correct ideas respecting several of the highest topics of natural philosophy. His cosmogony especially, considered merely in a scientific point of view, is extremely remarkable, inasmuch as the order which he assigns to the different epochs of creation, is precisely the same as that deduced from geological considerations. According to Genesis, after the earth and the sky had been formed and animated by light, the aquatic animals were created, then plants, afterwards land animals, and lastly man. Now this is precisely what geology teaches us. In the oldest formed deposits, those which are consequently deepest seated, no organic remains are found. The earth was then without inhabitants. As we come nearer the beds at the surface, we see appearing first shells and remains of fishes, then remains of large reptiles, and lastly the bones of quadrupeds. As to human bones, they have never been found excepting in alluvial deposits, in caves, and in the fissures of rocks, which shows that man has appeared last of all the other classes of animals.

*( To be continued. )*

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*On the formation of ice at the bottom of running water.*—THE people every where differ from the philosophers in their ideas of the formation of the ice of rivers and streams. They think that it comes from the bottom of the water, and in Germany they call it *grundeis*, ground-ice. Naturalists, who have long been aware of this popular opinion, have however treated it with contempt. According to them, it was altogether contradictory to that which we learn from theory and from the most exact observations. Nevertheless the watermen and all those accustomed to work upon the rivers, have not altered their opinion: they persist in declaring that they see ice rising from the bottom of rivers every year, that they detach it often with their oars from the deepest parts, and find it lined on the under surface with soil.

In the last century, two men belonging to the class of philosophers, Hales, a fellow of the Royal Society of London, in his *Vegetable Statics*, and Plot, in his *Natural History of Oxfordshire*, supported the opinion of the formation of ice at the bottom of running water, principally on the evidence of unscientific men, who stated that they were every year convinced of the fact, beyond the possibility of doubt. Hales, moreover, stated that he had seen at the same time in a river, both ice on its surface a third of an inch thick, and, through it, other ice adhering to the bottom, which, on breaking it, he found to be nearly half an inch in thickness. This ice at the bottom, he adds, was joined to that at the surface, the two plates becoming more and more separated as the water became deeper.

The publication of the writings of Hales and Plot made little impression on the scientific world: it however excited the attention of Nollet, who, in his *Météorologie*, on coming to the question whether *ice was formed at the bottom of rivers*, answered it positively in the negative, after having conducted observations and experiments, though with all the prejudice of a man who thought himself sure of the fact. He even commenced by declaring he should have hesitated to discuss such a question, if it had not been authorized by statements contained in the works of two learned men, (viz. Hales and Plot.) Mairan, in his *Dissertation sur la glace*, reproduced and approved of the ideas of Nollet, and the question seemed to be definitively settled until the year 1825.

At this period, M. Mérian, professor of natural philosophy at Bâle, wrote a memoir, in which he contended that the opinion of the vulgar, on the formation of ice at the bottom of rivers, is founded on satisfactory evidence. Convinced by the different statements in favour of the reality of this phenomenon, he was already prepared to admit its existence, when in 1824 he observed it himself in a canal whose water was so transparent that he could distinctly see the bottom at a depth of three feet. The bed of the canal, at the place observed, was formed of rolled flints. But wherever there could be perceived at the bottom of the water a projection in the deep parts as well as in the more shallow places, a fasciculus of pieces of ice was found, at a distance resembling a quantity of woolly flakes.

M. Mérian added to this observation many facts equally conclusive. In 1806, it was stated by a creditable observer, that some chains of six feet in length, which had been a long time lost under water, on being raised to the surface, were found entirely covered with a thick coat of ice. The same person related that an anchor, after being an hour in the water, had also been drawn out covered with ice.

New and more detailed observations on this subject, were made in the winters of 1827 and 1829, by another *savant*, M. Hugi, president of the natural history society of Geneva. During many successive hours, he observed ice rise in great quantities from the bottom of the Aar at Solerne. But M. Hugi did not confine himself to the mere remark that ice rose from the bottom of the river. He examined its structure minutely in comparison with that of the ice found on the surface, and has noticed remarkable differences between them.

A professor of natural philosophy at Strasbourg has also seen ice adhering to the bottom of one of the canals formed by the Rhine near this place, and has published his observations in a thesis this year.

Finally, M. Duhamel, satisfied of the reality of the fact, as well by the preceding observations as by many others of a similar kind which M. Navier had communicated to him, and by others for which he was indebted to M. Vauvilliers, chief engineer of roads and bridges, was curious to have personal assurance, and in February last, he remained for same days on the banks of the Seine, near the bridge of Grenelle, and there he observed at eight or ten feet from the brink, in a place where the current was very rapid, that the bottom of the river was coated with a layer of ice firmly adhering. He however detached with a pole some pieces whose thickness was fifteen or sixteen lines. The temperature of the water was at zero at the surface and at the bottom.

M. Duhamel, in a letter addressed to M. Navier, which was read before the Academy of Sciences of Paris on the 8th February last, explains how, according to his opinion, we must account for the formation of ice at the bottom of running water. In stagnant water, whose current is insensible, it has been remarked, he says, that the temperature of the bottom continues above zero, even when the surface is frozen. This phenomenon is explained by the known law of the specific gravity which water preserves at different degrees of temperature,—a law, by virtue of which the water acquires, between three and four degrees above solidification, a maximum of density which must necessarily cause it to fall to the bottom, and to remain there at this temperature. Thus we never find ice at the bottom of such a collection of water. But in a rapid current the unequal motion of the molecules, at different depths and at different distances from the banks, must produce a mixture which will bring all parts to the same temperature. For the banks and the bottom are in the most favourable conditions for the formation of ice, and it would be strange if it did not take place when the mass is down at zero. The bottom must furnish a much greater quantity than the margin, and it would even appear that the floating ice comes almost entirely from the bottom, since that which is formed at the sides generally remains attached.

Since the relation of M. Duhamel's observations on the formation of ice at the bottom of the Seine, a letter from Colonel Raucourt has been read before the Academy, (sitting of 15th Feb. last,) containing several observations, at different periods, on the temperature of the Neva, and on the formation of ice at the bottom of this river.

On the 13th March 1825, the temperature of the air being for some time at + 4° cent. M. Raucourt made several openings in the ice, in a place where the breadth of the river was about 1000 feet, and its greatest depth 63 feet.

At his first station, 400 feet from the bank, the water being 63 feet deep, and the velocity of the current near the bottom twenty inches in a second, the temperature of the water at the surface was at zero, and at the bottom at —2° cent. The bed of the river in this place was formed of large gravel; no ice could be observed.

At a second station, where the depth of the river was 41 feet, its velocity near the bottom some inches, the temperature of the surface being always at zero, that of the bottom was found to be —1° cent. and pieces of ice of many inches in thickness, detached from the bottom, were brought to the surface still coated with sand.

At a third station, 70 feet from the bank, the depth of the water being 26 feet, aud its velocity at the bottom absolutely nothing, very compact pieces of ice, of 6 and 8 inches in thickness, were detached from the bottom. They were composed of crystals more and more separated, which made the ice dull, light, and friable.

At his fourth station, the opening having been made still nearer the margin of the river, in a place where the water was absolutely stagnant, M. Raucourt found the whole mass of water filled with detached crystals of ice, like salts in their water of crystallization.

By direct observations on a stagnant pond, M. Raucourt found that the temperature of its waters did not present any variations, and that the surface being at zero, the bottom would be at 3° or 4° cent.

M. Raucourt repeated his observations on the temperature of the Neva in 1826 and 1827. One day the mean temperature of the air being —6° cent. the bottom (at 63 feet) was 3° below ice. In spring the temperature of the bottom of rivers approaches more and more nearly to zero, as the weather becomes less rigorous. During a thaw, the whole mass of the water is at zero, and then the temperature rises in summer without presenting any novel variation.

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*Phrenology.—Opinions of scientific men.* No. II.—*Dr. Alison, professor of the Institutes of Medicine in the Edinburgh University.*

In our last number, when giving the remarks made by Dr. Hope on the subject of phrenology, before the Royal Society of Edinburgh, we mentioned our intention of collecting the opinions expressed by men of scientific repute, on the merits of the phrenological theory; and we have received from a correspondent the following notes of Dr. Alison's lectures on physiology, wherein he alludes to the philosophy of mind.

1. With some striking exceptions, the most intelligent of the vertebrated animals have the largest brains.

2. Probably men of talent have generally large brains, as ideots generally have small ones; but there are exceptions to both rules.

3. We can very often observe something peculiar in the foreheads of men of genius; but peculiarities, thought by some to be characteristic, may be observed also in the forms of other bones.

4. Pathological observations make it probable that a part of the cerebellum is concerned in the emotion of sexual desire; but experiments and observations show that the cerebellum, as a whole, has other functions, and besides, it seems to attain its full size some time before puberty.

5. Attempts to ascertain the precise parts to which the different mental powers appertain, are highly laudable; and the supposition of this allotment to different parts, is neither irreligious nor absurd.

6. Phrenologists speak confidently of the organs behind the frontal sinus, which must always be doubtful.

7. There is not sufficient evidence adduced by phrenologists, to establish what they profess to have discovered; and the results of observations, by competent

persons, on the details of the system, are so various, and the sources of fallacy so great, that we can place no reliance on conclusions as to the special uses of parts of the brain from their methods of inquiry, unless confirmed from other sources—such as experiments on animals, or pathological observations on the human body—neither of which sources furnishes any distinct evidence of more than the appropriation of the brain proper to acts of thought.

"If I were to make any addition," says Dr. Alison, in approving of the above notes, "it would be to the effect, that if all the phrenologists think they have established were generally admitted, still it would not justify their pretensions to the exclusive knowledge of the right object, and right method of inquiries regarding the mind,—the difference between them and other inquirers on that subject, turning only, as it appears to me, on a *question of arrangement* of the knowledge that is acquired,—not on real difference as to the nature of that knowledge, or the means of acquiring it."

*Remarkable Peculiarity in a Fall of Snow; by* Mr. F. H. Sherriff.—*East Lothian*—On Saturday the 20th inst. it commenced snowing here about 8 o'clock, P. M. and continued till 12, about which time there arose a very violent storm of wind, accompanied with a heavy shower of sleet and rain, after which another fall of snow occurred. On the morning of Sunday, (21st inst.) the frost was pretty keen, and there was a slight crust found on the surface of the fallen snow.

The fields presented a very uncommon appearance, being thickly studded with snow-balls, varying from a foot to a foot and a half in diameter. The fields in which I first observed them, had a gentle declivity from south to north; but this, I think, is inadequate to afford a satisfactory explanation of their formation, as the hollow tract which they had formed in the snow, I observed to be from *west* to *east*. The wind was from the west.

I afterwards observed them in fields quite level. In one village in particular, which had an exposure to the west, they were exceedingly numerous, being not above a yard and a half separate from each other. I did not minutely examine the internal structure of them, but I saw one which had been cut through the middle by the wheel of a gig, and it did not appear to be composed of any thing but snow, having no hard body for an internal nucleus.—*Feb.* 25. 1830.

*Dr. Knox's Theory of Hermaphrodism.*—In the first Number of this Journal, (p. 64,) we published the earliest notice of a new theory of hermaphrodism, which has been advanced by Dr. Knox, who has been long known as an eminent comparative anatomist, though his researches seem to have been better appreciated on the continent than in this country. Since that period, the author has read a series of papers, illustrative of his views, before the Royal Society of Edinburgh, an analysis of which will be found in No. IV. of Brewster's Journal of Science for the present month, from which we hasten to extract the following particulars.

It was the opinion of the ancients, and of most modern physiologists, that, in man and the higher orders of animals, the male and female organs of generation are fundamentally the same organs, only differently developed in the one sex from what they are in the other; thus it is the general theory of the present day, that the testicles are analogous to the ovaries, the Fallopian tubes to the epididymes, the angles or horns of the uterus to the vasa deferentia, the body of the uterus to the vesiculæ seminales, and the penis to the vagina; and, in accordance, with this idea, physiologists account for hermaphroditical appearances, by supposing an irregular developement of the genital organs, whereby some of them inclined to the female structure, and others to the male. But several cases are on record, where both classes of organs have been found existing together in the same individual, as in the *free martins*, described by John Hunter, &c.—viz. both testicles and ovaries, vasa deferentia and Fallopian tubes, vesiculæ seminales and uterus. These organs, then, cannot be identical. Dr. Knox contends, with apparent justice, that "the type of the genital organs is hermaphroditical; that is, there are fundamentally male and female organs in the same being, or, originally in all embryos, elementary yet distinct parts, out of which both sets of organs may be formed by developement;" and when, in hermaphroditical animals, both male and female organs are developed, it is merely a return to the original type.

According to these views, the essentially male organs are the testicles, the vasa deferentia, the vesiculæ seminales, the prostrate, Cowper's glands, and the penis; and the essentially female organs are the ovaries, the Fallopian tubes, the uterus, the round ligaments of the uterus, the vagina, and the mammæ.

In addition to these principles with respect to the generative system, which we have previously exposed, Dr. Knox has advanced a most ingenious application of the new law for discovering the nature of rudimentary organs, by determining the original type of construction, to the respiratory organs;—a theory of the respiratory organs, showing them to be at once pulmonary and branchial.

"As in some animals," says the author, "both the male and female organs are found together, so also do we find in some animals two structures for the oxygenation of the blood co-existent, or developed one after the other, as in the tadpole.

"It is hard to conceive how, if these two organs were identical, as is supposed, they could exist at the same time in one individual, which they assuredly do in the Proteus and Syren. Here the principles, on which hermaphrodism has been explained, may be applied, and we may therefore say, *that the type of the respiratory organs is double; it is both pulmonary and branchial; the elements of both sets of organs are found in all vertebral animals.*

"From this it follows, that lungs and gills, although *analogous*, are not *identical* organs, and that they can no more be changed into each other, than male into female organs.

"Admitting this, we can now explain certain bones in fishes which have never been exactly determined; these are the bones which support the gills, called by some *ribs*, and by others *hyoid bones*. Lungs and gills are analogous, but not identical organs, the elements out of which the gills are formed, are not the same as those out of which the lungs are; therefore, when we analyze the structure of the gills, and find the branchial arches, we say that they are organs belonging essentially to the gills. But as the type of the respiratory organs is both lungs and gills, we must expect to meet, in some of those in which the lungs only are developed, with elements more or less remarkable, of the gills. Now such are the hyoid bones, which are in truth the branchial arches."

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### *Queries respecting the Natural History of the Salmon, Sea-Trout, Bull-Trout, Herling, &c.*

The perplexing history of the habits of the salmon, and its congeners, the subject of so much discussion amongst naturalists, has become an object of inquiry with Sir William Jardine, who is at present engaged in the preparation of a splendid work on the Natural History of British fishes. The following Queries have been handed to us by this gentleman for insertion in our pages, and we earnestly request our friends and readers to exert themselves in any way that may occur to them in procuring answers from individuals practically connected with the fisheries, or possessed of other means of acquiring information.—Ed.

The value of the Salmon Fisheries in Great Britain has decreased so much of late years, and particularly in the North of England, and South of Scotland, that a remedy for it, independent of its interest as a difficult and unsolved question in Natural History, will become of no little importance to proprietors. The following Queries are proposed, with the view and with the hope of gaining some information upon the natural history and economy of this valuable species. It is only by arriving at a correct knowledge of its various habits, and those of the species allied to it, which frequent our rivers in almost equal numbers, that we can hope to devise or accomplish any means of increasing the production, or of decreasing the certainly too extensive destruction of it in its different states.

The Queries relate only to its natural history, and answers are requested, stating facts relative to the opinions given, with the suggestion of additional Queries, or any thing that will tend to illustrate the history of the species.

Address the Answers to Sir W. JARDINE, Jardine-Hall, by Lockerbie, Dumfries-shire, or to the EDITORS of this Journal.

SALMON.—1. At what age do salmon commence spawning? and how often is it supposed that they have migrated to and from the sea, previous to their first parting with the spawn?

2. Do the males and females attain maturity at the same period or age? and do all of one age spawn nearly at the same season?

3. At what time do the young, or Fry, first leave the rivers?

4. When do the young, or Fry, first return to the rivers?

5. What is the size, weight, and appearance of the Fry, on their first return from the sea, and under what denomination do they then go?

6. Are they so far arrived at maturity as to spawn, and be productive, on their first return from the sea, or previous to a second migration?

7. Are any *fish* known to shed their spawn abortively, before they arrive at their full growth or maturity? or is the spawn observable in young fish, retained, until the parents attain the ordinary growth and size of the species when it is known to be productive?

GRILSE.—8. Are Grilses immature Salmon, and if they are, what is their age?

9. What is the distinctive character between a *large Grilse* and a *small Salmon?*

10. At what season do Grilses first appear in the rivers? What is their weight? and are they supposed to be the Fry of the same year, on their first return from the sea?

11. Have the Fry been marked, and afterwards taken as Grilses in the course of the same year, and have Grilses been marked, and afterwards taken as full grown Salmon?

12. Is it supposed that any sexual intercourse takes place between the Salmon and other species of the genus, thereby producing a mongrel or mixed breed of fish?

WHITLING AND SEA-TROUT.—13. Does the *Whitling* of the Tweed ever become a Salmon—if not, to what size and weight docs it attain?

14. Is the *Whitling* of the Tweed known by any other name in its various stages of growth? Does it spawn, and at what season? What are its migrations?

15. Is the *Sea-Trout* of some other rivers the same with the *Whitling* of the Tweed? Is it found in all rivers containing Salmon? Does it spawn? Is the young, or Fry known—and what are its migrations?

HERLING.*—16. Is the *Herling* or *Hirling* of the Annan and Nith, and the *Whiting* of the Esk in Cumberland, the same with the *Finnock* of the west coast of Scotland, and the *Sewin* of the Welsh rivers?

17. Is the *Herling* found in the rivers on the eastern coast of Scotland, or in any of the rivers in England or Ireland, and under what name or names is it there known?

18. Does the *Herling* spawn, and at what season? and is it known in any intermediate state between the Fry and *Herling?* Is the Fry known, and what are its migrations?

BULL-TROUT.—19. Is the *Bull-Trout* of the Tweed the same with the

* The Herling seems to be the *Salmo Albus* of Dr. Fleming's "British Annals," and most Ichthyologists—this species has not been thoroughly investigated.

Salmon-Trout of the Tyne and Tees, &c.? and is it known by any other name during its growth from the Fry to maturity?

20. Is the *Parr* met with in all rivers containing Salmon? where and when does it spawn? Is it the same with the *Brandling* of the North of England, and the *Skirling* of Wales? It it supposed to be a perfect fish, or the Fry of some species of Salmon?

21. What is the Grey (*Salmo Eriox*) of Dr. Fleming? What are its states from the young to the adult? What are its migrations?

22. Are there are any species of migratory Salmon, distinct from those above mentioned, known in the rivers of your neighbourhood?

*Account of the Hya-hya, or Milk-tree of Demerara.**—We take an early opportunity of presenting our readers with an account of the Hya-hya, or Milk-tree of Demerara, from a tolerably full report of a letter from James Smith, Esq. to Professor Jameson, in the Ed. Lit. Journ. No. 70. The notice may be complete, but as it is probable that the letter will be published at length, in the Ed. New Phil. Journ., we shall be able, in a future number, to give any additional information it may contain.

Mr. Smith, during his travels in South America, was constant in his inquiries after trees yielding a milky juice, similar to the Palo de Vaca (or Cow-tree) described by Humboldt. His Indian guides led him to a great variety, all of which, however, had more or less of an acrid and deleterious principle, mixed with the lactescent quality. At last, on an excursion up the river Demerara, he was told by the native inhabitants of a settlement just below the first rapids, of a tree, called by the Indians Hya-hya, the milk of which was both drinkable and nutritious. The specimen of this plant, seen by Mr. Smith, had a trunk from 16 to 18 inches in diameter; and was from 30 to 40 feet high, branching from the top. The bark was grayish, slightly scabrous, and about a quarter of an inch thick; and the milk seemed to be secreted between it and the wood. The leaves were elliptic, accuminate, smooth, and oppositely pinnate.† The flower was monopetalous; the calyx single, contiguous to the flower, and four-parted; the peduncle axillary, bearing four flowers, and sometimes five. The flower was sufficiently developed to enable Mr. Smith to ascertain that it belonged to the class *Pentandria*, and the order *Monogynia*. The tree had been felled before Mr. Smith saw it, and having fallen across a small rivulet, the water was completely whitened by its juice. The milk-like fluid was richer and thicker than cow's milk, and quite destitute of all acrimony, leaving only a slight feeling of clamminess on the lips. This viscosity it lost when drank in warm coffee, with which it mixed freely, and appeared incapable of being distinguished from animal milk. A portion of the juice, preserved in a bottle, did not begin to curdle till the seventh day after it was taken from the tree; and on the twelfth day, some of it was used by Mr. Smith in tea, without its being distinguished from animal milk by those who drank it. The Hya-hya is said to be by no means uncommon in the woods of Demerara; and there is reason to hope that its fruit may soon be procured. A dried specimen of the plant, and a small bottle of the milk, were transmitted by Mr. Smith to Professor Jameson, along with his letter. The latter is now undergoing a chemical investigation; the former was exhibited to the meeting of the Wern. Soc. accompanied by descriptive notes from the pen of Mr. Walker Arnott. This gentleman referred the Hya-hya to the natural order of *Apocyneæ*, and the genus *Taberna-montana*—under the name *T. utilis.* "The usual properties of the milk of the *Apocyneæ*," continued Mr. Arnott, "are deleterious, and it is rather remarkable to find an instance to the contrary in this tribe; and I do not think there is any other on record. Future observations may however, perhaps, ascer-

* Read before the Wernerian Society, Mar. 6, 1830.

† Though this report bears the evidence of an authentic source, we presume that this should be written *opposite*, as we are not aware of any of the Apocyneæ having *oppositely pinnate* leaves.

tain similar mild qualities in other species of *Taberna-montana*, especially in their young branches, or when the sap is on the ascent, and before it be elaborated. Among the *Asclepiadeæ* of Brown, which have similar baneful properties, and which many botanists, indeed, consider a mere section of *Apocyneæ*, an instance is also known of the milk being wholesome; I allude to a plant found in Ceylon, which the natives call Kiriaghuna, from Kiri, (milk), and employ its milky juice when the milk of animals cannot be procured; its leaves are even boiled by them as a substitute in such dishes as require to be dressed with milk —it is the *Gymnema lactiferum* of Brown. The young shoots of several species of plants belonging both to the *Asclepiadeæ* and *Apocyneæ* are used as food."

*Volcano in New South Wales, (Notasia.)*—M. Mackie, of Cockle-bay, has discovered a volcano, situated on the banks of Pag's river, New South Wales. It is only distinguishable at a quarter of a mile's distance; in the day-time, if the sun shines, a great volume of flames suddenly strikes the eye; it is generally mixed with smoke, especially in gloomy weather, and when the atmosphere is of a dull reddish tint. During the night, the flame may be distinctly seen, rising in a bluish sulphureous column, and spreading through the air. The mouth of the volcano is situated between the peaks of two mountains, which the natives name *Ouingen*. The crater is 30 feet long, and 12 feet wide; the earth, at a great distance from its margin, is black and bituminous, and destitute of humidity. M. Mackie, who has visited this volcano, states, that he did not meet with any water along the steep sides of the mountains, between whose summits this crater was found; the earth wanted consistence, and was scorched; and for the distance of about a mile and a half, in descending, with the exception of some carbonized stumps, there was not the least appearance of vegetation.

From the mouth of the crater, for a mile and a half below, there is nothing but a rugged, barren, arid waste; and the crater seems to be constantly extending its boundaries. During his visit to the volcano, the combustion was making rapid progress; the surface, at a certain distance from the crater, was incessantly cracking and falling down; and, from time to time, masses of earth separated from the margin, and fell into the volcano, whose flame, damped for a moment, seemed to increase on its new aliment. M. Mackie, one day, having given instructions to his companions to dig in a particular place, to ascertain the state of the soil, walked over a part where the surface was broken, and sank in, and much effort was necessary to save himself in this dangerous situation; fortunately an emollient resinous application diminished, in a singular degree, the pain of his burns and bruises.

It did not appear that any eruption had yet taken place, and M. Mackie remarks, that there was not the least vestige of lava at the base or on the sides of the mountains between which the volcano is situated. It is evident, however, that a vein of bitumen maintains the subterranean fire.—*Bull. de la Soc. Geog. Dec.* 1829.

*Stature of Man.*—Professor Quetelet, of Brussels, has found, from an examination of the militia registers of the province of southern Brabant for five successive years, that the mean stature is constantly more elevated in the towns than in the country, not only in the whole province, but in each *arrondissement*. One *arrondissement* alone formed an exception for a single year.

M. Villermé had already arrived at similar results in France, from admeasurements of a great number of young recruits.

This fact is the more interesting, as it is contrary to the generally received opinion.

*Characters of the New Wild Swan, (Cygnus Bewickii.)*—In a late Number we announced the discovery of a new species of wild swan, by Mr. R. R. Wingate of Newcastle, from a specimen sent to him, to be preserved for the Newcastle Museum. Since Mr. Wingate's dissections, several specimens have been shot in different parts of England, and Mr. Yarrell has described it before the Linnæan Society, (19th January last,) and determined its characters as follows:

*C. Bewickii*, rostro semicylindrico atro, basi aurantiacâ, corpore albo, caudâ rectricibus 18, pedibus nigris.

The new species is one-third smaller than the Hooper (C. ferus), with which it has been hitherto confounded. They differ more in anatomical structure than in external character, and principally in the trachea.

The characters of the hooper, as defined by Mr. Yarrell, are, "*C. ferus*, rostro semicylindrico atro, basi lateribusque (his ultra nares) flavis, corpore albo, caudâ rectricibus 20, pedibus nigris."

A paper, by P. J. Selby, Esq. descriptive of this new species, was read before the Newcastle Nat. Hist. Soc. on the 16th Feb. last, and will form part of the 1st vol. of their forthcoming transactions. It is remarkable that a specimen has, for some years, lain unrecognized in Mr. Selby's museum.

*On the Mucous Ducts of the Gasteropodous Mollusca; by Dr. W. Kleeberg of Kœnigsberg.*—In the gasteropodous mollusca of the genera *Limax*, *Arion*, *Helix*, *Bulimus*, we find under the mouth, between the two inferior lips, and the protuberance of the disk of the foot, the orifice of a canal, hitherto unobserved, which runs along the whole of the foot. This anatomical arrangement is not very distinct in the genus *Succinea*, which approaches nearer to the Lymnææ in internal structure. In the *Arion empiricorum*, which is entirely black, we perceive a trace of this canal, which appears in the form of a whitish band. The canal is not simple; it receives many little ducts, which come from the muscular sac in which the viscera are contained. In the *Bulimus ovatus*, Brug. a little gland, which has not yet been described, opens into this canal; it is of the size of a bean, trilobate, granulated, and situated under the œsophagus and the inferior ganglion of the cerebral ring, so that it is surrounded by nervous filaments passing from this ganglion. The distribution of all these ducts may be easily observed when filled with mercury: Mr. Kleeberg names them mucous ducts, but he has not been able to determine their use and importance.—*Bull. des Sci. Nat.*

### *History of the Fossil Elk of Ireland, by S. Hibbert, M.D. F.R.S.E. &c.*

In the third volume of the *Edinburgh Journal of Science*, Dr. Hibbert advanced the opinion that the Fossil Elk of Ireland (*Cervus Euryceros*, Aldrov.*) was of a race which had but very recently become extinct; and in the fourth number of the new series of the same Journal, published this month, we have some additional contributions towards the history of this animal, as an appendix to his former paper.

The facts contained in this communication may be epitomized under the following general heads:

"1. The Cervus Euryceros was the contemporary of such extinct animals of Europe as the Elephant, the Rhinoceros, the Hyena, the Hippopotamus, and divers others.

"2. The Cervus Euryceros was the contemporary of the earliest inhabitants of the human race dwelling in Europe.

"3. The Cervus Euryceros, or Fossil Elk of Ireland, so far from being an animal, the existence of which is referable to a remote antiquity, actually lived in the wilds of Prussia so late as the year 1550, and perhaps later.

* Dr. Hibbert continues to use the name *Cervus Euryceros*, applied to the fossil elk by Aldrovandus, in preference to *C. giganteus* of Blumenbach, or *C. megaceros* of Mr. Hart of Dublin, because of the priority of the former appellation.

4. " The Cervus Euryceros was an animal attached to a marshy state of the country.

5. " The chief use of the immense horns of the Cervus Euryceros was probably for his defence.

6. " The Cervus Euryceros was the ancient inhabitant of the temperate regions of Europe.

7. " The causes which led to the extinction in Europe of the race of the Cervus Euryceros were various, while their action was gradual."

Dr. Hibbert founds the opinion expressed under the third head, on the existence of a figure of a Cervus given by Sebastian Munster, in a scarce folio work, entitled " Cosmographiæ Universalis Lib. VI. in quibus, juxta certioris fidei scriptorum traditionem describuntur, omniū habitabilis orbis partium ppriæ'q. dotes. Regionum Topographicæ effigies. Terræ ingeniæ, quibus fit ut tam differētes et uarias specie res et animatas et inanimatas, ferat. Animalium peregrinorum naturæ et picturæ ; and dated M.D.L." &c. &c.

" Though," says Dr. Hibbert, " in such of the remote regions as were imperfectly known to naturalists, the narratives of Munster partake of the popular fables of the times in which he lived, no objection can lie against his evidence in regard to the productions of a country then so well known as Prussia. Accordingly, in enumerating the animals actually existing in this province in the year 1550, he has given the figure of a Cervus, corresponding so precisely in the form of his immense and wide horns with those of the fossil Elk of Ireland, that it is impossible to confound him with any other Cervus ;—and that there may remain no doubt whatever that the same was an inhabitant of the wilds or marshes of Prussia, he adds, '*I ordered the misshapen figure of this animal to be here depicted to the life, as well as can be expressed in a delineation.*' A wood-cut accordingly appears in Munster's volume, which is the only good historical record of this animal which I believe to be in existence."

A copy of this figure, from the engraving accompanying Dr. Hibbert's paper, upon precisely the same scale as the original delineation, illustrates this note.

The written account which Munster has annexed to his representation of this Cervus is very brief. It may be given in the author's own words. "Nutrit præterea Prussia animalia quæ putantur esse alces, Germanice autem vocantur Elend, habentque magnitudinem asini aut mediocris equi. Ungulæ ejus dicuntur prodesse his qui caduco laborant morbo, et pellis est tam dura, ut nec confodi neque dissecari possit. Caro ejus dicitur esse ex nobiliori venatione. Color autem subrufus est, nonnihil nigricans, habetque albicantia crura. Figuram hujus animalis ad vivum deformatam et qualiter lineis exprimi potest, feci hic depingi."

Munster afterwards translated his work into the German language, in which the only difference in the description of this Cervus, is, that the animal is described of a brownish instead of a reddish colour, and that in the Latin copy the author states that he had the animal drawn *to the life.*

While Munster was obtaining information about this Cervus, he found that less was known of him than of any other of the genus. He therefore wrote for additional information to a friend in Livonia, conceiving that in that country the animal was more abundant. His queries, however, so far from being resolved, were answered by a description of a perfectly different animal, and in such ambiguous language, that our cosmographer found it difficult to say to what race the description was relative. But in order that the Cervus, regarding which he was so anxious to procure information, might not be mistaken, he not only ordered a sketch to be taken of this mysterious animal, but he likewise annexed a faithful representation of the true Northern Elk, (*Cervus Alces*) with the view that a comparison between the two might be instituted; adding, that the representation of the true Elk (the *Cervus Alces*) was expressly made for him in Prussia.

"It is rather curious that Munster, in drawing two animals of this anomalous species of Cervus, which we shall presume to be male and female, gives to each of them horns; those of the animal in the front of the drawing, which we shall suppose to be of the male sex, being somewhat larger and more inflected than those of the female. The coincidence of this delineation with the observations of Baron Cuvier and Mr. Hart, but more particularly of the latter, is very striking; for both of them suppose that the female, as well as the male of the fossil elk, possessed horns, after the manner of the rein-deer."

"But it would be unfair to criticise," adds Dr. Hibbert, "with too much minuteness and severity, a drawing, accompanied with a description, made nearly three hundred years ago, during the very infancy of our knowledge of natural history, and at a time when the race described was evidently becoming extremely rare, if not extinct; and this forbearance is the more demanded as an act of justice, in a case where the essential and permanent characteristics of the form and figure of the animal appear to be given with such a degree of accuracy and fidelity, as to render it impossible that we should confound them with those of any other race of Cervi then known to be in existence. If, however, some slight discrepancies should be insisted upon, I am quite willing that Munster's Cervus be considered as a variety only of the *Cervus euryceros*, or Fossil Elk of Ireland, analogous to such varieties as we find in the breed of horses, of dogs, of foxes, of wolves, or of hares."

*Suggestions on the relation between Organized Bodies, and the Conditions of their Existence.**—Every student of natural science must have found the advantage of possessing some leading principles, however hypothetical, under which he may consider the many unconnected facts which daily fall under his observation. The following propositions are suggested as at least capable of proving serviceable in this respect, at the same time that they may possibly be found, from future developement, to be explanatory of several of the phenomena of organization. Though founded on the comparison of numerous facts, hitherto unexplained, no claim is advanced for these generalizations, except that they are not commonly received, and that they merit some consideration from the philosophical anatomist.

1. The developement of the process of organization,—a power imposed by the Deity upon matter,—depends upon the conditions of existence.

2. The perfection of organized bodies, or the number and complexity of organs, has a direct ratio with the number of the conditions of existence.

   Thus the lower the animal or plant in the scale of perfection, the fewer the conditions of its existence, and *vice versa*.

3. All organized bodies possess the power of varying the developement of the organs, by addition or subtraction of parts, as changes in the conditions of existence occur.

   It is easy to conceive that an organized body can assimilate elements in the form of a new organ, as new functions are required, when we recollect that it is constantly exercising a power of converting inorganic matter into the living emblem of its original form.

4. The characters of organized bodies will be permanent during the continuation of the same conditions of existence which led to their developement, and no longer.

5. The more numerous the conditions of existence, the less liable the characters of the organized body to change, and *vice versa*.

6. It has been observed that the older the formations of the earth's crust, generally speaking, the less perfect the organic remains they contain. This progressive increase of perfection in organization, would lead us to expect, from the foregoing principle, that, with the advancing age of the earth, the conditions have increased in number; and this seems to be the fact.

7. Adaptation is the law by which organized bodies change with the variation of the conditions of existence; and separation of the functions of relation, and concentration of the vital functions, seems to be the mode of perfection. H.H.C.

* By the "conditions of existence," we mean the external physical agents with which an organized body is in necessary relation, and upon which the integrity and action of its functions depends.

## NATURAL-PHILOSOPHICAL COLLECTIONS.

*Supposed Influence of the Spots of the Sun on Temperature.*—M. Arago comprises, in his annual epitome of meteorology, a table of the changes which the surface of the sun has undergone during the preceding year. His object is to furnish by these means data which may, at some period, serve to decide the question whether the solar spots exercise any sensible influence on terrestial temperature. It is unfortunate that M. Arago has not been able to fill up, from observations made in other observatories, the blanks which the inconstancy of the climate of Paris has obliged him to leave in his tables.

The difficulty of observing the sun, without being injured by the brilliance of its light, has long prevented astronomers from discovering the changes which take place at the surface of this planet, and until 1611 its spots had never been seen. Various explanations have since been advanced to account for this phenomenon. Lahire and Cassini supposed that they were the result of the exposure of the summits of many mountains in the substance of the sun, which became occasionally visible, in consequence of the fluctuations of the inflamed fluid which covers the surface of this star. In this view, the appearance of the spots would necessarily coincide with a diminution of the activity of the combustion of the sun. This was admitted by the astronomers whom we have named; but this explanation cannot now be sustained; it cannot account for the general and detailed observations which we now possess. It does not, for instance, explain how it happens that when we are observing two neighbouring spots, the one often increases whilst the other diminishes; for, according to the hypothesis of Lahire and Cassini, two adjoining spots should increase and diminish at the same time.

It has been supposed, also, that these spots were scoriæ thrown from volcanoes situated on the surface of the sun; others have said that the spots were placed at the bottom of a funnel-shaped cavity, which was formed in the luminous part of the sun. This was a much more satisfactory opinion; but it also must be renounced.

Herschell, at length, gave such an explanation of these spots, as is consistent with all the appearances which have been observed. He supposes the sun to be formed of a solid and opaque kernel, surrounded by an atmosphere of little transparency and reflective, which is itself enveloped by a luminous gas. If in a star, thus constituted, an opening were to occur in such a manner, that the aperture of the luminous atmosphere would be of the same dimensions as that of the atmosphere which immediately surrounds the obscure mass, we should see in the centre a black spot without any penumbra, which sometimes occurs; but if the aperture be larger in the gaseous atmosphere than in the first envelope, a part of the inferior atmosphere would be seen forming a penumbra, with all the peculiarities which we observe in the spots of the sun.

But what can be the cause of this opening, which we suppose to be found in the incandescent matter of the sun? It may be the result of an ascending current, which first breaks across the first atmosphere, and then the second, if sufficient force remain.

A very important thing to be remarked is, that, in almost every case, the formation of a new spot is preceded by a brilliant spot, called *faculum*, whose existence Galileo first remarked. Generally, also, when a spot closes, a faculum is formed in the place which it occupied. The appearance of facula seems then only to indicate the formation of spots, and far from announcing a diminution of heat in the sun, coincides with an increased activity in the gaseous matter of this star.

The explanation given by Herschell of the formation of spots in the sun, moreover, accords perfectly with the latter supposition, which has been adopted by this celebrated astronomer. He thinks that the appearance of a spot indicates a more active fermentation in that portion of the sun which is susceptible of incandescence; and, in support of his opinion, he has caused to be prepared a mean table of the price of corn in England, and of the number of spots which have been seen each year. He thinks that he has thus found a proof of the accuracy of his views; for the years when the spots were most numerous, the crops were most abundant.

Every one is aware of the uncertainty which such evidence must involve; but the opinion of Herschell is nevertheless very plausible, and the question is one of the most important which can occupy the attention of astronomers. M. Arago has taken the true means to solve the difficulty, by noting every year the number and dimensions of the sun's spots. There can be no doubt that these observations, when they have been repeated during a certain number of years, will serve to decide with certainty whether there be any relation between the spots of the sun and the heat of the seasons. We trust that all astronomers will concur with him in a labour, on whose importance, whatever may be the result to which it will lead, there cannot be two opinions.—*Le Globe.*

*Extract from the Analysis of the Labours of the Academy of Sciences, during the year* 1828; *by* BARON FOURIER. (*Concluded.*)—M. Girard, on the 31st March, read to the Academy a Memoir, which is to be printed in the ninth volume of the collection, and of which the following is the title:—*Memoir on the laying of water-pipes in the city of Paris; tables and descriptions of experiments made with reference to this subject on the expansion of cast-iron.*

This memoir bears upon a very important public use. The author, who to the most extensive experience adds the light of scientific knowledge, has deduced from observations made with great care, and from the application of the mathematical sciences, several remarkable consequences which we shall briefly indicate.

A pipe composed of leaden or cast-iron tubes, connected together in a series, may be considered as a single metallic rod, capable of being condensed or expanded by the diminution or augmentation of the temperature. The variations which this rod undergoes in its length are so much the more sensible the greater this length itself is; and the ruptures to which water-pipes are generally subject in the changes of the seasons, are almost always owing to these variations of length.

Agreeably to the arrangement pointed out by the author, and which has been adopted, the pipes intended for the distribution of the waters of the Ourcq, in the city of Paris, have been placed in arched galleries. It was therefore possible to remark each day, and each hour, the influence of temperature upon the diminution and increase of length. M. Girard selected for this purpose four pipes, each 580 *metres* in length, and placed in the same gallery, parallel to each other. Each of these pipes was divided into five parts, the extremities of which could slip into each other, so as to allow the length to which they were thus encased, to be measured.

In order to render more easy the motion by which this was to be effected, one of the four pipes was placed transversely on cast-iron rollers. The others were merely placed on pieces of oakwood. Things being thus arranged, the observations were commenced on the 13th January 1812, and were terminated on the 17th December 1815. During this period, the number of these observations amounted to upwards of 650. The temperature of the water varied in these pipes from 0° to 17½ degrees of Reaumur's thermometer, and it was found that the linear expansion of the cast-iron varied equally for each degree, and that it was for the length of 680 metres, $0^{m}.006810$ in the pipe which was placed upon the rollers, while it was only $0^{m}.005965$ and $0^{m}.006518$ in the other two which were placed upon pieces of wood.

The author had occasion to remark, that the true temperature of the pipes experimented upon was neither that of the water with which they were filled, nor that of the air of the gallery in which they were placed, but a temperature intermediate between that of the internal water and that of the external air, which were always different.

When the pipes were empty, which happened to be the case several times during the course of the observations, and when in consequence their outer and inner surfaces were in contact with the air, the author of the memoir remarked that the elongation in metres and in degree of temperature was about a tenth less than the elongation of cast-iron, such as it was observed in 1785, in England, by Major-General Roy. This evidently arises either from the difference of expansibility of the two kinds of cast-iron on which the experiments were made, or from causes which opposed themselves to the free motion of the tubes upon the surface of their supports. In giving a detailed account of the various circumstances of his observations, the author also pointed out the precautions necessary to be taken for laying in a solid manner, in the streets of a town, the pipes destined for distributing water to its different parts, and concluded his memoir with proving, by facts observed some years ago at Paris, how much more advantageous it is to lay these pipes in arched galleries, than to place them in the ground under the pavement of the streets.

*On some Properties of the Impressions produced by Light upon the Organ of Vision.*—The following results have been obtained by M. J. Plateau from a multitude of experiments, remarkable for their precision.

Section First:

1. Every sensation requires an appreciable time for its complete formation, as well as for its entire disappearance.

2. The sensations are not effaced suddenly, but diminish gradually in intensity.

3. When a sensation is disappearing, the progress of its decrease is the less rapid as it approaches nearer to its termination.

4. The different colours, observable by the simple light of the day, produce sensations which differ very little in their whole duration. In this respect, the colours ought to be arranged in the following order, commencing with that which produces the most durable sensation: *white, yellow, red, blue.*

5. The total duration, noted from the instant when the sensation has acquired its full force, to that when it is scarcely sensible, is, at least, 0″,34 mean term.

6. Lastly, it results accidentally from his experiments, that the principal colours ought to be ranged, with relation to the intensity of their sensations, in the following order: *white, yellow, red, blue,* commencing with that which produces the most energetic impression.

Section Second:

1. Additional facts confirm the last of the preceding results.

2. The visual angle under which his eye ceased to perceive the different colours, were as follows:

| | *In the shade.* | *In the sun.* |
|---|---|---|
| White, | 18″ | 12″ |
| Yellow, | 19″ | 13″ |
| Red, | 31″ | 23″ |
| Blue, | 42″ | 26″ |

The angles observed in the sun being nearly two-thirds of the corresponding angles in the shade.

3. When the sensations of two different colours succeed each other alternately, on their return, with a rapidity insufficient for the formation of a simple sensation, vivid gradations of colour are generally formed, differing from the two employed, as well as from their joint colour; we may even, by this means, produce a beautiful white from the employment of yellow and blue.

4. When two sensations alternate with each other, with such rapidity that they seem to form but one, this latter is not always the same as the material mixture of the two colours employed: thus, in combining in this manner, and in certain proportions, the impression of yellow with that of deep blue, we produce a perfect gray, without the least shade of green.

5. The sensations of certain colours (perhaps with the exception of yellow)

bear no ratio, in their combination with other sensations, to the intensity of these colours; their *maximum* of influence resides in a certain pale tint, on either side of which this influence diminishes: thus, the blue tint, which has this maximum with respect to red and yellow, is that of the sky in its most highly-coloured parts.—*Dissert. sur quelques propriétés, &c.; par M. J. Plateau.* 8vo. *Liége.* 1829.

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*On the Influence of the Aurora Borealis on the Magnetic Needle.—Extract from a Letter from the Rev. Mr Farquharson. F.R.S. to Dr. Hooker, 12th Feb.* 1830.

"You may, perhaps, feel some interest in learning that the council of the Royal Society, finding still much difference of opinion regarding the effect of the Aurora Borealis on the magnetic needle, sent me a properly constructed needle for experiment; and that, having had many very favourable opportunities since September last, I have obtained such results as appear to reconcile the discrepancies of former observations. I have seen the needle always disturbed when the fringes (arches) of streamers pass into the plane of the dip, but not otherwise; and this agrees with Captain Franklins' observations at Fort Enterprise, who found the needle disturbed there when the arches passed the zenith, the dip being then 86° 59′."

The needle, furnished to Mr. Farquharson by the Royal Society, was so delicately suspended as to render very sensible changes in the declination as small as 10″. In his experiments on the magnetic intensity, the intervals of time occupied in the needles' performing 50 oscillations, commencing with an arc of 12°, were noted by a stop-watch, in which the stop, being applied on the balance, is instantaneous in its operation. The watch is again released from the stop at the commencement of a new observation; thus compensating, on the principle of the repeating circle, for any inaccuracy in the reading off, or any inequality in the divisions of the dial plate.

The observations made on an Aurora Borealis, which appeared on the night of the 14th of December, have been particularly detailed by Mr. Farquharson to the Royal Society. On that occasion, the disturbance of the magnetic declination was so great, and so frequently changing from east to west, and the reverse, as to leave no doubt in the mind of the author of the reality of this influence. The needle, however, was affected at those times only when the fringes of the aurora were in a position such as to include the needle in their planes. It appeared to him also, that the side towards which the needle declined was the greater where the aurora gave out the most vivid light.

His experiments on the oscillations of the needle have not yet enabled him to determine satisfactorily whether any change of magnetic intensity accompanied these changes of direction.

From a comparison of his own with the observations of the Rev. James Paull, minister of Tullynestle, he infers that the height of an aurora, which was seen by them on the 20th, did not, at its upper extremities, exceed 4000 feet above the ground; and is led to the conclusion, that the aurora borealis is situated in the region immediately above the clouds, and therefore varies much in height, according to the different states of the atmosphere. He believes it to be an effect of the developement of electricity from the condensation of vapour. The position of the fringes, which are constantly at right angles to the magnetic meridian, their progressive movements from the north magnetic pole, and their influence on the needle whenever they come into the plane of the dip, are all of thom circumstances which establish the relation of this phenomenon to magnetism; while they at the same time illustrate the intimate connexion subsisting between magnetism and electricity.

***On the Production of Double Refraction by simple pressure; and on the origin of the doubly refracting structure; by David Brewster, L.L.D. F.R.S.L. & E.***

Dr. Brewster has lately read a paper before the Roy. Soc. of London, entitled "*On the production of regular double refraction, in the molecules of bodies, by simple pressure; with observations on the origin of the doubly refracting structure.*—The author has already shown, in former papers which have appeared in the Philosophical Transactions, that the phenomena of double refraction may be produced artificially by effecting certain changes in the mechanical condition of hard and of soft bodies. In all these cases, he observes, the phenomena are entirely different from those of regular crystals; and in none of them is the doubly refracting force a function of the angle which the incident ray forms with one or more axes given in position. In the year 1815 he noticed the depolarizing properties of a thin film, or of a mixture of resin and white wax, compressed between two pieces of glass. Accidentally meeting with the specimen which had originally been the subject of this observation, he found that after fifteen years it still retained this property of depolarization, and was induced to pursue the inquiry to which it led. He varied the proportions of the ingredients, and observed in the different cases the modifications produced in the phenomena by employing various degrees of pressure. He found that in every point their existed an axis of double refraction perpendicular to the plane of the film; and that the doubly refracting force varied with the inclination of the incident ray to this axis: just as happens with all regular uni-axal crystals. He infers from his observations, that the property of uni-axal double refraction is communicated to the molecules simply by the agency of pressure; for in all cases where pressure has not operated, the aggregate does not exhibit this property. These effects are precisely the same as those which would be produced by subjecting elastic spheres to a regular compressing force; the axis of pressure becoming an axis of positive double refraction; while extension, on the contrary, produces a negative axis.

From the consideration of the preceding facts, the author is led to a very simple explanation of the origin and general phenomena of double refraction in regular crystals. He considers this property as not being inherent in the molecules themselves; but as resulting from their compression either by an extraneous force or by their power of inherent attraction of aggregation. The phenomena of crystallization and of cleavage prove that the molecules of crystals have several axes of attraction or lines, along which they are most powerfully attracted, and in the directions of which they cohere with different degrees of force. Guided by the indications of hemitrope forms, and supposing the molecules to be spherical or spheroidal; it is inferred that these axes are three in number, and at right angles to each other, and that they are related in position to the geometrical axis of the primitive form. In like manner, the phenomena of double refraction are related to the same axis of the primitive form; and may be all rigorously calculated by a reference to three rectangular axes. The author pursues the consequences of these principles in their application to various kinds of crystals. It follows, from this theory, that the forms of the ultimate molecules of crystals existing separately, determines within certain limits the primitive form to which they belong, while the doubly refracting structure and the precise form of the crystal are simultaneously produced by the action of the forces of aggregation. These views receive a remarkable confirmation in the doubly refracting structure which the author discovered in chabasite; and they also enable us to understand the nature of that influence which heat produces on doubly refracting crystals, as discovered by Professor Mitscherlich. The optical phenomena exhibited by fluids under the influence of heat and pressure, and by crystals exposed to compressing or dilating forces, are also in perfect conformity with the above views, and would in themselves have been sufficient to establish the principle that the forces of double refraction are not resident in the molecules themselves, but are the immediate result of those mechanical forces by which these molecules constitute solid bodies.—*Lit. Gazette.*

## CATALOGUE RAISONNÉ.

### Supplement to English Botany. By MESSRS. J. D. C. and C. D. SOWERBY. London. *In Monthly Numbers.* Nos. I—VII.

The *English Botany*, carried on for a long series of years by the united exertions of the late Sir James Edward Smith and Mr. Sowerby, arrived at its termination about fifteen years ago. This admirable work stands even yet unrivalled among undertakings of a similar description; for it is the only one which attained its object of giving a coloured representation of every native plant, (exclusive of the Fungi.) British botanists have not, however, been idle since the last volume of that work closed. Many new phænogamous, and still more cryptogamous plants have been discovered, and a supplement was become highly desirable. It is true, that in the *Scottish Cryptogamic Flora* of Dr. Greville, about one hundred of the newly added *Musci* and *Algæ* have been figured; but that work could not publish the whole, and its very plan excluded the phænogamous species. Under these circumstances, therefore, we rejoice to see a supplement to the *English Botany* in progress, conducted by the sons of the late Mr. Sowerby, with the able assistance of Dr. Hooker, Mr. Borrer, and other naturalists. The names of these gentlemen are a guarantee for every thing we could wish in the descriptive department. We wish we could as heartily praise the execution of the illustrations, which are, for the most part, both in point of engraving and colouring, of an inferior order. Such plates as t. 2616, (*Woodsia ilvensis*), and t. 2627, (*Grimmia saxicola*), in particular, the public have a right to complain of.

In regard to the interesting plants which have already found a place in the pages of the Supplement, we have not space to enter upon any discussion. We are truly glad to find that Mr. Borrer has taken up the difficult genera *Salix*, *Rubus*, and *Rosa*; several have been figured, and we trust he will be able to throw some light on subjects which hitherto have existed in what may be called "darkness visible." By the way, in No. 7. there is a plate of *Rubus macrophyllus*, from "woods, thickets, and hedges," in Sussex. By some oversight, Professor Lindley's *Synopsis of the British Flora*, where the plant is first described as native, is not quoted. Mr. Lindley's station is "hedges in North Wales." It appears to be more frequent in Scotland, especially in Dumfrieshire, where Sir William Jardine, Bart. detected it four years ago; and in the neighbourhood of Edinburgh, where Dr. Greville found it in the course of the same year.

### *Des Gros Blocs de Roches, &c.* On the large Boulders which are found scattered over Formations of very different Characters. By COUNT G. RASOUMOVSKY.—*Ann. des Sciences Naturelles, Oct.* 1829.

From an examination of the boulders scattered over the plains of Northern Europe, the author thinks that it is necessary to admit the existence of two or of several currents, unequal in mass and in length; and further concludes that, by the same violent revolution which gave birth to them, the waters that covered the high mountains at that period were driven in different and often opposite directions; to different and more or less considerable distances; in variable quantities; and with various degrees of force, of inclination, and rapidity.

*Memoire sur le Fait, &c.* Memoir on the Facts of the Division of Formations, into a great number of beds of different characters. By Jobert, Senior.—*Ann. des Sciences Naturelles, Nov.* 1829.

If we admit that the formations of fresh water have been found in the lakes that deposited successive mineral beds, we are led by reasoning to seek for the ancient borders of these lakes. We may even conceive it possible to determine their primitive depth, and to fix the level of the waters. Mr. Jobert, considering the most universal ingredient of the deposits in the essential base, establishes that the successive precipitation of the lacustrine marles has been troubled at nearly periodical intervals. The cause is represented by the shales and sandstones; and, in the absence of these, by the line of separation of the calcareous beds.

The author considers that the calcareous matter of the tertiary formations has been furnished from the interior, brought to the surface by springs, and spread in the basins. The sandstones and shales he considers to be derived from superficial decomposition, and carried away by atmospherical waters. Thus, by admitting alternate dry seasons and seasons of rain, we should have the key of these phenomena. The theoretical opinions are supported by some remarkable analogies.

*Considerations Theoriques, &c.* Theoretical Considerations on the Caverns with Bones, at Bize near Narbonne, (Aude); and on the Human Bones found mingled with the remains of Animals belonging to lost species. By Mr. Tournal, Jun.—*Ibid.*

The researches of Mr. Christol have confirmed the opinion that the existence of man had not been separated from that of lost species of animals; and, further, that he had lived with much more ancient species, which would characterize the antediluvian population. The caverns of Bize, like those of Gard, contain species of lost animals mingled with human bones and pottery; but those of Bize having been filled after those of Gard, present a different population, having greater analogies with that of the present epoch. Mr. Tournal adopts the opinion of Constant Prevost, and thinks that it is quite unnecessary to have recourse to catastrophes and supernatural phenomena to explain such simple effects.

On the Falls of the Niagara, and on the Physical Structure of the Adjacent Country. By Mr. Robert Bakewell, Jun.—*Loudon's Magazine of Natural History*, No. XII.

The formations between lakes Erie and Ontario consist of close-grained and subcrystalline gray limestone, a dark argillaceous limestone and shale beneath. The limestone precipices are covered with alluvial sands. Mr. Bakewell, on the authority of a gentleman residing in the vicinity, states, that the falls have, within these last forty years, receded from 40 to 50 yards. The distance from Lake Erié to the Falls is 25 miles, from the Falls to Lake Ontario 7, which if the above maximum of the ratio were constant, would give 9850 years for the period in which they have been retrograding to where they now are. The paper is illustrated by interesting sketches.

Annuaire du Bureau des Longitudes, for the year 1830. Paris.

In addition to the ordinary information on tides, measures, weights, and coins, which this useful annual usually contains, some interesting documents on mortality, and on the changes of population in Paris, and in the kingdom of France, by Mr. Mathieu; scientific notices by Mr. Arago; a continuation of his account of steam-engines, relating principally to their accidents; a sketch of Elié de Beaumont's view on the relative age of the different mountain chains of Europe; and a notice of some of the re-results of Mr. Pentland's researches in Peru.

## Zoological Researches and Illustrations. By J. V. Thompson, Esq. F.L.S. &c.—No. III. Jan. 1830. Cork. King & Ridings.

This new number of Mr. Thompson's publication contains a memoir on the *cirripedes* or barnacles. In the language of a man mentally diseased, the author announces the discovery of the larva of the *Balanus pusillus.* Mr. Thompson, in a former number, advanced the opinion that the cirripedes belong to the crustacea; and he considers that a confirmation of his views is met with in the present discovery.

Amongst the captives procured by a small muslin towing-net, was a nondescript little translucent animal one-tenth of an inch long, of a somewhat elliptic form, but very slightly compressed laterally, and of a brownish tint. When in a state of perfect repose it resembles a very minute mussel and lies upon one of its sides at the bottom of the vessel of sea water in which it is placed; at this time all the members of the animal are withdrawn within the shell, which appears to be composed of two valves united by a hinge along the upper part of the back and capable of opening from one end to the other along the front, to give occasional exit to the limbs. The limbs are of two descriptions, viz. anteriorly a large and very strong pair, provided with a cup-like sucker and hooks, serving solely to attach the animal to rocks, stones, &c. and posteriorly six pair of natatory members. The tail which is usually bent up under the belly is extremely short, composed of two joints, and terminates in four setæ, and is employed to assist in progression and in changing the position from a state of repose. The greatest peculiarity however in the structure of this animals is the eyes, which although constantly shielded by the valves of the shell, are pedunculated as in the Crab and Lobster, and placed anteriorly at the sides of the body."

Having placed some specimens in a glass of sea water, after some days he found that two of them had thrown off the exuvia, and were firmly adhering to the bottom of the vessel, and changed into young barnacles; and afterwards another individual was seen in the act of throwing off its shell, and attaching itself as the others to the bottom of the glass.

"In this stage the sutures between the valves of the shell and of the operculum were visible, and the movements of the arms of the animal within, although these last were not yet completely developed; the eyes also were still perceptible, although the principal part of the black colouring matter appeared to have been thrown off with the exuvium. As the secretion of calcareous matter goes on in the oompartments destined for the valves of the shelly covering, the eyes gradually disappear, from the increasing opacity thence produced, and the visual ray is extinguished for the remainder of the animal's life; the arms at the same time acquire their usual ciliated appearance."

The number terminates with an addendum on a previous memoir on Nebalia.

## *Beschreebung des Koenigreichs Wurtemberg.*—Description of the Kingdom of Wurtemberg, published by order of Government, by the Professor Memminger, Member of the Royal Board of Statistics, and of Topography. Cah. 1—6.

This work may be considered as an authentic statistical and topographical account of Wurtemberg. By the plan adopted each department will be separately described, and will form the matter of a volume, accompanied with a map of the department from surveys executed by order of government. Every care seems to have been taken to complete a work which will leave very little to be desired in point of geographical information on the kingdom of Wurtemberg.

*Novæ Plantarum Species descriptæ et iconibus Illustratæ,* Auct. C. A. Meyer, (*Mem. of the Acad. of Morou,* T. VII.)

Mr. C. A. Meyer gives the following descriptions of three new species of plants brought home by Eschscholtz: *Claytonia sarmentosa*; sarmentosa; foliis nervosis; radicalibus oblongis obtusis, petiolatis; caulinis ovato, sub-cordatis amplexicaulibus distinctis; racemo terminali solitario ebracteato; petalis emarginatis. From the island of St. George: *Claytonia stolonifera*; caule erecto ramoso basi stolonifero foliis subsessilibus oblongo spathulatis, acutis, subnervosis, racemis subcorymbosis lateralibus ebracteatis; petalis integerrimis. From Unalaschka: *Ribes tubiflorum*; inerme; pilis glandulosis, demum deciduis; foliis adultis cordatis quinquelobis, subtus pubescentibus; racemis subspicatis terminalibus cernuis; calycibus tubulosis pubescentibus, bracteam superantibus; petalis suborbiculatis. From California.

*Voyage autuor du Monde, &c.*—Voyage round the World, executed by order of the King, in his Majesty's Corvette the Coquille, during the years 1822 to 1825. By L. Duperry, Captain of Frigate, Commander of the Expedition.—*Zoology*; by Messrs. Lesson & Garnot.—Parts XII. & XIII.

The 12th part of the geological department of this important voyage contains among the reptiles: Agama Molucana, Less.; Calates Chilensis, Less. Lophyrus Brasiliensis, Less.; Coluber Ikaheca Less.; from New Guinea.; The fish it contains are: Squalus Maou, Less.; from the Archipelago of the Pomotous. Cirrhites Pantherinus, Cloq.; from the island of Mauritius. Diacope macolor, Less.; from New Guinea. Julis quadricolor, Less.; from the island of Taiti; and the Julis semidecorata, Less., from Mauritius.

The 13th part is entirely devoted to animals of the lower classes to the Zoophytes, and the execution of the plates is next to that of the great work on Egypt. It contains: Eumindes Ophiseocoma, Less.; Zoanthe thalassanthos, Less; Actinanthe florida, Less.; Actinia Sanctæ Helenæ, Sanctæ Catharinæ, Peruviana, Capensis, Chilensis, and dubia, Less.; besides eight more new species of Actinia. The Physala Atlantica, Less., (Phy. pelagica, Lam.); P. Australis, Less, (Melagista, Peron and Less.); a plate of Vevellæ representing the V. mutica, Lam., and the V. cyanea, Less.

Geological Map of the north-west of Germany, composed of 24 sheets. By Mr. Fr. Hoffman, Berlin, 1829.—200 *francs*.

Professor Hoffman has proposed to himself, in this map, to represent the local departition and the connexion of the rocks which cover the surface of the north-west of Germany, and to give precise notions of the mineral riches of the country which it represents.

This map is also to serve as a basis to a geographical acquaintance with the country, the conformation of the land, the nature of the soil, and climaterial relations which depend on these. The facts collected by this naturalist, in a great number of excursions made during the last eight years, joined to the results of unpublished researches made by other skilful observers, would make us augur favourably of this great work, whose graphic representations will be derived from the chorographic map of Germany, and adjacent countries, by Reymann and Berghaus.

Notes on the Formation of extensive Conglomerate and Gravel Deposits. By Henry T. de la Beche, F.R.S. &c.—*Philosophical Magazine.* No. XXXIX.—*March,* 1830.

A short and rather imperfect inquiry into the extent of the causes at present acting on the surface of the earth. The action of tidal seas on their coasts, according to the author, is to pile up at one point the detritus of rocks which they wash away in another. Shingle beaches travel in the direction of the prevalent winds, or those which produce the greatest breakers, but there is no evidence of their being transported outwards, or into the depths of the ocean. It is rarely that pebbles on shingle beaches are found to have travelled considerable distances even along shore; shingle beaches are formed on sea shores from the harder parts of the neighbouring coasts, destroyed by the joint action of atmospheric agency, land springs, and the sea.

On the coasts of tideless seas and lakes there are also shingle beaches, but we do not see their bases, and they are of inferior dimensions.

*Action of rivers on their beds.*—Fragments of rock fall into the bed, the rock may be undermined, and these are the materials of gravel. This gravel cannot be carried far; short and rapid rivers bear pebbles into the sea, but when they are long and slow they transport mere sand or mud.

*Tidal rivers* most frequently keep their mouths open, though there is always a tendency to form bars and sand banks. When the force of the current is considerable, the tides small, or the seas not much subject to storms setting in shore, they form deltas. Tidal rivers, when small, have a tendency to be blocked up by the sea; in these cases the sea rejects the detritus it receives from the river, and forces it back with the cliff detritus upon the land.

The discharge of rivers into tideless seas generally tend to push forward deltas before them; torrents alone bear pebbles into these seas. On high and mountainous coasts gravel may be deposited in deep waters, and remain quietly at the bottom.

## PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

### EDINBURGH.

*Royal Society.—March* 1. Sir Walter Scott, Bart. in the Chair. Dr. Knox read No. II. of his series of Papers, "illustrating the laws which regulate Hermaphroditical Appearances in the Mammalia."

*March* 15. Dr. Knox concluded his papers on Hermaphroditical Appearances in the Mammalia.

Professor Christison read a paper, which he intimated to the Society was the first of a series of experimental essays on the Physiology of the Blood and Respiration.

*Royal Physical Society.—Feb.* 24. 1830. Mr. Ainsworth read a paper on the evidence derived from the Animal Kingdom, of a change in the climate of the Northern Regions.

*March* 3. A. Holroyd, Esq. F.L.S. F.Z.S., read a notice of some rare Animals recently added to the Collection of the Zoological Society of London.

D. Wotherspoon, Esq. F.S.S.A. communicated some Observations on the Falls of the Niagara.

*March* 16. A series of experiments on the Ammoniacal Amalgam, tending to disprove the metallic nature of Nitrogen; with observations, on the opinions of recent writers on the subject, were made by Mr. K. T. Kemp, Lecturer on Chemistry.

Mr. Hargreaves read a paper on the Mechanical Effects of the centre of Gravity.

Observations were then read on the various modes by which it is conceived that the Deluge was produced, by Mr. John Murray, lecturer on chemistry.

*March* 17. An extensive collection of Shells was presented to the Society, by Mr. Fraser of Newington.

Mr. Ainsworth exhibited a specimen of Mountain Rock, occurring in contact with a Basalt Dyke near Newhaven.

Messrs. Murray and Ainsworth were appointed to report upon it.

Dr. Halkerston read an essay on the properties and use of the Muriate of Soda.

Mr. Cheek read an essay on the progressive developement of organization in relation with the conditions of existence.

*March* 24. Mr. John Murray and Mr. Ainsworth reported, the former on the Chemical Composition, the latter on the Mineralogical Characters of the Rock found in contact with the Basalt Dyke near Newhaven, and usually considered to be a Clinkstone or Clinkstone-Porphyry.

Mr. John Edmonston read a notice of some peculiarities in the Dentition of a Rabbit, with an exhibition of the Skull.

*Wernerian Society.—Feb.* 20. An account of several new species of Grouse, recently discovered by Mr. David Douglas among the Rocky Mountains, was read by James Wilson, Esq.

The Rev. Dr. Scot read an essay on the Mustard Plants mentioned in the Gospels.

Also read, an account of some Fossil remains found near Kilmarnock, by Dr. John Scouler. Vid. Ed. Journ. of Nat. and Geog. Science, No. VII. p. 4.

*March* 6. A notice regarding the Hya Hya, or Milk-tree of Demerara; by James Smith, with botanical notes by Walker Arnott, Esq. was read. Vid. present Number, p. 61.

Also was read an essay on the question whether Domestic Poultry were bred among the ancient Jews; by the Rev. Dr. Scot.

*Horticultural Society.*—Thursday a quarterly general meeting of the Caledonian Horticultural Society was held in the Physicians' Hall—Sir Henry Jardine, Senior Vice-President, in the Chair. The Earl of Leven and Melville, Sir John Hay of Smithfield, Bart., Mr. Innes of Stow, and several other distinguished members of the Society, and promoters of the art of Horticulture, were present. The following prizes were awarded :—

For the best specimen of blanched Succory, raised in a cellar or dark out-house, or in a hot-house, pit, or frame, to Mr. William Oliver, gardener to the Earl of Rosslyn at Dysart House.

For the six newest and rarest hardy plants, cut specimens in flower, to Mr. Alexander Forrester, gardener to David Falconer, Esq. of Carlowrie.

For the best eight hyacinths, either in flower-pots or in water-glasses, red, blue, white, and yellow, two of each, to Mr. William Mylne, gardener at Drum to Gilbert Innes, Esq. of Stow.

For the best six stalks of forced Rhubarb, raised by a market gardener, to Mr. William Inglis, gardener to Wester Warriston.

No competitor appeared for the premium offered for Hyacinths, which had also flowered in Scotland in the preceding year; but an extra prize was awarded for a number of very fine Hyacinths, grown in a novel manner, by Dr. Adolphus Ross, in his drawing-room. A quantity of moss, classically called *hypnum*, and vulgarly *fog*, was placed in a water-tight box, about eight or nine inches deep, into which the bulbs were placed in the end of September, without mould, and duly watered. The result of this experiment was highly favourable, and Sir Henry Jardine, in moving that an extra medal be awarded for this novelty, complimented Dr. Ross on its success, for which the Doctor, who was present, returned his acknowledgment.

Another extra prize was awarded to Mr. John Mathison, gardener to the Lord Register of Scotland at Arniston House, for a fine specimen of Rampions (*Campanula Rapunculus*,) used as a sallad, and also as a second course vegetable.

A very beautiful specimen of a new variety of the Seville (bitter) Orange, which grows to a large size, was sent from the garden of Mr. Buchanan of Drumpellier, grown by Mr. Thomas Carsewell, his gardener. The fruit was attached to a small bough, and close by the fruit was a flower, which rendered this specimen of the orange-tree a curiosity.

Besides the competition flowers, a great many very fine hyacinths were exhibited from Drum Garden. A number of early tulips and hyacinths were sent from the Experimental Garden, as a very beautiful plant of *Azalea Ledifolia*, or White Chinese Azalea, which is one of the handsomest of the tribe, the flower petals being larger than those of the more common kinds, and of a pure paper white. An excellent specimen of the *Phænecoma Prolifera* also graced the table of the Hall, which, both in point of beauty and fragrance, was, considering the early period of the year, as well decorated as we ever recollect to have seen it.

Three ordinary and two corresponding members were admitted, and the meeting adjourned.

## LONDON.

*Royal Society.—Feb.* 11. A paper was read "On the twelfth axiom of the first book of Euclid;" by Viscount Mahon. Also, "A further inquiry into the comparative infrequency of calculous diseases among sea-faring people, with some observations on the frequency of these diseases in Scotland;" by A. Copland Hutchinson, Esq.

*Feb.* 18. A paper was read, entitled, "Observations made with the invariable pendulum, (Jones') No. 4. at the Royal Observatory, Cape of Good Hope, for the purpose of determining the compression of the earth;" by the Rev. Fearon Fellows, astronomer of the Cape Observatory; communicated by the Lords of the Admiralty, who also communicated a notice of a meteor observed at the Cape of Good Hope, 19th October 1829, in a letter from Captain Ronald, assistant-astronomer at the Cape Observatory.

Read also, a memoir on the developement of Functions; by J. Walsh, Esq.

*March* 4. A paper was read, entitled, "On the efficiency of Steam-Engines;" by Davies Gilbert, Esq.

*Linnean Society.—Feb.* 2. A paper was read, entitled, "The natural history of Petrophila, a lepidopterous genus in its larva state, inhabiting rivers, and furnished with branchiæ;" by the Rev. Lansdown Guilding, B.A. F.L.S. &c.

A paper was also read, "On the Functions of the Leaves of Plants;" by J. H. Dallas, M.D. F.L.S.

*Geological Society.—Jan.* 15. A paper was read, entitled, "On the Fossil Fox of Œningen, with an account of the lacustrine deposit in which it was found;" by R. J. Murchison, Esq. Sec. G.S. &c.

*Feb.* 15. A letter addressed to the secretary was read, entitled, "On the animal remains found in the Transition Limestone of Plymouth;" by the Rev. Richard Hannah, F.G.S.

Also was read, a paper "On the gradual excavation of the valleys in which the Meuse, the Moselle, and some other rivers flow;" by G. Poulett Scrope, Esq. F.G.S. F.R.S.

## PROVINCIAL.

*Natural-History Society of Newcastle.*—The sixth meeting of this Society was held on Tuesday evening, 16th February, Mr. Gibsone in the chair, when a paper by Dr Johnston was read on the locomotion of molluscous animals; also observations and a scientific description of a new species of swan, by P. J. Selby, Esq. one of the vice-presidents of the society. This swan was discovered by Mr A. R. Wingate of Newcastle, from a specimen sent to him to be preserved for the Museum, and was described by him in a paper read to the Society in October last; it has been called *Cygnus Bewickii*, in compliment to the memory of their late talented townsman, whose name, as Mr Selby observes, " will for ever be associated with British Ornithology." To illustrate this paper, there were several beautiful drawings made by Mr Selby, and it was understood at the meeting, that he had also offered to engrave them himself for the forthcoming part of the transactions of the society. A notice by Mr M. Dunn, of the Kilkenny 4-foot coal-seam was read. Also an extract from a memoir by Dr Duncan, describing the remarkable appearances exhibited upon the laminæ of a freestone quarry at Corn Cockle Muir, in Dumfries-shire, supposed to represent the impressions of the feet of different animals which had walked upon it, when the stone was an unconsolidated paste. Casts of these very curious impressions were presented to the society by Henry Witham, Esq. who also presented a valuable collection of crystallized carbonates and sulphates of lead from Lead Hills. Mr John Taylor, of West Boldon, presented some beautiful insects and minerals from New South Wales; and it was reported that 70 birds had been presented since the last meeting by different gentlemen, to all of whom a vote of thanks was passed.

At the seventh monthly meeting of this Society, letters were read from the York Philosophical Society, from Mr John Taylor of London, from an agent of the Earl of Lonsdale, and other gentlemen.

Mr Robinson presented a piece of Magnesian Limestone, with the impression of a fish, and a few remaining scales.

A paper was read from Mr Michael Forster, containing observations on a Basaltic Dyke found at Cockfield, and the effects produced by it on two seams of coal in the neighbourhood.

A catalogue of land and fresh-water *shell animals*, found in the neighbourhood of Newcastle, (45 land and 26 fresh-water,) with remarks by Mr Joshua Alder, was also read.

The Earl of Lonsdale was elected a vice-president of the Society.

## FOREIGN.

*Academy of Sciences.—Meeting of December* 28. Mr Serullas was elected to the seat, vacant by the death of Mr Vauquelin.

The professorship of Chemistry being also vacant, in the Garden of Plants, by the death of the same person, Mr Chevreul was elected.

Mr Durand addressed, through Geoffroy St Hilaire, a memoir on a bicephalous child, born in the department of the Pyrenees.

Mr Cordier presented a memoir of Mr Marcel de Serres, relative to a discovery of several Fossil Bones found in the cavern of Faujan.

Mr Heron de Villefosse presented a work of Major Muller's, on the inundations which occurred in the commencement of 1825 on the coasts of the Northern Sea, as well as on the banks of rivers, which empty themselves into it.

Mr Geoffroy St Hilaire reported verbally on a work of Mr Bourdon, entitled, Letters to Camille on Physiology.

*Jan.* 4. Mr Dumeril was nominated Vice-President of the Academy.

Mr Thenard reported in his name, and in that of Mr D'Arcet, on the procedure employed by Mr Chevalier to remove the black crust on old buildings. It consists in washing them, alternately with a very weak solution of muriatic acid and water.

Mr Thenard made another report on a memoir of Mr Payen, relative to the fabrication of Plaster.

Mr Cauchy reported favourably on a memoir of Mr Voisard, relative to questions of Mathematical Analysis.

Mr Ad. Brongiart read a memoir, entitled observations on the developement of Carbon in the Graminæ, and on the modifications which it determines in the parts of the plant which it attacks.

*Jan.* 11. Dr Herpen of Metz communicated to the Academy the results of his researches on the employment of Hydrochloric Acid in cleansing ancient buildings.

Mr Mathieu communicated a letter, addressed from Toulouse to Mr Arago, by Mr D'Aubuisson, containing the indication of the state of the Thermometer in that town during the late great Frost.

Mr Frederic Cuvier made in his name, and in that of Mr Molard, a favourable report on a procedure employed by Mr Barbier to write and read in obscurity, and adapted to the instruction of the blind.

Mr Charles Dupin read a memoir, forming part of the continuation of his labour on the Revenues of France in the nineteenth century.

*Jan.* 18. 1830. Mr Despretz stated several important chemical results to which his labours have led him.

Mr Mathieu reported favourably on a memoir of Mr Daussy, hydrographer, being the determination of the geographical position of Cairo, Alexandria, and several places in the Mediterranean.

A memoir of Mr Dutrochet was read, relative to the circular motions observed in waters enclosed in tubes unequally exposed to the action of heat and light.

Mr Julia de Fontenelle presented a memoir on the conservation of grains, and the formation of *Silos.*

Mr Dumas addressed a memoir on the formation of pus in the lymphatic vessels of the uterus, and in the prelombair ganglions, after three child-births.

*Jan.* 25. 1830. Admiral Roussin was elected to the seat, in the section of geography and navigation, vacant by the decease of Mr. de Rossel.

Mr Dupuytren reported on two works, containing the results of the surgical operations practised by Professor Vincenzio Andreini, in the great hospital of *Sainte Marie la Neuve* in Florence, from the year 1824 to 1829.

Mr Dutrochet wrote to the Academy to communicate some new facts relative to the influence which light exerts on the motion of liquids.

Mr Bussy requested the Academy to open a sealed packet, deposited with them in August 1828. He announced that it contained chlorure of glucinum, and metallic glucinum, obtained by the decomposition of chlorure.

Mr Becquerel read a memoir on some new electro-chemical effects adapted to the production of compounds, and on their application to the crystallization of sulphur and other substances.

Mr Cauchy read a memoir on the determination of the primitive roots in the theory of numbers.

Mr Adrien de Jussieu read a memoir on the group of Meliaceæ, in which he doubled the number of species known in the present day.

*Acts of the Geographical Society.—Meeting of the 6th Nov.* 1829. Mr Bottin is requested, by the central commission, to examine and report upon a table of the industry of the *Departement du Nord,* that Mr Marc Jodat proffered to the Society.

Mr Jouannin read a fragment of his journal of an excursion which he made into Bithynia, in the autumn of 1825.

Mr de la Pylaie made a communication on the limits between the Agnotes and the Corisossites or Corisopitenses, that is to say the people of Quimfer. He gave some details on the splendour of the ancient city of Talenta, and the total disappearance of its remains.

*Nov.* 20. The Baron de Capellen sent an official and detailed relation of the earthquake that overthrew, in 1823, one of the most fertile parts of Java. He added an hydrographical plan of the country when the eruption took place.

Colonel Boune is appointed to report on a memoir sent by Captain Sabine, on the recent observations made by Mr Hansteen in Siberia, on the intensity of terrestrial magnetism.

Mr Jomard communicated two letters, the one from Mr. C. Moreau, the other from Mr. John Barrow, containing notices of the Planisphere in the British Museum, which is an exact copy of the map of Fra Mauro, painted in 1459, in the church of St Michel of Murano, in Venice.

The president announced that Mr Dard is about to establish himself in central America, where he is anxious to be of use to the Society. Mr Warden will give him instructions.

Mr Barbié de Bocage communicated an official note on the division of Brazil into eighteen provinces.

Mr Bottin reported on Mr d'Espagnol's project on the statistics of the department of the Ariége.

## LITERARY NOTICES.

Mr R. P. Lesson is about to publish, Zoological Century, or Selection of Rare Animals, new or imperfectly known, with 100 plates from original drawings by Mr Prêtre; there will be 20 parts, each part 6 francs, in royal 8vo. Paris. Levrault.—Mr Seringe is preparing Collections of 100 Specimens of the Plants of Chamouni, and mountains neighbouring Mont Blanc, 1 vol. 4to. price 30 francs. Geneva.—Belenger is about to publish his Travels in India, in 3 vols. 4to. with an Atlas; they will be published in parts, 12 francs each; the zoological and botanical part to be divided into 15 parts, of which 8 will be zoological. —Travels in the Morea; by W. M. Leake, F.R.S.—Four Years' Residence in the West Indies; by F. W. N. Bayley, Esq.—Travels in Russia; by Edward Morton, M.B. are announced as in progress of publication.

### *List of New Books.*

Synopsis Hepaticarum Europæarum, J. B. G. Lindenberg, in 4to. 133 pages. Bonn.—Tableau des Terrains, &c. A. Brongniart, 8vo. 435 p. Paris and Strasbourgh, 1829.—Pluto oder Vertheidigung des Buches, die Unterwalt, 8vo. Leipzig, 1829.—Geognostische Profile, &c. Baron de Schwerin, 1st part, 6 maps in royal 8vo. 220 p. Munich.—Carte Geologique du Departement des Calvados; by Mr. de Caumont.—Geognosie des Terrains Tertiares; by Marcel de Serres, in 8vo. 276 p. 7 fr. 55 c. Montpelier and Paris.—Gebirg's Profil, &c.; by Professor Huggy. Soleure.—Geognostisches Gemælde von Deutschland, &c.; by Ami. Boue, and published by Leonhard, in royal 8vo. 623 p. 8 plates. Franckfort.—Memoires Geologiques et Metallurgiques, sur l'Allemagne; by Mr. Mâues, 8vo. 35 p. Paris.—Elemens pratiques d'Exploration; by C. R. Brard, 1 vol. 8vo. 32 plates, 584 p. 12 fr. Paris.—Symbolæ Physicæ seu Icones et Descriptiones Mammalium, &c. Hemprich and Ehrenberg, Decas 1. in fol. Berlin.—Observations de Avium Arteria Carotide communi; C. Nitzsch, 26 p. 4to. Halle. —Travels in various parts of Peru; by Sir Edmond Temple, 2 vols. 8vo.—Letters from Nova Scotia; by Capt. William Morrison, 1 vol. 8vo.—Travels in Kamtschatka, Siberia, and China; by P. Dobell, Esq. 2 vols. 8vo.

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.

THE

# EDINBURGH JOURNAL

OF

# NATURAL AND GEOGRAPHICAL SCIENCE.

MAY 1830.

## ORIGINAL COMMUNICATIONS.

### ART. I. *On the Native Forests of Aberdeenshire.* By the Rev. J. Farquharson, F.R.S.—*(Concluded from* p. 13.)

The facts now detailed may be deemed sufficient to account for the generally very limited life of the cultivated fir, and to suggest a very simple and obvious remedy for the evil. But lest it might be accounted too rash to rest a principle of such important practical application on a basis so limited, it may be necessary to adduce, as it is very easy to do, some additional facts in support of it, and a brief detail of some analogous examples.

Thus, for instance, it is a notorious fact that the trees of the outside rows of all our plantations of Scotch fir, are not subject to the same early death that overtakes those of the interior. Surrounded on all hands by numerous and very extensive plantations, the outside rows of which extend to very many miles, I have uniformly observed that these continue so healthy, that it was with some surprise I observed, during last summer, one instance of failure among them in my immediate neighbourhood. These outside trees have free room to extend themselves proportionally to their natural growth, on one side at least, and therefore fix themselves firmly in the ground, and acquire the dense foliage necessary to their perfect health. There are now standing, in good health, within a mile of this place, two outside trees of a recent plantation, the rest of which was cut down about twenty years ago. According to information I have received, this plantation had been made a little after 1740; and previously to 1788, a great natural death of the trees had taken place in its interior. The outside rows, however, continued healthy till after nearly all the rest had perished, but were cut down at the finishing sales, with the exception of the two to which I have referred. The plantation was about eleven acres extent, on good dry favourable soil.

There is, within a quarter of a mile of the manse of Alford, a plantation of Scotch firs of 40 acres, of about 47 years standing, the condition and progress of which I have had the fullest opportunity for observing during twenty-eight years; and as there are many circumstances attending them entirely confirmatory of the views above given, some of these will be now detailed.

Within the limits of this plantation, there are some patches of marshy ground, too wet for the habits of the Scotch fir, and which remain therefore clear of trees; but the larger part of the ground is quite dry, and of tolerably good soil. In 1800, when I first knew it, the young trees were all healthy, and occupied all the dry ground. The whole southern part of it had been planted of the usual thickness, and towards the middle, where the best soil occurs, formed an almost impenetrable thicket. In some places at the north side they were much thinner, and had evidently been so from the beginning, either from design, or, what is more probable, from accident,—as for instance the failure of some of the plants from being planted too late in the season, a case which may be often observed in the plantations now making. The divisions of the thick and thin planted trees passed into each other by insensible degrees. About the year 1807, a few of the trees of the thickest part of the plantation died, and were carried out for firewood, and the destruction of this part has gone on since, from year to year, to such an extent, that there are now two or three acres quite cleared of trees in the place which affords the best soil, and which, in 1800, formed the closest plantation; and, as the proprietor was desirous of saving this plantation, few trees have been cut here, but those that were already dead, or evidently dying. In addition to the complete destruction of this part, the mischief has penetrated into, and is now fatally making progress in, every place where the trees are much crowded together; and it has been very easy to observe, that it has been hastened or delayed in exact proportion to their thickness or thinness. It has not occurred to any extent in the thin parts of the north side, and there is in particular one part, at the north-east corner, where the trees had originally more room than elsewhere, in which few or no trees have died naturally; but where, on the contrary, they have now assumed the dense foliage and clear bark of the tops and branches, which mark a tree fairly established for a long and healthy growth like a native tree. It is farther to be observed, regarding this plantation, that in addition to the outside rows of trees continuing healthy,—those which have margined the patches of swampy ground,—have generally continued so likewise; and many of them have the appearance of living, if permitted by the axe, to a great age.

There are many other plantations in this neighbourhood, which furnish ample ground for remarks of a nature entirely similar to these; and if it is not generally known or remarked, that those parts of our plantations of fir which are planted thin, continue generally healthy in comparison with those that are thick, this arises from the circumstance, that, upon the natural failure of a considerable number of trees in any part of a plantation, it is considered as having reached its period of growth, and the salesman is sent into it, who, to suit his customers, cuts the thick and thin planted trees promiscuously, as they are required, and the latter have thus no opportunity to evince their superiority.

I had various opportunities for noticing, on an estate named Balmoral, belonging to Lord Fife, on the south side of the Dee, opposite to Crathy, that where the young native forests incidentally come up too thick on the ground, the trees are subject to the same early death that so generally overtakes those of our plantations.

An unusual proportion of the young native trees are double, or even triple. On examining them I was led to believe, although it was often not easy to be sure, that they were not two or three leaders from one root, but two or three distinct plants growing probably from the same cone. It is a great error not to single these when they are quite young, as few of them promised serviceable timber, and they probably die early, for I perceived few resembling them in the aged forests. If this be their fate, their numbers are so great as to make a great drawback in the produce.

It is surely a correct induction from these facts, that the cause of the fir trees of our plantations living so short a period in comparison with those of the native forests, is the unfortunately prevailing practice of planting them too thick in the ground. The proper extent of the remedy to this evil, which is evidently to plant thinner, will however admit of some discussion, and may perhaps, in the end, be determined only by experience.

On examining the few groups that occur among the large trees at Haughton above described, to ascertain how they have filled the ground, and what space has been necessary for their free growth, it is apparent that, where most checked by each other in their lateral branches, they still require a free space from stem to stem of 12 or 15 feet. At this rate 250 or 350 trees, were they all to arrive at maturity, would be amply sufficient for a Scotch acre, instead of the 2000 or 3000, or upwards, allowed by the present system. It is evident that this great diminution of the number of trees, would immensely diminish the expense of planting,—a matter very desireable where the returns are so remote as to this species of outlay. But then it may be said that, if the trees are so thinly planted at the beginning, there will be none to supply the place of those who either die or are destroyed by accident. Let us, in answer to this, examine our present young plantations, where we scarcely ever see an example of natural death among the trees, till they have become so large as to kill each other,—a case which will never occur in the thin plantation; and as to accidents, all may be guarded against by proper fencing, excepting the breaking down of the trees by heavy falls of snow, and our present plantations equally show, that seldom any extensive or very fatal injury may come from this. Even granting that a few trees should be now and then destroyed by the snow, would it not be infinitely better to apply an after remedy for the evil, by planting a young tree in place of the broken one, than by planting more than enough, to ensure the early destruction of all, especially considering with what facility and dispatch the most extensive plantations of thin planted trees might be examined, to have their deficiencies, if any, supplied? And it forms no material objection to this plan, that, in that case, there would be a young tree in place of one of equal age with that destroyed; for as it is only during a few early years of their growth that the trees are liable to suffer from snow, only a few years would be lost at the worst.

Another objection to the thin planting is, that the trees, instead of forming tall clean trunks of serviceable wood, will be apt to run too much into branches, assuming the appearance of bushes instead of trees. This, it must be acknowledged, will take place for some years; but it will be in the appearance only, and not in the reality. The young trees at the skirts of the native forests, which generally come up thin on the ground, at least at first, continue closely feathered with branches for several years; and this circumstance is probably the cause of, or at least closely connected with, their future great health and long endurance; for these numerous branches, covered with foliage, are the lungs of the plant, supplying it with vigour to establish itself firmly in the soil. But then, in the mean time, the leading shoot is not idle, but making as large additions to the height yearly, as that of a more confined tree could make, perhaps larger. The lower branches at last wither, and die upwards in succession, and at last the beautiful stems and clean wood of the aged trees, clearly demonstrate that no injury had arisen from the branches that so long clothed them in their youth. The large trees at Haughton, standing most of them much more remote from each other than it is here proposed to plant, and many of them even, properly speaking, solitary trees, have yet most of them lofty stems of very clean serviceable wood, rising, without a branch, much above the brushwood that surrounds them, and highly fit for all the ordinary purposes of deals or roofing.

It is an objection of very trifling moment, that the young plantation would for a few years look very meagre from not concealing all the ground. This temporary deformity of thin planted wood, is probably one reason for the almost universal adoption of thick planting. Most of the early plantations having been made in the immediate neighbourhood of gentlemen's residences, as much with a view to ornament as utility, it may have been desireable to make the trees cover the ground as speedily as possible, for which purpose thick planting would naturally be had recourse to. But in the course of a very few years, the healthy and natural aspect of a thin plantation would form a much finer object than the unnatural formality of an overcrowded one can ever present, and a short delay would be thus in the end amply compensated.

Nor in point of shelter would a thin plantation be exposed to any comparative deficiency. It is not while the trees are yet very young that they stand much in need of shelter; but only after they have attained a considerable height, to expose them to the power of the wind, as is quite evident from their thriving well, for a few years, in lofty and exposed situations, where they afterwards fail to come to any considerable size or value; and by the time that a plantation, containing 300 trees in a Scotch acre, attained a height of 15 or 20 feet, it is more than probable that it would have more power to disperse and break the current of air in a storm than a close planted one, over the even and uniform tops of which the current makes its may with almost equal facility as over a smooth field, to break, with unmitigated velocity and unbroken volume, into any opening where its power may be hurtful. Besides all this, the thin planted trees would possess the immense advantage of having got a firm hold of the ground, which, too many examples prove, the trees of the close plantations never attain.

It is an expedient of very doubtful success to thin too close plantations with the axe. If it is had recourse to very early and vigorously, some examples that I have noticed seem to prove that it may succeed. But in this case it would be extremely difficult to show what good purpose the supernumerary trees have served, while they have added greatly to the expense, first in planting them and then in cutting them down. If the application of the axe is long delayed, there is the greatest hazard of bringing on the same injury by it that arises from the natural death of some of the trees,—that is, exposing the surviving trees to the effect of the wind, which the conditions of their own tall growth and feeble roots unfit them to resist. Besides there are not wanting facts to demonstrate, that, under this system of management, the rotting roots of the trees cut down, are highly injurious to the survivors. I shall state one or two of those that have come under my notice. In this immediate neighbourhood, a considerable number of years ago, the site of an old plantation, then recently cut down, and full of decaying fir roots, was included within a larger plantation then made, and planted along with it. The young trees speedily died on the site of the old plantation, and it still remains totally bare of wood. In the year 1813, I cut down, in the garden here, a very old and large apple-tree, which produced only a worthless apple. The centre of the root was dug out, but its lateral branches were allowed to remain. The ground that had been occupied by it was thoroughly manured and limed, and included in a division of the garden, which was then filled up with a plantation of gooseberry and red and black currant bushes. A young apple-tree was also planted among these, not very remote from the site of the old one. The bushes and tree prospered well for about six years, and the former got into full bearing; but in the summer of 1820, just as the crop was getting into maturity, three of the gooseberry bushes near the site of the old tree suddenly died, and afterwards, for a continuance of seven years, some additional bushes, both of the gooseberries and the red and black currants, yearly died around the same place. The young apple-tree also perished, and several young bushes, planted to fill the vacant spaces, suffered the fate of the older ones; so that at this moment 1828, there now exists, in the middle of the plantation of bushes, a vacant circle of about 35 feet diameter, having for its centre the site of the old tree. On digging some trenches in this space for celery, three years ago, some roots of the old tree were incidentally dug out, and were found covered and penetrated by a tough viscid species of fungus, which I have not sufficient knowledge to describe, and on examining the root of one of the red currants, then recently dead, it was found deeply infected with a similar fungus.

It might be objected to the first example now adduced, that the failure of the trees on the site of the old plantation, was owing to the exhaustion of the ground by the former wood, and not to any injurious effect of the decaying old roots. But no such objection can lie against the second; for there the ground had been thoroughly enriched by a large application of manure, which was indeed frequently renewed after planting the bushes; so that it must be admitted as incontestible evidence of the generation of positive disease in live trees by the contiguity of dead and decaying roots.

It is probable that the larch will now, to a great extent, supersede the Scotch fir in the plantations of our granite country, which it well deserves to do, owing to its more vigorous growth, its thriving in a more elevated situation, and the early perfection and excellence of its wood.* Those of them earliest planted here, are generally found skirting gentlemen's lawns, and dispersed through small belts, where they have had often room enough. In some few places where they are more confined, their comparative vigorous condition shows that they bear crowding much better than the Scotch fir; and being deciduous, they are much better calculated to elude the force of the winter storms, than trees covered with a dense foliage. They are accordingly rarely uprooted by the wind, and would probably, although planted very thick, not suffer ultimately from that circumstance in the same degree as our Scotch fir plantations. Yet the habit of thick planting is so extensively and

* I stated an instance of the early perfection of its wood in former notes I sent you. The wood of the Scotch fir of the same age, 40 years, would not have lasted more than 5 or 6 years, instead of 16, during which it has continued exposed to the weather almost without decay. I will here state an example of the superior vigour of its growth, exhibited in a plantation of mingled larches and Scotch firs, very near this place, 18 years old. I have measured some of both kinds, growing under equal circumstances, and exhibiting a fair average of their relative vigour through the whole plantation. The larches are 25 feet high, and the Scotch firs 20 feet; and at one foot above the ground, the former are 30 inches in circumference, the latter 21 inches.

inveterately established, and so fully extended to the recent larch plantations, that some of them are already evidently suffering in consequence; and unless the habit is changed, the greatest disappointment will probably follow. The result of some observations that I have made on a few groups of larches, of about 60 years of age, is an estimate that they should stand at least 10 feet from stem to stem, at which rate about 540 trees would fill a Scotch acre. This tree is more spiry in the top, and evidently does not require so much room as the Scotch fir. This estimate, it is to be observed however, extends only to trees of 60 years, and will probably prove too many per acre for older trees. I take the opportunity of mentioning, that the larch is liable to the attacks of an insect, which has occasionally threatened great destruction in this valley, but has never caused in the end any extensive or permanent mischief.

6. Regarding the age of the finest native firs. The finest native trees are in a forest named Glenbeg, belonging to Invercauld. I have measured them in many places indiscriminately,—upwards of 40 feet girth,—of course some picked ones larger. I have stated the age of the finest trees at upwards of 200 years, wishing to confine myself much within the extreme limits, of which indeed I am not absolutely assured. I could find no opportunity personally of counting the rings of growth of any tree that could be deemed one of the greatest age among them; but was assured by a gentleman who lives on the spot, that he himself had reckoned rings to the amount of 250, and had evidence, on which he could rely, that within these few years some trees had been cut having about 300 rings.

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ART. II. *Account of the Series of Islands usually denominated the Outer Hebrides.* By William Macgillivray, A.M. &c. —(*Continued from* Vol. I. p. 411.)

### Sect. III.—*Climate.*

Science has hardly yet extended her influence to these remote islands. The proprietors seldom reside on their estates; the factors are busily occupied in replenishing their patrons' coffers and filling their own; and the ministers, the only other class that might be expected to make meteorological observations, we may suppose, are too keenly employed in looking after their flocks, and attending to their farms, to trouble themselves about thermometers and barometers. For these reasons, I can only speak of the climate of these islands from my own observation, and the little that I have to say on the subject is so vague as to be scarcely worth saying. Of the daily, monthly, or mean yearly temperature, I am not aware that any thing is known. The mean temperature of six springs in Harris, taken from the 2d to the 7th of June in 1820, I found to be $48\frac{7}{10}$, that of the air at the times of observation being $51\frac{7}{9}$.

The climate, speaking vaguely, is extremely varied. Spring may be said to commence about the 20th of March, when the *Draba verna*, in the few places where I have seen it, begins to unfold its blossoms. *Ranunculus Ficaria* seldom flowers before the first week of April; and it is not until the end of May that the pastures present any continuity of verdure. From the beginning of July to the end of August is the season of summer. Winter commences about the end of October. The spring is generally dry, with piercing easterly winds, which blow about the loose sand to a great extent. Of the summer it can only be said that it is frequently very wet and cold, seldom presenting a continuation of dry weather. During this season westerly and southerly winds prevail, and during the rest of the year, almost all the hard gales are from the same quarters. From September to the middle of October, the weather is generally good. Thunder is seldom heard in these islands in summer and autumn, but not unfrequently accompanies the first winter storms. The winter is extremely disagreeable, with frequent rains and storms; but the cold is not excessive, and it is seldom that snow lies long upon the ground, especially on the lower parts of the hills. The cattle remain in the open air during the whole winter, and to protect them against the inclemency of the climate, nature has furnished them with an abundant pile.

### Sect. IV.—*Soil.*

The soil of the Outer Hebrides exhibits little diversity, and may be reduced to three species, of which, however, there are several varieties. The predominant soil is *peat*, which, indeed, may be said to extend from one extremity of each island to the other, excepting where it is interrupted by the projecting rock, and the stripes, varying in breadth, of *marine sand*, which skirt the western shores. In some of the glens and hollows, there is also a small quantity of a *clayey* soil, mixed with a kind of gravel, generally consisting of angular fragments of gneiss. I shall now speak particularly of these three species, mentioning at the same time some of the plants which grow in them.

1. *Peat Soil.*—It is an opinion very generally held among geologists and agriculturists, that peat is chiefly confined to those low and level tracts which are usually denominated peat-mosses. The idea, however, is manifestly erroneous, as is shown by the circumstance of peat being cut as fuel in various parts of the Highlands at a great elevation,—in the Braes of Balquhidder, for example, at the height of upwards of 2000 feet, upon the summits of the mountains, where it exists more abundantly than on the declivities or in the valleys. In the Island of Barray it is cut at a height of 1000 feet, and on the farm of Scarista, in Harris, at a height of upwards of 1500; in both cases on the sides of mountains. In the whole

range, in fact, peat soil is to be seen at the very summits, and in all intermediate situations, down to the shores. It is also a prevalent opinion that peat is formed chiefly of decayed trees; but in none of the numerous varieties of peat met with in the Outer Hebrides, have I seen any indications of such an origin.

The most common kind of peat in these islands is of a spongy texture, composed almost entirely of the roots of *Scirpus cæspitosus, Carices, Junci,* and *Eriophora.* It is generally more or less continuous at the surface, and generally occupies the gentler slopes and lower tracts. The pasturage yielded by the plants of whose partially decayed roots this variety of peat is formed, is well adapted for summer grazing, and the moors of this description are the most valuable in the Hebrides, although in winter they are generally wet.

Beneath this more spongy peat, there is generally a layer, more or less deep, of a darker, more compact, and less fibrous kind, from which the natives extract their fuel. Peat of this kind also occurs in the lower parts of valleys and hollows, where it presents an irregular surface, formed of tufts of heath elevated above the general level, surrounded by mud, and in winter generally converted into islands. The pasturage in these low bogs is of the worst description, and cattle not unfrequently perish by sinking in the mud, as they attempt to pass from one tuft to another. The lower tracts of Lewis and North Uist present abundant examples of this kind of soil.

When the depth of soil is not great, and the declivity considerable, the peat is generally of a light brown, somewhat earthy appearance, friable when dry, and much impregnated with iron, leaving a great quantity of reddish ashes when used as fuel. The common ling, and in many places *Erica cinerea,* are the predominant plants which this variety yields. Towards the summits of the mountains, again, where the peat is still thinner, the pasturage is generally better, consisting of *Carices, Junci,* and *Scirpi,* with less heath, and numerous alpine plants.

The aspect of the vegetation, however, is little diversified over the whole range of islands, although a very long list of species, besides those mentioned, might be made out. Ling, heath, and *Carices,* are every where the prevailing plants. In some parts *Melica cærulea* is extremely abundant, and although rather a rank grass, affords good pasturage for cows and horses.

When the peat soil is mixed with the clay or grit which has originated from the disintegration of the gneiss rocks, the vegetation is greatly improved, presenting a copious intermixture of grasses and other plants.

The clayey soil which occurs in some of the valleys, and along the declivities, seldom presents itself unencumbered by peat, and is hardly deserving of particular notice. It however forms a stratum intermediate between the rock and the peat soil of the surface, extending over considerable portions of the islands. In an agricultural point of view, however, this layer is of little importance, and none of those gravelly or clayey subsoils, so common in the low country of Scotland, under a thin layers of moss, occur in the Hebrides; for which reason, it must be borne in mind, that the methods of improving land so successfully followed there, can never be practised in these islands.

But the most important soil consists of sea-sand, which forms a belt extending along the whole western coast of the range. It would appear that the bottom of the sea, along the western coasts of these islands, is almost entirely composed of sand, being only in some places interrupted by rocks. The water is seldom deep, and for this reason extensive tracts of sand are laid bare when the tide has receded. Barray is separated from South Uist, and North Uist from Harris, by a shallow channel, the bottom of which is chiefly of sand. Between South Uist and Benbecula, and between the latter and North Uist, there is a channel at high water, of considerable breadth; but at low water one passes from the one to the other over a tract of pure sand, along which run one or more stripes of water, collected from the dregs of the tide left in the sands, and the rills which enter from the hills. These sands are with propriety called fords. In some places, a valley formed between mountains or high land, has been, as it were, filled up by sea sand, so as to form a continuous and almost perfectly level plain. From a pool formed at the upper part by the water from the hills, there issues a stripe, which generally runs along one of the sides of the sand, and the latter is barricadoed on the side next the sea by a ridge of sand, in which there is only a single gap, which affords ingress and egress to the tide.

Numerous bays occur, the beaches of which are also of this sand, and in them it has generally accumulated in heaps, a little above water-mark. These heaps, having been acted upon by the winds, have furnished the materials of extensive tracts of comparatively level ground, which extend between the shores and the hills. These tracts have but a very small proportion of vegetable soil intermixed; and although in summer and autumn they are covered with a profuse and highly diversified vegetation, they present nothing in winter but a dreary waste of drifting sand.

One of the most singular appearances presented by these sands, is when a more or less level expanse, covered with thick verdure, has been corroded by the action of the weather on the side next the sea, so as to exhibit numerous creeks and bays, with sloping and sometimes nearly perpendicular faces. This expanse has at a former period extended towards the sea, from which its indented and abrupt edges may now be at a considerable distance, the intermediate space being occupied by loose sand.

The sand of these shores consists almost entirely of broken shells, aud is generally coarse, although it varies greatly in the size of the grain. The coarsest grains are always found at high water-mark, where there is generally a great accumulation of shells. It is not easy to determine whether the sand consists of fragments of the shells which occur abundantly along the coasts at the present day, or not, although the close inspection of it discloses nothing that might indicate a different origin. Considerable quantities of unbroken shells occur interspersed in it, often at great distances from the shore. These entire shells belong to the *Patella vulgata.* In some places the sand, in the vicinity of the shore, has become concrete, and in this state presents the appearance of a coarse-grained sandstone.

The violent gales of wind which frequently occur, scatter the sand in all directions, and often to a great extent. The sand-drift from the east coast of Pabbay, for example, passes over the island, which is about a mile in breadth; and the same takes place in Berneray, where it comes from the west coast. By this drifting, an intermixture takes places on the slopes of the hills with the peat soil that occurs there, forming compound soils of various fertility; and wherever there is the least proportion of sand, the vegetation is obviously improved. Accordingly there is the greatest difference, in point of vegetation, between the eastern and western sides of the range. While the former are covered with heath and *carices,* the latter present pasturages of great beauty, composed of numerous species of the most nutritious plants.

### SECT. IV.—*Of the Vegetation.*

The circumstance that most strikes a person who visits these islands for the first time, is the total absence of woods, and, as it would appear to the superficial observer, even of trees. The botanist, however, on searching the ruts along the course of the streams, the rocky shores of the lakes, and the islands which the latter frequently present, finds here and there a few diminutive specimens of several of our more common trees. The species which I have observed in such places are the following: Populus tremula, Betula alba, Corylus Avellana, Alnus glutinosa, and Pyrus Aucuparia. In the island of Lewis, not far from the manse of Keose, there are the remains of a birch wood, the stunted bushes of which occupy a considerable extent of ground. I have seen a few trees of birch in the Forest of Harris about twenty feet high, and many poplars from six to fifteen feet; but these were merely shoots from old roots which remained in the crevices of rocks. Pinus sylvestris had formerly grown in the Forest of Harris, where some of its stumps still remain projecting through the moss, their roots being invariably in the subjacent clay or gravel.

The other woody plants which occur are the following: Juniperus nana, Rubus fructicosus, Rosa tomentosa, Lonicera Periclymenum, Vaccinium myrtillus, Arbutus Uva-ursi, Empetrum nigrum, Calluna vulgaris, Erica cinerea, E. tetralix, Myrica Gale, Salix arenaria, S. repens, S. rupestris, and several other species. Of the Juniperus, it is worth observing that, although abundant in many parts, occurring frequently at the level of the sea, it nowhere presents the characters of the common species, but always remains a procumbent or prostrate shrub of diminutive size, producing berries nearly double the size of those of the other, more pulpy, and less pungently aromatic. The willows are all very small, although, in the deficiency of better materials, the people cut them for wicker-work.

Calluna vulgaris is the predominant plant on the heaths, to which it imparts its brown colour; but Erica cinerea is also abundant in some places. In the grassy pastures of the small islands, the latter assumes a very beautiful appearance, its flowers being increased in size, and its stems greatly diminished, so that at first sight it might strike one as a different species.

Numerous Carices, Scirpus cæspitosus, Eriophorum vaginatum and augustifolium, Melica cærulea, Nardus stricta, Agrostis vulgaris, Aira flexuosa and caryophyllea, occur abundantly on the heaths. The other more common plants observed there, are, Tormentilla officinalis, Pinguicula lusitanica, P. vulgaris, Drosera rotundifolia and longifolia, Pedicularis sylvatica and palustris, Melampyrum sylvaticum, Orchis bifolia and maculata, Gnaphalium dioicum, Ranunculus Flammula, Narthecium ossifragum.

The mountains, towards their summits, present the ordinary alpine vegetation of the mainland of Scotland. Among the species which I have observed in such positions, are the following: Saxifraga stellaris, nivalis, and oppositifolia, Cerastium alpinum and latifolium, Oxyria reniformis, Thalictrum alpinum, Statice Armeria, Plantago maritima, Alchemilla alpina, Silene acaulis, Apargia Taraxaci, Rhodiola rosea, Lycopodium Selago. A variety of Thymus serpyllum, of large size, remarkable for its total deficiency of smell, is very common on the summits of the mountains. It is also singular that Luzula maxima should occur at the height of upwards of 2000 feet, which it does on the summit of Ben Capval and other mountains, in great profusion, but seldom producing flowers.

The plants which occur in or upon the banks of the lakes upon the heaths are the following: Nymphæa alba in lakes with a muddy bottom, and not deeper than four or five feet, the most beautiful of the Hebridean plants; Nuphar lutea, observed in lakes in North Uist, but extremely rare; Lobelia Dortmanna, by the margin of lakes having a gravelly or pebbly bottom, very common; Sparganium simplex, not common; S. natans, somewhat rare; Poa fluitans, Menyanthes trifoliata, Equisetum limosum, E. palustre, Carex riparia, Potamogeton natans, P. lucens, P. heterophyllum, Scirpus lacustris, S. palustris, Litorella lacustris, Subularia aquatica. The latter plant I have only seen in one place, at the southern extremity of Loch Langavat in Harris.

Of the rarer plants which occur on the heaths, may be mentioned, Osmunda regalis, not unfrequent near lakes; Valeriana rubra, rare; Poa decumbens: Utricularia intermedia, found in Glen Ulladil; Ajuga pyramidalis, found at Creag Bhrist in Harris.

In a few places where there are remains of trees, there still occur some species of plants peculiar to woods, such as Oxalis Acetosella, Luzula pilosa, Vicia sylvatica; the latter I have seen only in the Glen of Rodell.

The rocks, although generally bare, are in some places abundantly crusted with lichens, among which Parmelia omphalodes, saxatilis, and parietina, Alectoria jubata, Ramalina fastigiata, Sticta scrobiculata, Lecanora tartarea, and many others, are particularly abundant.

Along the line of high water, on the sandy beaches, the plants which occur are the same as in other parts of Scotland. Cakile maritima, Salsola Kali, Atriplex laciniata, Chenopodium maritimum, &c. In the island of Barray, Pulmonaria maritima occurs in this situation, and in North Uist, Eryngium maritimum.

The plants which grow in the loose sand accumulated into heaps, are also such as are observed in similar situations elsewhere: Arundo arenaria, Triticum junceum, Festuca duriuscula. Elymus arenarius, which is of very rare occurrence, is, on account of its great size, and its resemblanee to Arundo arenaria, named by the natives "the mother of bent."

It were an almost endless task to enumerate the species which grow in the sandy pastures, which in summer present a diversity of flowers unrivalled by any that I have seen in Scotland or England. I shall, however, mention the more important species. Galium verum occurs in great abundance, and in searching for its roots, which afford a red dye, the people have often greatly injured the pastures. Daucus Carota is also extremely abundant, as are Thalictrum minus, and Raphanus maritimus. Of the latter, Dr. Walker remarks that it is greedily eaten by cattle, but I have frequently observed its large, close-pressed leaves left entire by them, when they had cropped bare the surrounding herbage. The grasses which occur in these pastures are the following: Bromus mollis, Aira cristata, Arundo arenaria, Holcus avenaceus, Cynosurus cristatus, Lolium perenne, Triticum junceum, Poa compressa, Festuca ovina and duriuscula, Poa pratensis, and Triticum loliaceum, the latter rare. The leguminous plants are the following: Vicia Cracca, V. lathyroides, Lathyrus pratensis, Trifolium pratense, repens, procumbens, and minus, Lotus corniculatus, and Anthyllis vulneraria. Together with these occur a multitude of plants with flowers of all colours, such as Achillea Millefolium, Bellis perennis, Matricaria Chamomilla, Erythræa Centarium, Gentiana campestris, Ranunculus bulbosus, Satyrium viride, Orchis latifolia, Polygala vulgaris, Prunella vulgaris, and Potentilla Anserina.

In the hollows where water lies in winter, and along the streams, large patches of Iris Pseudacorus are seen, forming the favourite haunts of the landrail, a bird extremely abundant in these islands.

The junction of the sandy and heathy soils presents a vegetation which, although not possessed of the varied tints which adorn the former, is greatly superior to the pasturage afforded by the latter.

The plants which occur here are chiefly Junci, Carices, some grasses, Orchis maculata and latifolia, together with numerous others, in enumerating which I should only be repeating names familiar to every one.

It is remarkable that neither the broom nor the whin occur in any part of the range in an indigenous state. The latter was planted at Rodell many years ago by the proprietor, and at Stornoway by a Mr. Sinclair; and in neither place has it shown the least tendency to propagate, although the plants have attained a large size.

The plants which occur as weeds in cultivated ground are the following: Raphanus Raphanistrum, Sinapis arvensis, Papaver dubium, Chrysanthemum segetum, Spergula arvensis, Stellaria media, Senecio vulgaris, Lamium purpureum, Matricaria Chamomilla, Anagallis arvensis, Chenopodium album, Urtica urens, Erodium cicutarium, Lycopsis arvensis, and various other species.

It is only necessary further to mention the few rare plants which I have observed. Scilla verna is extremely abundant in the pastures of the mainland of Barray. Juncus arcticus occurs along the west coast of North Uist and South Uist in great abundance. Oeanthe crocata is also abundant along the rivulets, as is Hippuris vulgaris in the marshes. Orobanche rubra grows at the head of the sand of Northtown in Harris, upon a gneiss rock named Creag Camna. Pinguicula lusitanica and Leontodon palustre, are more common than P. vulgaris and L. Taraxacum. Rhodiola rosea, Ligusticum scoticum, and Asplenium marinum, are very abundant upon the maritime cliffs. Draba incana grows on the granite vein of Ben Capval in Harris. Viola lutea is common in the sandy pastures.

Many plants, on the other hand, which are common in almost every other part of Scotland, are not to be seen in the Outer Hebrides, or are so rare there as to be looked upon as curiosities. Of the former, for example, are Veronica Chamædrys, Geranium pratense, Symphytum officinale, Primula vulgaris, Viola palustris; and among the latter are Digitalis purpurea, which is nearly as rare as the common sparrow, a bird to be seen only in the ruins of an old church at Kilbar, in Barray; and the whin and broom already mentioned.

By the botanist there are doubtless many rare and interesting plants to be discovered in these islands, which, in as far as I know, have not been visited by half a dozen persons who could botanically discriminate between a daisy and an ox-eye. To the agriculturist they must appear sterile in the highest degree. The grazier, however, will find that the pastures of the west coast are inferior to none in Scotland; and the vegetation of many of the small islands, has the quality of fattening sheep in a very remarkable degree. It would afford matter of astonishment to most persons residing in agricultural districts, to be informed that an island a mile in diameter, one-third of which is covered by sand, and at least a sixth bare rock, while the vegetation on the remaining part is never four inches high, should maintain two hundred black cattle, a hundred horses, and four or five hundred sheep, and yet this has been the case with the island of Pabbay, in the sound of Harris. The cattle of the small tenants are indeed stunted and ill-favoured; but this is caused by overstocking, and the degeneracy arising from preserving the breed unmixed; and where a judicious management has been adopted, the cattle of the Outer Hebrides have proved inferior to none in the neighbouring districts.

In conclusion, it may be observed that the great mass of the vegetation is the same as that which occurs in other parts of the country, although the absence of wood, furze, and broom, the diversified tints of the sandy pastures on one side of the range, and the general heathy vegetation of the eastern side and interior, make up together a picture very different from that exhibited by most parts of the mainland of Scotland.

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ART. III. *Description of a new Torricellian Air-Pump, with a Plate.* By K. T. Kemp, Esq. Member of the Royal Physical Society, &c.

The air-pump, as an instrument for philosophical investigation, yields to none either in the variety or importance of the discoveries to which it has led. By means of it we have become better acquainted with many of the phenomena of nature,—such as the pressure of the atmosphere,—the cause of evaporation,—the nature of sound, &c. It likewise constitutes an important part of the steam-engine itself.

Since it was first discovered, it has undergone many modifications, and has been greatly improved: at present, when constructed in the best manner, it may be said comparatively to be a very perfect instrument.

In every construction the end to be attained is the same, viz. the removal of as great a portion of air as possible from within an inclosed vessel or receiver. The more perfect the pump is, the better will this be effected.

In the air-pump of the common construction, the barrel and piston both contain a valve opening upwards, which depend entirely for their action on the elasticity of the air within the receiver. If we suppose the piston to be at the top of the barrel, and the air within the barrel and the receiver to be of the same density, when the piston is made to descend, the density of the air in the barrel is increased, and the air, by this means, forces open the valve in the piston, and escapes into the atmosphere. When the piston is again raised, its valve is shut by the external pressure of the atmosphere, and the air in the receiver, by its elastic force, opens the valve, and flows into the barrel, until an equilibrium is restored. This exhaustion goes on until the elasticity of the air within the receiver becomes so weak as to be incapable of raising the valve of the barrel.

It is evident that a pump on this construction cannot exhaust to any great extent, because a certain force is necessary for opening the valves, and this power is only obtained by the elasticity of the air remaining in the receiver.

This limit to exhaustion is caused much sooner, too, on account of the quantity of air which necessarily remains between the under surface of the piston and the bottom of the barrel, from the impossibility of bringing their surfaces into close contact, along with another quantity, insinuated among the leathers of the piston, expanding and filling the barrel at every ascent of the piston, as no part of it can be expelled through the piston valve, until it has arrived at the density of the atmosphere.

This portion, then, which, on this construction, cannot be got rid of, always acts as a counter force on the elasticity of the air within the receiver, and completely prevents any farther exhaustion.

Various methods have been proposed for carrying the exhaustion to a greater extent, but that adopted by Cuthbertson in the construction of his pump, is by far the most perfect.

The valves in this construction act independently of the atmosphere altogether, and are opened by the working of the pump. In this manner the exhaustion can be carried to a much greater extent, as the elasticity of the air within the receiver has no force to overcome in lifting the valves, but has merely to flow into the barrel till an equilibrium is restored. Another peculiarity of it is, that the atmosphere is completely excluded from the upper surface of the piston, and a vacuum in consequence is formed there.

When the exhaustion therefore is carried to a high degree, the air contained between the under surface of the piston and bottom of the barrel, along with that among the stuffing of the leathers, will be of the same density as that portion contained in the upper part of the barrel, which may be four or five hundred times rarer than that of the atmosphere. When the piston, therefore, again ascends, the barrel is filled with air of this high rarity, and it consequently admits of a new portion of air to flow in readily from the receiver. Now, in every other construction, the portion of air between the surface of the piston and bottom of the barrel being of the density of the atmosphere, when the piston is raised, it just expands and fills the whole barrel with air of a considerable density, which effectually prevents any great degree of rarefaction from taking place.

The excellence of the principles on which Cuthbertson's air-pump has been constructed, has not been sufficiently appreciated, otherwise we should not see individuals coming forward with their improvements on the air-pump founded on the most exploded and unphilosophical principles, and asserting that they are capable of producing an equal degree of exhaustion with his.

In every air-pump, however, where valves exist, from the imperfection of their construction and from their wear, they are always admitting minute portions of air to return into the receiver. The evaporation of the oil also tends to destroy the perfection of the vacuum in cases of high rarefaction.

Various attempts have been made to obviate this; among others, that of employing mercury to form the vacuum, whereby every particle of air would be expelled; but the difficulty attending the opening and shutting of the valves, has completely prevented any form of mercurial air-pump from being used.

In the plan of the mercurial air-pump which I now propose, the action of the valves is entirely dependent upon the motion of the pistons in the working of the pump, A Torricellian vacuum is produced in the exhausting vessels at each stroke of the piston, whereby a much greater degree of rarefaction takes place in the receiver than by any other means. In this arrangement, the exhausting vessels may be considered as occupying the place of the barrels in other pumps. Plate II. Fig. 1. represents a front view of the pump, where the barrels, exhausting vessels, piston rods and racks, are seen in their situations. IWXK is a strong wooden frame-work, on the under part of which, XK, rest the barrels of the pump. RS is a strong transverse bar for fastening the barrels in their situation. CD is another wooden bar, upon which the two exhausting vessels, F and G, are placed. HH are two tubes leading from the exhausting vessels F and G, which unite, and then proceed to the pump plate, which is supported on the transverse frame W. The tubes HH carry each a floating valve *m*, which both open into the exhausting vessels.

VV are the piston-rods with their racks. Behind the piston-rods, rises a tube from the under part of each of the barrels, A and B, which enters the exhausting vessels F and G. One of these tubes, E, is seen in section in Fig. 2. N and P are two tubes connecting the upper parts of both barrels with the exhausting vessels, N connecting the barrel B with the exhausting vessel F; the other, P, connecting the barrel A with the exhausting vessel G.

Fig. 2. is a section of the pump, where one of the barrels, exhausting vessel, and different tubes communicating with them are more distinctly seen. A is one of the barrels, which may be formed of cast iron or glass, so as not to be acted on by the mercury. R is a solid piston, with its rod *c c* attached, passing up through an air-tight stuffing of leathers, above which is placed a small cup, *d*, containing mercury, to prevent the insinuation of air through the leathers, at the top of the barrel A. D is the rack joined to the piston-rod. EE is an iron tube leading from the bottom of the barrel A, to the glass exhausting vessel F. In the upper part of the exhausting vessel F, is placed a cup and floating valve, G, opening outwards. HH is a tube leading from the pump plate L into the exhausting vessel, having at its extremity a float-ball, and valve, M, opening into the vessel F. P

is a tube proceeding from the upper part of the barrel A, and terminating in the other exhausting vessel G, as is seen in Fig. I. where it joins the upright tube that connects the under part of the barrel B with the vessel G, Fig. 1. N, Fig. 2. is also a tube proceeding from the upper part of the barrel B, Fig. 1. which joins the tube EE, Fig. 2. and terminates in the vessel F.

The under part of the barrel A, along with the upper part of the barrel B, communicate with the exhausting vessel F, and the under part of the barrel B, along with the upper part of the barrel A, communicate with the exhausting vessel G.

The capacity of the barrel A, when its piston is at the top, and that of the barrel B when its piston is at the bottom, must be precisely equal to the capacity of the exhaustiug vessel F, and a portion of the valve cup G; and in like manner with the other exhausting vessel and barrels.

Suppose now, the barrel A, having its piston at the top, along with its tube EE, to be both filled with mercury up to its entrance into the exhausting vessel F; and that the barrel B, Fig. 1. having its piston at the bottom, and its tube N, coming from the top of the barrel, both filled with mercury up to the entrance of the tube into the exhausting vessel F. When the piston R descends in the barrel A, Fig. 2. and the piston of the barrel B consequently ascends, the mercury is forced through the tubes EE and N, into the exhausting vessel F, and shuts the float valve M, at the termination of the tube HH, which leads to the receiver, and effectually prevents any air from returning by that passage. As the mercury rises, it completely expels the air through the valve G, which is provided with a cup, to admit of a portion of the mercury flowing in and floating the valve. The under part of the barrel B, and the upper part of the barrel A, are now in like manner to be filled.

Upon the next stroke, the piston R of the barrel A ascends, and a vacuum being produced in the under part of the barrel A, and upper part of the barrel B, a portion of the mercury contained in the cup G, passes through it into the exhausting vessel F, until the float valve regains its place. A sufficient portion of mercury, however, remains in the cup to seal it effectually against any return of air. As the mercury descends, a perfect Torricellian vacuum is formed in the upper part of the vessel F, and the air in the receiver, by its elasticity, forces open the valve M, against the tendency of the mercury to retain it in its place, which rushes up to supply the vacuum. When the mercury has descended to the bottom of the vessel F, the float-ball, carrying the valve M, falls about the 1-16th of an inch, and allows the air from the receiver to flow freely into the exhausting vessel. In like manner, at every succeeding stroke, the mercury rises in the exhausting vessel, and forces out the air by the valve G, and as the elasticity of the air in the receiver becomes gradually weaker as the exhaustion proceeds, none of it can pass from the receiver until the mercury has descended below the level of the valve M, when it falls out of itself, and thus admits free access to the air from the receiver to restore the equilibrium: and as this takes place at every stroke of the pump, when the air has even arrived at a very high state of rarefaction, there is nothing whatever to prevent it from passing along the tube H from the receiver to the exhausting vessel.

The tube HH being terminated at the bottom of the exhausting vessel, effectually prevents any return of air through the valve into the receiver; and as the cup wherein the valve G is placed, always contains a portion of mercury, no air can return into the exhausting vessel without first forcing this through, which never can take place while the pump is in working order.

By an air-pump of this construction, we can produce a much greater degree of rarefaction than when pistons and valves are used; for here the pistons do not directly produce the vacuum, this being dependent on the ascent and descent of the mercury into the exhausting vessels, where a Torricellian vacuum is produced at each stroke of the pump.

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## ART. IV. *Description of a New Species of British Fish.* By CAPTAIN THOMAS BROWN, F.L.S. &c.*

### PLATESSA CARNARIA,
### *The Flesh-coloured Fluke.* Plate III.

Head very large, being a third of the length of the fish, to the insertion of the caudal fin; eyes on the right side; irides orange, the nictiating membrane green; behind the eyes, the head is covered with prickly scales. Body ovate, the upper side covered with very small, smooth, concave adherent scales; flesh-coloured, with irregular deep rose-coloured distant spots. A fillet of small sharp fasciculated spines, run longitudinally at the junction of the dorsal and anal fins. Under side smooth, convex, and silvery white.

Length $5\frac{1}{2}$ inches, breadth $3\frac{1}{4}$ inches.

This species was procured, along with a quantity of the *Platessa flesus*, or common fluke, from Prestonpans. At first I considered it as merely a variety of that species, but it differs, in being much shorter in proportion to its breadth; in being more convex on both sides; in the head being greatly larger, measuring 1 and $\frac{5}{8}$ths of an inch, or exactly a third of the whole fish, exclusive of its tail fin: whereas the body of the *flesus* is half a head longer. The dorsal fin consists of sixty, and the ventral fin of forty-one rays; while the former of the *flesus* has only fifty-five, and the latter forty rays, and they are considerably different in their external shape. This of itself is a sufficient specific distinction.

* Read before the Royal Physical Society April 7. 1830.

# SCIENTIFIC REVIEWS.

*Two Essays on the Geography of Ancient Asia, intended partly to illustrate the Campaigns of Alexander and the Anabasis of Xenophon.* By the Rev. John Williams, Vicar of Lampeter, and Rector of the Edinburgh Academy. Murray. London. 1829.

Amongst the many literary and scientific publications which have issued from the shop of Mr. Murray in the course of his career as a bibliopolist, the work before us is none of the least valuable. Its learned and reverend author is well known to the public as the historian of the modern Jews, and the biographer of Alexander the Great, whose talents as a general, whose success as a conqueror, and expanded views in the promotion of science, literature, and civilization, (which latter were unhappily frustrated by his premature death,) worthy the pupil of the philosopher of Stagyra, have secured him deathless fame, have established for him

> " ——— Claram et venerabile nomen
> Gentibus—
> " — Quod nec Jovis ira, nec ignis
> Nec poterit ferrum nec edax abolere vetustas."

For both of these works, Mr. Williams has obtained a well-earned reputation, and received his due meed of praise from those best qualified to appreciate his labours and estimate their worth.

The publication now before us is intended as a sequel to the work on the Macedonian hero, for the purpose of illustrating several of his marches, particularly those from Babylon to Susa, from Susa to Persepolis, and from Persepolis to Ecbatana, and to fix the relative sites of these interesting cities. But by far the most laborious part of his work, is to illustrate the marches of Xenophon in that immortal work the Anabasis,—a work more generally read than his memorabilia of Socrates, and as much so as his biography of the elder Cyrus, but less understood than both. His main purpose, in the first essay, is to identify the ancient Ecbatana with the modern Ispahan, and in the latter to fix that of Opis,—a position which has been well denominated the opprobrium of modern geography.

The miscellaneous nature of our monthly Journal, prevents us from discussing the work at any length, and doing that justice to it which its importance, as an intended illustration of ancient geography, demands. To do the one or the other, would require an extended dissertation on each of the subjects, equal to the work itself,—a work so replete with collateral discussion, though evidently subordinated to the main topics. All we can do is to give an outline of the two essays, and subjoin a few remarks. The work abounds in classical and geographical erudition; so much so, indeed, that most of his readers will be able to follow him, *sed longo* *intervallo,* and hence Mr. Williams needs not to be surprized if this work be less popular, if popular at all, than his two preceding publications. Though it require talents of no ordinary magnitude to compose a well-arranged, close-connected, and perspicuous narrative, it requires but very ordinary mental powers to follow it, the road being rendered smooth and easy. But in discussion the case is quite different. It requires no great labour to read and understand the historical works of a Hume and a Ferguson, a Robertson and a Gibbon, but to read, where one is perpetually compelled to think, the philosophical works of a Hume, an Edwards, and a Brown, *hic labor, hoc opus est.* Where the mind is kept in a state of continual tension, the exertion is painful, and can only be duly appreciated by those who have been accustomed to such toil, and to examine what they read. Without the former, the latter is comparatively useless. It is an old and true adage, "that much reading stores the memory." *Memoria augitur excolendo* is in the mouth of every schoolboy, and is carefully inculcated on his mind as a necessary preliminary to literary excellence. But it would be equally proper to inculcate another maxim, *Judicium augitur excolendo,*—the necessity of cultivating the judgment,—that mental power which enables us to discriminate what we read and what we remember, and by the habitual exercise of which we become gradually fitted to encounter works where much discussion is necessarily required, and that with comparative ease. The study of comparative geography is an arduous task, and requires no common powers. Both worlds, if we may so speak, must, as it were, be brought together before the mental eye, and both must be accurately viewed before we can understand the mutual correspondencies, and fit them accordingly. But this can only be done by him, who, by painful labour and study, has made himself well acquainted with both. The study of each by itself is easy; but to make them reflect mutual light is the grand difficulty. Two great impediments have hitherto opposed the successful study of that branch of knowledge,—the comparative ignorance of the ancients themselves in geographical science, their unacquaintance with the geography of such countries as lay without the limits of their own country at the time they wrote,—and the confused, rambling, indeterminate, and inconsistent language which they use, when the geography of particular countries is the subject, whether incidentally or professedly. The second great obstacle is modern ignorance, not of geographical science, for of that there is no lack, but of many of the countries mentioned in ancient history, and described by the ancient geographers. As we are well acquainted with the geography of most of Europe, not however of all Europe, the task of identifying the ancient with the modern geography, has been rendered comparatively easy, as in the countries of Italy, Gaul, Spain, most of Germany, and Great Britain, all within the bounds of the Roman empire, and of which accurate surveys have been made successively since the era of Julius Cæsar. But as we advance eastward from Germany, the object becomes gradually dimmer, till we enter the wilderness of Turkish despotism, that region of darkness visible, which serves only to discover signs of woe, successive and doleful shades. It is plain, therefore, that as in going east our modern geographical knowledge proportionally decreases, so does our knowledge of comparative geography. When we cross the Hellespont the case is still worse, and not the twentieth part of Asia Minor is geographically known to Europeans. Beyond the Euphrates, all the region eastward to Aderbejan, south to Mesopotamia, and north to the plain of the Araxes, is little better than a *terra incognita*, a few routes excepted. East of the Tigris the case is much the same. The whole of Assyria, a few points excepted,—the south of Media,—and the whole tract south from the Duallah to the mouth of the Shat-ul-Arab is unknown, except the positions of Shush and Shushter. Of late years, indeed, we have become better acquainted with Persia Proper; but we are still unacquainted with the southern and midland parts of that empire. Mr. Frazer's route, as far as Mesched, has thrown great light on the northern parts; and with Aderbejan we are now tolerably well acquainted, by means of Morier, Kinnier, Porter, Alexander, and others.

Having thus premised the fact of our ignorance of modern Asiatic geography, the reader may easily see the difficulty of the subject, and what an arduous task Mr. Williams has imposed on himself, in endeavouring to dispel the mist which has so long enveloped the geography of Western Asia. A remarkable proof of this is the site of the famed Ecbatana itself, the capital of the ancient Medes, and then of the Persian empire, concerning which all the moderns without exception have been completely in the dark, some placing it at the Terva and others at the Tigranoama of Ptolemy, although that geographer has placed both these cities in Armenia. Others have fixed it at Tauris, as Ortelius, Golnitzius, John Minadoi, Pietro Della Valla, Chardin, and even that distinguished orientalist Sir William Jones, and the celebrated Gibbon. D'Anville and others have identified Ecbatana with the modern Hamadan, and this seems at present to be the prevalent opinion. Mr. Williams, in opposition to both these theories, however, endeavours to show that Ispahan stands on the site of the ancient Ecbatana, and this he proves from the marches of Alexander, as preserved in Arrian and Diodorus, namely the one from Persepolis to Ecbatana, and the other from Susa to the same capital. The one was performed in sixteen days, and the other in eighteen days, the respective distances being 192 and 220 miles each in British measure, and in a rectilinear line. If Hamadan and not Ispahan were the ancient Ecbatana, the intermediate distance to be marched would have been 540 English miles, or nigh 34 miles a-day direct, a thing quite impossible for any army; and what demonstrates still more the impossibility of such a march, was the nature of the space to be traversed, and the season of the year. It was winter, and the whole road mountainous, and the passes filled with snow. Now, how could Alexander perform such a march as that of 540 miles direct, if Hamadan and not Ispahan were Ecbatana, at such a season and in such a country? It is wonderful this glaring fact did not flash in the face of such men as D'Anville, Rennel, Vincent, and others, these oracles of modern geography. What confirms Mr. Williams' hypothesis most completely, is the subsequent march from Ecbatana to Ragau, performed in eleven days. Now, whether the point of departure be taken from Hamadan or Ispahan, the distance is little more than 200 English miles direct, or hardly more than 18 miles daily, and yet many men and horses died on the march through excessive fatigue, in so much so, that when Alexander arrived at Ragau, he had only 60 cavalry. If this march was so disastrous to the men and horse, what must that have been from Persepolis to Hamadan, if Hamadan were Ecbatana? It may also be remarked that the road from Ispahan to Rey, is much worse than from Hamadan to the same place, as it goes over very elevated ground, and as part of the Salt Desert must be crossed. Mr. Williams quotes the march of Nadir Shah from Ispahan to Istakar, (Persepolis,) which occupied twenty days, or four more than that of Alexander; but it was in the winter season, and the line of march had been previously laid waste by the Afghans. But still it was esteemed a rapid march considering circumstances. Diodorus tells us next, that the march of Antigonus from Ecbatana to Persepolis occupied twenty days, exactly the same as that performed by Nadir Shah. The line of march from Susa to the Pasitigris, and from thence to Ecbatana, proves the latter to be Ispahan, as it was quite absurd to take such a road if Hamadan and not Ispahan had been the object of the march. We think Mr. Williams has irrefragably proved from these marches, as recorded by Arrian and Diodorus, the identity of Ecbatana and Ispahan. We have not room to follow him through the remainder of his proofs, and we think the former quite sufficient to convince any reader of common understanding, and who will be at the pains to use it in reading this part of the book, that the learned and reverend author has established his point.

The second essay is employed on a much more difficult subject,—the marches of Xenophon,—and occupies not less than 250 pages; and no wonder, since it presents a much larger field for discussion than the former. Respecting the march from Ephesus to the field of Cunaxa, there is comparatively little difficulty. It is the direction of the course of march from this point to the Tigris, that occasions the first serious difficulty, whether they took the road to the Tigris above its confluence with the Duallah, or that to Jarjaryah, more than 50 miles below the influx of the Duallah; and consequently the site of Sittacè is the great object of discussion. In opposition to all who have preceded him on this knotty point, Mr. Williams fixes Sittacè opposite Jarjaryah, and on the left bank or the Tigris. The next point of controversy, and that much more difficult to settle than the site of Sittacè, is the site of Opis, whether it was above or below Sittacè. Here again, in opposition to the opinions of De Lisle, D'Anville, Vincent, Rennell, and Kinneir, he maintains that Opis lay far down the Tigris, to the south-east of Jarjaryah, and fixes its site a little above the modern Koote, and above the point where the Tigris sends off the Shat-ul-Hie to the Euphrates, and the commencement of the Mesene of the ancients, and the Misan of the Arabian geographers.

In contradiction to the common opinion, which makes the point of retreat commence at Sittacè, he commences at Opis, which, in his opinion, is the south-east point of the march of the ten thousand. This is a material point, as it influences all the other points northward up the Tigris, and consequently the whole subsequent line of retreat to the Araxes. He makes the Greeks to march up from Opis on the Physcus, which he thinks may have corresponded to the most northern channel of the Gyndes or Hud, to the Duallah, which he considers to be the Zates of Xenophon, and not the Zab or Zabatus, which latter he considers to be a false reading. From the Duallah he conducts them to the Hamrun Hills, which he endeavours to identify with the Carduchian mountains, at the point where the former are intersected by the Tigris, which points he identifies with the *Fathe* of Niebuhr. Compelled to trace their steps to Dura or Imaum Dor, he conducts them north-east, over the Hamrun ridge, to Altun Kupri, or the Golden Bridge, over the Little Zab, which he considers to be the Centrites of the Anabasis. From thence he conducts them to the southern branch of the Zab, which he identifies with the Teleboas, from thence to the Ha-Kiaree or main branch of the Zab, which, in his opinion, is the *Euphrates of Xenophon!* From thence again to the Koshab, or river of Van, which he identifies with the *Phasis.* From this point he conducts them across the great dividing ridge that separates the district of Van on the east from that of Khoy. From thence again he makes them to march north-east, turning the source of the Southern Euphrates on the road from Tauris to Dilibaba. From thence he leads them to the Harpasus, which, instead of being the Arpa-Shai of Tournefort, which joins the Araxes at Hajy-Bairamlee, he makes to be the Araxes itself, by taking away the aspirated *h*, and the letter *p*, and thus converting the *Harpasus* into the *Arasus*, or Araxes. No matter though all the ancients and moderns never wrote the name so, it answers his purpose, and that is quite sufficient for him. The Gymnias, to which they next marched, through the territories of the Scythini, he identifies with the modern Ispira, on the river of Byaboot. From thence the army is made to march north-west to Trebisond. From thence the coast to the Bosphorus was so well known to the Greeks, as to create no geographical difficulties, either to Xenophon or his commentators.

The places and rivers identified in the retreat, may be summed up in the following table:—

| Anabasis. | Modern Names. |
|---|---|
| Village of Cunaxa. | Kan of Arrowsmith. |
| Sittacè. | Jarjaryah. |
| Opis. | Vicinity of Koote. |
| Physcus. | North branch of the Hud. |
| Zates, corruptly wrote Zabatus. | Duallah. |
| Cænæ. | Cochi, western suburb of Ctesiphon. |
| Larissa and Mespila. | Bagdad, and a little beyond. |
| Carduchian Mountains. | Hamrun hills. |
| Passage of the Centrites. | Altun Kupri, or the Golden Bridge. |
| Centrites. | The Little Zab. |
| Teleboas. | Southern branch of the Zab. |
| Euphrates. | The Kiaree river. |
| Phasis. | The Koshab, E. of the Van lake. |
| Arasus, wrongly wrote Harpasus. | The Aras. |
| City of Gymnias. | Ispira. |
| River of the Macrones. | The Apsarus. |
| Thecha Mountain. | Ridge W. of the Apsarus. |

We have thus endeavoured to give an outline of Mr. Williams' supposed line of retreat of the Ten Thousand, and whether his theory be right or wrong, it is at least plausible and ingenious; and if it should hereafter be proved to be erroneous, as it is much easier to demolish a wrong theory than erect a true hypothesis, it will be no disgrace for him to have failed in attempting to aecomplish that which has hitherto baffled the most erudite commentators and the ablest geographers of modern times. We recommend the book as worthy the attention of scholars and geographers, and assure the reader that he will find a vast store of geographical information, diligently collected from classical and oriental geographers, and brought to bear upon the main topics he endeavours to establish and illustrate. Having said thus much in commendation of the performance, impartiality requires us to say that on many points we completely dissent from Mr. Williams; but our prescribed limits will neither allow space to state them, nor give our reasons of dissent. We cannot help thinking that in some instances Mr. Williams is unnecessarily severe on his predecessors in the path of comparative geography, and that at times he betrays a strong love of hypothesis, and a disposition to make every thing bend to a favourite notion, and even to alter the text of an ancient author, when the received reading appears obviously adverse to his theory, thus verifying an old proverb, that "if Mahomet cannot go to the mountains, the mountains must come to him." As a notorious instance of this, is an attempted substitution of the name *Gordyæi* for Garamæi in the text of Ptolemy, where he is describing Assyria. Chap I. Tab. V. of Asia, p. 141. *Ed. Magini.*

"That part (of Assyria) which borders on Armenia is called Arrapachitis; that which borders on Susiana, Sitacenè; the Garamæi occupy the centre. The district between Sitacenè and the Garamæi is called Appolloniatis; that between Arrapachitis and the Garamæi, Adiabenè."* Here Mr. Williams' quotation ends. We subjoin the remainder of Ptolemy's text; and, as will immediately appear for a very good reason, Appolloniatis lies between the Garamæi and Sitacenè. "The nation of the Sambatæ overlooks this district (Appolloniatis;) and Calacine, (Calachine, the Classitaæ of Pliny,) overlooks Adiabenè; and the region of Arbelitis (Arbela) overlooks the Garamæi." Now, an uninformed reader would imagine from the extract given by Williams, that the Garamæi are only twice mentioned, whereas the name occurs four times in this description of Assyria. Now, it would be extraordinary, indeed, if Ptolemy, or his transcribers, had all along in this description given *Garamæi* instead of Gordyæi, the truer reading. The error, it seems, is repeated four several times; and, consequently, according to Williams, the name Gordyæi should be substituted for Garamæi not less than four times. There is a nation, besides, called Sambatæ, described as lying above Appolloniatis. Williams gives us two reasons for these emendations, of *Gordyæi* for *Garamæi*. The first is, that such a people as the Garamæi never existed there or any where; and the second is, that his favourite *Gordyæi* or Koords occupy the very spot assigned to that non-existent people. His first assertion is incorrect, as either made in ignorance, or flowing from careless reading. The name Garamæi does not occur in any author before Ptolemy. But there is a passage in Tacitus' Annals, Lib. xii. c. 14. where, in describing the contest between Gotarzes and Mithridates for the Parthian sceptre, he says, that Gotarzes having offered sacrifices to Hercules, and the gods of the place, on Mount Sambylus, he descended and encamped in the plain, having the river *Carma* between him and the enemy. On this plain, intersected by the Carma, a battle was fought, which terminated in favour of Gotarzes. Now the Carma and Sambylus of Tacitus manifestly bear a strong resemblance to the Garamæi and Sambatæ of Ptolemy. As Gordyene often appears *Cordyene* or *Corduene*—as the Carduchi were clearly identical with the Gordyæi—in other words, as the initial consonant of such words is indifferently *K* or *G*—Carma may be Garma, and the tribe inhabiting its banks the Carmæi or Garmæi, or Garamæi. There can be as little doubt that Mount Sambylus was inhabited by the Sambatæ; and Mount Sambylus exactly corresponds to the Karad-sjogh of Niebuhr, or

* As Mr. Williams has not given the whole of Ptolemy's words, we shall here subjoin them :—

"Regionis vero pars, quæ juxta Arminiam est, vocatur Arrapachitis: quæ vero juxta Susianam est, Sittacene: Media teneret Garamæi; vocatur autem ea quæ inter Arrapachitidem et Garamæos est, Adiabene. Quæ autem inter Garamæos et Sittacenem interjacet, Apolloniatis, cui superjacet gens Sambatæ. Et supra Adiabenen, Calacine, autem Garamæis, Arbelitis regio imminet."

simply the Kara-dagh, the Black Mountains of the Turks, a pretty high ridge, stretching S. E. from the lower course of the Zab to the Duallah, leaving between it and the Hamrun hills an upland level. Further, the Carma of Tacitus is the modern Kourma, which rises in Mount Sambylus or the Karad-sjogh; and which, after intersecting the intermediate plains, pierces the Hamrun ridge, and enters the Tigris nearly opposite Tecrit; and which corresponds to the modern Odorneh, a large stream 60 yards wide at Toos-Kourmaty, and which is the same with the Tornado of Pliny, and the Torne of Heraclius, whatever Mr. Williams may have said to the contrary, when he charges it on Pliny as one of his barbarous appellations for the Royal River. Now, as we have Carma and Kourma—Toos Kourmaty, or Cormatou as Ali of Yesd has it—and as we have the Karadagh range, where Tacitus places the Sambylus,—there can be no reasonable doubt of the existence of the Carmæi or Garmæi inhabiting its banks, and of the Sambatæ of Ptolemy inhabiting the Sambylus. It may be remarked, that it is over this very range that Mr. Williams conducts Xenophon and his immortal band to the Centrites or Caprus.

We have further and more cogent proof still, that the Garamæi of Pliny were not *a non-existent people*, as Mr. Williams imagines. Agathias Scholasticus denominates the district of the Garamæi *Germa*. We are told by Dionysius of Telinara, that in the 155th year of the Hejira, the Arabs, impelled by a drought which prevailed in Mesopotamia, made an irruption into the districts of Mauzel, *Beth-Garme* or *Bajarma*, Heza, Marga, Canisapor, Risin, Kok or Coche, and Salakh or Salacha. Here we have the district of the Garamæi called in the Syriac Beth-Garme, or the Mansion of Garme from the Hebrew *Beth*. We find farther, that this very distinct contains the cities of Dakuka, Shahar, Kadta, Buaziche, and other cities enumerated by Elias-Constantinus, the Nestorian Bishop. This district was the see of a Nestorian prelate, and had one Constantine for its bishop in the year 969. We find that, in the 156th year of the Hejira, Paul, bishop of Tekril, and Zacchæus, bishop of *Charma*, died. Here we have *Charma* for *Beth Garme* or *Bajarma*. The illustrious D'Anville recognizes the Garamæi of Ptolemy under the name *Garme*, and that its principal city was Kark, on the eastern bank of the Tigris, a little above Samara or Sarramanrai, the capital of the Khalif al Molassem. Dakuka in Beth-Garme is recognized in the modern Dakook or Tauk, placed by Rennel on the north-west branch of the Kourma river, called Nahr Tauk or the Sari Bolar. This place corresponds to the Toouc of Sherefeddin. Rennel recognizes the Garamæi of Ptolemy in his large map, No. 3. appended to his dissertation on the geography of Xenophon's retreat, and places the Sambatæ to the east of the Karadgy-Dagh; to the west of the Zagros; to the south of the district of Shelrzour; and to the north of Appolloniatis, in perfect agreement with Ptolemy. After such an induction of proof to vindicate the text of Ptolemy from the unauthorized, uncalled-for attempt of Mr. Williams to alter the received reading, just because it did not suit his hypothesis, we think our readers will be convinced of the existence of such a people as the Garamæi, in opposition to the assertion of this author, and that the geographer of Alexandria was perfectly correct in placing them amongst the Assyrian tribes. We have not the smallest doubt that Gordyæi or Carduchi, and Ashurim, were generic names for all the people inhabiting Assyria, and consequently that the Garamæi were an Assyrian or Carduchian tribe, who derived their name from the river which watered the district; but the question is, if the ancients understood the names Assyrian and Carduchian as of the same latitude—or if the latter name was restricted to some particular district or districts of Assyria—and, consequently, where did they place them? As usual, the ancients have spoken very confusedly on the site of the Gordyæi or Carduchi, saying one thing at one time, and another at another. Their oracles are quite of the Delphic cast, and can suit any inquirer, and may be quoted for any thing. But it seems clear to us, that they used the name Gordyæi or Carduchi not as a generic name for the whole of the Ashurim or Assyrians, but as a peculiar appellative to a particular tribe and district. We neither can help nor reconcile the inconsistent descriptions of the Gordyæans, to be met with in the writings of the ancients; but must attribute it solely to the imperfection of their knowledge, and the total want of that accurate use of terms and names, which is now found to be an essential requisite in modern geographical description. We dismiss the subject with expressing our best wishes to Mr Williams in the prosecution of his literary labours, and only desire that, in any future work of a similar kind, he would be less dogmatic, less given to theory and conjectural emendations, and exercise a little more forbearance to such as have preceded him in the path of comparative geography. We would also recommend to him, that if he appear again before the public on a similar subject, he keep strictly to his text, and not interrupt the reader at every turn, with digression upon digression, and quotation heaped on quotation successively, till the main point is in a manner completely lost sight of. These digressions should be put in the form of notes at the end of the work, with marked references for the sake of the reader, or else occupy distinct chapters, that the attention of the reader may not be distracted at every term, till it is completely bewildered in the mazes of digression, and often irrelevant quotation.

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*A System of Geography, Popular and Scientific, &c.* By JAMES BELL. Vols. 1 and 2, and Vol. 3, Part I. Blackie, Fullarton, & Co. Glasgow.

THE science of the greatest importance to the happiness of mankind, is indisputably that which indicates the means of creating, of keeping, and of increasing the property of each family. Such is the aim of political economy, to which geography and statistics naturally attach themselves, as sources of knowledge and as collections of facts, destined to serve as a basis to the calculations necessary for practical results.

An acquaintance with geographical and statistical facts, interests almost all classes of society, and it is only by the extensive labour of collecting them from the numerous works in which they lie scattered, that we can succeed in assembling the materials of a good and faithful description of the globe, or become acquainted with the elements of the riches, and the power of nations,—a knowledge indispensable in the commercial and political relations of people to one another.

The author of the System of Geography before us, is certainly one of the first critical geographers in this country. His judgment and discrimination must be now familiar to our readers, and judgment, with a proper scepticism and enthusiasm in the cause of a noble and favourite science, are attributes that must ensure success in any branch of inquiry.

We have before us many geographical works of the highest importance, but they are chiefly in foreign languages, and this is the case with the best system of geography now extant,—that of Richter. It was praiseworthy, then, in a town which preceded Edinburgh in its literary career, to undertake a system of geography which should emanate from a British press, which by its plan and in its execution should be adapted for almost all classes of readers, and which deserves the kindliest reception of every one; for we have no hesitation in saying, that if continued with the same skill and spirit, it will be the best work on geography in the English language.

The first part of this work contains mathematical and physical geography,—the former of which is treated with much ability, and from the conscientious manner in which the author has collated the leading generalities of this most important branch of physical science, we feel convinced that it has only been the plan upon which the work has been conceived, that has prevented him from exposing at proper length, and in a more comprehensive manner, the details connected with inquiries of so much interest.

With respect to physical geography, it is a science as yet in its infancy, and it will probably be a long time before any person will come forward and collect the scattered materials of which it as yet consists. A good system of physical geography, Malte Brun said, can only be the work of ages and of nations; for it is evident that it is based upon the most multiplied observations, and demands an intimate acquaintance with those materials that, in the form of gases, fluids, or solids, enter into the composition of the globe, and with the varied forms of animal or of vegetable life, that are scattered on its surface, or buried in its mineral strata.

In studying the classification of any of the kingdoms of nature, we become zoologists, botanists, or mineralogists, or we may confine our attention to particular departments, and be entomologists, conchologists, cryptogamists, &c.; but we only lay stepping-stones for the great science of physical geography. In studying the more general facts that are applicable to matter, we may be chemists, or meteorologists, or astronomers, and our labours would still only tend to throw additional light on the same fundamental branch of knowledge; for in applying the acquaintance we may have gained, by a life of laborious study, with the organic or inorganic world, to the physical history of the globe, we shall only learn to gain a deeper insight into the intimate relation which exists between the apparently most distant objects, and admire still more intensely the never-failing harmony which exalts the works of the Creator.

There are those who might feel inclined to say that we are giving a general idea of what physical geography is instead of reviewing Mr. Bell's work; but they will be in error, as the author has attempted to give a general idea of the configuration and structure of the earth's crust,—of the distribution of animals and plants,—and some notions of the atmospherical agents; so that if we arrive at an expression of the sciences which this subject embraces, we have traced the outline of Mr. Bell's labours. If they are not as minute and as detailed, and at the same time as comprehensive as we would wish, it is not at present the author's fault, but that of the public. They care not to acquaint themselves with facts; they wish for the general principles that may be deduced from them, and leave to others the often-times unrewarded labour of their accumulation. Any thing that bears the aspect of science is repulsive; details are considered dry and austere; and how many neglect to acquaint themselves with the most superficial facts, when in the words of a lamented philosopher, science is nothing more than the refinement of common sense, making use of facts already known in the acquisition of new facts!

We would then inculcate the incontrovertible truth, that the number of our intellectual enjoyments, and they are the most lasting that we can possess, is entirely dependant on the amount of our knowledge; that an acquaintance with a few facts lays open the road for a knowledge of more; in other words, that one fact leads to another, and that in consequence the man whose attention has been devoted to the classification of material objects, as one who has been in the constant habit of analyzing his ideas, possesses a boundless power over an individual of an opposite disposition, and a source of internal pleasure, that must be constant in whatever situation he may be placed, or to whatever trials his feelings as a man, or his morality as one in the great chain of humanity, may subject him. No individual should harbour the thought that much happiness was not in store for him while there was much to learn. Montesquieu said that he knew no mental pain that could not be alleviated by a few hours reading,—the discovery of a plant saved a deserted traveller from despair,—and philosophy has ever carried persecuted and eminent men through the most unmerited sufferings.

This is the age of popular science: that is to say, hundreds of servile hands are now engaged plucking the laurels from the brows of the most laborious philosophers and naturalists of the two last centuries, to plant them in a soil where they must grow, for they are watered by the tide of opinion. In many cases, however, the compilation of popular works is at present in the best hands, and some of them are well calculated to be adopted as elementary works, or complete manuals of reference on the subjects of which they treat; while others which, both from their price and language, will be read before more valuable treatises, present the elements of a revolution in scientific accuracy. Nevertheless, the whole bad influence will not be felt in the present generation, more especially in this country; for, in the first place, we have too many men really devoted to the interests of observation and experiment; and secondly, it never has been the characteristic of our countrymen to be influenced for any length of time by what was really trifling; we are political economists by nature,—a nation that has no rivals in putting almost instantaneously to practical use the discoveries of genius, and in the ready appreciation of the rich fruits of science. The tide which flows with so much rapidity will meet with an opposition in this national character that will make it return to its own level.

The descriptive portion of Mr. Bell's work commences, we think judiciously, with Europe, the geographical account of which occupies a portion of Part I. Part II. the whole of the second volume, and nearly all that of the third. Malte-Brun and other geographers have followed a different plan; and the first mentioned author did not live to terminate that part of his system of geography that would have afforded the finest scope for his talents, and probably have added new credit to his labours.

In the present age, the importance of the three continents and of Australasia is entirely contained in their relation to the civilized states of Europe. And thus, beyond the contemplations of history or the researches of science, the interest of independent nations depends on their commercial advantages, while the remainder will be found to be colonized by civilized people, and are to be studied in the consideration of their political influence. It is not at present a question whether this order of things will continue, or whether geographical inquiry will in future emanate from the populous republics and empires of the western world,—it is sufficient that it is at this time concentrated in the civilization of Europe; and if the enthusiasm for the science, the dissemination of facts, and the patronage given to geography by the public, equalled the commercial enterprize, and the means which lie at their command,—no where would geography make such a rapid progress as in Great Britain herself; and we do sincerely hope, that our labours in collecting materials, and in distributing information on these topics, will not be unattended with beneficial results.

We are sorry that our space will not allow us to enter into any analysis of Mr. Bell's geographical labours. We consider our duty to have been accomplished in recommending the work; but, as a proof of their originality, we would request a perusal of any of the chapters, for example, the account of Iceland, in the faithful description of which, excepting a few of the leading physical features, as its spouting springs, mountains of snow, and volcanoes, it would be almost impossible to recognize the former undefined pictures given of a country, where literature dwelt amid bleak rocks and a stunted vegetation—when she was degraded in the rest of Europe, and had been forced to abandon the forum and academic groves of a much fairer sky.

The next volume will embrace countries whose geographical or statistical details it will not be so imposible for us to enter upon; and we shall therefore make a point of noticing the progress of this system, and pointing out the critical opinions of a man who has made geography a constant, an arduous, and a successful study.

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*Review of the Recent Discussion, before the Academy of Sciences in Paris, on the " Unity of Organization."*—Part II. M. Geoffroy St. Hilaire's Answer to Baron Cuvier.

M. Cuvier, having analytically considered the theory of M. St. Hilaire, as detailed in our last Number, required a rigorous determination of the language employed by M. Geoffroy, pleading that if, by " unity of composition," *identity* in its strict sense be meant, the statement is opposed by the evidence of our senses; whilst if it convey an idea of *resemblance, analogy* alone, it is true to a certain extent, but as old in principle as zoology itself.

At the next sitting of the Academy, M. Geoffroy was prepared with an explanation and advocation of his views, in answer to M. Cuvier's interrogatory strictures. The author of the " theory of analogies" has never made any distinction between the two ideas, " unity of composition" and " unity of plan," and did not employ the terms in their rigorous acceptation. Conducted by observation alone to the conclusion that animals are formed upon the same system of composition, he has called the principle which expresses this idea, the principle of *unity of organic composition.* " Doubtless," observed M. Geoffroy, " to be perfectly exact, it would have been better to name it a principle of ' unity of system in the composition and arrangement of organic parts.' But I wanted a name, and I could only obtain one by the contraction of this phrase, in the same manner as we employ ' criminal tribunal,' instead of a ' tribunal established for the trial of criminal causes.' " Much might be said in favour of the expression " unity of organic composition," even to justify the *unity,* more particularly attacked. Did not Leibnitz use this term in the same sense when he defined the universe " unity in variety ?" but, continued the Academician, let us leave the words and occupy ourselves with things.

Whether the expression of M. Geoffroy be exact or not, his meaning could not be mistaken. He wished to say, that all animals are the products of the same system of composition, and result from an assemblage of organic parts which are constantly repeated.

But, "explain yourself," it has been said. "Do you speak of absolute identity, or simply of analogies of resemblance?" M. Geoffroy answers, that he has never pretended to speak of anything but analogies of resemblance. "Then you have told us nothing new. And, far from having placed zoology on a new foundation, as you pretend, you have only repeated a principle known to Aristotle, and the confirmation of which has been the object of all naturalists worthy of the name."

That the first germ of the *theory of analogies* may be found in Aristotle, M. Geoffroy is far from wishing to deny. Indeed he has always been careful to point out the writings of this great man as the first source of the doctrines which he proclaims; and, as M. Cuvier has remarked, he is by no means the first who has sought to develope and apply the ideas entertained by the Greek philosopher.

In the year 1555, Belon placed together the skeleton of a man and that of a bird, with the view of observing the correspondence of parts between the two species.

Bacon, in his *Novum Organon,* declared the most indispensible quality of a naturalist to be "a certain active sagacity which would enable him to seize physical *conformities.*"

Newton, who had embraced with so much genius the relations of conformity in the planetary masses, did not doubt that the animal organization was regulated by a similar uniformity. *In corporibus animalium,* he said, *in omnibus fere similiter posita omnia.*

Must we conclude from these concessions that MM. Cuvier and Geoffroy are almost agreed? Certainly not; and the difference between them is greater than even M. Cuvier supposes.

In the first place, what is found in the works of Aristotle relative to this principle, is evidently confined to an expression of very confused generalities, some true and others false. Superior minds appropriate the former, and labour to develope them; but the latter have only been echoed by those who confine themselves to the study of differences.

As to M. Geoffroy, he has not limited himself to the reception of his ideas from Aristotle; he has sought the truth from nature herself; he has interrogated facts, and has descended into the examination of the most minute details, and his conviction is the fruit of personal study. A more attentive examination, and a new mode of investigation have shown him resemblances where heretofore nothing but differences had been perceived. The differences between the naturalists who still maintain the ancient ideas of the Aristotelian school, and those who adopt the theory of analogies as taught by M. St. Hilaire, are immense. The ancient school admits, with M. Cuvier, the analogy of organs only to a certain extent. M. Geoffroy, on the contrary, sees no exception to his great law.

Where M. Cuvier believes the chain to be broken, M. Geoffroy finds always the same relations, but more difficult to be seized.

But this is not all. The elements upon which M. Geoffroy thinks that the resemblances of organization ought to be established are altogether different from those which have been elsewhere adopted: the *forms* of parts and their *functions* have been with others the especial objects of examination. Hence it resulted that the veterinary surgeons, the ichthyologists, indeed all those who treat of particular animals, constantly make use of different language, under the supposition that they are occupied with organs peculiar to the animals which are the objects of their study.

Every one knows that things were in this state when M. Geoffroy St. Hilaire proclaimed a principle, which far from enlarging the received bases of zoology, far from confirming or perfecting the received opinions, tended to their entire overthrow. This principle consisted, in short, in the total rejection of every deduction drawn from the consideration of forms and functions, and in regarding anatomy as the only true foundation of all zoological research. Form, said he, is fugitive from one animal to another, and functions are no less so, since they increase with the bulk, whilst all other things remain the same in the animal which undergoes this change.

Man, at his birth, has the same parts as the adult; what a difference, however, in the functions which these parts fulfil! Let us give another more striking example, which will show how accurately it may be said that there is a *unity of composition* in certain parts which exist under very varied forms, and perform different functions. The composition of the lower part of the anterior limb of the mammalia is regarded as identical in the theory of analogies: a similar use for the phalanges, the same arrangement, the same disposition to form fingers, the same muscular apparatus to extend and bend them; "why, then," said M. Geoffroy, "may we not say that there is an uniform repetition of materials? why may we not call it 'unity of composition?'" Observe, however, how the function varies; for this same trunk of the anterior limb becomes the foot of the dog, the claw of the cat, the hand of the ape, a wing in the bat, an oar in the seal; and, lastly, a part of the leg in the ruminants.

The theory of analogies differs, then, essentially from the Aristotelian doctrine, in recognizing peculiar principles, and in introducing into the study of organic systems anatomical considerations as the only groundwork of a truly scientific classification. It has not enlarged the base on which zoology rested; it has not augmented the resources for classification which science possessed, since instead of admitting three elements, it considers one alone, regarding it sufficient to establish identity when the examination of form and function led to nothing but difference and opposition. It recognizes other principles; for it does not draw its analogies from the organs in their *totality*, (which is only to be found analogous in very similar ainmals), but from the materials of which the organs are composed.

This is a fundamental point in the new doctrine, and may be thus illustrated. We designate under the name *organ*, a part of the body serving for the operations and sensations of the animal. The same organ differs in different animals, either by a variation in the respective size, or by the addition of new parts; but size ought not to be considered in the determination of resemblances,—we must only attend to the addition or suppression of parts. The hyoid bone of man, for example, is composed of five small bones, that of the cat of nine; are these two parts, designated by a similar term, analogous in both these species? For an affirmative answer to this question, according to the ancient doctrine, it would be sufficient that they performed the same function in both; but, according to the doctrine of analogies, a different view is taken of the matter. That part alone of the hyoid of the cat, which corresponds to the five little bones of the hyoid of man, is considered to be analogous to it. This doctrine, in short, makes the analogy exist exclusively in the identity of the constituent materials.

Let us show, without quitting the example, how the theory of analogies may become an instrument of discovery. The naturalist, remarking the deficiency of the hyoid of man to make it complete, will inquire what has become of the little bones which he finds in the cat. He will necessarily seek for them near the defective organ; but to find these parts, he will have recourse to another principle of the new doctrine, to that of *connexions*, a sort of Ariadne's thread, which will guide him surely in such researches. The application of this principle will lead him to discover that the parts of the hyoid bone which are wanting in man, are no other than the needle-like prominences to which anatomists have given the name *styloid processes*.

Such is M. Geoffroy's exposition of his ingenious doctrine. Still the subject of contention between M. Cuvier and himself, it will shortly be determined by the test of facts. The example of the hyoid bone, has led M. Cuvier into a long discussion on its analogies, and the sternum has also served for the basis of many objections; whilst, on the other hand, M. St. Hilaire has supported his opinions by lengthy elucidations from the organization of fishes.

In the class of fishes, M. St. Hilaire caught the earliest glimpse of his extended views. Appointed in 1804 to describe the *tetraodons* for the great work on Egypt, he found it necessary to *determine* a very singular part, which gives to these fishes the faculty of changing their usually lengthy form into a spherical ball. He fancied that the bone which served for this purpose, corresponded to the *coracoid*.

From this apparatus he passed to others, and successively sought to determine the relation of each of the parts of this animal with those of the other vertebrata; but he was unable to discover the entire coincidence, and was entirely stopped when he came to the *operculum*.

This difficulty was insurmountable, and led M. Geoffroy to despair of the success of his researches, till the year 1817, when the great problem was at length resolved, and he recognized, in the bones of the operculum of fishes, the analogy which they bear to the bones of the ear. From this moment he returned with increased ardour to his labours relative to the establishment of the theory of analogies, never again to be abandoned.

The peaceful members of the Academy of Sciences, have sought to terminate this philosophical contention, on the pretence that there is no point of difference between the combatants. "Both," say they, "are devoted to the study of zoology, both consider and compare the different organs in the chain of beings; but whilst one seeks for the analogies, the other more especially directs his attention to the differences." And they see, moreover, that one party must be wrong, and whichever fails, the error will lie with one of the first naturalists of the age. M. St. Hilaire has consented to relinquish the discussion in the Academy; but, confident in the truth and novelty of his conclusions, he has determined to write a work, wherein he will controvert the opinions of M. Cuvier. The discussion has expanded beyond the primitive considerations which led to it, and will consequently require an extension of our review.

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## *On the present state of Science abroad.*

### No. I. *Scientific Coteries of Paris.*

It will be some consolation to you who make yourselves our foes, to find that your neighbours are the victims of the same conflicting passions with yourselves. To see your betters fall into the same human tricks,—to mark the most high of the philosophical, the *spirituel* nation, begin to exhibit the same writhings and totterings on the seat of power, is a comfortable assurance that there may be those who will not speak contempt of your unworthy doings. And, on the other hand, we feel proud to see that France the volatile, has spirits as determined as our own.

The arrangements which were made for the direction of the *Bulletin Universel des Sciences,* being contrary to the views of MM. Saigey and Raspail, two of the French *savans* connected with that periodical, they associated themselves, in 1828, in the publication of a scientific miscellany, entitled *Annales des Sciences d'Observation,* and entered into an agreement with M. Baudouin, a bookseller.

We were very much surprized to find, at the conclusion of the second volume, that the work, which appeared from its liberal character, calculated to render the most important services to science, was abruptly discontinued. The first part of the third volume, just published, acquaints us with the cause.

It appears that the publisher having for some time withstood the attempted briberies,* and exposed to the editors the designs of "one of their rich adversaries," was at length condemned to prison for the publication of one of Beranger's songs. This was too much for the firmness of the publisher; and the commutation of his punishment became intimately connected with the threatened ruin of the obnoxious work. A pernicious *coterie* was labouring, and their intrigues were for a time successful.

Every stubborn means was now resorted to to put down the *Annales.* M. Baudouin refused the new types which he had promised,—the necessary periodicals were not procured,—those which the editors themselves obtained were intercepted,—and at length the publisher marked his determination by preventing the printing of an article entitled "*Coteries Scientifiques,*" which had been sent to press.

An action was brought by MM. Saigey and Raspail against M. Baudouin, and a dissolution of the partnership obtained, with damages of 2000 francs. The publication of the *Annales* is now recommenced, under the most happy auspices, and we sincerely wish it all prosperity.

We cannot avoid observing a singular relationship between the spirited enterprize of these authors and our own undertaking. Embued with an unalterable determination to expose all unfair dealings,—eventually to impeach all who, under the cloak of high names, conceal a desperate inefficiency,—and to support the oppressed labourer in science, however poor and "uninfluential" he may be,—we have individually gained the good report of those who profess to be free, and the most flattering silence from those who are under the influence of the scientific powers. We have individually the merit of having obliged intrigue to tremble, and the rich possessor of the demi-sinecure to marshall his bands, and stretch forth his arm for additional aid. We have individually undertaken not only to spread abroad the knowledge of the *progress* of scientific discovery, but also the *state* of science, and of the spirit which animates scientific men; and hitherto we have been individually unfortunate in finding that intolerance is too generally the offspring of place. But thanks to our nativity, we live not in a land where such practices could have been carried out, as have tainted the fair fame of our scientific neighbour; for we think little of the vain attempts which are made to keep our labours from the public eye. Finally, we have been individually successful in the result of the exposures which we have been already forced to make. As for ourselves, we are satisfied in having drawn the earnest and praiseworthy attention of the Royal Commissioners to the abuses in the Edinburgh College Museum,

* It is stated that M. Baudouin was able to despise the condescending invitation which he received to the *soirée* of the rich man, and to spurn the tempting offer of a *service of porcelain,* embellished with elegant designs. This is almost worthy of a place near an anecdote we can tell about certain French silk stockings.

and in having instigated the present investigation of the independent members of the Wernerian Society into the singular condition of their mis-directed institution.

But in our case there still remains much to be affected, before prejudice shall be induced to relinquish an authority which has been too long possessed, and which, like gold from the miser, or opinion from the bigot, must be wrung away by slow degrees.

The *Coterie*, we must inform our innocent readers, is a group or association of place-men and place-hunters, generally collected around an essential nucleus, whose designs give life and spirit to the whole. It is formed for the purpose of securing and gaining places, directing votes, and for general monopoly. It seems to be a necessary excrescence on all well-fed and overgrown bodies, whereby the intestine humours, which, without it, might poison every individual part, are voided, and thus their injurious influence exerted over a smaller portion. "To conceive a society of men without coteries, would be to imagine a rich harvest free from tares, a picture without a shade; if the world were inhabited by only four individuals, this society would have two coteries." A coterie of place-men differs from a coterie of independents, in the former having influence, riches, and a servile tribe of expectants to aid the execution of any purpose; whilst the latter relies on truth, publicity, and a fearless exposure of the means by which the existence of the former is maintained. The former is essentially founded on a conscious unworthiness: the throne that is won by blood, by blood must be preserved. The latter is composed of such spirits as have curbed the licentiousness of ill-gotten power, and have given temporary ease to the world by the abolition of tyrannical rule.

In Great Britain the coterie has attained a high degree of perfection. Under the name of *soirée*, evening-party, *conversazzione*, it may be met with wherever there is any thing to be gained or lost. In our own city, we know that coteries manage almost every scientific institution. Let us notice, for example, the Wernerian Society. There a coterie of rather small dimensions regulates every act. And now that a few independent members have come forward to inquire how, and by whom, the library and museum have been managed, strange lights rise above the convenient mist which has hitherto enveloped the sacred head.

Germany is perhaps the only country where the coteries preserve a tolerable equilibrium, mutually negativing each other's acts. The learned of the nation, scattered over a great extent, belonging to different circles, or to different towns, can only form coteries in their respective districts, which do not interfere with each other's bad practices or good things. And in Germany, if a man of science be elevated to a place, he labours to preserve what he acquired by labour; and science has not to deplore his good fortune. Whereas, in this country, if an individual succeed in throwing the dust of new doctrines into the eyes of the populace, till they blindly elevate him on their subservient shoulders, and proclaim him to be a true prophet who is come amongst them, he speedily resigns himself to an easy indifference as to the progress of knowledge around him, and sleeps in his cushioned chair. But other minds are not stagnant; the march of science advances with a quick though silent tread; the universal activity soon becomes an object of importance, and at length a novel and unexpected sound effectually rouses the sleeper. Then the coterie is brought into play, as an engine of power and self-preservation, and that which before shed a certain magnificence about the sinecurist, becomes to him a seat of thorns.

In France we find the most opposite extreme from what we observed in Germany. There every thing is centred in the metropolis. Paris has all,—the provinces nothing. The student has to run a hundred leagues to find even the rudiment of a library or museum; and he must go double the distance to meet with a man capable of conversing on a scientific subject. From all parts of France the young *savans* hasten to Paris,—there they must intrigue,—there they must gain,—there they must profess,—there they must publish. The coteries there are found within the same walls, and at the same banquets; and consequently if one become more powerful than the rest, it imposes silence on all: the others murmur, but they dare not raise a complaint. The subaltern coteries soon join themselves to the principal, and seeing that the harvest is monopolized, they are glad to glean: places, favours, prizes, the eulogiums of scientific journals, all fall under the disposition of the privileged coterie; and woe to the refractory, for their talents will only hasten their fall!

Such a coterie, we are told, has for some years existed in Paris, beseiging the doors of the Academy of Sciences; and, thanks to its alliances, it enjoys exceeding favour in certain corners of the hall. No one esteems it, every one fears it; but like those serpents which fascinate, it draws around it even those who hold it in abhorrence. "Mark that man of talent," observes an eloquent writer, "who stands near one of these coryphæi,—humble, subdued,—forming his manners after those of the man whom he nevertheless hates. He listens gravely to the most palpable absurdities,—to assertions in which he sees the most extreme puerility: he does not even dare to defend his calumniated friend: he is ill at ease, but is obliged to smile: he finds it necessary to become himself, and the intriguer turns his back: then he sighs and finds himself relieved. This scene afflicts the soul with grief; at this moment one would desire to know nothing of a man of genius but his writings."

From this academical coterie emanated the insidious means which were employed, as above related, to put down the independent journal of MM. Saigey and Raspail,—a publication which does honour to continental science. Showing favour to no individuals, and impartially weighing all doctrines, as far as human frailty will permit, it was eminently calculated to disturb the repose of those who sought to obtain every honour and every place. But their attempts have been futile, and disgrace is reflected on them from their meditated injuries. The editors of the *Annales des Sciences d'Observation* are triumphant, and we with pleasure add a branch to their laurels. We hold forth the hand of fellowship to these freemen, and will show to them that they have found worthy associates.

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*Arcana of Science and Art, &c.* In 8vo. Pp. 296. With Engravings. John Limbird, Strand, London.

If science and art make any progress, and of this we think there can be no doubt, a register must be of extreme utility, and, when demanded, is the characteristic of an age of improvement. The little work before us is cheap,—is printed with a type that admits of the accumulation of much interesting matter; and, being the only work of the kind, is indispensable to the cabinet and library. We say—being the only work of the kind—because we think, that with the same materials which modern genius and invention yearly afford, a work of a more striking character might be produced. The progress of art is simple, and consists in indicating the improvements of machinery, and the career of invention; but the progress of science, which the work also professes to delineate, is complicate, and the collection of facts which the compiler has given, are like drops of water scattered in the atmosphere, and which require to be united in the form of clouds, before they can fall and fertilize the earth. Their relation to other facts, and to the opinions of men, (and in this lies the only labour of an editor,) must be established, and they must be strung on the golden thread of philosophy, ere they can any way tend to assist in the progress of science. The chapter on Expeditions of Discovery, which is derived from the sole source of information on that subject, we mean the "Edinburgh Journal of Natural and Geographical Science," would have been infinitely improved by the use of a little method. We often, for example, follow travellers in their labours, noticing them as far as is in our power, every month. The analysis of these separate articles would furnish a concise and interesting account of their results; but it is a labour which the editor has not been at the trouble of undertaking.

We trust that these remarks will lead to more care, and consequent perfection in the ensuing volume of this little miscellany, which is certainly well conceived, and calculated to become eminently useful to the crowds who yearn for that amusing, and unconnected, *scrappish* information, which marks the taste of the present day. In the mean time, we recommend to the popular reader the purchase of the "Arcana" for this year, as a bouquet adorned with pleasant flowers from many a gay parterre, and a wreath as expertly woven as most publications of that class.

# GEOGRAPHICAL COLLECTIONS.

*Annual Notice of the Labours of the Geographical Society.—(Concluded from* p. 48.)

THE Geographical Society has too often associated itself with the campaign of the Astrolabe, that the principal results of that voyage should not be recalled to memory at one of its solemn meetings.

Mr. d'Urville, worthy successor of Messrs. Freycinnet and Duperrey, undertook more especially to continue the operations of Mr. d'Entrecasteaux. He commenced them on the coast of New Zealand, of which more than 400 leagues have been surveyed. Islands, bays, and streams, whose existence had not been indicated, are to be met with on the maps of the Astrolabe. They further state, as a *new* fact, that the northern island of New Zealand is almost divided into two by a very narrow isthmus. In this expedition, the survey of the isles Fidgi, which received the national name of Viti, presents a thread of operations skilfully chained together, and the result of which determines the position and the outline of a hundred and twenty islands and isles, of which some were unknown. The most southerly islands of the archipelago of St. Esprit are surveyed. They are completing the geography of Loyalty Islands, and the labours of the French navigators will fill up the gap that the English had left in the hydrography of that archipelago.

Among the detailed and complete surveys, we must mention those of the Langlan Islands, of the eastern part of the Dublon Islands, of the Elivi Islands, of the southern coast of New Britain, and of that long continuation of shores between the straits of Dampier and the bay of Geelwink, that border New Guinea in its northern part.

Taking all together, the expedition of the Astrolabe procures to geography and to hydrography the detailed survey of nearly 1000 leagues of the least known coasts in the world, and assures the position of nearly 200 islands or isles, of which 70 or 80 had been hitherto figured on no map.

The results of this voyage, in relation to geology and to natural history, are also of interest to physical geography, to which these researches are allied. Messrs. Quoy and Gaimard, naturalists of the expedition, have executed their labours with the talent and continued zeal which they gave proofs of in the voyage of Freycinnet. The collections they have made from every point to which access was offered them, and which have been deposited in the *cabinet* of natural history, and the new species they have obtained are considerable, and surpass those of their predecessors.

France is also indebted to Captain d'Urville, and the skilful officers of the Astrolabe, for surveying the ill-fated shores on which the vessels of La Perouse were wrecked. They saw through the transparent waters the scattered remains of that expedition, but no living remnant of the wreck came to comfort their eyesight; and, taught by the silence of death, they paid to the shades of their unfortunate countrymen the tribute of their grief and their regrets. A cenotaph, erected on a point in the centre of the ocean, is to day the only result of forty years of research.

We cannot separate the voyage of Captain d'Urville from those of his talented predecessors, Messrs. Freycinnet and Duperrey. The interest which attaches itself to their scientific labours, increases with the successive publication of each of the parts which compose them. The splendid atlas of Captain Duperrey is terminated. Let us hope that the enlightened world will not be long in enjoying all the results of these great voyages, of which France justly honours herself.

The Society continues the publication of its memoirs. The first two volumes have met with a most favourable reception,—such also will be the destiny of the third, which contains the orography of Europe by Mr. Bruguière, a work that received your approbation, and is printed at the expense of the Society. Two of our colleagues have wished to associate themselves more intimately to this publication. Mr. Brué has offered the map which accompanies the orography, and on which the great features of the system of Mr. Bruguière are traced. Mr. Denaix, on his side, had equally placed at your disposal another plan destined for the same object. These acts of generosity have been participated in by Mr. Vivier, who offered to the Society to engrave, without expense, and from a drawing adopted by it, the coin of the medals that are annually distributed.

As an auxiliary to the memoirs, the Bulletin of the Society, as in preceding years, contains useful documents, which could not find a place in your large collection, and it acquires, from this appropriation, a more especial interest.

The sittings of your commission have often been filled up by reports intended to make us acquainted with those works that were thought worthy of such a distinction.

In the course of the year many scientific communications have been made. Mr. Jomard has exposed to you the actual state of our knowledge on the course of the Dhioliba. He begins by acknowledging that all the suppositions that have been emitted, to the present day, repose on facts that are either incomplete or disputed, and that time alone can decide upon. Nevertheless, he discussed the merits of the three that alone coincide with the information that had been obtained, and stopped at that which appeared to him to be nearest the truth. He thinks that the river has its issue in an internal sea, the lake Tchad. These difficult questions have been treated of by Mr. William Hutton, in the 15th chapter of his Journey to Coumassie, 1820,—a chapter which has furnished to Mr. Denomé the subject of annotations and of accounts which are destined to throw light on the geographical problem of the identity of the Nile and the Niger.

Ancient Africa has occupied the attention of Mr. Marcus. He has presented, in a notice on the history of the foreign colonies in Abyssinia and Sennaar, from the seventh century before the Christian era to the fourth after Jesus Christ, a rapid review of the work which he intends publishing on this interesting subject.

Mr. Warden, whose predilection for every thing that concerns North America is so natural and so profitable for us, has given an account of the American colony of Liberia, founded on the coast of Africa, in the moral and philantrophical aim of civilizing the interior of that continent. He recalled to our memory, on another occasion, the ruins of Palenqua and of Mytla, and some other antiquities of Mexico. The rich collection of Mr. Baradère has been appreciated by him, and recommended to the attention of the Society, which required to wait, before it could give its opinion, for the results of the journey of Mr. Corroy in the midst of those remains of Mexican civilization, which we require to guess at as a problem.

We are also indebted to Mr. Warden for useful information obtained from Mr. A. Storr's account of the country situated between the Missouri and the internal provinces of Mexico, and for some interesting details of General Ashley's expedition into the countries neighbouring the Rocky Mountains. Mr. Giraud gave you a short description of the Indian tribes that inhabit the deserts to the west of the Mississippi as far as the mountains.

Dr. Siebold has triumphed over the mistrust of the monarch, the nobles, and the people of Japan. He has been living there these several years in the midst of learned men: he traverses the country without obstacles: he is admitted into the libraries without difficulty: enlightened men communicate their labours to him, and he embraces several branches of human knowledge, more especially geography, upon which he appears to have collected more facts and documents than his predecessors. You are indebted to Mr. Derfelden for these curious details, transmitted with other scientific information.

Mr. Van Capellen, ancient governor of the Indian archipelago, de Vins de Peyssac, Graberg de Hemso, Spencer Smith, Tanner, and several others, have made interesting communications, which we regret not to be able to re-produce here.

Every year we cast a rapid glance upon some of the principal geographical labours of your members: to analyze or to judge them would be departing from a simple notice. It requires first to pay a new homage to the services rendered by the war and marine *depots,* by Messieurs the geographical engineers, and engineers of bridges and highways, and to repeat that every year science is indebted to these learned bodies for some new perfection.

It would be a want of gratitude not to mention the continued interest shown by Mr. Becquey, general director of bridges and highways, and of mines. You have a proof of this interest in the new publication of the hydrographical map of France, a work skilfully executed by Mr. Dubrena, and which will be consulted with fruit, not only by the geographer, but by the individual who would wish to enrich his country with some new manufactural products.

The mineralogical map of the kingdom, not less useful, is terminated. Let us hope that its publication will soon satisfy the want that has been long felt of a similar work.

The French Pilot, by Mr. Beautems-Beaupré, and the engineers under his orders, is one of those enterprizes which hydrography and humanity will receive with equal gratitude.

The universal atlas of ancient and modern geography, that Mr. Lapie is publishing, is got up with the greatest care, and the execution deserves the highest praise.

Mr. Denaix is pursuing, with a perseverance that has no other impulse than his love of science, his essays on methodical and comparative geography.

We are indebted to Mr. Jomard for two maps of ancient and modern Egypt, founded on the great topographical map of the country, in which he assisted as engineer. One represents Egypt and a part of the adjacent countries, the other, containing Lower Egypt, traces particularly the ancient mouths and branches of the Nile.

Other cartographic labours should be mentioned here. Mr. Vander-Maelen, known by his universal atlas, has just published another devoted to Europe, that contains more critical accuracy and details, both better chosen and better arranged. The termination of Mr. Abrahamson's labours on Denmark, is worthy of the first sheets of that work.

The special maps of Ireland by Mr. Bald, of the department of the north by Mr. Jodot, of the departments contained in Auvergne by Mr. Busset, and of the channel (manche) by Mr. Bitouzé d'Auxmenil, have a right to an honourable mention, and to a distinguished reception. Elementary atlasses, too long neglected, meet in Messrs. Tardieu, Dufour, &c. men capable of giving them a useful direction, and raising them to the rank of estimable works.

An establishment that more especially attaches itself to the publications just mentioned, has been created. It belongs to the Society to state its hopes, that the depot for maps in the king's library will receive all the developement of which it is capable.

Statistics have also been subjected to the same onward impulse as other geographical sciences: they are more instructive, more conscientious, and more systematic. We must place at the head of works of this kind, the statistical researches on the town of Paris, and the department of Seine, of which the fourth volume has just appeared. I regret that the Society is not at the present moment at the house of the learned administrator, the Earl of Chabrol, who directed and ordered this fine work, that they might offer him their merited praise, and repeat his titles to public gratitude.

The statistical researches on the forests of France, by Mr. Faiseau Lavane,—on its commerce, its agriculture, and its sheep,—on its canals undertaken since 1821,—the official tables of its moral state, published annually by the minister of justice,—the comparative statistics of instruction, and number of crimes, by Messrs. Balbi and Guerry,—a similar work of Mr. Jomard's,—the statistical account of the religious state of the kingdom,—the researches on its population,—on the relative predominance of sexes,—the statistical report on our colonies by

Mr. de Ferussac,—the numerous special statistical details of our departments,—and more especially the great statistical works on France and Russia, compared to the other states of the world, by Mr. Balbi, are so many labours that tell of the progressive march of statistics, and of the elevated and philosophical point that it has attained.

In a memoir on the comparative population of ancient and modern Egypt, Mr. Jomard establishes, from unanswerable authorities, the population of that country under its kings, the Arabs, and at the present day. He proves that, in ancient times, it never could have fed as many as 6,000,000 inhabitants. He finds its population to be four millions and a half under the Arabs, and he concludes that it can nourish, at the present day, valuing the inhabited or cultivated superficies at 1500 leagues, about two millions and a half, or three millions of inhabitants.

Another work of the same author, the statistical description of Cairo, retraced to the year 1800, presents a more extended work, and must have required more numerous researches.

Mr. Laurenaudière terminated his address by a notice of the deplorable loss of Mr. Pacho, whose melancholy end and labours we have before alluded to. He also paid a handsome tribute to the memory of Admiral de Rossel, secretary of the Society.

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### *Descriptive Notice of the Valley of Sales, (Department of Aveyron, Rouergue,) South of France.*

THE plains of tertiary formations at the northern foot of the Pyrenees, terminate geographically with the cliffs of Parisian limestone on the northern banks of the river Garonne, and which are immediately succeeded by the underlying molasses (plastic clay) and chalk. These cliffs extend in an easterly direction to the Pointe St. Sulpice, in the department of Tarn, moving afterwards abruptly northward in the direction of the river of that name. Beyond Alby the country is composed of old red sandstone, accompanied with limited coal basins, (Crammose, &c.) : the *Erica ciliaris* still characterizes the uncultivated tracts. The secondary formations are succeeded by mica slate and quartzose rock, forming ranges of hills, which are associated with gneiss in the vicinity of Rhodes, and with occasional basins of sedimentary deposits. To the north of this town old red sandstone is met with, interspersed with irregular tracts of mountain limestone, succeeded by argilophyre (greywacke) at St. Cyprien, beyond which the tributary streams of the Lot, Aveyron, and Dordogne, course through vast districts of clay-slate, mica-slate, and gneiss. The scenery of these tracts is exceedingly beautiful : the rugged acclivities of the mountains are clothed with dark forests of chestnut trees, and the hamlets of the Rouergueois, cumulated on their table-shaped summits, overlook one continued scene of mountain grandeur and of savage beauty.

In a small tract of mountain limestone, in the vicinity of Rhodes, and removed from any great thoroughfare, there exists an assemblage of natural curiosities, that should tempt the traveller to leave the beaten tract ; and these are congregated around the village of Sales, where he will find a comfortable inn, and ropes and ladders for his excursions. This village is situated on a rocky platform, with cliffs above and below, and a powerful stream of the clearest water, issuing from the foot of the first cliff, turning the wheels of no less than six different engines in its short and rapid course over the platform, from which it is precipitated in a beautiful little cataract into the vale below.

The village is reached by a foot-path that terminates at the summit of the first cliff, down which, notwithstanding its verticality, the stranger proceeds by a kind of stair-case of jutting crags and steps hewn out by the villagers. The foot of this cliff is ploughed up on one side, and its base clothed with green vineyards; on the other, the streams issue from different clefts of the rock, and huge angular masses are strewed on their course, and heaped in ruinous profusion.

One of the streams issued from the limestone, in a pent up mass of two feet in breadth and one in depth; its temperature was 13° centigrade.

Vegetation in the neighbourhood of these springs is luxuriant. The *Samolus Valerandi*, *Lysimachia Linum stellatum*, *Anagallis repens*, *Statice ferulacea*, *pubescens*, Decand.? *Linaria supina*, *Saponaria ocimoides*, and a host of more common plants; but the numerous ferns, their green fronds sparkling with drops of scattered spray, constitute the characteristic feature of the vegetation of this moist and shady cliff. Among these the *Adianthum capillus*, *Pteris aquilina*, *Asplenium Halleri*, (*Aspidium fontanum*, Sw.) *A. adianthum nigrum*, &c. &c.

The fall of a portion of rock has exposed the opening of a cavern a little to the south, and at an elevation of about 30 feet above the springs. The entrance presents the form of a triangle, whose two sides are constituted by the opening of the cleft, and the base by the line of junction of the strata, placed superiorly, and putting, as it were, a bar to the continuation of the fracture. This opening presents in its disposition several interesting features: it is not in fact an outlet, but has formed part of a passage, through which the water coursed in an inward direction, and when we gain the entrance, the elevation of the floor is found to be greater as it is nearer the external opening, leading interiorly on a slightly inclined plane, and before penetrating farther, a slight elevation is to be passed over.

The cavern makes many abrupt turns, descending constantly towards the lower part of the rock. Stalactites are numerous, but not very transparent, and stalagmites attain a very great size in one or two places, tending to block up the cavern. There is no vegetation beyond the entrance, but hosts of gnats and pale moths flutter around the lights. The stranger's progress is stopped by a deep pool of water, long before which he is obliged to walk in a wet slippery mud. Matters thrown into this pool, have been known to find their way out of the springs of Sales; and, according to our guides, fish of a species unknown to them, were sometimes carried out by the waters. Might these be the fish of subterranean lakes? Fortis mentions the occurrence of such in the subterranean lakes of Dalmatia, and such were the fish mentioned by De Humboldt as thrown up by the volcanoes of the Andes.

In many parts of the cavern, water had been retained in circumscribed basins; its long residence there had given rise to a kind of efflorescence, the abstraction of part of the lime leaving the more argillaceous parts in irregular mammelonary concretions.

The tall mountain rock throws its shadow upon a village church and a few cottages by the side of the brook. The harmony and stillness of the valley, seldom broken by any rude storm, is felt still more intensely under a southern sky, where vegetation is luxuriant, and flowers shed sweetness around, perfuming the air with their rich fragrance. The hurrying traveller smiles for a moment on the peace and contentment of the cottager,—glances in passing admiration at the symetry and expression of native beauty, that, like a simple flower growing on the cataract side, is radiant and calm, while all is noise and ruin around; and in the cemetry of such a home, he sees the cypress veiling the shrine of many an unrecorded fair, and the rock entombing the wreck of many a virtuous life.

Beyond the platform on which these few hamlets are grouped, the rock is again cleft vertically, and the stream is precipitated over a fall of about forty feet in height. The point where the waters are precipitated over the rock, is clothed with a rich carpet of pendulous grass, and the green branches of a few shrubs hanging in festoons divide the waters, while the angry spray, dashing on the plants and trees around, glitters in the sunbeam like points of fire.

At the foot of the fall is an expanded cavern, from whose roof a small quantity of water drops the greater part of the year, and whose floor is covered with incrustations and stalagmites, with occasional pools of water. The sides are decked with plants of the genera Jungermannia and Marchantia, and a few ferns.

In seasons when the body of water is great, the noise in this cavern is deafening, and forms a great contrast with the stillness of the valley, where the breeze whispering among the green leaves is alone heard; but the bright iridescence of beams broken in the falling waters, are seen from there in the greatest perfection, the decomposition of light often producing at once coloured arcs and the most radiant spheres.

On leaving this cascade, the sound of waters may be heard creeping along the valley, till a few miles off they are again lost in the bosom of the rock. In their course they become augmented by the waters of many rivulets, and they fall into their subterranean passage with much rapidity and noise. This spot has been called the *Abîme de Tindernel*, and it is not the least remarkable in this interesting valley. It has been neglected, and when we were there a stranger had not been seen for years; but it ought to be no longer so. There are spots from which the wanderer tears himself with difficulty, and of which he ever afterwards retains a most lively remembrance, and such a spot is the valley of Sales.

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### *Geographical Botany of Germany and Switzerland.*

The limits between Germany and Switzerland are very difficult to be pointed out, and being entirely political, they bear no relation to the physical characters of the country. The vegetation of the mountains is continued in its transverse chains or extensive prolongations, lost by gradual shades in the plains, or found again in the compensating influence of equatorial distance or polar approximation. The features presented by the distribution of the larger divisions of the vegetable kingdom are well marked, and variety in the families, and the augmentation or diminution of the number of species in each, may be traced in their progressive relation to the three co-ordinates of latitude, longitude, and altitude.

The number of species that these two countries contain is 3413, distributed in 74 families. This number has since received considerable additions from plants discovered in Istria and in littoral Austria. It is true that these countries neither belong to Germany by position or by climate, nor by their inhabitants, and the results, for the geographical botany of Germany, would have been more uniform, if they had not included the flora of countries belonging to that part of the political circumscription of the country, in which we find the vegetation of the basin of the Mediterranean.

Among the 3413 species, 619 belong exclusively to the Alps, and 570 are only found to the south of the chain in Istria and the littoral countries. The monocotyledons amount to 696, the dicotyledons to 2717. In northern Germany, the relation between these two divisions is, $= 1 : 4{,}5$; in the south the relation is, $= 1 : 3{,}6$; in Switzerland it is as $1 : 3{,}74$; in the plains and low tracts their relation is, $= 1 : 3{,}6$; in the mountains as $1 : 5$, and in the Alps as $1 : 4{,}7$. These results given by Ant. Wiest, (*Untersuchungen über die Pflanzengeographischen Verhæltnisse Deutschlands,*) confirm those indicated by Wahlenberg and Ringier.

With respect to their terms of life, the plants of Germany may be distributed into 684 annual, 169 bis-annual, 2170 vivacious, and 390 arborescent.

The number of bis-annual and vivacious plants is the greatest in Switzerland, a necessary result of a coarser climate and short summers.

The principal results as found by Mr. Weist, with reference to the progression of families in the different regions, are as follows:—

Nine families increase in number in proportion to their elevation, the Junceæ, Campanulaceæ, Primulaceæ, Gentianeæ, Violarieæ, Saxifrageæ, Thymeleæ, and Cynarocephaleæ.

Twenty-eight others increase towards the plains, and some disappear entirely in the mountains. The Leguminosæ, Chenopodeæ, Rubiaceæ, Solaneæ, Euphorbiaceæ, Polygoneæ, Alismaceæ, Urticeæ, Capparideæ, Malvaceæ, Jasmineæ, Convolvulaceæ, Portulaceæ, Amaranthaceæ, Typhaceæ, Nayadeæ, Salicarieæ, Aroideæ, Grossularieæ, Cucurbitaceæ, Hydrocharideæ, Myrteæ, Polemoniaceæ, Sarmentaceæ, Laurineæ, Cacteæ, Tiliaceæ, and Ebenaceæ. The generality of these familics also increase in number as you approach southern countries.

Seven families increase on leaving the plains, but do not attain their maximum in the Alps, but in elevated countries and mountains. They are the Agrimonieæ, Dipsaceæ, Coniferæ, Crassulaceæ, Orchideæ, Oleagneæ, and Colchicaceæ.

Ten others become more frequent in elevated countries, and are less numerous in the mountains. The Cyperaceæ, Chichoraceæ, Caryophylleæ, Ranunculaceæ, Amentaceæ, Rhinanthaceæ, Valerianeæ, Globularieæ, Berberideæ, and Rhododendreæ.

Nineteen families increase towards the Low Countries, but do not attain their maximum, which they present in the mountains. The Rosaceæ, Pomaceæ, Drupaceæ, Ulmariæ, Labiatæ, Tiliaceæ, Boragineæ, Geraniaceæ, Ericineæ, Irideæ, Caprifoliaceæ, Asparageæ, Frangulaceæ, Hypericineæ, Cisteæ, Apocyneæ, Aristolocheæ, Rutaceæ, and Terebinthaceæ.

Six families increase in number in the low countries, and in part in the Alps, and are less numerous in the mountains. The Gramineæ, Onagrarieæ, Papavaraceæ, Acerineæ, Plumbagineæ, and Plantagineæ.

Two families, the Cruciferæ and Umbelliferæ, attain their maximum in the low countries, and diminish nearly in the same relation towards the plains and the Alps. These two families attain their maximum in temperate latitudes, and become less frequent towards the poles or the equator. The Corymbiferæ present exactly opposite relations, and are less numerous in countries of a medium elevation.

Out of 1500 plants of the French flora, growing at an elevation of more than 3000 feet, Decandolle found only 15 annuals. Out of 619 true alpine plants, Mr. Wiest found 22 annual. The mountains of Germany possess the greatest number of shrubs and trees. The Coniferæ predominate in the most elevated countries: oaks and beech trees in the low countries. The predominant species in humid and marshy countries, are 459 in number: 73 others are peculiar to the border of the sea,—among them Gramineæ, Compositæ, Chenopodeæ, and Cruciferæ, are the most numerous.

Very interesting results of the influence of soil, climate, and exposure, on the distribution of plants, may be obtained by the comparison of the particular floras of Switzerland, Wurtemburg, Wetteravia, of Manheim, Vienna, and Dresden, of Munster and Berlin.

Switzerland possesses most Caryophylleæ, Saxifrageæ, Primulaceæ, and Compositæ. Wurtemburg has the greatest number of Orchideæ, and Vienna of Leguminosæ. The less numerous families in Wurtemburg are the Euphorbiaceæ and the Gramineæ. Wetteravia is richest in Umbelliferæ and in Ranunculaceæ, and the poorest in Compositæ, Cruciferæ, Saxifrageæ, Amentaceæ, and Coniferæ. The Rubiaceæ and the Amentaceæ, (especially the willow trees of the banks of the Rhine and the Necker,) predominate at Manheim, which presents the fewest Cyperaceæ and Primulaceæ. The flora of Vienna is particularly rich in Euphorbiaceæ and in Leguminosæ. The Junceæ, Caryophylleæ, and Ericineæ, on the contrary, are the less numerous.

Dresden offers, after Munster and Berlin, the most Monocotyledons and Ericineæ, the fewest Umbelliferæ and Malvaceæ. In the flora of Munster the Junceæ and the Graminæ predominate; the less frequent families are the Ranunculaceæ, the Leguminosæ, and the Rubiaceæ. The Cyperaceæ, and, generally speaking, the Monocotyledons, predominate at Berlin; the Orchideæ are 16 in number, while there are 38 in Wurtemburg.

The number of cryptogamous species in Germany surpasses that of the phanerogamous; for 4340 species are known, distributed in the following manner in the different families: 73 Ferns, 701 Mosses and Hepaticæ, 375 Algæ, 681 Lichens, and 2510 Fungi.

*Algiers.*—The town of Algiers, built in an amphitheatre, forms a triangle. One of the angles is bathed by the sea; the two others elongate themselves on a gradual slope, forming a point, at the extremity of which is built the new palace of the dey, called la Casba.

The town is defended by a fort, called the Fort of the Emperor; that of the Star, marked on most maps, does not exist at the present day.

The gardens of the Dutch and Swedish consuls overlook the fort, and the fortifications on the land side are very imperfect: the ramparts are often intersected by habitations. The ditches of the town are always dry, and on account of their rapid slope, cannot, it is stated, be inundated.

The town has three gates: Babalouet to the west, the New Gate to the south, and Babazon to the east.

Its water is derived from an exposed aqueduct, originating about a mile and a half from the town.

The garrison consists of 4000 Turks, and 2000 more are distributed over the different posts of the regency. Crowds of Arabs would, independently of these, dispute the debarkation of foreign troops.

The artillery consists of 800 field-pieces on the side facing the sea, and from 100 to 120 on that facing the land.

The French papers talk currently of making this town a Christian port on the Mediterranean. According to some, this is to be accomplished by re-establishing at Algiers the order of Malta, under the title of Knights of the Mediterranean. A hundred young gentleman, it is stated, have equipped themselves for this chivalrous service. According to another statement, the Duke of Chartres is to accompany the Dauphin to Toulon, and to embark thence for Algiers, which, with Tunis and Tripoli, he is to govern in quality of sovereign. We suspect that there is no truth in either of these statements. It is certain though, that several engineer geographers, (Capt. Filhon, Messrs. Levret, Olivier, and Rozet,) are employed to make the geodesical and astronomical observations necessary for the accurate topography of the country. They will continue the great meridian carried by Biot and Arago to the island of Formentara, and the geological and statistical inquiries will afterwards be carried on with much anticipated success.

*Death of Mr. de Rossel.*—The loss of this learned geographer has been deeply and sincerely felt on the Continent, where the science, and all who devote themselves to it, are held in such high esteem. Mr. de Rossel entered the navy at a very early age, and gained much credit in the war of 1781 and 1782. Under the patronage of General d'Entrecasteaux, he shortly afterwards went with him in the research of La Perouse. He had the good luck to preserve the materials of that expedition on an enemy's land, and to restore them to France.

He was, after the publication of that voyage, appointed to fill an important situation in the depot of the navy. He co-operated with energy and success with the Academy of Sciences and the Board of Longitude, and from that period his writings began to influence the progress of the art of navigation, and of nautical astronomy.

Mr. de Rossel was one of the founders of the Geographical Society. He lived entirely for science; and perhaps his devotion, which knew no bounds, contributed to his premature death.

*Dr. Siebold.*—We learn that Dr. Siebold, celebrated for his labours on Japanese literature and science, has unfortunately excited the suspicions of the Japan government. An astronomer of Jeddo, capital of Japan, had given him numerous maps of the country. The magistrates of Vangasatri, one of the five imperial cities, caused him to be arrested and all his papers seized, which were examined with the greatest care. It is expected, however, that they will allow of his return to Europe.

### *Rivers of Canada.*

The rivers which feed the great stream of the St. Lawrence, as well as the extended lakes connected with it, may be considered as of three classes: first, those of great magnitude, and traversing extensive regions; secondly, those of inferior size, flowing only through particular districts, and from 40 to 150 miles in length; thirdly, those of smaller dimensions, suppose of less than thirty miles in length. It is only of the rivers of the second class that we mean to speak in this article. Of the first class, there are only two, the Ottawa and the Saguenay. The former is still too little known through the greater part of its course, to be the subject of particular description, and would at any rate require to be separately treated. The latter is also of such magnitude, as to require a separate notice.

The streams of the third class are far too numerous to be detailed.

Of the rivers falling into the south side of the St. Lawrence, within the bounds of Lower Canada, the largest, in respect of quantity of water, is the Richelieu, and it is also the best known. The principal origin of its waters is in the United States, and if we estimate the whole length of country from which it collects them, from the south point of Lake George to the termination of the river at Sorel, that length cannot be less than 160 miles. The breadth of the same tract varies from 10 to 60. Taking it at the medium of 30 miles, the extent of country from which its waters are collected, must be at least 4800 square miles. Only a small portion of this however lies within the Province.

From the Province line to the mouth of the river, the distance appears to be about 70 miles, and hence the space of which it collects the waters, within the Province, being a triangle of 30 miles base, will be 1050 square miles in extent, or one-fourth of the whole expanse which it drains. Its capabilities and defects as a water communication, are well known.

In the triangular space bounded by the Richelieu on the east, the line 45° on the south, and the St. Lawrence on the north-west, the only river requiring to be enumerated in this class is the Chateaugay, celebrated in the events of the late war. It rises in Hemmingford, and after running twenty miles in a winding course to the west, flows through nearly the same distance north-east into the St. Lawrence. It appears to collect the waters of a space nearly equal to 400 square miles.

That part of the District of Three-Rivers which lies south of the St. Lawrence, together with the adjoining part of the District of Montreal, as far as the river Richelieu, is watered by a large number of rivers. Among these, the principal, or such as belong to our secondary class, are the St. Francis, the Yamaska, the Nicolet, and the Becancour, of which the three first, all lose themselves in lake St. Peter. The natural limits of this part of the country are the Chaudiere on the east, and the Richelieu on the west. The largest of these rivers is the St. Francis.

This river has three principal sources, lake St. Francis, lake Memphramagog, and lake Tornefobi. The first of these is in the township of Garthby, and takes the name of the river, which, from this place, runs about 30 miles in a south-westerly direction to the township of Ascot. This lake is divided into two parts, one of which is 12 or 14 miles in length, and of very irregular breadth: the other about half as much.

Lake Tornefobi is in the township of Hatley. Its outlet unites with two or three other streams from Compton and Clifton, and falls into the St. Francis in Ascot.

Lake Memphramagog is of a lunular shape, extending about 20 miles in length, but very narrow, dividing the township of Stanstead, and having its southern extremity in Vermont, and the northern in the township of Hatley. Its outlet falls into a small lake Scaswap, from which its waters are conveyed into the St Francis in the township of Ascot.

From this confluence of these various branches, this river flows in a northwesterly course, a distance of 60 or 70 miles, into the lake of St. Peter. Its navigation is interrupted by many impediments of rocks and rapids, which are minutely described in Col. Bouchette's work, p. 322.

The whole length of this river, cannot be less than 100 miles. The country from which it collects its waters, is of a triangular shape, each side being about 60 miles, the vertex being at the embouchure into lake St. Peter, and the base a line extending from the south point of Memphramagog to the easterly point of lake St. Francis. The area will therefore be about 1500 square miles, or equal to 15 ordinary townships. In the north its shape is very narrow.

In some parts of its northerly course, it is closely approached by the Nicolet, which flows nearly in the same direction a few miles to the east.

Between the St. Francis and the Richelieu, the River Yamaska has its course, and as nearly parallel to the former as the irregularities of all rivers can be supposed to permit. Its south-west, and remotest branch, originates near the Province line in the Township of Sutton. This branch runs westerly for nearly thirty miles, in the course of which it is joined by the north-east branch. It then runs north for about thirty miles, receiving the Tortue from the east, and falls into the upper end of lake St. Peter, a few miles above the mouth of the St. Francis.

The region which its waters form is nearly an isosceles triangle, having for its base a line of 30 miles, and each of its equal sides about 50. It covers therefore, nearly 700 square miles.

The river Nicolet has its sources in the Townships of Shipton and Tingwick. It consists of two principal branches, distinguished by the names of the eastern and western, which unite about 20 miles from the embouchure. The distance in a straight line, from the source to the mouth, seems to be about 60 miles: and the breadth of the space which it waters about 12. It collects therefore the waters of about 720 square miles. It is honoured above the other rivers in Canada by being the site of a seat of learning established by the late Catholic Bishop, and entitled, "The College of Nicolet." It appears not to have been accurately surveyed; but, by the report of the Indians, is navigable for canoes nearly the whole of its course.

The waters which fertilized the lands lying between the Nicolet and the Chaudiere, are collected and conveyed into the St. Lawrence by the Becancour, a river of very devious course. It rises in the townships of Broughton and Leeds, and after running nearly 25 miles north-west into Nelson, flows almost directly west about 45 miles, when at Bulstrode and Aston it again directs its course to the north, and falls into the great receptacle of Canadian waters by two channels separated by the island of Dorval. The scenery on its banks has been much admired.

The direct distance from its source to its mouth seems to be about 60 miles, and the breadth of country through which it winds, about 25. It therefore receives the waters falling upon an extent of nearly 1,500 square miles.

The most easterly of the rivers of this class, which fall into the south side of the St. Lawrence is the Chaudiere, in magnitude equal, if not superior, to the St. Francis. It has its origin in the springs which feed Lake Megantic, a body of water about 10 miles in length, and 3 or 4 in breadth, and still retaining its Indian name. This river flows northerly from this Lake 40 miles to Aubert Gallion, and then north-westerly into the St. Lawrence. It abounds in falls, one of which is particularly celebrated for its beauty and surrounding scenery. But the same cause which contributes so much to the grandeur of its appearance, renders it unserviceable as a water communication. It receives in its course, the Beaurivage, and other streams which do not appear to have been minutely explored.

The length of country which it traverses is about 100 miles, and the breadth probably not much less, for the most part, than 30. The extent of land, therefore, which it clears from redundant waters, must be 2500 or 3000 square miles.

Beyond this stream to the east, run the Echemin and the devious River-du-Sud; but they do not possess such magnitude as to entitle them to be described under this head.

Beyond these, we meet with no rivers worthy of notice till we arrive at the St.

John, long and still remaining the subject of political discussion between Great Britain and the United States, and which, conveying its water into the Bay of Funday, falls not within the present investigation.—*Quebec Star.*

*Manners of the Ingouch.*—At the present day, when an Ingouch owes any thing to a Tchetchentse, and cannot or will not pay, the Tchetchentse goes to the *kounak* (host or friend) whom he has among the Ingouch, and says to him, 'Such a person, of such a nation, owes me so much—make him pay me, for I have brought a dog, and I will kill it upon the dead of your family.' This menace make the Ingouch tremble, and he immediately employs himself in behalf of the creditor. If the debtor denies the debt, they compel him to take an oath in the following manner: they mix together the bones and excrement of dogs, and put this mixture in front of the *Ierda,* or divine rock; the two parties go thither, and the debtor says, in a loud voice, 'If I do not tell the truth, I consent that the dead of my family may carry on their shoulders the dead of the family of such a person, and that too in this road, when the rain shall have fallen, and the sun shine upon it." This ceremony takes place for thieves and receivers more frequently than for debtors, as the Ingouch oftener rob their neighbours than borrow from them: trade, however, gives rise to some credit. The annexed is more extraordinary:—If an Ingouch loses his son, another who has lost his daughter comes to him, and says, 'Your son may want a wife in the other world, give me so many cows for the *kalym,*'—and this is never refused. The *kalym* is among Mussulmans the dowry which the husband gives to the father-in-law. The Tchetchentses seldom give more than ten cows, but the Ingouch give to the number of thirty; they have as many as five wives. After the death of the father, his sons marry them all. The Tchetchentses as often reproach them with this infamous custom; but the Ingouch reply, 'My father slept with my mother, and I may very fairly sleep with his wife.' The Ingouch are never tired of admiring the act of writing, and regard it as a perpetual miracle, which Christianity and Mahometanism operate in favour of their disciples. The following fact proves that the Ingouch are still attached to their religion, although some are Mussulmans in secret. Two brothers of this nation having been sold into Turkey, had embraced the Mussulman faith, had been to Mecca, and having become free, returned to their country; their mother was still living, and they had not much trouble in converting her to the Mahometan doctrines. Afterwards, impelled by a holy zeal, they preached publicly against the religion of the rocks. But the Ingouch assembled, and said to them, 'You teach us a law which you learnt whilst you were slaves; we will have nothing to do with it,—go out of our country, and never return.' The two brothers went to establish themselves among the Tchetchentses, where they still remain.—*Potocki's Travels.*

*China.*—The learned orientalist, Professor Newman of Munich, is about to take his departure for China, where he is going to study the language and the literature of the country. The Royal Academy of Berlin has put a considerable sum at the disposition of the professor for the purchase of Chinese works.

*Champollion.*—The frigate Astrolabe, that carried Mr. d'Urville on his voyage of circumnavigation, has arrived at the Havre laden with the objects of antiquity collected by Mr. Champollion in Egypt. Among these is a sarcophagus that weighs 12,000 lbs.

*Amsterdam and St. Petersburg.*—A regular communication is now established between Amsterdam and St. Petersburg. A steam-boat takes the traveller to Hamburg, when a stage coach awaits for Lubeck, from whence another steamboat carries him to the Russian capital. The distance from Paris is 580 leagues, and the journey is accomplished in ten days. In the beginning of June, equally regular communications will be established between Stockholm and Copenhagen.

# NATURAL-HISTORICAL COLLECTIONS.

## Baron Cuvier's *Lectures on the History of the Natural Sciences.*

Lecture IV.—Greece.—The Greeks did not receive all their knowledge from Egypt. They had communications with the Phenicians, and probably also with the Babylonians. It is certain that they had intercourse with the tribes of Colchis and Caucasus, from whom they received religious rites very different from those of Egypt. But we can only form conjectures as to the results of these early communications, and can only refer to the period when Cadmus brought the Phenician alphabet into Greece, as that at which precise historical accounts commence. An uninterrupted chain then commenced, and the history of the sciences became based upon a continuous series of written documents.

The sciences once introduced among the Greeks, were with them free from the fetters which had retarded their progress among the other three nations, whose history we have sketched. They had no longer to suffer either from the irruptions of barbarians, or from the selfishness of a privileged caste.

India, Assyria, and Egypt were, as we have said, countries quite open, and, from the very nature of their ground, in a great measure incapable of being defended. The case was different with Greece, the whole central part of which being mountainous, afforded great facilities for resisting an invasion. There each tribe, separated from the others by deep gorges, found natural ramparts in its rocks. An invader could only conquer the land foot by foot, and the parts which he had subjected would quickly withdraw themselves from his domination. All the small islands which depended upon that country were equally defended by their mere position, and enabled to maintain their independence. Accordingly, Greece could never remain long united under the same form of government; and perhaps this circumstance, which arises from the very form of the country, will, even at the present day, prevent the establishment of a central government

The settlements which the Greeks made on the coasts of Asia Minor and Italy were not, it is true, so easily defended; but when they were overpowered, the learned men to whom they had given birth fled back to Central Greece, and thus carried to that country the tribute of their acquirements; so that the conquest of the colonies, instead of retarding the civilization of the mother country, only served to accelerate it.

Mythological forms were in the east only the emblematic expression of a general system of philosophy, and thus the priests were at the same time the learned men of the nation. In Greece, there were only received the external forms of religion, without any apprehension of the meaning concealed under these emblems, so that there the priests were not in general more learned than the vulgar. They did not form a caste; for, although there was a tendency to perpetuate the priesthood in the same families, this tendency was confined within very narrow limits, and had very little influence upon the constitution.

The sciences, therefore, at their renovation in Greece, were completely separated from religion, and consequently free in their progress; whereas in the countries in which a divine origin was attributed to them, they necessarily remained stationary, as nothing, without sacrilege, could be changed in a doctrine that had emanated from the divinity itself.

The history of the sciences in ancient Greece presents four very distinct epochs. The first commences at the settlement of the Pelasgi in that country, and ends at the arrival of the Egyptian colonies, about the fourteenth or fifteenth century before our era. The second includes all the time that elapsed between the arrival of these Egyptians and the settlement of the Greek colonies on the coasts of Asia Minor, about the year 1100 before Christ. The third extends from the establishment of these colonies to the time when the intercourse with Egypt was renewed, about the year 600 before Christ. The fourth period commences with Thales' journey to Egypt, and comprehends the most brilliant age of Greece.

Were we to trust to some writers of the Alexandrian school, we might suppose ourselves possessed of a very correct history of ancient Greece. In them we find the genealogy of the kings who reigned in that country with quite as many details as those of the sovereign houses of Europe. But these genealogies, in which some mythological personages always figure at the head, such as Jupiter or Neptune, have evidently been fabricated. Thus the history of the Greeks, up to the time when Cadmus brought them the art of writing, is entirely conjectural. All that we know is, that before the arrival of that chief, the Pelasgi were not entirely uncivilized, but were acquainted with several of the arts.

The Pelasgi came originally from India, of which the Sanscrit roots that are found so abundantly in their language do not permit us to doubt. It is probable that they passed over the mountains of Persia, and thus penetrated to Caucasus, from which point, instead of continuing their route by land, they embarked on the Black Sea, and made a descent upon the coasts of Greece. In that country they founded several cities, and at the places where they first settled, Thyrintum, Mycenæ, &c. there are still seen remains of their buildings, which are known by the name of cyclopean walls. At the time of Pausanias, it was already known that these buildings were anterior to the arrival of the Egyptian colonies, and that it was to the labours of the Pelasgi that certain gigantic works were to be attributed, such as the treasuries of Minias, and the canals dug through Mount Ptoüs, for the purpose of giving issue to the waters of the lake Copaïs, and prevent the inundation of Bœotia.

The religion of the first Pelasgi was much more simple than that of the Greeks. It was probably confined to the deification of the various powers of nature, and their representation under sensible forms.

The disturbances which took place in Egypt about the fourteenth and fifteenth centuries before the Christian era caused various emigrations. Those which were directed towards Greece were pretty numerous. The best known are those of Cecrops, Danaüs, and Cadmus. Cecrops, in the year 1556 before Christ, carried the mysteries of Isis or Ceres into Attiea; Danaus, in 1485, carried there the thesmophories; and Cadmus, in 1493, introduced the alphabet, the eastern origin of which is sufficiently attested by the forms of the letters and the names which they have retained. These colonies arrived with sufficient strength to establish themselves in the country of the Pelasgi, and diffuse their civilization there. But, as we have said, their chiefs had been but half instructed in the learning of Egypt, so that they carried with them only the external form of the religion, without attaching any metaphysical idea to it. Their divinities, although evidently borrowed from the Egyptian mythology, henceforth appeared under human forms only, and this anthropomorphism was peculiarly favourable to the progress of the graphic arts. What, in fact, would sculpture have become, had it been condemned to the reproduction of the hideous forms of those emblematical beings in which the priests had personified one of the attributes of the divinity, had it represented a god with four heads and a hundred arms, as in India, or with the head of a wolf or hawk as in Egypt?

The particular tribe of the Hellenes, which extended its domination not only over the Pelasgi, but also over the foreign colonies that had settled in Greece, finally gave its name to the whole country. This tribe, which, under the guidance of Deucalion, established itself in the neighbourhood of Parnassus, came from the north, and probably from the Caucasus, it being on that mountain that the poets represented Deucalion's father, Prometheus, as chained. Now the tribes of the Caucausus assuredly had knowledge of the doctrines of India, by means of their intercourse with Colchis, which was long a kind of mart for the commerce whch they carried on in all the European seas. The Hellenes were the first civilized of all the Greek tribes. It was by them that the worship of Apollo and the cultivation of the arts were introduced.

The Greek religion partook, at its commencement, of the Indian and Egyptian religions, from which it originated. The island of Samothrace, in which the most ancient mysteries were established, had divinities whose names still indicate the metaphysical ideas which were attached to them. In Thrace, the part of the continent nearest to that island, Orpheus instituted religious forms, which resemble those of the east. The influence of Cecrops, however, prevailed, and pure anthropomorphism was generally established.

This Orpheus was a priest and a poet at the same time. There are attributed to him a collection of hymns, and some works in which are found details respecting plants and stones, but only considered in their relation to theurgy. Nearly at the same epoch, Chiron, it is said, studied their properties with the view of applying them to medicine.

Chiron and Orpheus are reckoned among the heroes who, under the name of Argonauts, went to Colchis to the conquest of the golden fleece. It is probable that this expedition is not the representation of a single fact, but rather the expression of the commerce which was established by way of the Black Sea with the tribes of the Caucasus. Even Orpheus and Chiron might be nothing else than the poetical representation of the first efforts for the cultivation of the necessary arts. Be this as it may, the family of the Asclepiadæ, which began to be noted about this period, that is about 1300 years before Christ, made real efforts for the advancement of civilization.

A century after, the famous Trojan war took place, in which was displayed a struggle between the Europeans and Asiatics. The poems of Homer, which were written about the year 950, that is to say, about 200 years after the event, show us that the arts at this epoch were already considerably advanced, those of forging and tempering the metals, polishing and gilding armour, manufacturing cloth, dyeing with brilliant colours, being successfully practised. Sculpture and painting had also been invented.

The Iliad and Odyssey contain some moral maxims ; but no traces of a philosophical, nor even of a strictly religious doctrine, are seen in them. The gods are only men, more beautiful and stronger, but still vulnerable, and differing from other men only in possessing the faculty of concealing themselves from the view, and ascending in the air.

The comparisons with natural objects, which occur so frequently in the verses of Homer, show that at this period correct observations had been made on the manners of animals. When that poet compares a hero, pursued by common warriors, to a lion assailed by jackals, the representation which he gives of the habits of the latter is as correct as brilliant.

Hesiod may be considered as the contemporary of Homer, for his two works bear the impress of the same epoch. In his Theogony, we see mythological anthropomorphism in all its purity. In the history of the giants and Titans, there are hardly perceived a few traces of pantheism. In his book of Days aud Hours, Hesiod inculcates upon men the necessity of labour, and gives them some rules calculated for their guidance. He speaks of the cultivation of wheat, of the time proper for tilling and sowing, &c. It is to be remarked, that he always indicates the time proper for these operations by the heliacal rising of a star, which proves that if the lunar year was already established in Greece, it was at least little used in domestic life, its mode of division necessarily rendering it inconvenient. Hesiod, in his book, names a certain number of plants, and describes their properties.

Such was the state of knowledge in Greece, in the ninth century before our era.

It was during the time that elapsed between the Trojan war and the birth of Homer and Hesiod, that the colonies which directed themselves towards the coasts of Asia Minor went forth. Their emigration took place in consequence of the revolutions which happened in Greece, when the Heraclidæ conquered the Peloponesus. Ionians, Dorians, and Æolians left their country, and founded a great number of cities in Asia, some of which, as Smyrna, Ephesus, and Miletum, soon acquired great importance.

When there were Greek settlements on both sides of the Egean Sea, the frequent intercourse which took place between them gave a new stimulus to commerce, and soon brought in the riches of the east. The new cities were soon in a state to send out colonies, and several tribes went forth to settle along the shores of the Black Sea.

A little more than two centuries after the conquest of the Peloponesus by the Heraclidæ, Greece was again agitated by new disturbances, the result of which was the almost universal abolition of royalty. This revolution gave rise to a new emigration, which, taking a direction the reverse of that taken by the others, betook itself to the shores of Italy, and settled in the country which afterwards bore the name of Magna Græcia. These Italian colonies, which soon became extremely rich and polished, were an additional means of civilization for central Greece.

We at length come to an epoch marked by two events, which exercised a great influence upon the progress of science. The first is the re-establishment of the intercourse with Egypt, which took place when Psammeticus took Greeks from Asia Minor into his armies as auxiliaries. The other is the war of the Persians against the Greeks, the conquest of the colonies of Asia Minor, and the invasion of central Greece itself, an undertaking which fortunately was not crowned with success.

About 600 years before Christ, Cyrus made himself master of Media. His son Cambyses carried his arms towards Egypt, subjected the whole of that country, and reduced the priests to a state of great degradation. The effects of such conquests are generally less severe, because the victors, yielding to the ascendancy of civilization, adopt the manners and customs of the vanquished. In Egypt, a union of this kind could not take place. The Persians, whose religion was founded on the doctrine of the two principles, were in this respect evidently superior to the Egyptians, and had moreover a horror for the worship of that people, on account of the honours which they paid to images. They, therefore, exercised the most cruel persecutions against them.

The same motives rendered their yoke heavy upon the Greek colonies of Asia Minor, when Darius, the successor of Cambyses, conquered them. Oppression arrested among them the progress of the arts and of poetry, as in Egypt it had extinguished the philosophical and religious doctrines. The conquest of Darius threw upon Central Greece a multitude of emigrants, who carried thither the knowledge which they had acquired in Egypt; for, as soon as the gates of that country were thrown open by Psammeticus, Thales, Pythagoras, and several other sages, hastened to the school of the Egyptian priests. It may therefore be said, that, if the successes of the Persians disquieted Greece, they in no degree injured its civilization, but rather contributed to its improvement.

Xerxes, who reigned after Darius, attacked Central Greece; but he was repulsed, and from this period commences the most brilliant epoch of that country. In fact, philosophy, which was at first cultivated in the colonies of Asia Minor, and then in the Italian colonies, at length concentrated itself at Athens, and in a small number of years arrived there at a high degree of perfection.

The Greek philosophy is not derived from a single root. It had no uniformity, because it was not confided to a single body of teachers. It was derived, it is true, through different channels from the ancient Egyptian philosophy; but the sages who went to drink at this source, modified each in his own manner the doctrines which were communicated to them, and formed various schools.

The oldest, the Ionian school, was founded by Thales, about the year 600 before Christ. It possessed a great number of followers in the cities of Asia Minor, Ephesus, Miletum, &c. The most celebrated of all was Anaxagoras, who modified its principles, and introduced them at Athens, about the year 500 before Christ.

The second school is that of Pythagoras, who was born in 584, and flourished about the year 550 before our era. He had also received his doctrine from the Egyptian priests, and differed less from them than Thales had done. He even attempted to establish their constitution; for, having gone from Samas to Crotone, he there founded secret societies which soon caused disturbances, in which most of his partisans were massacred.

The third or the Elean school derived its name from a small city of Lucania, in which it was first established. It had for its founder Zenophanes, who was born at Colophon in Asia Minor, but who afterwards passed over into Italy. This philosopher does not appear to have borrowed any thing from the Egyptians. His doctrine bears a greater resemblance to that of the Indians, it being that of unity or pure idealism.

The fourth school, or the Atomistic, founded by Leucippus, adopted a system entirely the reverse of that of the Eleans. It chose pure materialism, and saw nothing in the universe but matter and motion.

Along with these four purely speculative sects lived the family of the Asclepiadæ, who cultivated the sciences solely with a practical object. They attached themselves especially to facts, and their method at a subsequent period served as a model, and greatly contributed to the advancement of the positive sciences.

LECTURE V.—SCHOOLS OF PHILOSOPHY BEFORE SOCRATES.—We have seen that there were formed in Greece, or rather in the Grecian colonies, four great philosophical sects or schools, which, in consequence of political events, became concentrated at Athens. A useful rivalship took place among them, and their labours in the hands of Socrates gave rise to a new school, which, by the judicious method adopted by it, opened up a path for the sciences in which they could no longer be seen to retrograde. But before speaking of this remarkable epoch, we must revert to the four original schools, which as yet we have only mentioned.

*Ionian Sect.* The Ionian Sect, the oldest of all, is that whose dogmas have most reference to the natural sciences. Its philosophy was at first almost entirely material; which proves that, at the time when Thales went to study in Egypt, the priests of that country had already in a great measure lost the remembrance of the metaphysical doctrines which were anciently preserved in their colleges. The experimental method not being then known, the philosophers of the Ionian school bent their efforts towards the discovery of a principle, that is, something which existed before all. Thales thought he had discovered it in water. This idea he had no doubt borrowed from the Egyptians, but he modified it in his own manner. With him water was the first matter of which the world was formed. But this water might exist in different states of density, and in each of these states it formed a secondary principle, or element. These elements, combining in different proportions, gave rise to all bodies in existence. Thales gave a soul to the world, to animals and to plants; but by the word soul he meant nothing more than an internal cause of motion.

Anaximander considered water only as the second principle, the first, according to his system, being infinity. It is not easy at the present day to form a precise idea of what he meant by this word. It is not likely that he meant by it that limitless space existed before matter, as all the ancient philosophers considered matter to be eternal. Be this as it may, Anaximander, having placed his second principle in water, maintained that men were at first fishes, and that they arrived at their ultimate state only through a series of transformations. This singular idea has been several times brought forward since, and even in our own day.

Anaximenes, a disciple, as is believed, of Anximander, placed his principle in air, which, at different degrees of condensation, and by means of various combinations, gave rise to all objects and even to the gods.

Lastly, Heraclitus, who may also be looked upon as belonging to the Ionian school, placed his principle in fire; but he perhaps regarded it rather as being the source of animation and motion than as forming the matter of bodies itself. Some connection may be perceived between this system and that of the physiologists, who have placed the principle of animal life in the heat produced by the act of respiration.

*Italian School.* The second or Italian school was founded by Pythagoras. This philosopher was born at Samos about the year 584 before Christ. He was the contemporary of Anaximander, Anaximenes, and Heraclitus. It has even been said that he was, like them, a disciple of Thales. But this is by no means certain. After having travelled into Egypt, Magna Græcia, and perhaps India, he returned to his native country, which he found governed by the tyrant Polycrates. Displeased with the changes which that ruler had introduced, he retired to Italy, and settled at Crotona, a city built 120 years before by a colony of Achæans. There he presently founded secret societies, to which he gave institutions modelled upon those of the sacerdotal caste in Egypt. He did not receive his disciples until after they had been subjected to a long noviciate; and imposed upon them fasts and abstinences of various kinds, the object of which is not well known. The societies which he founded were soon dispersed, because they were accused of ambitious views; nor were they renewed until long after his death.

Pythagoras has left no work, nor is it even known if he ever wrote any. He had acquired the first elements of geometry in Egypt, and is said to have sought the principle of things in the power of numbers. All that relates to this part of his doctrine has been so disfigured by those who renewed his school after the period of the persecutions, that it is difficult to judge of his real ideas. Perhaps he meant to say that it is possible to estimate all the powers and magnitudes in numbers, and thus render them comparable and capable of being submittèd to calculation. In this case, his idea was the same as that which, at the present day, serves as a basis to all mathematical physics.

He divided all objects into such as are in pairs or single. The latter were composed of monads or unities, the former of diads or dualities. He even carried the language of arithmetic into his moral system, and said that justice was always divisible by two. It is impossible not to consider this expression as allegorical, and it may be equally supposed that, in many cases, ideas have been attributed to this philosopher which he did not entertain, by taking literally what he had said in a figurative sense. But even amid all these singularities, we cannot fail to see that some progress was made. In fact, the Ionian school had seen all in matter, whereas the Italian school sought something more, and thought it was found in the power of numbers.

According to Pythagoras, the universe was a harmonic whole, and, for this reason, the number of the planets was equal to that of the tones of the gamut. In the centre of this harmony was the sun, the soul of the world and the principle of motion. The souls of men and animals partook of the nature of this celestial fire, as well as those of the gods, who were only animals of a higher order.

A school founded on the mathematical sciences could not fail to elicit some truth. Accordingly, about the year 520 before Christ, we find an immediate disciple of Pythagoras, Alcmeon of Croton, engaged in anatomical researches on animals. He is said to have maintained that goats respire by their ears, and this assertion has made him to be considered by some as an observer unworthy of credit, while others have seen in it a proof of his being acquainted with the Eustachian tube, by which the air in fact penetrates from the back part of the mouth into the inner ear. We cannot, however, be too scrupulous as to what we are to believe respecting those ancient philosophers who left no writings behind them. All that tradition has preserved respecting them is generally so incorrect, that we might with equal reason give them the honour of the most beautiful discoveries, or attribute the most extravagant fancies to them.

Alcmeon made observations on the formation of the embryo. He said that the head was first formed, and it is true that during the first period of the fœtal life, that part is proportionally of very great size. He thought that the fœtus was nourished by the skin, and compared the period of puberty in man to that of flowering in plants. We only know the opinions of this philosopher by what Chalcidias has said of them in his commentary on the Timæus.

Timæus of Locres was an immediate pupil of Pythagoras. He wrote a book *on Nature*, in which he treats of the soul of the world. He is less known, however, by this work than by the dialogue in which Plato has introduced him as interlocutor.

Ocellus Lucanus was also a Pythagorean philosopher, but probably less ancient than the former two. He is author of a book, entitled, *on the Nature of the Universe.* He maintained the unity of the world and its eternity, as well as that of the species. He speaks of the four elements, their mutations and combinations. Between men and the gods, which latter he considers as merely animals of a higher order, he places intermediate beings, the *demons.* But he makes the whole universe together a supreme divinity.

This pantheism, which admits beings of different degrees, also formed part of the system of Empedocles. That philosopher, who was born at Agrigentum in the year 444 before Christ, was a contemporary of Socrates. He wrote a poem in six books on nature. In this poem he speaks of the four elements. He does not consider any of them in particular as a principle, as the different philosophers of the Ionian school had done. It is the confused mixture of them all, their chaos, that he looks upon as the pre-existent substance.

Empedocles did not confine himself to speculations, but was an observer, as Alcmeon had been. He showed the analogy between the egg of animals and the seed of plants, discovered the amnios, and it might be supposed, from a verse of his which has been preserved, that he knew the cochlea of the ear. He applied his knowledge to the general good, rendered the country more healthy by draining the waters, purified the air by fires, and, it is said, stopped an epidemic disease by closing up a hole in a rock from which emanated noxious vapours.

Another Pythagorean, whom the ancients appear to have held in great esteem, but of whose writings nothing remains, was Epicharmas. He wrote upon physics, moral philosophy and medicine. Neither the time nor the place of his birth is known with accuracy.

These are the principal philosophers of the Italian school who engaged in the sciences. The Pythagoreans almost always inspired uneasiness among the people, by the form of their associations and the mystery which surrounded them. This cause prevented their doctrine from being widely propagated. It had become extinct, when it was revived by Plato, who adopted it in part.

*Eleatic School.* Along with the Pythagorean school there arose another, that of Elæa, founded by Xenophanes, who, about the year 500 before Christ, went from Colophon, his native country, to settle in Sicily. This philosopher is the first who combated the anthropomorphism of the Greeks. The divinity was with him the *unity* or *whole ;* but his pantheism, instead of being material like that of the Ionians, was purely spiritual. Parmenides, his disciple, went farther, and maintained that all sensible nature was an illusion. His system was precisely that which occurs among the Indians at the present day.

Parmenides found that this illusion takes place according to certain laws, so that we may reason respecting these appearances just in the same manner as respecting realities. He admitted two principles ; the one active or hot, fire ; the other cold or inert, earth. It was from the concourse, or rather the opposition of these two principles, that, according to him, all living beings resulted. This philosopher had for his friend Zeno the Elæan, the inventor of dialectics. Their principles not being founded on observation, they required very subtile reasanings for their establishment. The art of connecting them was therefore necessary. But presently what was only a means became an object. It was difficult always to prove, and occasionally they adopted either side. In this manner, very ingenious men succeeded after many efforts in rendering obscure what was clear, and in making doubtful what seemed certain. They soon even went so far as to deny motion, and supported their assertion by demonstrations of which it was often rather difficult to find the weak side.

Parmenides and Zeno went to Athens about the year 460 before Christ. Anaxagoras arrived there about the same period. Socrates was then ten years old, and thus might hear the discourses of the whole three.

*Atomistic School.* Leucippus, the founder of the atomistic sect, was the contemporary of Zeno and Parmenides, and the avowed opponent of their doctrine. Disgusted with idealism from the abuse which he had seen made of it, he went into the opposite extreme, and became entirely materialist. He rejected alike the intelligent unity of the Elæan school, and that *whole* which is neither material nor immaterial, and the numbers with the harmonic proportions of the school of Pythagoras. He recognised nothing beyond vacuity and atoms. These very atoms he despoiled of the properties which other philosophers had admitted, and allowed them only figure and motion. The various properties of bodies, their colour, their consistence, heat and cold, depended upon the figure and arrangement of these molecules. The eternal circle of destruction and reproduction of beings resulted from their motion. The soul itself was but an aggregation of atoms in a particular mode of combination.

Democritus of Abdera was the continuator of this school. The year of his birth is not well determined, and it is only known that he lived a very long time, and in 399 before Christ, the same year with Socrates. He supported the system of atoms, having found a means of combination for them. Leucippus had admitted variation only in the figure of these atoms, but Democritus admitted it in their motion also. He distinguished direct motion, oblique motion, and rotatory motion, according as the images which make impression upon our senses are corporeal, or formed of very minute particles which, proceeding from external objects, touch our organs.

Alcmeon had studied the anatomy of various animals, but Democritus was in reality the first who instituted comparative anatomy. He observed the differences of organization of a great number of species, and tried to deduce from them the differences in their manners and habits. He knew the biliary passages, and discovered the causes of mania, which he placed in an alteration of the viscera of the lower belly.

The atomistic sect has a peculiar and very decided character, whereas the other three, being only branches of the school of Thales, resemble each other in various points.

The medical school, which existed along with these four sects, was much older than any of them, and had been perpetuated from time immemorial in a single family, that of the Asclepiadæ. Its two principal branches were established in Gnidos and Cos. Most of the temples of Esculapius were kept by priests of this family.

In these temples, diseased persons were received. They were made to observe certain religious ceremonies. Remedies were administered to them, and those that had benefited them were kept in mind. Moreover, they who had been healed at a distance from these places, often sent to them the history of their disease, as if *ex voto.*

It was from one of these collections that had been continued for nearly 800 years, that Hippocrates drew ; and his books present, as it were, an abstract of the researches of the Asclepiadæ. All the works, however, which bear the name of this illustrious physician, do not belong to the same author, as is perceived by the difference in the style, and the contradictions which exist in the different treatises. It would appear that there were three individuals of the same name and family. The first lived in the time of Miltiades, and to him is attributed the book on fractures or articulations. The second and most celebrated was a contemporary of Socrates.

Anaxagoras united the school of Thales with that of Socrates, whose master he was. When the Persians subjugated Asia Minor, he had left Clazomenes, his native country, and settled at Athens. He was the friend of Pericles, and partook of the hatred that was excited against him. Having been accused of atheism by the enemies of that great man, he was obliged to retire to Lamsacus, where he died at the age of 72, in the year before Christ 428.

It was he who first clearly distinguished between mind and matter. In his time, the philosophers considered motion as inherent in bodies, or regarded bodies themselves as pure illusions. Anaxagoras established the reality of matter, and at the same time that of mind, which governs and arranges it. The principle, as will be seen, is that of natural theology, which serves as a basis to all the religions of the present day. Nothing, therefore, could be more unjust than the accusation of atheism directed against the man who was the first theist among the Greeks.

Anaxagoras does not admit as a principle either fire or water, or even the union of the four elements. According to him, there is a diversity in matter. Each kind of matter is formed of corpuscles similar to itself, and therefore similar to each other. From the singular objections which the ancients offered to the theory of *homœmeria*, (which was the name they gave to these component molecules,) it would appear that they had not comprehended it. They asked, for example, if a man is composed of little men, as if Anaxagoras had ever admitted this mode of composition for any thing else than for simple bodies.

None of the works of Anaxagoras has come down to us; but some of his apophthegms have been preserved. He said that nothing originates from nothing, that all is in all, and can produce all, meaning no doubt by this that each compound body contains all the species of simple molecules which, on being combined in other proportions, would give rise to the mixed bodies.

Our philosopher sought the reason of things in observation. It is related that the people having looked upon a ram which had only one horn, as a fearful prodigy, Anaxagoras dissected the animal, and explained the physical cause of the monstrosity. He was not, however, very strict in his examination of facts, if it be true that he believed weasels, the ibis, and crows to produce their young by the mouth. A very large meteoric stone fell, in his time, near Œgospomatus; and to account for this fact, it is alleged he concluded the sky to be vaulted with stones. He believed the moon to be inhabited, and considered the sun as in inflamed metallic mass. This gave occasion to one of his principal accusations.

Anaxagoras was the forerunner of Socrates, of whom we shall speak in the next Lecture. *

*Account of several New Species of Grouse* (Tetrao) *from North America.* By James Wilson, Esq. F.R.S.E., &c.—At a late meeting of the Wernerian Society, Mr. Wilson gave a detailed account of several new species of grouse discovered by Mr. David Douglas among the Rocky Mountains in North America. He observed in general, that birds of this genus are of a hardy constitution, and patient of extreme cold. They only occur in northern or temperate countries, and have not yet been discovered in Africa, in the eastern parts of Asia, or in South America. The special localities which they affect vary according to the different kinds; and even the haunts of the same species admit of variation according to circumstances. The Wood Grouse—such as the Capercailzie (*Tetrao Urogallus*)—prefers forests of pine; the Red Grouse (*T. Scoticus*)

* We are pleased to observe, from the last Number of the Edinburgh New Philosophical Journal, that these abstracts of M. Cuvier's Lectures are likely to be accurate. "Of these highly interesting Lectures, at present delivering in Paris," says the Editor of that Periodical, "we shall in this and the succeeding Numbers give such a view as will interest our readers. The reports we now publish are held by some of our friends now attending these Lectures to be correct." We translate *our* report from *Le Globe*, French newspaper; and the same source supplies the Edinburgh New Philosophical Journal.—Ed.

restricts itself to the sides of sloping mountains and moors, careless of more shelter than is afforded by the heath, or other alpine plants of yet more lowly growth, or even by the natural roughness of the ground. The habits of the Black Cock are intermediate between those of the species just alluded to. Ptarmigans (of which the species of Europe and America are still insufficiently characterized and distinguished) prefer, in comparatively temperate climates, such as that of Scotland, the bare and stony sides and summits of our highest mountains; but under the rigorous temperature of Greenland, and the most northern parts of America, they are chiefly found by the sea-shore, and among the willow and other copse woods of the lower and more sheltered vales. The restriction of the Common Grouse (*T. Scoticus*) to the two islands of Great Britain and Ireland, is a familiar though a singular fact in the geographical distribution of birds. The first and most remarkable of the specimens to which it was Mr. Wilson's more immediate object to direct the attention of the Society, was the *Tetrao Urophasianus*, or Pheasant-tailed Grouse, the largest of the American species of this genus, and, excepting the Capercailzie, the largest to be met with in any country. This bird seems to have been observed by Lewis and Clarke, by whom it is mentioned under the name of Cock of the Plains; and a notice of it was published, some time ago, in the Zoological Journal, by Chas. Lucien Buonaparte, who obtained an imperfect specimen of the male in London. The length of this bird (when full grown) is 32 inches; its girth 22; its weight from 6 to 8 lbs. The female is considerably less than the male. Her plumage closely resembles his, except that she wants the lengthened filamentous feathers on each side of the neck, and differs slightly in the colour of chin, cheeks, throat, and breast. The flight of these birds is slow and unsteady. Their wings are feeble and proportionably small; their progress through the air is effected by a fluttering motion, rather than a direct continuous flight. When raised, their voice resembles that of the common pheasant.

They build on the ground, beneath the shade of *Purshia* and *Artemisia*, or near streams among *Phalaris Arundinacea*. The nest is carelessly constructed of grass and twigs; the eggs (from 13 to 17 in number) are about the size of those of a common fowl, of a wood-brown colour, irregularly blotched with chocolate-brown at the larger end. The period of incubation is about three weeks, and the young leave the nest a few hours after they are hatched. In the summer and autumn months, these birds are to be found in small troops; in spring and winter, in flocks of several hundreds. They never perch; indeed, within their range, not a bush larger than a broom or common whin is to be found. Their food consists chiefly of the buds, leaves, and fruit of *Purshia tridentata*, *Artemisia*, the seeds of *Cactus*, brown and black ants, and sand-bugs. Their flesh is dark-coloured, and not particularly well flavoured. They are plentiful throughout the plains of the Columbia River, and in the interior of North Carolina; but have never been seen east of the Rocky Mountains.

The next species, in size and importance, is Richardson's Grouse (*T. Richardsonii*), so called in honour of the distinguished traveller of that name. There is a remarkable difference in this species between the plumage of the male and female. The weight of these birds varies from 2½ to 3 lbs. Their voice is a continuation of distinct hollow sounds, like the cooing of a dove. They build their nests of small twigs, leaves, or grass, amid coppices of birch or hazel, in the vicinity of springs or mountain rills. They lay from 13 to 19 eggs, nearly as large as those of the domestic fowl, marked with red specks. Their flight is swift, steady, and peculiarly graceful. When startled, they drop from the branches of the pine-trees, their usual roosting-place, to within a few feet of the ground, before they commence flying—a circumstance which often deceives the hunter. This trait seems peculiar to the species. In spring, they are seen in great numbers, basking in the sun, on the southern declivities of low hills; and, in winter, in flocks of sixty or eighty, in the vicinity of springs, lakes, or large streams. They are easily destroyed, continuing to sit with apparent tranquillity after several shots have been fired. Their flesh is white and excellent. They feed on the buds of the pine, the catkins of birch, alder, and hazel, and the fruit of the *Fragaria* and *Vaccinium.* They are very abundant in the sub-alpine regions of the Rocky Mountains, in Lat. 52 deg. N., Long. 115 deg. W., and still more numerous in the rocky districts of the Colombia, in Lat. 48 deg. N., Long. 118 deg. W. They are rare on the mountains of the of N. W. coast.*

The third species exhibited was named the smaller Pheasant-tailed Grouse (*T. Urophasianellus*). The sexes resemble each other closely in colour, but the male is rather larger than the female, and his tail more fully developed. Their prevailing colour is pale brown, richly blotched and barred with black. The wing-coverts, and the outer webs of the primary wing feathers, are marked with many rounded or oblong spots of a pale colour. Their flight is swift, noiseless, and steady. They are shy, and not easily approached by the sportsman. They are found in the same range of country with the larger species first described, with which they associate, and which they resemble much in their habits. The number of their eggs varies from 12 to 15, in size not much exceeding those of a pigeon, and in colour of a light ash.

The fourth species has been named, in honour of Mr. Sabine, *Tetrao Sabini.* The plumage is rich and varied, and presents those singular appendages or shoulder-knots, so conspicuous in the wood-partridge of the United States and Canada (*Tetrao Umbellus.*) The colours in the plumage of the female are grayer, and less richly toned—in other respects, the sexes do not much differ. The weight of an individual bird is two pounds. Their voice is a continuation of measured sounds, not unlike the ticking of a large clock. Their flight is rapid, and consists of a quick clapping of the wings, and then of a sudden shooting forwards, without any perceptible motion of the individual parts. They feed on the buds of *Pinus, Fragaria, Rubus, Corylus, Alnus,* and the berries of *Vaccinium.* They pair in March, and build upon the ground, in coppices of *Corylus, Amelanchier,* and *Pteris,* and on the outskirts of pine forests. Their nests are composed of the slender fronds of *Pteris,* dry leaves, and grass. Their eggs are of a dingy white, with red spots, and vary in number from 9 to 11. They are remarkable for attachment to their young. The *Tetrao Sabini* is a rare bird. During spring, is found in small flocks, rarely exceeding eight or twelve; at other seasons, it seldom happens that more than three or four are seen together. Like the *Tetrao Umbellus,* which it resembles in the prevailing character of its plumage, it is in the habit of perching upon the stumps of decayed trees, in the darkest parts of the forests, and there performing the singular operation called *drumming;* which is effected by giving two or three loud distinct claps with its wings, followed by many others, which become quicker and quicker, until the noise appears to die away in the distance, like the sound of a muffled drum. This beautiful species was discovered by Mr. Douglas, in the woody parts of the N. W. coast of America, between the parallels of Lat. 40 deg. and 49 deg.

The fifth and last species exhibited, is called, in honour of the distinguished commander of the over-land Arctic Expedition, *Tetrao Franklinii.* Mr. Wilson has as yet seen only the male. The general plumage is dark and glossy, composed of alternate bars of black and grayish brown. The head, neck, and breast, are almost black; the tail is entirely black. The upper and under tail-coverts are black, terminated by a large white spot; and the lateral parts of the abdomen are likewise spotted with white. It runs with great speed over shattered rocks and among brushwood, and only uses its wings as a last effort to escape. When raised, its flight is similar to that of the last-mentioned species. Its alarm note is composed of two or three hollow sounds, ending in a disagree-

* *Tetrao Richardsonii,* as above described, appears to be synonymous with the *Tetrao obscurus* of Say, recently figured by Lucien Charles Buonaparte in his American Zoology. The latter name, as prior in date, is probably entitled to the preference, although we believe that no copy of Buonaparte's work had reached this country at the time Mr. Wilson published the figure of *Tetrao Richardsonii* in the 8th Number of his *Illustrations of Zoology.*

able grating noise, like the latter part of the cry of the Guinea fowl. Like other birds of the same genus, it builds on the ground, not unfrequently at the foot of decayed stumps, or by the side of fallen timber, in the mountain woods. Its nest is composed of dead leaves and grass, and contains from five to seven eggs, of a dingy white colour, not larger than those of our wood-pigeon. It is said to be one of the most common birds in the valleys of the Rocky Mountains, from Lat. 50 deg. to 54 deg. N., near the sources of the Colombia. It probably inhabits still higher latitudes.—Mr. Wilson remarked, in conclusion: "I have little doubt that some of these birds might be imported into this country, of which the soil, climate, and natural productions, are not so dissimilar to those of their native regions, as to preclude the hope of a successful issue to an experiment of a very interesting nature, which the wealth and zeal for field sports, inherited by many of our aristocracy, would render easy, and which might eventually prove of more permanent and substantial advantage. Their importation would certainly form a fine addition to the feathered game of Great Britain.—*Ed. New Phil. Journ.*

*Peculiar Formation of the Negro Stomach.*—"I had frequently observed," says Mr. Madden, "that the exhibition of an emetic to the negro soldiers was often attended with convulsions, and even death: on further inquiry I found that these remedies invariably produced distressing effects on all the black people of *Dougola* and *Sennaar*. On examining the body, I found the stomach different from that organ in white people, both in size and structure. As this difference has not been noticed hitherto, I am free to acknowledge, that the appearance I observed, might be the consequence of disease, and not its natural state; but as I remarked the same especial difference in three cases, I think I am warranted in the supposition that the smallness of the negroes' stomachs, and the peculiar corrugation of their folds, are no less distinct marks of that race, (insomuch as physical organization is concerned,) than their thick craniums and prominent cheek bones. The vulgar notion of "thick headed" persons being obstinate, is founded in truth. But the peculiarity to which I alluded was this, the stomach was below the ordinary size of that organ in Europeans, and its internal surface resembled in some degree a turtle's throat, from the extent of its corrugations. I discovered likewise, a difference in the skeleton, in two of these cases, each having six vertebræ of the loins, instead of five, and on examining the spines of many living negroes, I find the occurence of six lumbar vertebræ very frequent. This accounts for the extraordinary length of the lumbar part of the back in so many negroes. That they are a distinct race I think is evident from these, and other peculiarities.*—*Travels in Egypt.*

*On the Excavation of Valleys;* by Professor Sedgwick.—We extract, from the "Annals of Philosophy" for last month, the following valuable observations, contained in an Address to the Geological Society of London, delivered by the President at the Anniversary Meeting. Those who are desirous of forming a proper estimate of the charlatanical "New System of Geology" of Dr. Ure, may refer to the same pages for one of the most caustic *exposés* that we have for a long time read.

Our attention has been several times called to the theory of the excavation of valleys, and to the effects produced by river currents in modifying the form of the solid parts of the earth. The subject was introduced during the former year by a memoir of Messrs. Lyell and Murchison, on certain portions of the volcanic regions of Central France; in which they show (in accordance with the views of Montlosier, Scrope, and some other writers) that the existing rivers have, by a long continued erosion, eaten out deep gorges, not only through currents of basaltic

* In Alexandria, in the Military Hospital, I had many opportunities of witnessing the post mortem appearances of the negro stomach, and the result was to confirm the observations I made in Candia.

lava which have flowed through the existing valleys, but also through solid rocks of subjacent gneiss. They further prove, on evidence which to me seems not short of demonstration, that no great denuding wave or mass of water, lifted by supernatural force above its ordinary level, could have assisted in forming such denudations; for the country is still studded with domes of incoherent matter, the remnants of former craters; from which may be traced, continuously, streams of lava, intersected in the courses of the rivers by these deep gorges—the gages and tests of the erosive power of running water during times comparatively recent.

The elaborate Paper of Mr. Conybeare on the valley of the Thames is still fresh in our recollection. He proves that the erosive power of the river has, within the records of history, produced no effect on the general features of the country through which it flows, and that the propelling force of its waters is not now, and never could have been, adequate to the transport of the boulders which lie scattered on the sides and summits of the chains of hills through which it has found a passage: that much of the waterworn gravel, which has been drifted through the breaches opened in the sinuous line of its channel, is composed of rocks not found within the limits of its basin; and that the form of the country is often the very reverse of that which would have been produced by mere fluviatile erosion, however long continued. Similar facts are supplied by nearly all the greater valleys of England; and on the whole they point to one conclusion, that fluviatile erosion, as a mere solitary agent, has produced but small effects in modifying the prominent features of our island: at the same time they leave untouched all the facts of an opposite kind, supported by direct evidence, whether derived from the volcanic districts of Central France, or from any other physical region on the surface of the earth.

The power of mountain torrents in transporting heavy masses of stone is strikingly illustrated in a short paper by Mr. Culley. He states that a small rivulet, descending from the Cheviot Hills along a moderate declivity, carried down, during a single flood, many thousand tons of gravel into the plains below; and that several blocks, from one-half to three-quarters of a ton weight each, were propelled two miles in the direction of the stream. Facts, similar in kind, but on a scale incomparably greater, must be in the recollection of every one who has seen the Alpine torrents descending into the plains of the north of Italy.

When mountain chains abut in the sea, the laws of degradation are not suspended. At each successive flood, fragments of rock are drifted in the direction of the descending torrents, and rolled beneath the waters. This kind of action is, indeed, casual and interrupted; but it is aided by another action which is liable to no intermission—the beating of the surf and the grinding of the tidal currents on all the projecting parts of a steep and rocky shore. Under such conditions, I doubt not that there are now forming at the bottom of the sea, and at depths perhaps inaccessible, alternating masses of silt, and sand, and gravel, which, if ever lifted above the waters, may rival in magnitude some of the conglomerates of our older formations.

Our last paper, on the excavating power of rivers, was from the pen of Mr. Scrope. He contends that diluvial torrents would only form trough-shaped channels, extending in the direction of the principal rush of water; but would never produce curves in which the excavating force worked in a direction opposed to that of the general current. He describes part of the course of the Moselle and of the Meuse, where the rivers wind through hard transition rocks, in long sinuous channels, varying in depth from 500 to 1000 feet. In one of the great flexures of the Moselle, the river, after passing over no less than 17 miles, returns to within 500 yards of the point from which it started. These phenomena are regarded by the author as sure indications of slow fluviatile erosion. For he considers the idea of a great debacle, or diluvial current, winding its way back in lazy flexures towards the point from which it started, as absolutely unintelligible.

If I might give my own opinion on this debated question, I should say, that the existing river drainage of our physical region, is a complex result, depending upon many conditions—the time when the region first became dry land—its external form at the time of its first elevation above the sea—and all the successive disturbing forces which have since acted upon its surface. But none of these elements are constant: no wonder, then, that results derived from distant parts of the earth should be so greatly in conflict with each other. In the formation of valleys there is, therefore, little wisdom in attributing every thing to the action of one modifying cause. We know by direct geological evidence, that nearly all the solid portions of the earth were once under the sea, and were lifted to their present elevation, not at one time, but during many distinct periods. We know that elevating forces have not only acted in different places at different times, but with such variations of intensity, that the same formation is in one country horizontal, in another vertical; in one country occupies the plains, in another is only found at the tops of the highest mountains. Now every great irregular elevation of the land (independently of all other results) must have produced, not merely a rush of the retiring waters of the sea, but a destruction of equilibrium among the waters of inland drainage. Effects like these must have been followed by changes in the channels of rivers, by the bursting of lakes, by great debacles, and in short by all the great phenomena of denudation. In comparing distant parts of the earth, we may therefore affirm that the periods of denudation do not belong to one, but to many successive epochs. And by parity of reasoning we may conclude, that the great masses of incoherent matter which lie scattered over so many parts of the surface of the earth, belong also to successive epochs, and partake of the same complexity of formation.

The excavation of valleys seems therefore to be a complex result, depending upon all the forces, which, acting on the surface of the earth, since it rose above the waters, have fashioned it into its present form. We have old oceanic valleys which were formed at the bottom of the sea in times anterior to the elevation of our continents. Such is the great valley of the Caledonian canal, which existed nearly in its present form at a period anterior to the conglomerates of the old red sandstone. We have longitudinal valleys formed along the line of junction of two contiguous formations, simply by the elevation of their beds. To this class belong some of the great longitudinal valleys of the Alps. We have other valleys of more complex origin; where the beds through which the waters now pass have been bent and fractured with an inverted dip at the period of their elevation. Such is the valley of Kingsclere, described in a former volume by Dr. Buckland. We have valleys of disruption, marking the direction of cracks and fissures, produced by great upheaving forces. Such are some of the great transverse valleys of the Alps. Of valleys of denudation our island offers a countless number. Some are of simple origin; for example, the dry combes and valleys of the chalk, which appear to have been swept out by one flood of retiring waters during some period of elevation. Others are of complex origin, and are referrible to many periods, and to several independent causes. Lastly, we have valleys of simple erosion: such are some of the deep gorges and river channels in the high regions of Auvergne, excavated solely by the long continued attrition of the rivers which still flow through them.

I should not have dwelt so long upon this subject, had it not occupied a large portion of our attention during the past year; and I may be pardoned for entering a record of my own views on a question of no small complexity, and on which there is still much contrariety of opinion.

*On the Influence of Water on the Respiration of Fishes;* by M. Flourens.—Water may act on the respiration of fishes chemically, physically, or mechanically. In a memoir lately read before the Academy of Sciences (12th April,) M. Flourens confined himself to the mechanical influence of water, which has not been heretofore sufficiently attended to. He has observed, that water acts on the branchiæ or gills by separating their laminæ to facilitate the access of the air; a result which is founded on numerous experiments.

It is known that fishes die almost immediately in the air. M. Flourens supposed that this arose from a true asphyxia occasioned by the sinking of the branchiæ, no longer supported by the interposition of water between their laminæ; and this idea has been confirmed in prolonging the life of fishes by artificially keeping the laminæ in the state of separation which the water produces. On the other hand, by compressing the branchiæ under water similarly to their condition in the air, death occurred as quickly as in the latter fluid. With the view of proving that water exercises only a mechanical action on the respiration of fishes, M. Flourens has put many of these animals into wine. They did not live as in water, but their death was much longer delayed than in air. He explained this action of the wine, by remarking that this liquid contains much less air than the water.

*The Nuremberg Boy, Caspar Hauser.*—There was published in *Le Globe* of the 21st November last, an account of an unfortunate boy, named Caspar Hauser, who had been immured for 12 years in a dungeon by an unknown tyrant.

In the month of May 1828, there was observed at the entrance of one of the gates of the city of Nuremberg, a young man who kept himself in a motionless attitude. He spoke not but wept, and held in his hand a letter addressed to an officer of the regiment of Light Horse in garrison in that town. The letter announced that from the age of four to that of sixteen years, the bearer had remained shut up in a dungeon, that he had been baptised, that his name was Caspar Hauser, that he was destined to enter the regiment of Light Horse, and that it was for this reason that the officer was addressed.

When it appeared evident from the state in which the young man was, that the statement contained in the letter was true, he was confided to the charge of an enlightened professor of the most respectable character, and, by a decree of the magistrates, was declared an adopted child of the city of Nuremberg.

He is described as a young man, below the middle stature, thick, and with broad shoulders. His physiognomy was mild and frank. Without being disagreeable, it was no way remarkable. His eyes announced weakness of sight, but his look, especially when a feeling of internal satisfaction or of gratitude made him raise it towards the skies, had a heavenly expression. He approached strangers without embarrassment, and even with confidence. His carriage was modest.

The style of the written narrative resembled that of a scholar of ten or eleven years, and consisted of short and simple phrases, without errors in orthography or grammar. The following is a brief account of it:—His recollections disclose to him a dark dungeon, about five feet long, four broad, and very low; a loaf of bread, a pitcher of water, a *hole* for his wants, straw for a bed, a covering, two wooden horses, a dog of the same material, and some ribbons, with which he amused himself in decorating them. He had no recollection of hunger, but he well remembered being thirsty. When he was thirsty he slept, and on awakening the pitcher was found full. When he was awake, he dressed his horses with the ribbons, and when his thirst returned he slept. The man who took care of him always approached him from behind, so that he never saw his figure. He remained almost constantly seated. He recollects no feeling of uneasiness. He is ignorant how long this kind of life lasted; and when the man began to reveal himself and to speak to him, the sound of his voice became impressed upon his ear. His words are indelibly engraved upon his memory, and he has even retained his dialect. These words ran exclusively on fine horses, and latterly on his father, who had some, and would give them to him. One day, the man placed upon his legs a stool with paper, and guided his hand in order to make him trace some characters upon it. When the impulse given by the man's hand ceased, his hand also stopped. The man endeavoured to make him understand that he was to go on. The motion being without doubt inopportune, the man gave him a blow on the arm. This is the only feeling of pain which he remembers. But the stool greatly embarrassed him, for he had no idea of how he should put it aside, and was utterly unable to extricate himself from this prison within a prison. One day, at length, the man clothed him, (it would appear that he wore only a shirt, his feet being bare,) and taking him out of the dungeon put shoes upon him. He carried him at first, and then tried to make him learn to walk, directing the young man's feet with his own. Sometimes carried, and sometimes pushed forwards, he at length made a few steps. But, after accomplishing ten or twelve, he suffered horribly, and began to cry. The man then laid him on his face on the ground, and he slept. He is ignorant how long these alterations were renewed; but the ideas which he has since acquired have enabled him to discover, in the sound of his conductor's voice, an expression of trouble and anguish. The light of day caused him still greater sufferings. He retains no idea of his conductor's physiognomy, nor does he even know if he observed it; but the sound of his voice, he tells us, he could distinguish among a thousand.

During the first days which he passed among men, he was in a state of continual suffering. He could bear no other food than bread. He was made to take chocolate: he felt it, he told us to his fingers' ends. The light, the motion, the noise around him, (and curious persons were not wanting to produce the latter,) and the variety of objects which forced themselves upon his observation, caused an indescribable pain, a physical distemper, but this distemper must have existed in the chaos of his ideas. It was music that afforded him the first agreeable sensation: it was through its influence that he experienced a dispersion of the chaos. From this period he was enabled to perceive a commencement of order in the impressions by which he was assailed. His memory has become prodigious: he quickly learned to name and to classify objects, to distinguish faces, and to attach to each the proper name which he heard pronounced. He has an ear for music, and an aptitude for drawing. At first he was fond of amusing himself with wooden horses, of which a present had been made to him, when he was heard continually to repeat the word horses, beautiful horses, (*ress, schone ress.*) He instantly gave up, when his master made him understand that this was not proper, and that it was not *beautiful.* His taste for horses has since been replaced by a taste for study. He has begun the study of the Latin language, and by a natural spirit of imitation, his master being a literary man, he is desirous of following the same career.

It was supposed, at one time, that traces were discovered of the monster who had confined this unfortunate young man; but they ended in nothing else than the probability that the place of his imprisonment was in a district at the distance of about 30 miles from the city of Nuremberg.

The curiosity of the people to see a phenomenon, happily of such rare occurrence, rendered it necessary to place Hauser in retirement. Accordingly, he was put under the care of a respectable family, where his education was carefully attended to, and his mind made rapid acquirements.

A recent notice in the *Gazette de Nuremberg,* relates a terrible accident which has happened to young Caspar, threatening his death, and which has increased the sympathy of the public, already so deeply excited. He had arranged a number of books upon a table, and placed a loaded pistol on the top of them, for his defence. Some of the books gave way, and, in his anxiety to catch the falling pistol, he seized it so suddenly that it went off, and the ball struck the right side of his head. Happily, however, it did not penetrate the bone.

The interest excited thrroughout all classes in Germany by the misfortunes of this young man is intense; and the singularity of the case, as affording an illustration of the developement of the mind, has been highly estimated by the metaphysicians of that country.

*Phrenology.—Opinions of Scientific Men.*—No. III.—Baron Cuvier.—"He received them (Drs. Gall and Spurzheim) with much politeness. He requested them to dissect a brain privately for him and a few of his learned friends; and he attended a course of lectures given purposely for him and a party of his selection. He listened with much attention, and appeared well-disposed towards the doctrine; and the writer of this article heard him express his approbation of its general features, in a circle which was not particularly private.

"About this time, the Institute had committed an act of extraordinary courage, in venturing to ask permission of Buonaparte to award a prize medal to Sir H. Davy, for his admirable galvanic experiments, and was still in amaze at its own heroism. Consent was obtained; but the soreness of national defeat rankled deeply within. When the First Consul was apprised that the greatest of his comparative anatomists had attended a course of lectures by Dr. Gall, he broke out as furiously as he had done against Lord Whitworth; and at his levee he rated the wise men of his land for allowing themselves to be taught chemistry by an Englishman, and anatomy by a German; *sat verbum*. The wary citizen altered his language. A commission was named by the Institute to report upon the labours of Drs. Gall and Spurzheim; M. Cuvier drew up the report. In this he used his efforts, not to proclaim the truth, but to diminish the merits of the learned Germans. Whenever he could find the most distant similarity between the slightest point of their mode of operating, and any thing ever done before, he dwelt upon it with peculiar pleasure; and lightly touched upon what was really new. He even affected to excuse the Institute for having taken the subject into consideration at all, saying that the anatomical researches were entirely distinct from the physiology of the brain, and the doctrine of mental manifestations. Of this part of the subject Buonaparte, and not without cause, had declared his reprobation; and M. Cuvier was too great a lover of liberty not to submit his opinion to that of his Consul. His assertion, too, that the anatomy of the brain had nothing to say to its mental influence, he knew to be in direct opposition to fact; but even the meagre credit which he did dare to allow to the new mode of dissection, he wished to dilute with as much bitterness as he could. So unjust and unsatisfactory, so lame and mutilated did the whole report appear, that the authors of the new method published an answer, in which they accused the commissaries of not having repeated their experiments. Such was the reception which the science, that we (phrenologists) now see spreading over the globe, met with from the Academy of the Great Nation.—*Foreign Quarterly Review.*

*On the Shamrock of Ireland.*—Mr. Bicheno, on the 16th March last, read a paper before the Linnæan Society of London, "on the plant intended by the Shamrock of Ireland," in which he attempted to prove, by botanical, historical, and etymological evidence, that the original plant was not the white clover, which is now employed as the national emblem. He stated, that it would seem a condition at least suitable, if not necessary, to a national emblem, that it should be something familiar to the people,—and familiar, too, at that season when the national feast is celebrated. Thus, the Welsh have given the *leek* to St. David, being a favourite oleraceous herb, and the only green thing they could find on the 1st of March; the Scotch, on the other hand, whose feast is in the autumn, have adopted the *thistle*. The white clover is not fully expanded on St. Patrick's day, and wild specimens of it could hardly be obtained at this season. Besides, it was probably, nay almost certainly, a plant of uncommon occurrence in Ireland during its early history, having been introduced into that country in the middle of the seventeenth century, and made common by cultivation. He then referred to several old authors, to prove that the *shamrock* was eaten by the Irish; and to one who went over to Ireland in the sixteenth century, who says it was eaten, and was a *sour* plant. The name also of shamrock is common to several trefoils, both in the Irish and Gaelic languages. Now the clover could not have been eaten, and it is not sour. Taking, therefore, all the conditions requisite, they are only found in the wood-sorrel, *oxalis acetosella*. It is an early spring plant; it was and is abundant in Ireland; it is a trefoil; it is called *sham-rog* by the old herbalists, and it is sour; while its beauty might well entitle it to the distinction of being the national emblem. The substitution of one for the other has been occasioned by cultivation, which made the wood-sorrel less plentiful, and the Dutch clover abundant.—*Lit. Gazette.*

# NATURAL-PHILOSOPHICAL COLLECTIONS.

*Lecture of* MR. FARADAY, *before the Royal Institution of London, on Mr. Wheatstone's Discoveries relative to Linear Conductors of Sound.*

The fact of the transmission of sound through solid bodies, as in the case of a metal rod placed at one extremity to the ear, and struck or scratched at the other end, has been long since observed; but as an aerial medium was formerly thought to be alone capable of propagating sonorous undulations, even Lord Bacon, when describing this experiment, falls into the error of attributing its transmission to spirits contained within the pores of the body. The first correct observations on this subject appear to have been made by Dr. Hooke, in his Micrographia, (1667;) and he made an experiment through a distended wire, of sufficient length to observe that the same sound was propagated far swifter through the wire than through the air. Professor Wunsch of Berlin (1788) made a similar experiment, substituting 1728 feet of connected wooden laths for the wire, and confirmed Dr. Hooke's results. Other experiments of a similar nature were subsequently made by Herhold and Rafn, Hassenfratz and Gay Lussac, Lamarck, &c.; but the first direct observations of the actual velocity of sound through solid conductors were made by Biot, assisted at different times by Bouvand and Martin: his experiments were made on the sides of the iron conduit pipes of Paris, through the length of $951^{m}$ 25: and the mean result of two observations made in different ways gave 3459 metres, or 11,090 feet per second, for the velocity of sound in cast iron. Previous to these direct experiments, Chladni had in an ingenious manner ascertained the velocity of sound in different solid substances; and his result has been fully confirmed by calculations from other grounds. His method was founded on Newton's demonstration, that sound passes through a space filled with air, of a given length, in the same time that a column of air of the same length, contained in a tube open at both ends, makes a single vibration. Chladni's discovery of the longitudinal vibrations of solid bodies, which are exactly analogous to the ordinary vibrations of columns of air, enabled him to apply this proposition to solid bodies, and to establish the general law, that sound passes through every body in the same time in which that body, when it vibrates, freely makes one longitudinal vibration. In this manner he ascertained the velocities of the following substances, among others: tin 7800, silver 9300, copper 12,500, glass and iron 17,500, and various woods from 11,000 to 18,000 feet per second. The intensity with which sound is transmitted, has been found to be nearly in proportion to its velocity. Some known practical applications of this principle were then noticed, such as the stethoscope, microphone, &c. In all the preceding experiments, the sounds transmitted were mere noises, such as the blow of a hammer, or, as in Herhold and Rafn's experiment, a single musical sound, produced by striking a vibrating plate attached to the conducting wire; and in no case were any means employed for the subsequent augmentation of the transmitted sound. Mr. C. Wheatstone was the first who tried experiments on the transmission of the modulated sounds of musical instruments; and who showed that the undulations propagated through linear conductors of considerable length, were capable of exciting in surfaces with which they are in connexion, a quantity of vibratory motion, sufficient to be powerfully audible when transmitted through the air. The following observations will illustrate the nature of this resonance or reciprocation. A sonorous body is audible in proportion to the quantity of its vibratory surface. Thus, a plate of metal or wood is capable of producing powerful sounds without accessory means; but insulated strings, or tuning forks, being vibrating bodies of much smaller dimensions, are scarcely audible at any great distance; but they are capable of considerable augmentation when communicated to surfaces, as when the insulated string, or the tuning-fork is placed on a table or on the sounding-board of a musical instrument. There are several circumstances which influence the intensity of the tones of a sounding-board: the principal of these is the plane in which the vibrations are made, with respect to the reciprocating surface. Thus, the vibrations may be so communicated as to be perpendicular or normal to the surface: in which case the sound is the most greatly augmented; or they may be tangential to, or in the same plane with, the surface, when the sound is the most faint. These two cases may be illustrated by placing, for the first, a vibrating tuning-fork perpendicular to the surface of a flat board; for the second, placing it perpendicular to one of the edges of the board. In intermediate positions, viz. when the vibrations are communicated obliquely to the surface, the sounds have intermediate degrees of intensity. These facts being understood, the peculiarities of the sounding-boards of various musical instruments admit of easy explanation. In the piano-forte, the sounding-board is better disposed than in any other instrument, as the planes of the vibrations of the strings are always perpendicular to its surface. The difference of intensity when a string vibrates in this way, and when it vibrates parallel to the surface, may be easily tried. In the sounding-boards of the harp, the guitar, the violin, &c., the circumstances are less simple; but it would encroach too much on our space to enter into details. Sufficient having been said to illustrate the subsequent applications, we will only add, that the volumes of air contained between the sounding-boards of a musical instrument greatly augment the intensity of the sound. The office of the bridge is obviously to communicate the vibrations of the strings to the sounding-board. Aware of this fact, Mr. Wheatstone substituted a glass rod five feet in length for the bridge, and found that the sound of a tuning-fork, or of an insulated string, placed at its end, was as distinctly audible as when it was immediately in contact with the board. This experiment, which was the first Mr. W. made on this subject, and which suggested all the subsequent ones, was repeated in the lecture-room, by substituting a deal rod forty feet in length, extending from the roof of the cupola to the floor of the room. The experiment was neat and decisive. When no sounding-board was placed at the lower extremity of the conductor, no sound was heard; but it became powerfully audible the instant the communication was made. This experiment was repeated with different acute and grave-toned tuning-forks, both in succession and in combination. As the sounds employed in these experiments are only audible when they become augmented by resonant surfaces after transmission, it is easy to repeat them, and to appreciate their results, under any circumstances; but when it is required to transmit the sounds of a musical instrument, it is necessary to prevent the sounds being heard through the air, otherwise the communicated sounds will not be distinguishable from the original sounds. This may be effected by having the originally vibrating and the reciprocating instruments in different rooms, and allowing the conductors to pass through the floor or wall separating the two rooms. This experiment was tried, by communicating, by means of a slender deal rod, the sounding-board of a harp in the lecture-room with a piano-forte in a room below; and the performance of the latter was transmitted in the most perfect manner to the former instrument; and when the communication was interrupted, the transmitted sounds ceased. The construction of the lecture-room did not admit of the experiment being tried in the way first employed by the experimenter; viz. the sounds transmitted from a piano-forte in a chamber above, by a wire of very small diameter, to a lyre suspended from the ceiling. The transmission of the sounds of other stringed instruments, such as the harp, violin, violoncello, &c., were found to be equally effective. But Mr. W. did not confine his experiments to the transmission of the sounds of vibrating sounding-boards. He discovered also the means of transmitting the sounds when produced from wind instuments. He observed that the peculiar sounds of a clarionet, or other reed instruments, were not to be attributed either to the column of air or to the vibrating tongue alone, but that they mutually influenced each other, in such a manner, that whether the sounds are communicated to the atmosphere from the column of air, or to a conductor from the vibrating tongue, the quantity of the sound undergoes no change. The transmission of the sounds of reed wind instruments he therefore found as perfect as those of instruments dependent on the vibrations of sounding boards. In other classes of wind instruments, the difficulties of transmission are greater; for it is not possible to transmit the vibrations of the air immediately through solid conductors with any degree of intensity; but if the intermediation of other bodies which enter readily into vibration, from the agitations of the air, be employed, the transmission may be effected. Thus, if the end of the conducting wire be placed in the most strongly vibrating part of the column of air in a flute, there is but little perceptible transmission of sound; but if it touch the sides of the instrument, it will more readily transmit the sounds in proportion as the sides are more susceptible of entering into vibration. In a similar manner, the sounds of an entire orchestra, or of the human voice, may be transmitted, viz. by connecting the end of the conductor with a sounding-board so placed as to resound to the various instruments; but in such cases the sounds are by no means so intense as when they are communicated directly from the instruments. The effect of such intermediate transmission was exemplified by some performances on Mr. W.'s new instrument, the symphonion. A few observations were then made on various proposed applications of this principle, and on the possibility of telephonic communication. It was stated, that as sound has been proved to travel through several conducting substances at the extraordinary velocity of 18,000 feet in a second, were it possible to transmit audible sound so far, a phonic communication might be made between London and Edinburgh—a distance of nearly 400 miles—in less than two minutes. Theoretical considerations have shown, that when sound is communinicated without any divergence through a perfectly elastic body of equal density throughout, its energy suffers no diminution; it follows, therefore, that the more perfectly we can approximate to these conditions of a conducting body, the less limitation there will be to the transmission of the sonorous undulations. But these points can be determined only by extended experiments.—*Lit. Gaz.*

*Kater's Small Pocket Azimuth and Altitude Instrument.*—As Captain Kater has not as yet given a detailed description of this exceedingly useful instrument, the following brief account may not be unacceptable.

The great advantages it possesses, are—extreme portability; the ease and accuracy with which it can be used; and its cheapness.

A circle, three inches in diameter, is fixed to a hollow cone, which moves upon a solid axis, and the whole is supported by a tripod stand, into which this axis screws. At the back of the circle is fixed a spirit level. A telescope, magnifying about eight times, to which are fixed too opposite verniers, moves upon the circle; there is, also, a tangent-screw for slow motion. A ball and socket is screwed into the back of the instrument, which serves as a counterpoise when vertical angles are taken.

In the focus of the telescope are placed one vertical and three horizontal spiders' threads, which are illuminated by a very ingeniously contrived reflector, forming a portion of a hollow cone, silvered inside, which fits upon the object end of the telescope.

The motion in azimuth is given by two projecting pieces attached to a tube, which fits rather tightly on the conical axis; these pieces serve also, by being brought in a line with one of the radii of the tripod-stand, when the telescope is directed to a star, to turn the instrument 180° in azimuth, so as to bring the star into the field of view when the face of the circle is changed from left to right.

To use this instrument, it must be carefully levelled, and the telescope being directed to a star, or other object, so that it appears upon the horizontal wire, and upon or very near the vertical wire, the verniers read off the apparent elevation to minutes. The circle is then turned half-round in azimuth, and the angle being read off by the two verniers, we have the altitude deduced from the mean of four readings.

To take horizontal or oblique angles, the vertical column is unscrewed from the stand, and the ball and socket joint screwed in its place.

With this instrument the time may be deduced from the sun's altitude, taken under favourable circumstances, to within three-tenths of a second of the truth; and the latitude deduced from a *single* observation of the pole-star will seldom differ more than twenty seconds from the truth, or, by a mean of seven or eight observations, it may be determined to five seconds.

The three horizontal threads with which the telescope is furnished, make it a very efficient equal altitude instrument.

The great advantages of this instrument over a sextant, to persons travelling on land, are the facility and expedition with which it can be used, requiring none of those troublesome adjustments which in all *reflecting* instruments are necessary; being a perfect circle, with two verniers, any errors of eccentricity are corrected; it can be used when the sun or star is in the *zenith*, which gives it an immense advantage in tropical latitudes over the sextant, and it renders unnecessary that troublesome auxiliary, an artificial horizon. If the sun's altitude be taken, and a different limb be brought to the horizontal wire, when observing with the instrument turned half round, the mean will give the apparent altitude of the sun's centre, consequently there will be no allowance necessary for semi-diameter.

All the parts essential to accuracy are finished in the best manner; and those parts, where a high finish would only add to the expense, are left in a rough state, and painted. The whole is packed in a mahogany box, seven inches long, by four wide, and three deep, which also contains a zenith eye-piece. Mr. Robinson, of Devonshire Street, Portland Place, is the maker, and he charges seven guineas.

This instrument, when intended for more accurate surveys, has a horizontal as well as a vertical circle. The horizontal circle is furnished with three equidistant verniers, and a lower telescope, which, when directed to a fixed object, indicates any accidental derangement which might take place in the position of the instrument. The price of the instrument thus constructed is ten guineas.—*Brande's Journal.*

*On the Motion of Currents in Liquids.*—M. Dutrochet has made some singular remarks on the influencing causes of the motion of currents in liquids, and has found light to affect them considerably. He finds that difference of temperature is the efficient cause, and that 1-800th of a degree of difference is sufficient, when aided by light. In the absence of light such motion will cease. When the windows of the experimental room are closed so much as only to admit light enough to distinguish, whether the circulating motion continues or not, it soon ceases; when re-opened, the motion recommences. When completely suspended by the absence of light, if the table be struck with slight blows, the vibration communicated immediately causes the motion to recommence; when the liquid was again at rest, the sound of a violoncello, or bell, was occasioned, and the vibrations communicated to the liquid, again caused it to acquire circulating motion. Hence it would appear that the vibration of the particles of a liquid favour the circulating motion which a slight difference of temperature is competent to produce; that this previous vibration is a necessary circumstance, and that light consequently only acts by producing it amongst the particles of the fluid. From whence M. Dutrochet concludes, that, in the phenomena of circulating motion in liquids, two causes operate—the *efficient* one, difference of temperature, the *accessory* one, light, or any other circumstance which can communicate feeble vibrations to the particles of fluid.—*Revue Encyc. Jan.* 1830.

# CATALOGUE RAISONNÉ.

*Observations sur divers ossemens, &c.* Observations on different Bones of Mammiferæ and of Birds, found in the Quaternary Calcareous Formations of the Environs of Perpignan, and on a new species of Fossil Bear. By Mr. Marcel de Serres.—*Annales des Sciences d'Observation*, Vol. III. No. II.

It will be difficult to establish any distinction between the upper fresh-water formations of the superior or tertiary series, and the lacustrine marles of the quaternary deposits, which will not finally be connected with local phenomena; an increased acquaintance with their organic remains, and the relation of these to existing species, can alone give certainty to the results. Marcel de Serres considers the upper fresh water formation to be quaternary, and yet places it below the conglomerates of the same age, (diluvium,) which bear the same relation to the former as the plastic clay or molasses do to the tertiary rocks, or the conglomerates of the old red sandstone to the secondary sedimentary deposits. We prefer the grouping of Dr. Fleming, considering lacustrine marls with actually existing species as quaternary, and marls with extinct species, or species no longer inhabiting the same spot, as tertiary, though from the nature of the locality the interposed conglomerates may sometimes be wanting, or the bones found imbedded in the marls, may belong to species whose residence in those countries comes under the dominion of historical evidence.

The following facts are of importance to these considerations:

Bones belonging to the *Carnivora, Rodentia, Ruminantia,* and birds, are found in marls near Perpignan, which contain dispersed boulders and gravel. The *Carnivora* and *Ruminantia* are the most abundant.

The new species of bear, for which the learned naturalist proposes the name of *Ursus metopoleainus,* must have been one-third greater than the brown bear of the Pyrenees. The forehead is very flat, with two strongly developed protuberances on the borders of the temporal fossæ, forming a crest that joins the sagittal.

The small molar tooth which occurs behind the canine in living bears, and which, according to Cuvier, has never been met with in fossil species, occurs in this animal. This is also the case with respect to the second little superior molar tooth, placed immediately before the one that precedes the anti-penultimate.

The remains of this *extinct* bear are found in company with bones of the great fossil elk, and of a small unascertained species; also with the bones of sheep of a greater size and strength than those of ordinary sheep.

The remains of birds belong to the Gallinaceous family, and generally to the pigeon tribe; while the remains found in caverns are principally waders or Palmipedes: remains of birds are also met with in the sands and blue marls of the tertiary marine deposits.

*Les Arborisations des Calcedoines, &c.* Do the Arborizations of Chalcedonies, and of certain Agates, derive their origin from Fossil Confervæ? By Mr. Raspail.—*Ibid.*

Mr. Raspail asserts, in opposition to the opinion of Mr. Adolphe Brongniart, that the arborization observed on certain chalcedonies and agates, is produced not only by vegetables, but in still greater numbers by zoophytes, such as Sertulariæ, by eggs of mollusca, &c. and that it is absurd to attribute this configuration to inorganic infiltrations.

*Hectostoma Nouveau Genre, &c.* Observations on the Hectostoma, a new genus of Parasitical Worms of G. Cuvier. By Mr. Raspail.—*Ibid.*

A worm was lately found at Nice, by Mr. Laurillard, in the cup of a Sepia, and was described by Cuvier under the name of Hectostoma, (Vide Vol. I. p. 218, of this Journal.) Might it not happen, asks Raspail, after inquiring into the grounds for the formation of this new genus, that the tentacula of the Sepiæ, like those of the Alcyonella, Rasp. may move for a long time after being amputated, and in such a manner that we might easily take them for infusoria, and in this case might we not have an hectostoma ?

*Histoire Generale, &c.* General History of Voyages and Travels, arranged and completed to the present day. By C. A. Walckenaer. T. XVII. Paris, 1829. 8vo. 539 pages.

This volume contains voyages to the Cape of Good Hope, and along the western and southern coasts of Africa, from Cape Negro to Cape Corrientes. The travellers are, 1st, Cornelius de Jong, who twice visited these countries, at first in 1791, returning to Europe in 1793, and afterwards going out in 1794, and returning in 1795. Mr. Walckenaer has preceded these two journies by a biographical notice of the traveller. 2d, Percival in 1796, the colony having fallen into the power of the English. 3d, Barrow, whose well-known travels began in 1797, and lasted two years. 4th, Semple in 1800 and 1801. 5th, Messrs. Truter and Somerville in 1801 and 1802. The latter gentleman added considerably to the observations of Barrow. 6th, Henry Lichenstein in 1803—1806, also a most interesting journey; for the analysis of a portion of these travels, we are indebted to the exact and learned Mr. Depping.

*Agenda Geognostica.* Guide for the Geological Traveller, and Lessons on Practical Geognosy. By C. C. de Leonhard; with Four Plates. 8vo. Pp. 355.

There is no practical geognost who has not drawn up for himself the outlines of a little work of this kind; for when many subjects present themselves for rapid observation, it is almost impossible to pass in immediate consideration the various points of view in which caverns, rivers, glaciers, &c. must be examined, and the relations which they bear to geological facts. It would be impossible to make the work known or appreciated by any thing that we can say. It would be of the highest importance that it should be translated into the English language. The practical geology is by de Leonhard,—the natural philosophy by Muncke,—the formula for the dip of rocks and for soundings, by Dr. Arnetti; Prof. Bronn and Dr. de Konig have given information, the one on fossils, the other on geographical botany.

*Handbuch der Zoologie, &c.* Manual of Zoology, or Description of Animals from their external forms and their internal structure, as well as from their functions. By C. Fischer, Professor at Vienna, 1 vol. 8vo. Pp. 599.

This manual is quite on a level with the actual state of the science. The author has followed the order of Cuvier, only that he has begun by the bottom of the animal chain. Man is not included, because the censor would not allow of it.

*Manuel de l'Histoire Naturelle, &c.* Manual of the Natural History of Mollusca and their Shells, &c. By MR. SANDER RANG. 8vo. Pp. 390. Eight Plates. Roret. Paris.

This little manual is, of all general works on mollusca and their shells, the best representative of the state of the science, and the result of successive discoveries.

Mr. Rang gives the tables of the methods of Mr. Cuvier in 1817, of de Lamarck in 1818, of de Ferussac in 1819, of de Blainville and Latreille in 1825. A table also presents a view of the classification followed in this manual, which is also *new*, offering the modifications which Mr. Rang proposes in Mr. de Ferussac's method.

Mr. Rang gives with great care the characters of the classes, orders, and genera, and has generally indicated the most remarkable species.

Commentatio de Historia Naturali Animalium Molluscorum, Regno-Belgico indigenorum. Auct. HENR. GUIL. WAARDENBURG. 4to. Pp. 59. Leyden.

The author of this dissertation has given a short account of the anatomy, physiology, and habits of the mollusca, principally derived from the works of Cuvier. He has also enumerated the species of indigenous mollusca of Belgium, the specific definitions, and the localities. He has adopted the classification of Lamarck. Like all works of a local character, this dissertation is useful in making us acquainted with the mollusca of Holland and its shores.

*Essai monographique, &c.* Monograph of the Hieracium and some neighbouring Genera. By AUGUSTE MONNIER. Pp. 92. 8vo. Nancy, 1829.

Hieracium is perhaps one of the most difficult genera for the determination of species. The number of species has been beyond measure increased by florists, who, in the least variation of form, have seen new plants, and have given them new names. The generality of species of Hieracium pass into one another in almost imperceptible transitions, and unless we have made an attentive study of all the varieties, that is to say, unless we have herborized a long time in the different mountainous countries of Europe, where the different stations singularly modify the characters of the types, we shall always find a difficulty in distinguishing them.

Mr. A. Monnier has, it appears, particularly devoted himself to the study of the genus Hieracium, and the work which he now publishes, is the fruit of several years laborious study, and of multiplied journies in the Alps, Pyrenees, and Vosges; but he does not appear to have been acquainted with a recently published paper of Mr. Don's, on the genera of the family Chicoraceæ. The sections are, however, well characterized, and as our space will not allow us to analyze the work, we recommend it to the attention of botanists, as containing some novelties in relation to the genus Hieracium.

# PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

## EDINBURGH.

*Royal Physical Society.*—*March* 31. 1830.—A Collection of Insects was presented, accompanied with some remarks on their Natural History; by Mr. Hewett Watson.

A notice of some rare Animals recently added to the collection of the Zoological Society of London, was read by A. T. Holroyd, Esq. F.L.S. F.Z.S.

Mr. W. Ainsworth made some remarks on the Mineralogical Characters of the Magnesian Limestone of Durham, illustrated by specimens and sections.

*April* 7.—Captain Thomas Brown, F.L.S. &c. read an account of a new species of Fish, of the genus Platessa, (Vide present Number, p. 99.)

Mr. K. T. Kemp made some observations on the mode of determining the size of Galvanic Plates necessary for producing a full shock on the human body: with remarks on the difference between the intensity and quantity of Galvanism.

*April* 14.—Mr. J. Marsden read some observations on the Physiology of Plants.

Mr. K. T. Kemp noticed some experiments where Electricity is excited by simple substances; with observations on the cause of bodies being conductors, and non-conductors of Electricity.

*April* 21.—Mr. Ainsworth exhibited specimens of Coprolites from the Museum of Professor Buckland, and made some observations on their Geognostical distribution.

An account of a new instrument for measuring the Dip of the Magnetic Needle was given, with an exhibition of the contrivance, by Mr. Fowlis of St. John's, (New Brunswick.)

Henry H. Cheek, F.S.S.A. &c. communicated some remarks on Geoffroy St. Hilaire's theory of the Unity of Organization.

*Wernerian Society.*—*March* 20.—Mr. James Wilson read a paper "on the Origin of our Domestic Poultry."

Dr. Scot read a paper "on the question, whether the Hyena of Naturalists be mentioned or alluded to in the Sacred Writings."

*April* 3.—A very able and interesting account of the anatomy of the Sturgeon was read by Dr. Craigie, exposing many errors that Dr. Munro, *secundus*, and Sir Everard Home have committed, in their details of the structure of this Fish.

## LONDON.

*Royal Society.*—*March* 11.—Mr. Lubbock read a paper on the Pendulum.

An experimental inquiry relative to the Polarization of Heat, by the Rev. B. Powell, Savillian Professor of Geometry in the University of Oxford, was read.

Mr. Aldini presented an interesting work on the improvement of Light-Houses.

*March* 18.—A paper was read on the Electricity of Threads of Glass, by William Ritchie, Esq. F.R.S.

Dr. Simons read an essay on the Velocity of Sound.

*April* 1.—A letter was received from the Rev. James Farquharson, containing the sequel of his observations on the Aurora Borealis.

George B. Balton, Esq. read a statement of the principal circumstances in connection with the Union of the Siamese Twins, (they being present.)

Mr. Coddington exhibited his improved Microscope; Mr Ritchie, his new delicate Torsion Balance and Galvanometer; and Captain Fleming, an ingenious mechanical invention to be used on board ship.

## PROVINCIAL.

*Northern Institution.—Meeting of 29th Jan.* 1830.—(John Ross, Esq. Banker, in the Chair.) A large and most splendid collection of Tropical Insects, which has just arrived from Mr. William Fraser, watchmaker in Demerara, (late of Inverness,) and corresponding member of the institution, was presented in his name.

The first number of the Perth Literary and Scientific Miscellany, was also presented from the publisher, Mr. Morison; and from Hugh Rose, Esq. of Glastullich, a series of old and interesting manuscripts, chiefly relating to the family of Munro of Fowlis, was laid on the table; among which were,

1. Letters of Caption, Munro against Munro, for 2120 merks, 18th June 1687.

2. Original holograph Letter of Sir Robert Munro of Fowlis, to his brother, Duncan Munro, Esq. of Opsdale, dated 2d June 1739. (Both these brothers were killed at the battle of Falkirk, 17th January 1746; see Chalmers' Rebellion, and Inverness Courier of 30th December 1829.)

3. Original Draft, offer of Service, Captain, afterwards Major George Munro of Culcairn, to Sir John Cope, dated 16th August 1745. (See the interesting story of Major Munro's death, in Chambers' History of the Rebellion, Vol. II.)

4. Route of Lord Sempil's Regiment from Ostend, in 1743.

Mr. Adam, Rector of the Academy of Inverness, and Associate of the Society of Arts for Scotland, afterwards exhibited two Rain Gauges of very different construction, and read to the Meeting a clear and interesting description of their construction and use, which he illustrated by brief, yet minute, calculations of the areas of their respective wide mouths for the reception of rain, and of the areas of circular sections of the comparatively small cylindrical brass and glass tubes into which the rain was conducted, in order to determine the precise length of the respective scales, which should indicate a depth of one inch, or of any subdivision of an inch deep, of rain falling around them.

Mr. Adam's communication called forth expressions from the Meeting of their high satisfaction with its details.

*Meeting of 26th Feb.*—A series of Chinese copper coins were presented from Mr. Davidson, writer in Inverness, and a one pound, or L. 12 Scots, note of Messrs. Kellar and Co. of Glasgow, dated 3d October 1764, and a specimen of the paper currency of the French Republic in 1793, from Mr. Grant, Balvonie.

A very beautifully executed series of drawings, by a lady, done from the Etchings of Mr. Pently, of the carved monumental stones at Nigg and Shandwick in Ross-shire, were also laid on the table, through Mr. Ross, Baliefearie. They are intended for the Royal Antiquarian Society at Copenhagen, betwixt whom and this Institution a correspondence has for some time subsisted through their Secretaries.

Mr. Anderson, General Secretary, read to the Meeting a paper drawn up by him on the Vitrified Forts of this country, describing their general characters, and enumerating the lines or chains of those most singular relics of antiquity which exist in the neighbourhood of Inverness.

The details of the paper were illustrated by specimens of all the varieties of condition presented by the burnt or scorified stones, collected from the different stations examined by the author, on whose communication some interesting remarks were made by Dr. Nicol.

*March* 26.—John Macpherson, Esq. factor for Lovat, was elected an ordinary member of the association.

Several articles of dress, &c. made by the Indian tribes of the southern hemisphere, brought to Britain by Captain Cook, and by him presented to his friend Captain Richard Allan, R.N. were laid on the table as a donation from John Macdonald, Esq. Ness Castle.

The communication read at this meeting was on a Geological subject. It was from the pen of W. Ainsworth, Esq., and related to the indications of a considerable diminution which has taken place in the level of the sea in the north of France. From the present aspect of the country, as well as from historical records and popular traditions, it would appear that the German ocean formerly covered the sites of many flourishing French and Flemish towns now considerably removed from its waters. To the north of the straits of Calais and Dover its bed extended inland farther south than St. Omer, which seems to be partly built on a shingly headland that anciently projected into the sea.

Some remarks were made on the paper connecting the facts detailed in it with the appearances in the north of Scotland, of an ancient shore line considerably elevated above the present level of the Moray Firth.

## FOREIGN.

*Academy of Sciences.—1st February* 1830.—M. Jaume St. Hilaire presented a Memoir on the Composition of Soils, which, without cultivation or manure, are best fitted for the growth of plants.

Mr. Henri Cassini made, in his name and that of Mr. Desfontaines, a very favourable report on a Memoir of Mr. Adrien Jussieu, relative to the group of Meliaceæ. (Vide Journal, Vol. I. p. 463.)

Mr. Larrey read a Report on the Physiology of Mr. Isidore Bourdon.

Mr. Adolphe Brongniart read a Memoir on the Structure of Leaves, and on its relation to the respiration of vegetables in air and in water.

*Feb.* 8.—Messrs. Jacobi and Herschell were named Corresponding Members of the Academy.

Mr. Navier read a Memoir of M. Duhamel on the formation of ice at the bottom of running waters. (Vide Journal, Vol. II. p. 55.)

General Rogniat made a very favourable report on a work of Colonel Nisas, entitled, Essay on the General History of Military Art.

Colonel Raucourt read a Memoir on the rapidity of the Neva at St. Petersburgh, and on the means of appreciating it in the different parts of its course.

Mr. Robert addressed a letter, in which he considered cow-pox as a local small-pox.

Mr. Villerme read a letter from Professor Quetelet of Bruxelles, in which he deduced, from observation, that the mean height of men was constantly greater in towns than in the country.

Mr. Magendie presented, in the name of an American surgeon, Dr. Ogden, the description and model of an instrument to cure the deformities and lateral distortions of the spine.

Mr. Sylvestre made a very favourable verbal report on the Annals of the Horticultural Institution of Fromont.

Mr. Chevreul read a note on the colouring principal of the woad.

Dr. Lambert read a Memoir on the principle of motion in animals.

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# MISCELLANEOUS INTELLIGENCE.

### GEOGRAPHICAL SOCIETY OF LONDON.

We did not anticipate when we commenced our labours, about eight months ago, that we should so soon have the pleasure of announcing the intended formation of a Geographical Society in London, yet such is the case; for an institution of this character is about to be founded, under the auspices of men versed in the subject, and enthusiastic in its cause. We have dwelt upon the advantages which London offers as a centre, from whence, in pursuit of commerce, science, and diplomacy, thousands emanate yearly to the remotest countries of the globe, till we were almost tired of the subject; but our energies receive a new strength, when we recollect how much the knowledge and talent of the metropolis may be enabled to accomplish when well directed. To compare the utility of this Society with others, appears to us quite unnecessary. We earnestly wish for the progress of all science, and consider the assembling of individuals for that purpose as indispensable; and we now solicit public attention to a society whose object is to accumulate information on unknown countries or lands little visited,—to disseminate knowledge on neglected races of men, and to bring from obscurity the productions of distant shores,—which will guide the navigator, by increasing the accuracy of our charts,—extend our colonial possessions, and give more accurate information of their value and conduct. The character that will be given to the Geographical Society of London, will depend upon the enlightened endeavours of its promoters. We are sure that it cannot remain stationary during universal progression; and we can only say for ourselves, that our voices and pens will be devoted to its advancement.

*Swan River.*—Mr. Baxter is just arrived at London from New Holland, with a large collection of plants and seeds; amongst which are several new species of Banksia, Amherstia, Lambertia, and Dryandria. His botanical investigations have extended from Swan River down the western coast to King George's Sound; and he has also examined the vegetation of the banks of Swan River and of other parts of this great island. Mr. Baxter gives unfavourable accounts of our new colony, the details of which we hope to publish in our next Number.

*Mr. Burchell.*—This traveller has returned from South America with a most extensive collection. During his absence he has been the legatee of a large fortune, which is said to have been left to him by a reverend prelate, from a pure desire to encourage science.

*New French Journal of Geology.*—MM. Rozet, Jobert, and Boué, have instituted a monthly "Journal of Geology," to contain from five to seven sheets, with from two to four plates, price 30 *francs*, per annum, (equivalent to thirty shillings in the English book trade.) Geological papers will be admitted in all the spoken languages of Europe—no extracts from other works, but translations of important matters. M. Rozet is to be the travelling associate. A numerous correspondence is already established over Europe, and in the United States.

*Geological Society of Paris.*—The same gentlemen are about to establish a general Geological Society, free to all nations. It is intended to publish a *Bulletin des Seances*, and to prosecute their researches by excursions in different countries.

The Scotsman (Newspaper) has corrected an error in Mr. Lloyd's report of the levelling of the Isthmus of Panama; the elevation of the Pacific at this latter place should be 3.52 feet instead of 352 feet.

# LITERARY NOTICES.

Mr. H. Jouy, member of the Asiatic Society, with the assistance of Mr. Reinaud, is about to publish a translation of the Geography of Aboul-Feda, from an Arabian manuscript in the King's Library, Paris....Bory de St. Vincent, as the chief of the scientific expedition to Greece, is to superintend a general account of its proceedings....The editors of this Journal are making arrangements for the production of a monthly sheet of Catalogue Raisonné, which will contain notices of all scientific works, and books of travels published in this country, and on the continent; and will also contain a list, with critical observations on the commucations and papers contained in scientific periodicals; thus coustituting a monthly register of the progress of science and art....A second voyage round the World, from the German of Otto Von Kotzebue, is in the press....As is also, a translation of Niebuhr's disquisition on the Geography of Herodotus, and researches on the history of the Scythians, Getæ, and Sarmatians....A. M. Hay, of Edinburgh, is in search of subscribers for a work, which is to explain the formation of the Terrestial Globe and other Planets.

*List of New Books.*

Disputatio de Strabonis patria, by Trebelis. 4to. p. 23. Bantzen....A Year in Spain, by a young American. 8vo. pp. 395. Boston....Gemaelde der Physischen Welt, J. G. Sommer. Vol. II. and III. Prague....Handbuch der Naturgeschichte, by Stein. 2 vols. 8vo. Leipzig....Ordines Naturales Plantarum, T. Bartling. 8vo. Gœttingen....Species Graminum iconibus et descriptionibus, Dr. Trinius. 10 parts, 4to....Handbuch der Zoologie, Prof. Fischer. 8vo. pp. 599, Vienna....M'Kenzie's Notes on Haité. 2 vols. 8vo....Coddington on the Eye, and Optical Instruments. 8vo....Houle's Mission to India. Part II. 8vo....A second volume of the British Naturalist....A new edition of the Stories of Popular Travels in South America....A Manual of the History of Philosophy, translated from the German of Tennemann....Auldjo's Ascent of Mont Blanc, 2d edit.... Cuvier's Animal Kingdom; Fossil Remains, by E. Pidgeon....Ranking's Historical Researches on the Conquest of Peru, Mexico, &c. in the 13th Century, by the Mongols....Carte Géologique de l'Odenwald, &c. par Klipstein, 18 pages. in 4to. Heidelberg....Flora Altaica, par Ledebour, Meyer et Bunge, Tome I. Berolini....Spicilegia Zoologica, &c. by John Edw. Gray. Part I. 4to. Plates.

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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.

JUNE 1830.

## ORIGINAL COMMUNICATIONS.

ART. I. *Account of the Series of Islands usually denominated the Outer Hebrides.* By WILLIAM MACGILLIVRAY, A.M. &c. —(*Continued from* Vol. II. p. 95.)

### SECT. VI.—*Wild Animals. Mammifera.*

FROM the preceding sections some idea may be formed of the general nature of these islands, from which their capabability of supporting animal existence may in some measure be inferred. The land mammifera are of course the same as those which occur in other parts of Scotland, although the catalogue of them is brief, on account of the exposed nature of the country, the absence of woods, and the scantiness of the vegetation in the parts comparatively free from the intrusion of man.

The species which reside entirely on land are the following:

1. The *Red Deer. Cervus Elaphus,* LINN. This animal was formerly very abundant in the large islands, but at the present day is almost exclusively confined to Lewis and the northern part of Harris. A few individuals still occur on the moors of the two Uists; but on the moors and mountains of Lewis, and the Forest of Harris, considerable numbers of this fine animal are still to be met with. The red deer has been called a "noble animal," not by poets and poetical writers only, but by naturalists, who have indeed been too often poetically disposed. It is certainly a large and graceful animal; but as persons of the classes mentioned, generally employ the epithet noble to denote courage and power, they ought to choose another for an animal which is timid in the highest degree. It is extremely vigilant, feeds chiefly in the evening and morning, and rests during the greater part of the day, generally in

places where it can see around it to a great distance. Its smell is such that one needs not expect to steal upon it, unless he moves against the wind; and its acuteness of vision renders approach very difficult, the deer being much more likely to perceive its enemy than the latter to perceive it, more especially as its colour so nearly resembles that of the brown herbage of the heaths. The want of trees and brushwood is an additional circumstance which impedes the hunter in his progress. Yet under all these unfavourable circumstances, and many others to boot, an expert hunter may approach within pistol-shot; and I have myself, without much practice, been within three yards of a deer. When deer are shot at they scamper off in great trepidation, but after proceeding about 200 yards, turn and stand for a moment, and then set off with renewed speed, when they betake themselves to the distant heights. The male alone, as every body knows, carries horns. The number of branches on each horn, has been found, in the Outer Hebrides, amounting to eleven or twelve. Eight, however, are considered as the highest number, excepting in extraordinary cases. The back and sides are reddish-brown, the belly and perinæum dull white, the feet gray. The female is much inferior to the male in size. Both have a prominence on the forehead. The rutting season is from Michaelmas to Martinmas, when the stags bellow, roll themselves in mud and pools, fight with their fellows, and by their long journies and violent exertions become very thin. The deer were so plentiful in Harris and Lewis thirty years ago, that the poor people found it difficult to keep them off their little patches of corn, which they came to eat under night, and the lairds were so selfish as to prohibit the use of guns. The late Lord Seaforth, however, being translated to another sphere, and local militia being instituted, they very rapidly decreased. The hunters of the Hebrides are not good marksmen, and never shoot running or flying, nor do they ever venture to fire at a deer unless with a rest. They seldom employ ball in shooting deer, preferring buck-shot or swan-shot. I have heard of a shepherd in Lewis killing five with one shot, and an individual was named to me who had shot eighteen in one season. The stags are in best condition immediately before the rutting season, and the females about Martinmas. The stag is vernacularly named *damh*, the doe *adh* or *grighach*, the young *laogh;* and the species is designated by the name of *fiadh*. The antlers of the red deer were the badge of the clan Kenneth, or Mackenzies. This species is the sole representative of the *Rûminantia* in the Outer Hebrides.

2. The *Pine Martin,—Mustela Martes,* Linn.; in the Gaelic language *Taghan,* is not very uncommon in some parts. It resides in holes among the blocks and loose stones on the sides of the mountains, and lives upon feathered game and other birds. It is also said occasionally to attack very young lambs.

3. The *Common Shrew,—Sorex araneus,*—in Gaelic *An Luch fheoir,* (the grass mouse,) occurs in the sandy pastures, especially on banks near rivulets.

4. The *Gray Rat,—Mus decumanus,* GMEL.; in Gaelic *An Rodan,* is abundant in most of the islands, its habits being the same as in other parts of the country. This animal swims with ease, and has settled in many islets at a great distance from the larger islands, where it feeds principally upon shell-fish and crustacea.

5. The *Domestic Mouse,—Mus Musculus,*—in Gaelic *An Luch,* is also common enough in the huts, and in winter betakes itself to the corn yards, where it often does much damage. The rat can subsist in independence, but the mouse never occurs at a distance from houses.

6. The *Hare,—Lepus timidus,—An Gearr,* has been naturalized in the neighbourhood of Stornoway and in Barvas, in the district of Lewis, and in one of the Barray islands; but it does not appear that it ever occurred indigenously in any part of the range.

7. The *Rabbit,—Lepus Cuniculus,* LINN.—*An Coineanach,* has also been naturalized in Barray and Vatersay.

These are all the mammifera which find subsistence exclusively on land. I have now to mention those which, residing on shore, procure their food from the waters: and these belong exclusively to the order *Carnivora.*

8. The *Common Otter,—Lutra vulgaris,*—in Gaelic *Am Balgar,* is of frequent occurrence in many parts. It resides among blocks, and in the fissures of rocks along the coast; seldom frequenting the lakes or streams of the interior, and preying upon marine fishes. Some persons who are particularly addicted to the hunting of this animal, kill considerable numbers of it, and dispose of the skins to others who are in the habit of making a voyage annually to Greenock and Glasgow for merchandize.

9. The *Common Seal,—Phoca vitulina,* LINN.—*An Rōn,* is extremely abundant in many parts, frequenting the sounds, which are full of islets and rocks, on which they are often seen resting. Some of the small islands, which are situated at a great distance from the others, are remarkable for the prodigious numbers of seals by which they are frequented. The Rock of Gasker, twelve miles from Harris, in the Atlantic, is a celebrated place of resort for these animals. Great numbers are killed upon it annually, upwards of a hundred and twenty having been destroyed in one day. In the end of autumn, or beginning of winter, a boat goes from the Island of Tarnsay to this rock. The seals are then found on shore, in the middle of the island; and the men, armed with sticks, arrange themselves in a narrow passage, after which they shout to frighten the seals. The latter, in their haste to escape, come tumbling and floundering in a confused mass, the largest individuals taking the lead. To these the men are obliged to allow a free passage. Then commences the application of the bludgeons, and by the time the last seals have got through the perilous pass, the ground has been heaped with the dying and the dead. Individuals of immense size are said frequently to present themselves. Of the

larger seals the skin and blubber alone are embarked, while those of a smaller size are carried off entire. The island of Hasker, off the west coast of North Uist, is alike famous as a resort of these animals. The flesh is sometimes eaten by the natives, and the skins form an excellent covering for trunks.

In these remote islands individuals of enormous size are said to occur, so that there may possibly be two or more species; but those individuals which have come under my own observation, I could only refer to the common species, notwithstanding the great differences in colour and size which they exhibited.

There now remain the cetaceous mammifera, of which little can be said with certainty, although many species are of very common occurrence.

10. The *Porpoise,—Delphinus Phocæna,*—named in Gaelic *Puthag,* or the *blower,* on account of the mode in which it respires, is not uncommon, but is seldom obtained, a few individuals only being now and then cast ashore after a storm.

11. The *Grampus,—Delphinus Orca,* Linn.—named, like other cetaceous animals, in Gaelic *Muc Mhara,* or *sea hog,* occurs in the sounds at all seasons, sometimes in droves of many hundreds; but its appearance is very irregular, and not of frequent occurrence. When grampuses appear on the coast, the inhabitants of the neighbourhood assemble and pursue them in boats. No harpoons are taken, the only weapons used in the pursuit being small pebbles. The herd being partially surrounded, the grampuses, instead of facing their puny antagonists, betake themselves to flight, and are easily driven in whatever direction is deemed expedient, by means of a little manœuvring, and the occasional disposal of a few pebbles. Their destination is always a shallow beach, where, owing to the size of their heads, they stick fast, and splashing about the water with their tails, quickly render it turbid, by which those in the rear are unable to perceive the nature of their position, and generally run ashore. A few may escape, but the whole herd generally sticks. The men now leave the boats, and assisted by others on shore, stab and cut at the animals until the sea is red with blood. Prizes of this kind, however, are seldom obtained. Many hundreds have been secured in this manner. The largest are about 40 feet long, and the smallest 12. The ordinary size, however, is about 25 feet. The quantity of oil which they yield is from one barrel to five or six; seldom, however, more than four.

In case I should be mistaken as to the species, it may be well to add a few particulars derived from my note-book. The head is very round; the teeth about eighteen in each jaw, short and blunt. There are two pectoral fins, and one dorsal, which is curved backwards. The blow-hole is semilunar. The upper parts and sides are glossy black, the belly grayish, the skin smooth and shining. These imperfect notes I took from one of a drove of fifty that had been driven ashore at East Tarbert in Harris, in the beginning of July 1818.

12. Of the *Delphinus Hyperoödon* an individual was cast ashore in the island of Tarnsay about twelve years ago, of which I obtained the teeth.

13. I have heard of an individual of the fin whale, *Balæna Physalus,* 70 feet in length, having been cast ashore on the island of South Uist; but I had no opportunity of examining it. Dr. Walker mentions its having been occasionally cast ashore in Lewis.

It is more than probable that many other cetaceous animals occur in these seas, although I am unable to say any thing respecting them from my own observation.

Stragglers must of course be inhabitants of the ocean, and of such I have only a single example to mention. An individual of the *Walrus, Trichechus Rosmarus,* presented itself on the east coast of Harris, in the end of December 1817, and was shot, as it lay upon a rock near *Caolas Stocnis.* This individual was about 10 feet long. Its tusks projected 8½ inches beyond the gum. The occurrence of so rare an animal excited great astonishment at the time, and the courage of the person who ventured to shoot it was highly extolled. It formed the subject of many a conversation over the whole district; and its ghost appeared to a young woman in a dream, stating that it had visited their inhospitable coast in search of a lost brother. I was in the country at the time, and saw the animal after it had been mutilated.

If we except the *Cetacea,* which are probably numerous in the seas of the Outer Hebrides, the mammifera which occur in these islands are, as has been seen, few in number. Of the *Quadrumana* there are of course none. Of the *Cheiroptera,* I have not seen even the species so common in other parts of Scotland. Of the *Feræ* there are only four species, although it is probable one or two seals will yet be added to the list. Of the *Glires* I know only two with certainty that are indigenous, and two naturalized; and of the *Ruminantia* only one: while the orders *Marsupialia, Edentata,* and *Pachydermata,* are entirely without representatives. It is of course needless to say what animals are not to be found there, as the fox, the water rat, or the mole; and all that it is necessary to add is, that with respect to the proper land animals, I do not expect any addition to be made, as I have been particular in my inquiries respecting them.

*(To be continued.)*

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## ART. II. *Account of the Falls of the River St. John, (New Brunswick.)* By ROBERT FOULIS, Esq.* *(With a Plate.)*

THE Grand Falls of the river St. John, are situated on the northern confines of the province of New Brunswick, near its separation from Lower Canada, by an imaginary line drawn

* Read before the Royal Physical Society.

from the mouth of the Rustigouch River, in the Bay of Chaleur, to the junction of Grand River with the St. John, 230 miles distant from where that river falls into the Bay of Fundy.

The principal tributaries to the Main River, above the falls, are the St. Francis, the Madawaska, Grand River, and River Verte: the last so named from the singular tint of its waters, which may be seen in green streaks, as its stream mingles with the waters of the St. John.

A chain of high lands crosses the country where the Grand Falls are situated, and taking a circular direction on each side, ranges on the left to the south-west, and on the right to the north-west, forming the boundaries of a broad extensive valley through which the river majestically meanders.

The flat tracts extending on each side, from the banks of the river to the foot of the high lands, called in the language of the country *intervales*, have evidently at some distant period been covered with the waters of the river, when they must have formed the bed of an immense lake, although such changes have taken place, that but small portions of these alluvial deposits are now overflown even by the annual freshets which inundate the *intervales* in the lower districts of the river. These plains are generally covered with long grass, and occasionally studded with clumps of large elm trees, which at every turn of the river present landscapes that impress the mind with feelings of seclusion and peaceful serenity, forming a striking contrast with the scenery below the falls, where the bold projecting rock, the rugged precipice, the shelving bank, the struggling violence of gushing waters dashing on confused accumulations of fallen trees, bring the mind, amid the turbulence of jarring elements, to a feeling of awe and devotional superstition.

When the traveller has ascended the river, and approached within three miles of the falls, he arrives at what is called the *White Rapids*, where the river is about 300 yards broad. These rapids are occasioned by ranges of projecting rock, composed of greywacke slate, which cross the river at right angles, having an inclination of 30 degrees to the north, over which the water descends with a velocity equal to 130 feet in 20 seconds. The banks on the right present masses of unstratified rocks, consisting of granite, greenstone, limestone, and conglomerates. On the left there is a bank of gravel 80 feet in height, containing many boulders. Masses of this bank are continually falling into the river, rendering the passage dangerous and difficult.

On approaching *the Portage* at the falls, the first appearance of the place would lead a stranger to suppose that the river terminated here in a basin, surrounded by high lands which form a magnificent natural amphitheatre, the inlet of the water being completely hid from view by projecting rocks on the right; and it is not until the traveller has arrived at the foot of the pass, that he perceives the river issuing with great rapidity of current from a narrow rugged chasm on the northern side of the basin.

This passage of the waters cannot be approached with safety in boats on account of dangerous whirlpools, and the steep perpendicular rocks prevent minute investigations by land; the traveller is therefore obliged to leave the banks of the river and ascend the Portage Hill by a circuitous passage to the left.

The summit of this hill is 240 feet above the level of the basin below, over which it rises perpendicularly on the north, and with a more gradual slope to the south-west. Inclining along the summit of the hill, by a path leading to the north-west, the ruins of an old military post are passed on the left; and a view of the river is again obtained. The portion seen is the upper basin, which is immediately above the falls. Turning to the right, a grove of spruce, hemlock, and birch trees, conceal from the eye the abyss, from whence an immense column of steam-like vapour is seen ascending. A hollow tremulous sound now vibrates on the ear, and, on arriving near the spot from whence it proceeds, it seems as if it came from the ground beneath, and that the foot was also sensible of the tremulous motion.

Emerging from the grove, which, in the direction of the vapour, consists of stunted trees, the traveller unexpectedly finds himself standing on the edge of a rugged precipice overlooking the cataract, the deafening roar of which now suddenly affects the ear, on which it strikes with rather more painful sensations than the first gentle sounds had prepared the tympanum for receiving. The spectator starts back, with an involuntary shudder, from a sense of danger which it requires some nervous resolution to overcome, and restore the mind to a fit state for contemplating the sublime scenery with which he is surrounded.

The river dashes down a precipice 74 feet in perpendicular height by three divided streams. The central one is the largest, and falls from a curved line. The water is received into a dark narrow caldron below, where the agitated current, having much the appearance of rolling fleeces of wool, sends up columns of vapour, which, as they catch the sun-beams, display the most beautiful prismatic colours. Turning round, the spectator perceives that the water again descends from the horrid gulf below by a narrow crooked chasm, which leads to the basin on the other side of the Portage Hill, and through which it is urged with violence by a fall of 45 feet, the descent in all, from the upper to the lower basin, being 119 feet. This passage seems to have been produced by the effects of an earthquake, which, by opening this channel, has drained the water from an immense tract of country by thus lowering the fall 121 feet.

The rock which composes the Portage Hill, and is the barrier to the descent of the river, is an insulated bed of transition limestone, of a blue colour, intersected with white veins. I may also state, that I discovered a transported mass of the same kind of limestone 20 miles south, at the falls of the River Rustic, a stream which empties itself into the St. John.

ART. III. *Notes on the Caverns in the North-Eastern District of the High Peak of Derbyshire, with an Account of a Descent into Eldon Hole.* By the EDITORS.

CAVERNS have been met with in different spots over almost the whole of the carboniferous limestone district of Derbyshire. Their direction is found to vary with that of the vallies; and their characters are regular with respect to the minor details of the varied operation of the same causes which produced the vallies,—of the differences of structure, and of the accidents of stratification; and are also constant with regard to the physical geography of the entire tract.

In no part of this country do we find the caverns at once so extensive, presenting features of so much magnificence, and combining in their phenomena so many illustrations of their natural history, as in a small district, of a few miles in extent, in the north-eastern part of the Hundred of the High Peak.

Here, terminating to the north by lofty hills which receal the greatest subterranean beauties, the mountain limestone is separated from the superincumbent millstone grit, by two vallies of different elevation, and of very different aspect and magnitude; the most easterly is called Hope Vale. The westerly valley, little cultivated and not many thousand yards wide, is terminated to the north by a range of millstone grit and shale hills, of a rounded outline, which itself terminates above Hope Vale, in the culminating point of Mam Tor, to which the latter presents an abrupt and precipitous bare acclivity.

To the north originates another range, which, coursing round to the east, forms a series of distinct summits, joined by their bases and acclivities, forming the northern boundary of Hope Vale, and extending beyond the eastern termination of the limestone range. These hills, pretty lofty in the east, attain their maximum of elevation at the hill above Peak Castle, becoming gradually lower towards the west.

One or two small hills extend towards the southern foot of Mam Tor, separating the western and eastern vallies, but joined to the latter by a beautiful rocky pass called the Winnats, (Wind-gates.)

Between these ridges of limestone hills and the eastern range of millstone grit which stretches out from Mam Tor, lies the low fertile plain of Hope Vale, ornamented with towns and villages, watered by streams curling from the adjacent hills, and smiling with the products of a rich and luxuriant soil.

Above Castleton, at the foot of Peak Castle, is the extensive cavern known by the name of Peak Cavern. Not many hundred yards to the west is the entry to Speedwell Mine, leading to another large subterranean cavity. At the foot of the hills between Mam Tor and the main limestone ridge, are the mines of Odin, &c. communicating also with subterranean cavities; and in the western valley are numerous passages, termed swallows in the language of the country, receiving the waters from the various streams which traverse the marshy valley called Rushop Edge, that lies between Perry Foot and the hills extending towards Tillington, south of Chapel le Frith and the grit range of Lord's Seat and Cowburn Moss Hills; while on the southern acclivity of the limestone hills, a little to the west of Mam Tor, is that deep and difficultly accessible cavern, called Eldon Hole. Between Eldon Clough and Tideslow Top, there are three summits with a tame and rounded outline, which are continued to the east, and constitute Peak Hill.

To the south the easterly range comes by Tideswell Lane Head to Litton, and curves round, forming a platform to the east of Tideswell. Smalldale and Bradwell, the latter celebrated for a cavern remarkably abundant in stalactites, are situated on small masses of limestone to the east of this range, at its northern extremity, and are separated by a rich valley from the millstone grit forming the elevated plateau of Abney, Abney Grange, and Great Hucklow. This limestone range is traversed by the veins of lead which are worked from Hucklow over the hill called Tideslow Top.

Wherever the millstone grit can be examined at its line of junction with the limestone in this part of England, numerous beds of shale are universally found, gradually alternating more and more frequently with arenaceous beds, till they are finally succeeded by those extensive deposits accompanying the coal measures, and situated between the old red sandstone and alpine or carboniferous limestone, and the magnesian limestone and red marl, and which we express by the general term of millstone grit.

Where the inclination of the strata is not great, and in this case they are almost horizontal, it must naturally follow that a great extent of these shales will form the support of the soil between the limestone and the arenaceous deposits. And it will also follow, that being strata of little consistency, very friable, and easily decomposed even by the action of air and moisture, as demonstrated in the neighbouring hill Mam Tor, or the *Shivering* Mountain, the influence of streams and water courses will be more remarkable, forming vallies of greater or less extent. In the valley where this junction takes place, the streams of water course down from the northern ridge of hills, scoop out for themselves channels in the shale beds, till, meeting with the limestone, they are engaged in the swallows, certainly not formed for their reception, but probably the result of their action in partially overcoming the increased resistance, wherever they could meet with the smallest chink. And these passages, on minute examination, presented but one constant feature,—the evidence of the continued action of water.

One of the swallows, the most easterly in the valley, is interrupted by the hill which we alluded to as advancing towards the southern base of Mam Tor, and penetrates into its very depths. We followed its eccentric course many hundred yards, but left it descending deeper into the bosom of the rock. Another stream, a little further west, penetrating into the same rock, follows a passage upon the same level as the valley, into which it again issues at the other side, and, after coursing some time down the vale, loses itself finally in the main or southerly ridge. This passage can, when the water is low, be penetrated and explored throughout the whole of its extent.

Beyond these, further to the westward, several streams of water may be seen entering the limestone rock at different points, and in almost immediate succession.

These swallows present in most places the interesting feature of their having at one time or other changed their place; while the streams supplying them, before upon a level with the valley, now form for themselves secondary valleys as it were, confined in their limits by the size of the stream, and following a course at right angles to the main valley. Two separate entrances are then left, one above the other; the lower one alone receiving the influx of waters. In some cases, the waters, previous to their entrance into the lower swallow, buried themselves in the earth, obviously to join one still deeper, and thus the two openings above ground are left dry.

We were able to trace different causes for this fact; the most common one appeared to arise from the scooping effects of the waters, which, by lowering their channel, necessitated the enlargement of their present swallows, or the formation of a new one. But they were also occasioned by the blocking up of their former passage, which we have seen occasioned by the falling in of masses of rock and portions of the strata, leaving sometimes apertures to the day beyond the first swallow; and also by the labours of man, anxious to preserve his cattle from accidents that ensue by their falling into these holes, or their being borne in times of overflows down these hidden streams of water. The magnitude and sudden increase which these streams sometimes assume is remarkable, and their current is at that time proportionally rapid and impetuous.

Notwithstanding the occasional diminution of the elevation of these swallows, they still remain a considerable height above the cavern of the Peak, which pours into Hope Vale a tributary stream of water; nor is there much probability that any immediate effect of time will produce an equality of level in the two valleys.

The fact that objects, when allowed to follow the course of the waters, entering at the swallows, occasionally re-appear with the stream that issues into Hope Vale, and the evidence derived from their relative situation, and from the existence of analogous cases, can leave no doubt of the immediate connection which exists between the two.

This relative situation at once combines the evidence of the comparative quantities of water, of the geological probabilities, and the physical necessities for the exit of the waters on the earth's surface. Analogous facts furnish us with similar chemical or mechanical actions, and with similar and varied effects produced in different, but still more particularly in identical formations.

There existed, however, on the eastern acclivity of the limestone ridge a hole celebrated for its depth, its difficulty of access, and for the traditional tales of wonder which had been attached to its dark depths. It appeared probable that, placed as it was near the entrance of the waters at the swallows and their direction towards the caverns of Hope Vale, that an exploration of its communications might lead to some additional facts of interest on the subterranean course of these streams; and accordingly we prepared to make a descent.

To accomplish this, planks were placed across the opening to support a turn-tree or windlass, a strong rope of more than 80 yards in length was swung on a saddle, and held by several men; another, to which was attached a heavy stone, was let down into the cavern as a guide, and a piece of wood was fastened to the extremity of the former to give the comfort and security of a seat. We were accompanied in our descent by two miners, Daniel Miller and John Thornhill, whose skill and care deserve aknowledgment.*

The chink forming the entrance of Eldon Hole, is about 34 feet long, and presents no features in which indications of the action of water could be traced. Its elevation above the limestone district to the south, forbade any idea of its entrance having communicated with any waters coming from that direction; and being not far removed from the summit of the ridge on which it is situated, there was neither distance for the accumulation of any body of water, nor evidence of the former existence of any such stream that could have contributed towards its formation.

Subsequent investigation soon showed us that it was in reality *an empty vein*,—a large opening in the rock, unfilled by any subsequent deposition, and such as has been described by the Baron Von Buch and by Wahlenberg. This vein, at the point where its two sides come into closer contact, is filled with a soft yellow clay, about 18 inches wide. The open portion, constituting the first chamber of Eldon Hole, bore evident traces of the long-continued action of running water.

It is a remarkable fact connected with the veins of metallic ore which are known to abound so much in the limestone of Derbyshire, that their direction is uniformly from east to west; while all veins that course in an opposite direction, are either empty, unproductive, or filled with non-metallic substances. Now the direction of the large vein of Eldon Hole is from north to south.

A wall of stone is placed around to keep cattle from its danger-

* Several descents had been previously made into this curious cavern. There is a record of an individual who lost his reason in the attempt. Mr. Lloyd has given an account of his descent in the Philosophical Transactions, and we found his description extremely accurate. Since that time some miners penetrated the abyss, on the invitation of a gentleman engaged in a topographical history of the High Peak.

ous brink; and many of the stones are thrown down by the traveller, who listens with anxious ears to the sound of the rock, bellowing from side to side, and at length growing low and dull, till it seems lost in the unfathomable distance.

Vegetation is luxuriant at the entrance. Trees and shrubs of various kinds, including the elder, hazel, and alder trees, grow on the naked rock. Jackdaws, many of which build on the sides of the cavern, probably brought their seeds.

At first the descent is accompanied with little trouble; the eye is interested by remarking the change in vegetation from dicotyledonous to monocotyledonous plants, and, finally, to plants of the most simple organization. The latter make their appearance where the sides of the cavern become closer; moisture dribbles on the rope and body, and the progress becomes more slippery. At this point the rock deviates from the perpendicular; and here Mr. Lloyd (Phil. Trans. Vol. LXI.) remarked a cavern which seemed to go a great way, but which he could not enter. No more vegetation is now perceptible; and, passing over the jutting rock, another passage presents itself, from which the descent is tolerably perpendicular to the first landing place, a pile of stones, 62 yards from the mouth. This heap of stones runs into the depth below, at an angle of 35°—38°. Its length from top to bottom was 78 feet; forming an immense, but ridiculous memorial of an attempt that was made, with much expense, some time back, to fill this vast cavern.

We landed on the pile, when the cavern opened to the east with all the splendour and magnificence of a glen in the bosom of the earth, whose rugged sides and high canopy of rock, lost in the dim obscurity of the deep, presented to the eye the indistinct and mysterious forms of Nature's sublimest architecture. The day on which we made our descent was clouded and stormy, and the loud peals of thunder, shaking the mountain rock on which we leaned, and re-echoed in low deep mutterings from the murky darkness before us, added to the fearful grandeur of the scene. Arches succeeded one another in apparent symmetry, and terminated in an expansion that lost itself in obscurity. The first arch to the east was 22 feet wide and 6 feet high: the second, of immeasurable height, exhibited the simplicity of Saxon style, with an entablature of stalactite. Three vast openings formed the series of caverns; the first, constituting the lesser cavern, open at the top, and the two others almost joined to form the large one. In the lowest division on the north-east, was a grotto of stalactites, and on the east side, conglomerated stalagmites rising in columns of from 2 to 3 feet in diameter, and from 20 to 30 feet high. The large cavern was 22 feet wide, and in the north-east corner was a hole nearly filled up with large fragments of rock. Above is a chink filled with clay, which widens on ascent for about 20 yards, and terminates in a beautiful grotto, hung with pipe and conical stalactites. To the south of the large cavern a small opening runs along for about 10 yards.

The subterranean streams of water that enter by the swallows in the upper valley, are not then to be seen in any part of Eldon Hole, but probably course in an easterly direction on the north side of Eldon Clough and Peak Hill.

The subterranean waters are first met with at Speedwell Mine, in which the excavations, at a distance of 760 feet from the entrance, terminate in a platform, upon which the waters fall from a lofty cavern, and are again precipitated over a perpendicular cliff. The water has been allowed to accumulate in the line of the former workings, and the curious are obliged to navigate in a little boat to this interesting and striking spot.

The platform is stated to be 353 yards from the perpendicular surface, and the elevation of the abyss, into which the waters throw themselves, and which has been plumbed 103 yards, and into which much rubbish and broken rock has been cast, in ineffectual attempts to fill up the chasm, will not be much greater than that of the farthest extremity of the Peak cavern, into which the waters are found flowing. This latter cavern, of gigantic dimensions at its entrance, being about 87 yards high at its immediate opening, can be penetrated to a very considerable distance, part of the course being through caverns with natural contractions and curious deviations from the simplicity of a mere water course, and part along the sometimes muddy and sometimes stony banks and bed of the stream, which having entered by an impassable opening, and finally bubbles forth at an increased depth a very little to the left of the great entrance.

But our limits do not now permit of further details. We must return to this "Wonder of the Peak" in a future number, the present descriptions being supposed to be confined to Eldon Hole, whose interest lay as much in the mystery that was attached to its dangerous descent, as in the important relations which it bears to the other caverns of the Peak.

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## ART. IV. *On the Double Type of the Respiratory Organs, as illustrated by Professor Rathké's Discoveries.* (*With a Plate.*)*

(Communicated by T. W. Jones, Esq. Lecturer on General Anatomy.)

Taking into consideration the co-existence of lungs and gills in the Proteus, and reflecting on the circumstance that, in fishes, there are bones connected with the gills, whose analogies in the other classes of animals have not been determined, Dr. Knox was

* For the accompanying plate, we are indebted to MM. Saigey and Raspail's valuable *Annales*.

We have requested our friend, Mr. Jones, to furnish us with an abstract of the important discovery of Professor Rathké, as the notices which have been already published in this country are in a great measure useless, from not being accompanied by the author's illustrative figures.

led to make an application of the principles of his theory of hermaphrodism to the respiratory organs of the vertebrate animals; affirming *that the type of the respiratory organs is double;* that is to say, that there are originally the elements of both lungs and gills; but that, in those animals which breathe by lungs, the elements of the gills are not developed; and in those animals which breathe by gills the lungs are not developed.

According to this idea, *gills,* although analogous to, are not identical with *lungs,* seeing that they may exist together in the same animal.

The theory of the double type of the respiratory organs is rendered complete by the observations of Professor Rathké,* who has detected rudimentary gills in chicks, in embryos of several of the mammalia, and in the embryo of the *lacerta agilis.*

According to him, the following peculiarities are observed on the outside of the lower and lateral parts of the neck of the chick of the third, but particularly of the fourth day of incubation, (fig. 1 and 7:) immediately behind the opening of the mouth are two broad and thick lobes (*c,* fig. 7,) belonging to the two lateral halves of the chick, and formed of the same gelatinous substance as the rest of the body.

These lobes are incorporated together below, on the mesial line of the body, but in such a way that their point of union is indicated by a broad and superficial groove.

There is, moreover, at the lower aspect of each lobe, a transverse shallow groove, which divides the lobe into two parts. Its anterior part, becoming developed, forms the lower jaw. The posterior makes, with its posterior margin, which is rather sharp, a slight projection downwards, and covers by its posterior region the foremost fissure, which is the largest of the neck, nearly in the same way as the operculum covers the gills in most fishes.† Behind this part, the cervical region becomes a little narrower below; now it is on this contraction, (that is to say, at some distance behind the kind of operculum just mentioned,) that the orifices of the two other fissures of the neck are found. The upper and smallest portion of the cavity which lodges the heart, (*e,* fig. 7,) begins immediately behind the two lobes of the cervical region. At the third and fourth days of incubation the heart is as yet only formed of *one ventricle* (*e*) and of *one auricle* (*f;*) and it gives off the *aorta,* (*d*).

The anterior part of the arterial system of birds has, at the beginning, the same disposition as that of salamanders at the first period of development; that is to say, birds have vessels which present a striking resemblance to the branchial vessels of salamanders, during the first period of their development.

* Act. Cur. Nat. Bonn. 1829. Tom. XIV. Part I.

† According to this, the bones of the *operculum* are to be looked for in the lower jaw, and not, as M. St. Hilaire thinks, in the small bones of the ear. This is the more likely, as there is a fish in which their is an appearance of rudimentary *ossicula auditus.*

At the fifth day of incubation, the two posterior *branchial* openings of each side have already, in certain embryos, so much diminished in extent, that they only form small round holes scarcely visible; in others, they are completely obliterated (fig. 2 and 8.)

However, when, in the latter, the pharyngeal cavity is divided and its parietes folded back, there are found on each side, at the places previously occupied by the two last branchial openings, the same number of little apertures, which are the vestiges of the branchial cavities, but which are themselves effaced during the following hours.

The embryos of the mammalia also present, at an early period, several fissures on the sides of the neck, which, traversing the thick wall of this region, lead into the pharyngeal cavity. The foremost, situated immediately behind the rudiment of the lower jaw, is the largest; the posterior is the smallest. An embryo of a pig, six lines long, and which was just three weeks old, exhibited not three of these fissures as in birds, but four (figs. 3 and 9, *aaaa*, 11, *cccc*.)

The three first represented small cavities of a lenticular form, flattened from before backwards, the external and internal orifices of which were a little narrowed. The posterior fissure, which had perhaps been previously the largest, formed, on the contrary, a round canal scarcely perceptible. The anterior cavities were lined by a very delicate membrane, which was a prolongation of that of the broad and long pharyngeal cavity. Professor Rathké supposed he saw, in the interior of these cavities, small parallel projections directed from within outwards, which rose from the surface of the membrane, and resembled the branchial laminæ in the respiratory cavities of sharks. However, he does not vouch for the accuracy of this observation, seeing that he might have been deceived by the minuteness of the object, and by a preconceived opinion.

In the *embryo of a horse*, six lines long from the vertex to the tail, (fig. 4 and 10.) the openings of the neck were already closed, and in their stead were the lung and the trachea, with the larynx; but all these parts were still at the first period of their development.

As he had expected, Professor Rathké found similar appearances in the embryos of lizards.

From the analogies just related, Professor Rathké infers that *the laminæ which exist in the neck of the chick, are rudiments, or one of the lowest of the transitory forms of the gills;* and that *birds have gills, which however disappear after the first period of their embryo development.*

*Explanation of the Plate.*

Fig. 1. Anterior part of a chick at the fourth day of incubation, magnified two times.

Fig. 7. *Id.* merely in outline. *a a a*, Vesicles which represent the first traces of the encephalon and medulla oblongata.

*b*, First trace of the lower jaw.

*c,* Part analogous to the operculum of fishes, which, by its posterior extremity, covers the first opening of the neck: the two other openings are more behind.

*d,* The aorta.

*e,* The ventricle of the heart.

*f,* The auricles.

*g,* The first vestiges of a liver.

*h,* The first trace of a wing.

Fig. 2. Embryo of the fifth day, magnified one time, and represented in its natural position.

Fig. 8. *Id.* *a a a a, b, c, d, e, f, g, h,* as in fig. 7.

*i,* A part of the amnios.

*k,* A part of the sac of the yelk.

*l,* The pelvic extremity.

*m,* The tail.

Fig. 3. Embryo of a pig of three weeks, magnified one time.

Fig. 9. *Id.* *a a a,* the branchial openings.

*b,* The heart.

*c,* The liver.

*d,* The supra-renal capsule.

*e,* The extremity of the common integuments of the abdomen, in which is found the anus.

Fig. 11. *Id.* The anterior part slightly magnified, and seen from the inferior aspect.

*a,* The nostril.

*b,* Lower jaw.

*c c c c,* Branchial openings.

*d,* Ventricle of the heart.

*e,* Auricle.

*f,* Aorta.

*g,* Vena cava.

Fig. 4. Embryo of a horse, magnified half a diameter.

Fig. 10. *Id.* *a,* The heart.

*b,* The left lung.

*c,* The liver; there is seen on the fore part of the liver a part of the diaphragm.

*d,* The left supra-renal capsule.

*e,* The penis.

*f,* A part of the integuments of the abdomen.

*g,* Section of the symphysis pubis.

Fig. 5. Anterior part of the body of a very young embryo of the *Blennius viviparus,* intended to show the resemblance existing between the gills of these fœtuses, and the branchial openings of the embryos of birds and mammalia.

Fig. 6. Embryo of the *lacerta viridis,* viewed from the right side, and magnified four times. The intestinal canal, and the sac of the yelk, which hang mostly out of the belly, have been removed. The heart is situated below the neck, which presents on each side three branchial openings; the vesicle at the posterior extremity of the embryo is the allantois.

# SCIENTIFIC REVIEWS.

*The British Flora.* By W. J. Hooker, LL.D. and Regius Professor of Botany in the University of Glasgow. Longman. London. 1830.

We remember to have seen, some time ago, a question put in one of Loudon's publications, what was the best book, both as to cheapness and information, on British plants: and if our recollection serve us right, the answer was that none then in circulation could be recommended; that Hooker's "Flora Scotica" was a model, but that unfortunately it only applied to part of the kingdom. That the "Flora Scotica" deserved this encomium need not now be told. The conciseness of the remarks and the rejection of useless synonyms, enabled the author to get much into a small space, and the public were so well aware of the utility of such a work, that although only printed in 1821, yet for these two or three years past, the work has been very scarce. A new edition was therefore called for; and it was now thought expedient to extend it so as to apply to the whole of the British isles. The name of the work has also been changed, but such in few words seems to be the origin, nature, and object of the "British Flora," a work that requires no recommendation on our part, as by this time every practical botanist in the three kingdoms must have pronounced it to be the best that has yet been presented to the public. The matter is good, the typography is good, the paper good, and the whole carefully corrected for the press.

The classification followed is that of Linnæus, and we firmly believe this to be the best suited to English taste at present. Thus in many copies of the "Flora Scotica" we have slily looked at in the possession of others, we have rarely found that the second part, which included the natural orders and the Cryptogamia, had ever been opened, while the first was "well thumbed." An author and a bookseller must in some degree consult the taste of the public, and therefore in the "British Flora" we have the whole account of the natural orders reduced to a few pages at the end of the volume. Keen advocates as we are for a natural system in all the branches of natural history, we look on this arrangement with regret, and we cannot help thinking that if the genera and species, accompanied with the same judicious remarks and observations that we find in the work before us, had been disposed after the Jussieuan or natural method, it must have met with nearly as favourable a reception from the public; but most assuredly must, at the least, have contributed much towards the final adoption, in this country, of a method that alone in botany merits the name of philosophical. The Linnæan classification is nothing more than a dictionary or grammar with which we cannot burden our memory: the Jussieuan system forms a philosophical and entertaining work, that delights and instructs at every step. Many objections have been urged to the natural system, such as that it requires a previous knowledge of the names of plants, and that it is therefore totally unfit for a student who has no assistance; and we do allow that the Linnæan mode is that by which one may more easily make out the name of a plant, if he has no previous knowledge of botany, or if his eye has never been accustomed to group together natural objects. But such is only the lowest department of botany, and even these difficulties might we hope be obviated by attendance in a class-room.* The principles of the *andria* and *gynia* system may be taught in half a dozen lectures, and if the other 50 or 60 of a summer course were to be filled up with disquisitions on the natural arrangement, and illustrations given by arranged plates, and dried or living plants, we have the presumption to think that the students, though at first they might find the plan very dry and unpalatable, would go away with a very superior knowledge of botany, and with an ardour that can never be imparted by the artificial system.

In the course of the volume before us, we observe that several new species have been added to the British catalogue since Smith's "English Flora" was published. Among these are *Fedia mixta* and *eriocarpa, Crocus minimus,* (*Cr. reticulatus,* Sm. not Bieb.) *Avena planiculmis,* Schrad. (not of the "Flora Scotica," which is *A. alpina,*) *Myosotis collina, Œnanthe apiifolia, Statice spathulata, Erica ciliaris, Ledum palustre, Rosa Wilsoni, Papaver nudicaule, Callitriche pedunculata, Hymenophyllum Wilsoni,* (which till now Scottish botanists had confounded with *H. tunbridgiense,* and of which the only existing figure is a wretched one in the trumpery "Promenade de Dieppe aux montagnes d'Ecosse," of Ch. Nodier,) *Equisetum Drummondi, Salix lævis,* and some others of that genus, which we hope are equally good species. In this last genus, however, we almost wish our author had disregarded the remarks of Sir J. E. Smith in the "English Flora," and we feel sure that if he had consulted only his own judgment, we might have had the whole reduced to fewer species than sixty-six, a number by far too great, unless we look on them as the *forms* so much written upon by those German botanists, who lay aside the word *species* until all the *forms* shall have been described or figured, when they intend to amuse themselves again by combining them into *species.* This Penelope-web-like entertainment may satisfy the idlers who have perhaps nothing else to do; but it tortures the science, and we sincerely trust may never be admitted into this country.

The genera *Rosa* and *Myosotis* have been ably written, and *Rubus* also, as far as we can judge, by the laborious and accurate Mr. Borrer; and we think by the descriptions now given, more British botanists may be tempted to study these difficult tribes.

* In mathematics *synthesis* or *composition* is first taught to the student, and when more advanced geometrical *analysis.* We wish the same in botany; the Linnæan is the *analytical;* the Jussieuan is the *synthetical* mode.

So excellent is the composition of the whole work, that, although sitting in our critical chair, we have almost nothing to find fault with. Perhaps among the grasses there are too few of the new, but generally adopted genera, taken up. In Tetradynamia *Königa* is retained, although there be an older *Königia.* "Nomina generica simili sono exeuntia, ansam prebent confusionis," *Lin. Fund. Bot. Coronopus* is again restored, although even given up by Smith. *Arenaria peploides* being monœcious or diœcious, (it is difficult to say which on account of its long roots,) and having very few and very large seeds, is surely, both by habit and characters, a distinct genus. The *Eriophorum gracile* of Scotland, at least what was found by Don, has glabrous peduncles, and has nothing to do with the foreign species of the same name, and is a mere state of *E. angustifolium.* With regard to the habitats, the size of the work did not permit them to be given at great length, but of those that are given, there are a few which we hope may be altered in a future edition. Thus the variety of *Melica cærulea,* (the *Molinia depauperata* of Lindley, and apparently a good species,) said by Lindley to have been discovered by Donald Munro, and, according to Dr. Hooker, by D. Don, was found by G. Don in August 1812, at the same time, and on the same rocks where he met with *Astragalus campestris*: this grass was first named by Don *Melica iridifolia,* but afterwards *M. alpina. Convallaria verticillata* was first discovered by G. Don in the Den of Reichip in 1790, who mentioned the circumstance to Mr. A. Bruce, and this gentleman, with the Rev. Mr. MacRitchie of Clunie, only re-found it in 1792, after a two day's search. It has also been met with by Mr. MacRitchie in Craighall woods near Blairgowrie. *Arundo stricta,* we are informed, existed very lately indeed in the original station. *Stellaria scapigera,* we know not why, has the habitat altered both by Smith and Hooker. G. Don's words are, "By the side of rivulets on the mountains of Badenoch, between Loch Erreachd and Loch Lagan, and by the side of a rivulet on a mountain to the eastward of Loch Nevis, Inverness-shire." *Luzula arcuata* was first discovered by G. Don on Ben Mac Duich, and distributed by him under the name of *Juncus nivalis.*

We are glad to see *Althæa hirsuta* again restored to a place in our Flora. It was first noticed by Hull in his "British Flora," p. 155, as having been found at Cobham by Mr. Rayer. We scarcely know why other authors have excluded it; perhaps through a desire of only introducing those plants that are indigenous in the strictest sense of the word; but in this feeling we do not participate. Foreign authors, as De Candolle, bring forward those species that are perfectly naturalized, as *Œnothera biennis, Tussilago fragrans, Mimulus guttatus,* and *Eranthis hiemalis.* All British authors admit the first, but dismiss the others; although more than one spot in Scotland could be pointed out where those mentioned above have firmly fixed themselves.

*Lepidium hirtum* of Smith is now we perceive called *L. Smithii.* The difference between it and the true *L. hirtum* was, we believe, first pointed out in the Ed. New Phil. Journal, Vol. V. p. 321, where an opinion is expressed that it is the same with *L. heterophyllum;* and where it is obscurely stated, in opposition to the author of the "British Flora," that the scales on the fruit, however microscopic, do always exist. Connected with this species, we observe a curious paragraph in a letter from G. Don, bearing date 21st March 1810: "I shall send you the true *Th. campestre* and the one figured in E. Bot. for *hirtum,* which I have long ago proposed to call *Th. incanum,* and the true *hirtum,* if I can fall in with a better specimen. They are all three distinct species, and I have long ago, and repeatedly, said so to Dr. Smith; and, at last, in his last letter to me, he seems now convinced of their being so."

The name of *Sonchus alpinus* is properly restored to our British plant. It is the name by which it is known in the Alps, and in Lapland, and though what Smith figures in his "Icones" looks very distinct, it may even be only a variety; but Wahlenberg states that he has never seen such a one, and that the plant of the Alps (*S. cæruleus Sm.*) is very common in Lapland. The only description worth attending to, given by Linnæus himself, has been entirely overlooked in the discussions on this species. We therefore add it here, as we find it in Smith's edition of the Tour in Lapland, II. p. 77: "Leaves about twelve or fourteen, half clasping the stem, gradually smaller upwards, nearly the shape of dandelion or of the common sowthistle, *one-half of each leaf, consisting of the terminal lobe,* making exactly an acute triangle, toothed at the edges; from that part downwards the leaf contracts, but not to the main rib, and then again expands into two narrow appendages, as it were, equal in breadth but unequal in length, which are crenate at the edges. From thence begins the stalk of the leaf, which is winged and toothed, and half embraces the stem. The leaves are thin and smooth, with a rib purple on the upper side, and *the upper ones are least divided, as well as the bluntest.*" All this applies to *S. alpinus* of the Alps and of Scotland, but not to Smith's *S. alpinus;* which has runcinate acute leaves with the terminal lobe not larger than the others.

We conclude these remarks by again stating that this a work perfect in itself, and acceptable in the highest degree to the student of British botany.

Having expressed our opinion in so decided a manner on the superiority of the natural system, it may be expected that we now devote a few lines to a work arranged in this way, and referred to by Dr. Hooker in his preface: it is Lindley's "Synopsis of the British Flora," published a year ago.

In this work such a spirit of pride and arrogance appeared in the few first pages, that, till lately, we frankly avow we never gave it the high consideration that a work recommended by Dr. Hooker merits. We see in the title-page the author styles himself

"Professor." We had perhaps erroneously imagined that all titles or dignities flow from the crown either directly or indirectly, and that universities hold their power only by royal charter to grant degrees of A.M., M.D, &c.; and till now we never supposed that an unchartered seminary of education in London or elsewhere, could confer any of these degrees; or could assume a still higher prerogative, and give the titles of "Professor" to the gentlemen who there give lectures on the various branches of literature and science. We know that, by the rules of the English language, any one who *professes* a subject, whether he belongs to a collegiate body or not, may assume the name of "Professor;" but, then, if Mr. Lindley be a "Professor" of Botany, so is Mr. Frost, so is any member of the Med. Bot. Society, *et hoc genus omne;* and the usual practice is against such assumptions.

Let us now look at the preface. Mr. Lindley here explains the nature of the arrangement he intends to follow. Speaking of the previous works on the Flora of Great Britain, he says, "These have all, with the exception of the Flora Scotica of Dr. Hooker, been arranged upon the principles of a system, which, whatever popularity it may, from particular circumstances, have acquired, and however useful it may have been found in communicating a knowledge of the names of things, does certainly not now tend to the advancement of science, or to an accurate knowledge of things themselves." And it is to obviate this defect that the "Synopsis" was offered. Now we do not agree that his own is the *first* work on the Flora of Great Britain that has followed the natural arrangewent. Mr. Lindley knows well that Mr. Gray or Mr. Salisbury, or both under Mr. Gray's name, did, in 1821, publish a "Natural Arrangement of British Plants;" and however detestable that work be, still there are some things in it, which even De Candolle has thought right to copy, and which Mr. Lindley again has copied and quoted (let *him* explain this want of candour,) from De Candolle without any allusion to Gray. Mr. Lindley's work is, however, entitled to the merit of presenting this system, as far as regards Britain, in a portable form.

Upon carefully perusing this work, it appears to us that it is rather a compilation, about which Mr. Lindley had given himself no trouble, than as an effort of that genius, which any one who looks at his other publications knows he possesses in a great degree. In his haste to adopt new genera, or, as he himself says in his preface, "to render the nomenclature of genera and species conformable to that of continental writers of the highest authority," he has not taken time to scrutinize the plants themselves, but, trusting to the "continental writers," who are as frequently in error as the British authors, has sometimes put species into genera with the characters of which they do not agree, and in which no analytical student would search for them.

With this work, however, in so far as it contains, at a cheap rate, the characters of the natural orders, (we wish another sheet or two on this subject had been added to Dr. Hooker's work, so as to have entirely superseded Mr. Lindley's,) and the "British Flora," a young botanist can find no difficulty in making himself intimately acquainted with all the native plants in Great Britain.

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*Journal d'un Voyage, &c.* Journal of a Journey to Timbuctoo and to Jenné, in Central Africa. By RENE CAILLE. 3 vols. 8vo. and Atlas. With a Map and Geographical Remarks by MR. JOMARD.

THIS is an account of a successful journey to Timbuctoo, a city of Central Africa, which appears to be surrounded by a fiery and pestilential atmosphere; for history has recorded the attempts to reach it, successful and unsuccessful, of twenty-five of our countrymen, fourteen Frenchmen, two Americans, and one German, of which a very small number, from the days of Houghton, have not fallen victims to their heroic devotion. Timbuctoo has, however, been visited as far back as in the 16th century by Leon the African, subsequently by Paul Imbert, who accompanied a Portuguese renegade, by the celebrated Robert Adams, by Major Laing, and lastly by the author of the narrative before us.

There are some who may think that we have been a long time in giving any opinion or detailed account of Caillé's journey; but we were anxious to be satisfactory in our information, and, at the same time, to avoid the rash conclusions to which others had hastily arrived.

It was necessary for this purpose to institute tedious comparisons between the reports of the author and the information transmitted to us by others; and in such a proceeding it is upon the most trivial details that we must often seek for discrepancies or analogies that may lead us to form a correct judgment. In the present case, the nature of the evidence offered many insurmountable difficulties, often resting on the oral traditions of ignorant people, or accompanied with details with so little connection, that it becomes an Herculean task to unravel the truth.

If, for example, we take the report of Leon the African, the river passing at Timbuctoo runs to the west. "We navigated," says he, "coming from the kingdom of Tombuto, to the orient, and following the course of the stream towards the kingdom of Ghinea and the kingdom of Melli, which are both to the west of Tombuto." This assertion is not confirmed by the French traveller. Even should we suppose that one of the two branches which he saw before the city was an affluent and not a branch, and that he had not perceived it, (which would be very extraordinary,) this statement could not be made to agree with his, as the inhabitants informed him that this branch joins the main stream at a short distance from the city.

The account given by Robert Adams has also few coincidences with the narrative of Caillé; it is in consequence rejected by Mr. Jomard, who states that it is little believed in the author's own country.

The words published by well informed travellers, as Syme, Bowdich, and others, as belonging to the vocabulary of the Timbuctoo language, have no conformity with those given by Caillé.

Robert Adams described the river as coursing two miles from the town, between two mountains to the south-west, and about 3-4ths of a mile broad. Caillé did not see these mountains. Three mosques have arisen in the town since Adams' visit, for he saw none. Adams saw houses of the most simple construction; some were built of clay, and straw or grass, and others of wood or of earth. Mr. Caillé found them built of *brick.* Adams saw numerous elephants, Caillé none,

Riley saw a town built of stone, of earth, and reeds, at whose foot passed a little river, then dry, and another of considerable size coursed to the east, one hour's ride or two hour's walk from the city. He calls it the Zolibib.

The information given of the countries traversed by Major Peddie and Captain Campbell, as well as Watt and Winterbottom, correspond in many particulars with the accounts of Mr. Caillé.

Major Laing, after having explored Timannia, Kouranko, and Soulimana, and determined the position of Timbo, of Falaba, and the sources of the Mongo and the Rokello, came into the very vicinity of the long sought for sources of the Dhioliba or Niger. He assigned the position and the elevation above the sea of Mount Loma, from whence this great river takes its origin; and he first traced on the map the first part of its course towards the north for an extent of about twenty-five leagues.

The French traveller first reached the Dhioliba at Couroussa, and observed its direction. The ascertained points of Timbo and the Dhioliba, were placed by Jomard in their relation to the observation of Caillé. In the construction of the new itinerary, the gap was filled up, and the first thirty-five or forty leagues of the course of this great river traced on the map.

The situation of Timbuctoo on the map, is one of great singularity. It is made to occupy the centre of that tract, which is generally left for the *Desert of Sahara,* in large letters. It is at once moved to the north and to the east, the Dhioliba having been followed in that direction by Caillé. The reasons for our placing it in a different latitude, appear very evident to Mr. Jomard, who sees the important relations which such a town might have with our establishments on the western coast, and with any large river emptying itself into the Bight of Benin.

Watt and Winterbottom, in 1794, had learnt at Timbo, that there was four months' journey to Timbuctoo, and on the road the towns of Belia, Bouria, Manda, Sego, Sousundou, and Genah, were to be met with. Accordingly, we have on the map of Caillé the same names frenchified, as Baléya, Bouré, Amana, Sansanding, and Djenné, at which latter place Caillé again joined the Dhioliba, while Jomard fills up the curve from Courassa, which is really lengthening Major Laing's researches as far as Dhjenne, placing Bouré, Sego, and Sansanding, on this arbitrary course of the river, which he further supposes Mungo Park to have navigated in his last journey.

Caillé, in his journey, in 1827, to Timé, revolved round the whole of this space, and yet obtained no additional information; and the greatest errors may still exist in laying down the true direction which he took on leaving this latter town.

We now take leave of the geographical part of this journey. The materials on which the new truths are founded are of the highest importance, how they were obtained we shall not discuss, because no attacks should be made without being borne out by the strongest proofs. A celebrated writer in the Quarterly Review has not been prevented openly calling their authenticity in question; and though, lately, before the Academy of Sciences, Mr. Coquebert-Montbret has stated that nothing legitimates these attacks, and that the review in question will make even little impression on British readers, we have that opinion of the reviewer, that we think he would not trifle upon so disagreeable a theme. We certainly think the most honourable and proudest manner in which the Geographical Society, or the French as a nation, could answer these *unjust attacks*, would be to command the ex-consul Rousseau to clear away the heavy imputations that lie on his character, throwing off their apparent carelessness of the late transactions in Tripoli, and instituting an immediate and public inquiry into the foundation of such attacks.

When to these unpleasant circumstances under which the work made its appearance, were added many circumstances of peculiarity in the reports of scientific bodies, and in the work itself, the most inexperienced critic must be excused a little scepticism, even though that scepticism might have originated from a want of knowledge of the French character.

We wish to make no invidious comparisons; we have proved, or, if we have not yet, we will prove, that we are neither stupified by the fogs of our national air, nor dazzled by the brilliancy of foreign colours. Without the slightest prejudice, there is much difference between sincerity and enthusiasm. Our continental neighbours boast of bearing no resemblance to their anti-revolutionary ancestors. They have become staid, judicious, honourable, and proud—in opposition to inconstant, thoughtless, dissembling, and vain. And certainly the revolution did effect a great change in the intellectual and moral character of the many tribes of men which constitute the French nation; and most of whom were, until that period, unable to tear themselves from the enervating influence of bigotry and superstition, or unyoke the thraldom of a latent feudalism.

Yet so slight an occurrence as the successful expedition of a traveller, has been characterized by a degree of national feeling that we were not wont to expect of the science and liberalism of Paris. It is not customary to begin the detail of our victories or our successes by an account of the failures of others; and yet though an individual, no matter of what country, had visited this long-sought and ill-described city three years previously,—declamatory phrases were disseminated, which spoke of the millions that Great Britain had spent in attempting what an unprotected and unassisted Frenchman had just accomplished; and then a work is got up that bears every character but that of simplicity, and the stamp of industry, knowledge, and acquirement, without that of sincerity. The narrative is laboured; loaded with inapposite remarks that could not have originated with a suffering traveller, in similies that are shorn of the roughness they must have exhibited, had they referred to any thing African,—a burning sun or a rocky desert.

The scientific remarks are got up in the present most popular Parisian style—a sort of ridicule of physical geography, in which the flexible stems of one family of plants are entwined with the shady branches of another family. Species have received their scientific names, and in many cases we feel inclined to ask on what authority; customs of Mahometans and pagan nations of the south are expanded upon, evidently from the most superficial notes, and the whole is called the work of Mr. Caillé. It has more the appearance of having been "got up" by, or with the assistance of two or three individuals. Not that such co-operation is blameable; but that, from facts of this nature, the whole work has appeared a mere fabrication to a nation remarkable for the possession of so many talented and candid men, who would feel outraged at the idea of an imposition; and, unfortunately, an investigation of the atlas accompanying the work, did not at all tend to diminish this unpleasant conclusion. Has so pitiful a representation of a city been exposed to the sight of the members of the Geographical Society? And did they signify approbation of its accuracy? We do not, however, think that there has been the guilt implied in the representations of a celebrated geographical reviewer. We see at once that such a drawing originated in frivolity and vanity; not having a better, they would have a bad one sooner than none; but if they have in consequence exposed themselves to unjust suspicions, let it be a lesson for the future, that important subjects are not to be treated with so much levity, and in so unsatisfactory a manner.

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*Monograph of the Genus Unio, by* MR. ISAAC LEA, *in the Transactions of the American Philosophical Society.* (New Series.)

IN the third volume of the Transactions of the American Philosophical Society, (New Series,) Mr. Isaac Lea has published a very interesting paper on the genus *Unio* of Lamarck. He has minutely described all the known species, and has cleared up several obscure points, respecting which authors had fallen into error. Various important changes have been made in the nomenclature. A more detailed description has been given of the anatomy of the animals of Lamarck's family of the *Naiades*. Eighteen new species of *Unio*, and four of *Symphynota* have been described. The latter genus has been instituted by Mr. Lea for the reception of all the fresh water connate shells, at present distributed among various genera, viz. *Hyria* of Lamarck, *Dipsœas* of Leach, and *Cristaria, Prisodon,* and *Paxyodon* of Schumacher.

There cannot be a better method of clearing up the confusion which often prevails among species, than the consideration of isolated genera; for in the minute investigation of species which results, many distinct facts will naturally present themselves, which would otherwise have escaped unnoticed.

In the progressive motion, and the description of the parts of the shell founded upon it, Mr. Lea follows the Cuvierian method, which is the reverse of Lamarck's, and in his measurement has adopted the plan of Barnes, the greatest transverse line of the shell being its *breadth*, the greatest line perpendicular to this the *length*, and the greatest line from the most ventricose part of one valve to that of the other being the *diameter*. We have thus the greatest measurements of the shell, and the marginal descriptions give the form.

He considers the food of the animal to consist exclusively of animalcules, having kept several individuals, during a period of ten months, in a basin, without any other food than such as might be afforded by change of water. The animal, he says, is hermaphrodite; and in the dissection of an *Anodonta undulata*, nearly three inches long, he found the oviducts charged with about 600,000 (as nearly as he could calculate) young shells, perfectly formed, both valves being distinctly visible with the microscope.

"It has been matter of speculation," he says, "how the calcareous matter was secreted to increase the anterior margin of the teeth, as well as the whole surface. In this examination we found the surface of the broad teeth, some of which were near half an inch thick, to be completely covered with a prolongation of the mantle, extending from the great anterior to the great posterior cicatrix; so that to have the teeth closed they completely enveloped it. This part of the mantle is exceedingly thin and transparent."

He considers the rays on the outer surface of the epidermis as of no use in specific distinction, most young shells being rayed, while many adults of the same species have none of these markings. The colour he also considers a deceptive character, in which we entirely agree with him.

Much reliance, he says, cannot be placed on the *teeth* of the *Unios*, as affording specific characters, unless other parts are at the same time taken into consideration. This we have found to be the case in the few British species of the genus, the most puzzling differences arising from difference of locality.

Neither do the elevations always afford good distinctive characters, as they vary greatly in individuals.

The epidermal colours of the Naiades are very limited. "The ground varies from deep fuscous or black to pale yellow, frequently passing through obscure green."

The form of the umbones, or *beaks*, he does not consider as affording a permanent character, many of the species having them entirely decorticated, and some partially so. In short, few are free of this denudation. He, however, recommends the strictest attention to the *situation* of the beaks, whether they are medial, terminal, &c.

"The *margins*," he says, "should have our attention in examining a species." But we differ from the author in this matter, and are persuaded that little reliance can be placed on these parts, they being exceedingly variable in shells of the same species.

"The muscular impressions are more important, and should always have our attention in examining a specimen. But even this character is not infallible. It should be understood that the animals of this family always possess two pairs of muscles, used for locomotion, or placed near or in contact with the two adductor muscles, used solely for closing the valves. In the anterior margin they are generally separate, in the posterior more generally confluent; but in the same species we sometimes find individuals presenting two, sometimes four cicatrices, besides those of the cavities of the beaks, and this depends in a great measure on the thickness of the shell. If the specimen be ponderous, we often find the posterior muscle of the foot attached to the side of the lamellar tooth, near to its termination; if it be thin, although of the same species, it will be found generally confluent, or near to the great posterior muscle. The cicatrices made by the attachment of the superior part of the mantle in ponderous shells, generally will be found on the under part of the cardinal tooth. Sometimes six or eight may be found, and their direction is towards the lamellar tooth. In thin shells, these cicatricss will be found in the cavity of the beaks, generally traversing it in an oblique direction."

These are important facts, and if they generally obtain, as Mr. Lea asserts, they prove how extremely difficult it must be to ascertain the species of this genus; for we had placed much reliance on these as distinctive characters. In the many marine shells which we have examined, we have always found the muscular impressions to afford unvarying and important characters.

Our author further asserts that little reliance can be placed on the *ligament* as a specific character.

He finds that there are 41 distinct and well characterized species of *Unio*, including the 18 new species which he has himself described. The other alleged species he discards as mere varieties. Of the *Symphynota* he describes 9 species.

This paper is written with much care and discrimination, and forms an important accession to our conchological information. It is illustrated by twelve plates, engraved and coloured in a style which does credit to the artists.

The great rivers and lakes of America abound in shells of this interesting family, which has fewer representatives in the European waters. Yet it is seldom that in this country one meets with specimens in the cabinets of the curious, although the *Unios* in general, and the great American species in particular, are held in great esteem. The splendid nacreous interior of many of them, forms a most striking contrast to their rugged and sombre exterior, while others present a beautiful red or purple hue, vying with the most glowing of our vegetable productions. The genus has hitherto been very obscure, owing to the want of characteristic specimens; and we cannot but regret the retardation of precise knowledge on this subject, whilst a magnificent collection lies hidden from view in the unexplored receptacles of the Museum of the University of Edinburgh.

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*The Gardens and Menagerie of the Zoological Society Delineated; being Descriptions and Figures in Illustration of the Natural History of the Living Animals in the Society's Collection. Published with the sanction of the Council, under the superintendance of the Secretary and Vice-Secretary of the Society.* Chiswick. Nos. I.—VIII. 1829-30.

The great beauty of the wood-cuts of this interesting work has afforded us the highest gratification. Although some of the more minute features of the exterior of animals, especially the gloss and texture of the hair and feathers, might be better expressed by copper engravings, it is astonishing with how much accuracy the details are delineated; while in the general characters of life, and the particular forms and aspect of the animals figured, hardly any thing is left to be desired. Figures drawn from skins stuffed with straw and cotton we are wearied of looking upon. Whatever may be the skill of the artist, if he adheres to his original, and is unable to throw the object into characteristic forms and attitudes, he can never produce but a caricature, pleasing perhaps to those who love to study nature at second hand, in the cabinet, but most unsatifying to him who delights only in the direct manifestation of the wonders of animated existence. A single outline from living nature is worth a whole fasciculus of the stiff and stupid-looking things which we are accustomed to see. Nevertheless, we cannot conscientiously give unqualified praise to the whole of the engravings in this work: the turtle-dove, for example, which we should never have recognized. On the other hand, what a noble-looking fellow is the Thibet watch-dog, with his grim and leonine visage; and how naturally represented are the two species of sea-eagle, and so many other animals, which we cannot afford time to enumerate.

The descriptions, from the pen of Mr. Bennet, Vice-Secretary of the Zoological Society, are written in a very pleasant half scientific and half popular style. Besides the necessary particulars relative to the zoological characters of the animals, there are given numerous anecdotes, and such accounts of the distribution and habits as might be interesting to the public. As a favourable spemen of the manner in which the work is conducted, we extract a portion of the description of the condor.

"The Condor has been observed throughout the whole range of that immense chain of mountains which traverses the continent of South America, from the Straits of Magellan to the seventh degree of north latitude. It appears, however, to be much more common in Peru and Chili than in any other part of the chain, and is most frequently met with at an elevation of from ten to fifteen thousand feet above the level of the ocean. Here, in the regions of perpetual snow, they may be seen grouped together to the number of three or four, but never in the large troops in which the true Vultures sometimes assemble, on the bold points of the jutting rocks, many of the most remarkable of which are designated by the natives with names derived from the bird that haunts their pinnacles. It is only when driven by hunger that it descends into the plains, which it quits as soon as its appetite is satiated, unable, as it would seem, to support for any great length of time the increased weight of the atmosphere and the warmer temperature of the lower world. On such occasions it rarely perches on the branches of the trees, but generally takes up a position on the ground, for resting on which its comparatively straight talons are peculiarly fitted. It is said that the female bird builds no nest, but deposits its eggs upon the bare rock without protection of any kind. These eggs are stated to be perfectly white, and three or four inches in length. The female is also said to remain with her young for a whole year.

"The habits of the Condor partake of the bold ferocityof the Eagle and of the disgusting filthiness of the Vulture. Although, like the latter, it appears to prefer the dead carcase, it frequently makes war upon a living prey; but the gripe of its talons is not sufficiently firm to enable it to carry off its victim through the air. Two of these birds, acting in concert, will frequently attack a Puma, a Llama, a Calf, or even a full grown Cow. They will pursue the poor animal with unwearied pertinacity, lacerating it incessantly with their beaks and talons, until it falls exhausted with fatigue and loss of blood. Then, having first seized upon his tongue, they proceed to tear out its eyes, and commence their feast with these favourite morsels. The intestines form the second course of their banquet, which is usually continued until the birds have gorged themselves so fully as to render themselves incapable of using their wings in flight. The Indians, who are well acquainted with this effect of their voracity, are in the habit of turning it to account for their amusement in the chase. For this purpose they expose the dead body of a horse or a cow, by which some of the Condors, which are generally hovering in the air in search of food, are speedily attracted. As soon as the birds have glutted themselves on the carcase, the Indians make their appearance armed with the lasso, and the Condors, being unable to escape by flight, are pursued and caught by means of these singular weapons with the greatest certainty. This sport is a peculiar favourite in the country, where it is held in a degree of estimation second to that of a bull-fight alone.

"In tenacity of life the Condor exceeds almost every other bird. M. Humboldt relates that, during his stay at Riobamba, he was present at some experiments which were made on one by the Indians who had taken it alive. They first strangled it with a lasso and hanged it on a tree, pulling it forcibly by the feet for several minutes; but scarcely was the lasso removed, when the bird arose and walked about as though nothing had occurred to affect it. It was then shot with three balls discharged from a pistol at less than four paces, all of which entered its body, aud wounded it in the neck, chest, and abdomen: it still, however kept its legs. Another ball struck its thigh, and it fell to the ground: this was preserved by M. Bonpland for a considerable time as a memorial of the circumstance. Ulloa had previously asserted that, in the colder parts of Peru, the skin of the Condor was so closely covered with feathers that eight or ten balls might be heard to strike it without penetrating its body. M. Humboldt's bird did not die of its wounds until after an interval of half an hour.

"The stories which have long been current, on the authority of credulous travellers, imputing to the Condor a propensity to carry off young children, and even to attack men and women, appear to have originated solely in that common feeling which delights in regarding mere possibilities in the light of positive facts. M. Humboldt declares that he never heard of an instance in which a child was carrried off, although the children of the Indians who collect the snow on the mountains for sale, are constantly left sleeping in the open air in the midst of these birds, and offer of course a temptation which would be irresistible if not counteracted by some peculiar instinct. With respect to the risk incurred by men, while he confesses that two of these birds would be dangerous enemies for a single man to encounter, he states that he has frequently approached them within ten or twelve feet, as they sat three or four together perched upon the rocks, and that they showed no disposition to attack him. The Indians of Quito, moreover, unanimously assured him that men have nothing to apprehend from the Condors.

"When first taken captive they are sulky and timid; but the latter feeling soon wears off, and they become savage and dangerous. After a time, however, they seem to become reconciled to captivity, which they bear tolerably well. The fine male figure at the head of this article, which was purchased for the Society in Holland, is as quiet and resigned as any of the other birds of prey in the Collection, and appears to have suffered little from his continued residence in a climate so much more temperate than that from which he was originally brought."

The gardens of the Zoological Society, as the prospectus remarks, have become universally known as a favourite resort of the scientific, the curious, and the idle; and the extension of the gratification afforded by their contents to the public at large, is deserving of the highest commendation. But it will not be long ere this Institution, which has assumed a prominent feature in the science of Britain, will obtain our attention and our meed of praise.

The first number of their little popular periodical, contains figures and descriptions of the Chinchilla of Peru, celebrated for the softness and beauty of its fur, but never before figured; the Ratel, *Ratelus mellivorus*, a native of the Cape; the Wanderoo Monkey, *Macacus silenus;* the Hare Indian Dog and the Esquimaux Dog; the Barbary Mouse, *Mus barbarus;* the Condor, *Sarcoramphus gryphus;* the Crested Curassow, *Crax alector;* the red and blue Maccaw, *Macrocercus Macao;* and its brother, the red and yellow Maccaw, *Macrocercus aracanga.*

The second contains the Diana Monkey, *Cercopithecus Diana;* the Mona Monkey, *C. mona;* the Napu Musk, *Moschus javanicus;* the Palm Squirrel, *Sciurus palmarum;* the Dingo Dog of New Holland; the Collared Peccary, *Dicolytes torquatus;* the White-lipped Peccary, *D. labiatus;* the White Stork, *Ciconia alba;* the Black Stork, *Ciconia nigra;* the White Spoonbill, *Platalea leucorhodia,* and the beautiful Californian Quail, *Ortyx Californica.*

The Indian Ox, the Zebu, the Squirrel Petaurus, the Leopard, the Jaguar, the American Bison, the Nyl-ghau, the Beaver, the Slow-paced Lemur, the American Tapir, and the White-cheeked Marten, are among the more interesting species of the succeeding numbers.

In a scientific point of view, this work will be valuable chiefly on account of the figures. But, with reference to the descriptions, we cannot but remark the great superiority which even our popular zoological works of the present age possess over the gravest and most elaborate productions of our grandfathers. It is obvious, nevertheless, to the most superficial observer, that, in this most interesting science, the greatest uncertainty and confusion are prevalent; and notwithstanding all that has been achieved by the Cuviers, and St. Hilaires, and Lamarcks of our times, there is need of some mighty genius, who may gird his loins to the task of clearing our schools of the lumber which they contain, and, establishing more comprehensive principles, and laying down stricter rules for classification and description, become the founder of a new sect, which in its time will be thrust aside. Before the structure and habits of half the quadrupeds of the globe are half so well known as those of man, many ages will pass; and even of man himself, the knowledge which we at present possess, will probably be little esteemed by the philosophers of some future generation.

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*Voyage dans les Steps, &c.* Travels in the Steps of Astrakhan and the Caucasus, with the Primitive History of the People who have anciently inhabited these Countries. By COUNT JEAN POTOCKI. With Notes and Tables by M. KLAPROTH. 2 Vols. Paris, 1829.

WE are indebted to Klaproth for bringing the two interesting works before us from almost total neglect. One of them had never been printed, and, except by occasional mention, we were wholly unacquainted with the researches contained in the other. The Count Potocki made the history of man his more immediate and particular study, and the power given to him by elaborate research, has been concentrated on the races of Northern Russia. The work, in other respects, bears some resemblance to the travels of Pallas. Occasional historical disquisitions, interspersed with remarks on the physical aspect of the country,—observations in natural history,—and the trivial occurrences of a journey, but every where characterized by apposite remarks on the customs and origin of the hordes of men who inhabit these steps, and who are daily incorporating themselves with the pastoral tribes of the more northerly provinces,—the example of a change from the nomadic to an agricultural life, is indeed most frequently given by the leaders or princes themselves.

The course of the Wolga, with no cataracts and of considerable depth, presents the same facilities for traversing these extensive plains, as the Ohio does in the barrens of North America, or the Nile in the sandy deserts of Egypt; and thus we have become well acquainted with the country on its banks by the observations of many acute and judicious travellers. Our author varied the route a little, and went across the country to Sarepta. Forts constructed at the time when the nomadic tribes extended their incursions more to the interior, are met with between Koslov and Tambov; and it is a remarkable fact that, when they rise under an angle of 45°, they no longer contain the germ of destruction. At Kaffa our traveller thinks that he saw an intrenchment, described by Herodotus as having been constructed by Scythian slaves in the time of Cyaxares, king of the Medes.

A little beyond the intrenchments, moghila or tumuli are met with, the only remaining monument of the many nations who have traversed, rather than dwelt on these plains, ploughed at the present day by the marmot, (*Glis marmota,*) and the souslik, (*Mùs citellus.*)

Count Potocki followed in the distance the course of the Don, the Tanais of Scythia, perceiving the towers of Bèloievskai, which he looks upon, in opposition to De Lisle, as the Belovega of Nestor, and the Sarkel or *Hospitium album* of the writers of the Constantinian empire.

The tongue of land that divides the Don from the Wolga is lofty and barren, though intersected by vallies clothed with verdure. The *Khoutor* or chalets of these districts are built in deep rents in the neighbourhood of springs and trees; but these beautiful retreats are only seen in their immediate vicinity, and have therefore no effect on the general outline of the scenery.

The overflowing of the Nile is absorbed by numerous canals, but that of the Wolga is like the deluge of Ovid, a vast archipelago linked by forests, amidst which fish pursue numerous species of the rat tribe, that have taken refuge in their foliage.

The tents and Asiatic figures of Kalmucks were stretched along the shores of the Tsaritsa, which, according to the best geographers, constitutes the limits between Europe and Asia. At the time that Potocki wrote, the Mongolian language used by the Kalmucks had been little read, but we have since become partially acquainted with it, through the labours of Abel Remusat and Schmidt of St. Petersburgh.

It is an error generally adopted to confound the Tatars and the Turks, and to apply the name of the first, who are Mongolians, to the greater part of the tribes which form part of the Turkish nation. This error is pretty generally adopted in Russia, where they say Tatars of Kasan, of Astrakhan, of Tobolsk, of Jenisask, &c. who are all in reality Turks, and consider the name of Tatar as an insult equivalent to calling them thieves. It is the same with respect to the two nations to whom in Europe we give the name of Kirghiz or Kirghese. Though they speak the same language, they differ essentially in their exterior. The first of these nations calls itself Kaszak, and spurns the name of Kirghiz. The tribes have a Mongolian physiognomy, and occupy the immense step that extends from the left bank of the superior Irtyche to the Jaik or Oural, extending to the north to the 55° of latitude. They lead a nomadic life; and raise tents of felt where they find fresh water and pasture for their flocks. The true Kerghizes, now called Kara Kirghiz, and Bourout, occupy, on the contrary, the banks of the Jenessei, the Jyos, the Abakan, and the Ob in southern Siberia.

We mentioned the tents of the Kirghiz, but this name is inaccurate; as is also the term Kibitka, which the Russians make use of. The habitations of the Kalmucks consist of a mobile framework, which they transport on their camels, and cover with felt when wanted. This habitation they call *Ghir*. Those of the Tatars are pretty similar, but smaller, and do not take to pieces; and are transported on their chariots. They call them *Karatchou.*

The Mongolians still preserve the respect for the threshold of the tent doors, which led them to threaten travellers, who had the misfortune to touch them even with their feet, with summary punishment. Count Potocki asks, is it from this peculiarity that is derived the term Sublime Porte?

Klaproth says, that the nomadic tribes of Asia, who delight in tea as an exhilarating beverage, make infusions of that character with the leaves of *badan,* (Saxifraga crassifolia;) *balgou,* (Tamarix Germanica;) *khatatsa,* (Potentilla rupestris and fruticosa;) *nakhatsa,* (Glycyrrhiza hirsuta;) and *serlik,* (Polypodium fragrans.) They also add the roots of a species of Sanguisorba, called *chudon,* and the seeds of *tsartsa,* (Acer tartaricum.) The Kalmucks also use the seeds of *temehn chike,* (Lapathum acutum,) and the roots of a species of Acorus, called *Ouldæ ebessoun.*

Tumen, a prince of a nomadic tribe, showed the Count his coat of mail, which had a name, as the sword of Roland was called *Durandad,* and the sword of King Boleslaw, *Szeczerbek.* The armour of Tumen was called *Kistchim-Kilintchik;* and was well known by all the Tatars, and even in the Caucasus.

Count Potocki sailed from Astrakhan to the Caspian; but he only found shores covered with reeds and mud, of which Vernet himself could not have made a picture. The islands of the Wolga were covered with the reed-huts of the fishermen, and were more picturesque. We remember that Dr. Lyall says that the fisheries of the Wolga are the most productive, for the same space, of any part of the world; and of the immense commerce for salt which this entails, we have spoken in our account of Eversman's journey to the Steps.

The effect of the *mirage* of magnifying objects in the perspective is very prevalent in the Steps; and tufts of heath and other shrubs, moving before the wind, appear so large as to frighten horses, which appear to be affected by the same illusion. The Count makes no further remarks on the local peculiarity of this phenomenon than have been already furnished to us by Pallas and Gmelin. Men appeared to him like obelisks, shrubs like huts, and laden camels like mountains.

Our traveller compared the vocabulary of the Tcherkese language given by Pallas with the pronunciation of a native prince, and found it incorrect. Klaproth has given a better vocabulary in the second volume of his journey to the Caucasus. It appears that the language of this nation, so celebrated for the fairness of its women, (commonly called Circassians,) is like the warbling of birds. The placid sky and fine evenings invite the inhabitants of these verdant and fragrant Steps to revelry. Like the Bedouin Arabs they pass their nights in the enjoyment of tales and poetry; and though we must not seek for a faithful painting of national manners in their tales of love, yet our traveller asserts, that he never heard so many amatory songs in Madrid or Cadiz, and those continued for so many nights. The Troubadour Tartar accompanies himself on a guitar with two cords. The instrument reaches past his left ear: his head hangs down over his right shoulder; and his eyes are fixed on the earth, where he seems to seek for thoughts or reminiscences.

The politics of the Caucasus are more versatile than those of Southern America; nor can one ever judge by the results of one year what will occur in the next. Republics which are under the protection of a prince, make new alliances; others render themselves entirely independent; conspiracies are formed and dissipated; and yet the whole is influenced by an apparent justice, which only wants a Grotius or a Puffendorf, in the opinion of our author, to render such fine materials effectual.

We have given some notices of the manners of the Ingouches in our geographical collections. The Count Potocki obtained his principal notions from hearsay, which, on the plan of Herodotus, he always carefully separates from what he himself observes. There is a curious relation between some of the customs of the Ingouches and those of some pagan nations of central Africa. Thus, that in the sandy deserts of this latter country, a rock or stone may become an object of veneration is not surprising; but it is curious that, in a country not at all deprived of stones and rocky eminences, a people should deviate from the manners of neighbouring tribes, give to their sacred rocks the name of Jerda, and offer sacrifice before them. The Ingouch also have fetiches, sometimes of silver. They call them *Tsououm.* They address themselves to the fetiches for rain, for children, &c.; and they further take for themselves the name of a cow, a pig, or a dog.

Count Potocki did not visit the mountains of Caucasus; but speaks of them, as seen from the ramparts of Mosdok, in the same raptures as other travellers who have visited the same country. The Arabs were not accustomed to make journies to the glacier of *Grindelwald* or of Chamouni. They knew only the hills of Parnassus and Olympus; and it is not astonishing that such as came to Phasis, or Dioscourias, should have been struck with the sublimity of the scene, and led to adopt the opinions of eastern nations, who made them the seat of their mythological traditions. Zoroaster, speaking of the wicked genius Arimanes, says, "He flings himself from the summit of the Boruz; and his body, extended over the abyss, seems like a bridge that is thrown across the world."

Cleanthes says, that the name of Caucasus was that of a shepherd killed by Saturn, disguised as a crocodile. Our author says, that it should be Koh-Kaf, which, in the Persian language, signifies, Mountains of Kaf. Now the Mountains of Kaf, which surrounded the world, and which were inhabited by the bird Anka, were known to all antiquity.

Count Potocki, on leaving Mosdok, proceeded in a pretty direct line to Tasman, passing through the country of the Tcherkeses, the Great Kabardah, the territory of the Kalmucks, and of the Nogai. The habitations of the Tcherkeses, says our traveller, are not properly houses, but rather large baskets made with branches, carefully entwined, and covered with clay, or mud and reeds. They are arranged with order; the distinction of property marked out; enclosures respected; and separate houses devoted to hospitality; that is to say, to receive travellers.

A village of this kind does not remain in the same place for more than four or five years; by that time the princes have quarrelled with their neighbours, or they have formed new alliances, and they go and establish themselves elsewhere, for the land belongs to the nation in general.

On leaving the borders of the Kouma, the Count traversed the Steps to an encampment of Turcomans, who give to themselves the name of Turkmen, or of Turk-Turkmen. They constitute the principal race of Bucharia, for the Sartes are the subjected tribe. They descend from the Sodgians; but the Turkmen are the Torki of Nestor; the Ouzi of Byzantinian authors; the Ghoz of the Arabs; and the Cumani Nigri of the Hungarian historians.

The Tatars call *Koum*, or sands, countries which are lightly sandy, which cover themselves in spring time with yellow flowers, and with excellent grass for cattle. They prefer these places during the heats of summer, because the flies are less numerous, and the waters purer; and in winter, because the snow is less tenacious. Hence the nomades seek the possession of the sands, and thus Almus, first chief of the Hungarians, arriving on the Theiss, demanded of Salanus a specimen of the grasses which grow on the sands of Olpar, now the Steps of Kecskemet. The most celebrated sandy plains in Tatar history are the *Sara Koum* and the *Kara Koum*. Russia had also in its empire two sandy plains which have much reputation—the Steps of Anketeri, and of Ryn Peski beyond the Wolga. The sands of Anketeri are traversed in different directions by several bands of downs, which would be worthy of the naturalist's attention.

The nomadic life appears to be one of real delight, and the proof of it is, that the tribes are passionately attached to it. There is a charm even in its simplicity. The nomade sleeps on his hide so close to the grass, that he is only separated by planks; he almost touches it, and breathes its fragrant perfume. When the grass begins to perish, the Nogai moves his hut to a different spot. The landscape is uniform, and the green carpet is the same; but he can distinguish each individual in the flock, and his eye extends over the whole of his possessions.

Count Potocki, after his arrival at Taman, passed the Bosphorus, and returned to Europe after a journey of eleven months. We have endeavoured to convey some general idea of the nature and object of his researches rather than to criticise the results. Of the most important of these, on the contrary, we have, as far as was in our power, given careful sketches; and we shall, probably, in a future number, pay the same well-merited compliment to the primitive history of the Russian tribes, which, accompanied by important notes by Klaproth, constitutes the second volume of the work.

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*Anthropogénèse, &c.* Anthropogenesis, or the Generation of Man, with comparative views on the re-production of the Three Kingdoms of Nature; by J. B. Demangeon, M.D. &c. Paris: Rouen Freres. 1829.

Although the proper study of man may be man himself, yet man, who has for ages been engaged in the study of all things external and internal, has yet not perfected his knowledge of what it most concerns him to know. The author of the Anthropogeneis has chosen an interesting department of the great science of the microcosm, and has treated it in an interesting manner. The subject, he says, he has found so difficult to manage, that he has been obliged to make numerous excursions into the three kingdoms of nature, and to draw from them whatever he could find illustrative.

The first chapter treats of generation in the species whose sex is known; the second of generation in those whose sex is not known. Generation is the act by which the elements, kept in reserve by nature for a new individual organization, are united and vivified. In vegetables, the pollen introducing itself by the stigma into the style or vaginal canal of the ovary, gives rise to the formation of the seed, which, on being placed in a favourable situation, reproduces the species of plant from which it was derived. In the most perfect animals, generation is effected through the means of copulation, by impregnation, which is the application of the seminal fluid of the male to the eggs or sexual product of the female; and, in some species, without copulation, by the mere sprinkling of the fluid of the male upon the eggs after they have been deposited. In this kind of generation, which is called *univocal*, the germ preexisting in the product of the female is vivified and developed.

Some persons, however, finding no germ in the eggs of many animals, or in the egg-like vesicles of the mammifera, and observing animalcules in the spermatic fluid of the males, have supposed these to form the germ of the new animal. Reproduction, or extension, of life, also takes place in many cases by buds or slips, as in some worms, in zoophytes, and in many vegetables, which, for this reason, are named *gemmiparous*. Many plants and animals do not appear to possess sexes, although this may merely be owing to our want of the means of examining them with sufficient accuracy. The germs of many animals are capable of existing in a dry state, or otherwise removed from the influence of the vivifying powers, which may account for the apparent creation of animals in places where they could not be supposed to have had progenitors. Within certain undefined limits, the author seems to believe in the possibility of *equivocal* generation, which is dependent upon a power pervading all nature, and which is the same that produces the crystallization of inorganic bodies.

In the third chapter, he treats of the generation of the entozoaria or intestinal worms, which occur in many parts of the body of man and other animals, as well as vegetables, and the generation of which is still involved in obscurity. The fourth treats of the preservation of the species, of the races, and the transmission of resemblances; on the latter of which subjects there are given many interesting facts. In the succeeding chapters the following subjects are treated:—the first composition and the evolution of the embryo; the different hypotheses that have been brought forward to account for the organic composition; the capacity of engendering; the products of the sexual secretion of the males, and the causes of fecundity in general. The capacity of engendering is more precocious in warm than in cold countries. The common period at which reproduction may take place in the climates of southern Europe, is at 13 or 14 in girls, and 16 or 17 in boys; and it commonly ceases about the age of 40 in women, about 60 in men. The author attended a woman who was brought to bed at the age of 50; and there are men who possess the faculty of procreation at 70. Blumenbach mentions a Swiss girl who became a mother at the age of nine; and, in the Memoirs of the Academy of Paris, a woman is stated to have brought forth a child at the age of 58. Old Parr married again at the age of 80, and had two children by his last wife. According to the Scriptures, Solomon begot Rehoboam at the age of twelve; and Achaz begot Ezechias at the age of ten. Venette relates that Jeanne de Peirie had a child at the end of her ninth year.

The product of the sexual secretion of females and their fecundation; the causes of sterility and importance; hermaphrodism; superfetation; and the duration of gestation, are then separately discussion. On the subject of the *viability* of the child, as the author expresses it, or its capability of living, he relates the following case, which was submitted to the Medical Faculty of Strasburg, in

1820. A lady of Turin, aged 20 years, died intestate, on the 28th October 1818, in her last stage of gestation, and on the tenth day of a putrid fever. Immediately after she had breathed her last gasp, at half-past two in the morning, there was extracted from her, by the Cæsarean operation, a child which was still alive, but which died at the end of thirteen minutes, and which was not opened after death. The husband, who was witness of the operation, along with the surgeon who performed it, declared himself the heir of the child, resting his claims upon the declaration of the surgeon, which bore "that the child had all the characters of maturity, and that it was living, which he discovered by motions of the legs and feet which had taken place before, during, and after the operation; by the circumstance of the child's opening its hands which were closed; by the circumstance that on cutting the umbilical cord, blood sprung out, and that pulsations were felt in the cord, the carotid arteries, and the region of the heart; by the circumstance that on pouring water on the child's head, in administering baptism to it, there resulted a motion of the lips and mouth, and an impression which produced an inspiration; and, lastly, by the circumstances that the natural heat remained; that, after having lived about thirteen or fourteen minutes, some drops of blood came from the nose of the child; that it became pale, stretched its limbs, closed its eyes, and died." The brothers of the deceased opposed the husband in his claims, and, during the procedure dependent before the Senate of Turin, some distinguished members of the Medical Faculty of that city proposed the following questions to the Faculty of Strasburg:—1*st*, If it be sufficiently proved, by the motions of which mention is made in the above declaration, that the child in question lived a life which rendered it capable of succeeding; that it had been born capable of living in consequence of the operation performed upon its already dead mother, and that it had really breathed? 2*dly*, If the dissection of the child's body, which had been neglected, might not have been of great assistance in determining whether the child had actually lived, and in discovering the cause of its death, which had been so quick?" The Faculty named a commission, composed of Professors Louth, Lobstein, Flamant, Tourdes, and Fodéré, and it was unanimously decided that the first question should be answered affirmatively, and the second negatively.

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*Histoire Naturelle, &c.* The Natural History, General and Particular, of the Mammifera and Birds discovered from 1788 to the present day. Vol. I.—The *Cetacea.* By R. P. Lesson. Paris, Chez Baudouin frères. 1828.

Of all the departments of natural science, that of which we know least, as the author justly remarks, is *Cetology.* It alone has remained stationary in the midst of the innumerable discoveries which have enriched zoology, and created a new era in human knowledge. Many of the cetacea have been known from the earliest antiquity. The writings of ancient authors, of Aristotle, of Pliny, of Elian, make mention of them under the name of *Cetus*, or of Κηθη, (cete), which was also applied to large fishes of the genus *Squalus*. This is the source of the name *cetacea*, which has been in universal acceptation by the moderns. Observed from the remotest times on the coasts of Celtic nations, the cetacea received from them the name of *Whall*, (whale), and this word, slightly modified by orthography, is used by all people of Teutonic origin. The Italians and French on the coasts of the Atlantic and Mediterranean apply the term *souffleur*, (blower or spouter,) or its synonyme, to all the tribe.

Aristotle speaks only of a single species of whale, and says that it is a thousand feet in length, an exaggeration which proves that he only knew it by popular report. He however places it in the Indian Ocean, and it is therefore possible that it may be the *Balæna mysticetus* of which he speaks. He separates the cetacea from other animals, to form a sort of genus. " We may establish," he observes, " the genus of birds, that of fishes, that of cetacea," &c.; but nothing would induce us to suppose that he had any true idea of these animals.

The history of the dolphin is much more circumstantial, and we cannot doubt that Aristotle was well acquainted with it; but he has so mixed the truth with fable, that it is requisite first to know the facts before we can find them in his history. The porpess is the *phocena* of Aristotle, according to most ichthyologists of the last century; but he names the Black Sea alone as its habitat, and says that its size may be less than that of the dolphin. The porpess of the Mediterranean, however, appears to be, according to the learned Scaliger, the *tyrsio* of the Greeks, although some authors take the tyrsio to be the common seal.

If, after Aristotle, we consult the works of Pliny, we draw therefrom but little additional knowledge. Under the description of certain species, he has united the marvellous tales which seamen have related of many kinds of marine animals. He was acquainted, however, with the use and functions of the spiracles, though he gives no explanation of their mechanism.

But, notwithstanding the critical labours of the moderns, it is vain to attempt the positive determination of the animals of which the ancients wrote; and even still more obscurity pervades the works of the naturalists of later ages. Rising from the torpidity of a long and dark period, they found in monastic libraries the writings which had been penned in the times of Greek and Roman glory, and they seized with avidity every thing that had been related, prizing hat most which was most marvellous. Their works, however, con- 'n numerous and important observations, and the natural historian [illegible] find it no unprofitable task to sift the wheat from the chaff, The works of Rondelet, Belon, Conrad Gesner, Aldrovand, Jonston, followed each other in the train of error, containing a repetition of the same old superstitious tales under the title of the Natural History of the Cetacea. After them there was an interval during which many voyages were undertaken; and much light was thereby thrown upon the history of these animals, especially by the writings of Eggede, Ellis and Anderson, whose Natural History of Greenland, &c., (1750) is yet, with a very few exceptions, the only original source whence we may derive detailed information on this subject. From the time of Anderson to the present date, the history of the cetacea received many valuable accessions from the labours of Forskal, Hasselquist, Klein, Illiger, Olafsen, Peron, Duhamel, Shaw, Risso, &c., but its progress was far behind the other branches of the science. The treatises of Bonaterre and Lacépède, the most complete which we possess, leave much to be desired, and are by no means free from error. Thus, at the present day, though innumerable new animals had been discovered, we were not in possession of a single work whereto we could refer for information on this class of beings. Nevertheless, the invaluable work of Scoresby, the "Zoology" of Shaw, the "Mammalogie" of Desmarest, and especially the "Regne Animal" of Cuvier, as well as his "Ossemens Fossiles," contained a scattered mass of new and interesting facts which only required the labour of judicious compilation.

It might, therefore, be expected that a work on this interesting subject would be received with eagerness, and perused with attention. That which our author presents is in all respects worthy of praise. In an introductory essay he enters into the peculiarities of organization, and the habits of the great order of cetaceous mammifera, and before proceeding to his own descriptions, gives a brief account of the species in the seas of Kamtschatka, published by Chamisso, from figures drawn on wood by the Aleutians; and of others described by Lacépède, from figures painted in China and Japan.

The *Herbivorous* Cetacea form the first group, and the *Piscivorous* the second. The Lamantins, of which the American, the broad-beaked, and the Senegal species are described, form the first genus of the former, then comes the Dugong of the Indies, and lastly, the *Stellerus borealis.*

Of the *Piscivorous* Cetacea, the species described are the Narwhal; the Greenland Anarnak, *Monodon spurius;* two species of *Diodon;* a *Hyperoodon;* three *Xiphii;* one *Aodon;* twenty-seven Dolphins; one Cachalot; the *Balænoptera borealis, B. Rorqual, B. acuto-rostrata,* and *B. australis;* and two species of Balænæ, the southern and the northern. The history of the common whale and spermaceti whale is given in detail, as is that of several others of the new and rarer species. Twenty-two coloured figures are added, engraved in the simple style which is best adapted to the form of animals presenting so little complicated an external organization as the cetacea.

# GEOGRAPHICAL COLLECTIONS.

## *Account of the Islands in Passamaquoddy Bay.* *

Grand Manan, or Great Mary Island, is situated in the Bay of Fundy, between the Grand Passage and the Bay of Passamaquoddy. On the northern side the shore is straight, bold, and almost inaccessible to any landing, but on the southern side the shore is indented into several small bays and coves, and rendered of easy access and safe landing by a chain of outer islands, about fourteen in number, which afford various shelter, and sufficient harbours for fishing-boats and small craft. The principal is called Grand Harbour, about the middle of the island, where vessels of about one hundred tons burden may lie in perfect safety: the water is too shoal (being not more than six or eight feet at low water) for vessels of a larger burden. At Seal Cove, near the southern end of the island, is a good road for vessels of any burden, and close in with Inner Two Islands, at Hardwood Cove, is a good harbour, and a smooth level beach to land on. The approach to this side of the island by navigators is thought dangerous, on account of the rapidity of the tides, and some reefs which extend towards the Grand Passage, to the distance of ten or fourteen miles; but the fishing here for cod and herring is generally good and productive, especially in the winter. There are several ponds, and large tracts of barren heaths interspersed through the Maid and Outer Islands. The wood land, when cultivated, is found to produce crops of grass, grain, and vegetables, equal to those of the other parts of the country. Cattle and sheep thrive well, especially on the Outer Islands, some of which are partly, and others wholly free from the growth of any kind of wood, in which situations cattle soon fatten for beef. The sheep will live through the winter without food from the stall or barn. There are no foxes, bears, snakes, or toads. A pair of moose deer were placed on the island by the first settlers in 1784, which would soon increase to a considerable number, could they be preserved from the depredations of interlopers. Among the minerals on the island, copper ore containing some silver has been found, and lapis lazuli is said to have been found on some of the adjacent ledges. The island is supposed to have been granted to Lord William Campbell when governor of Nova Scotia; there was, however, no settlement made on it till the year 1784.

On the 6th May 1784, Messrs. Jones, Ross, and Gerrish, took possession of the island by virtue of a license of occupation, and brought on with them two other families, besides labourers and cattle. It appears to have been the constant practice of the licensees to encourage the improvement, cultivation, and settlement of the islands, in the same manner that they would have done provided they had had a regular title to them, having now introduced between fifty and sixty families, and furnished them with lots of land. Lots were at first given to any settler that offered by way of probation during seven years, at the expiration of which, such as continued on the lots were to be confirmed in their title, and such as might abandon their settlements before the expiration of that period, were

* We are indebted to our friend, Robert Fowlis, Esq. of St. John's, (New Brunswick,) for these notes on the islands of Grand Manan. They are situated at the entrance of the Bay of Fundy, and immediately off the boundary line limiting the British possessions in North America, aud the territory of the United States. Their geognostic structure, which appears to be chiefly constituted by crystalline rocks, (granite, gneiss, clayslate, and beds of serpentine and steatite,) is unfavourable in an agricultural point of view, but of importance when we consider their situation as affording harbours for our ships, and outposts for any forces defending that line of country, for both which purposes they seem partially fitted; while the presence of numerous streams, and extensive alluvial depòsits, renders the soil more tractable than was at first expected. Ed.

made subject to forfeit to the licensees all they had done on the lots, without any claim of remuneration. Messrs. Ross and Gerrish took immediate possession, and improved sundry of the most valuable situations, both on the mainland and adjacent islands, some of which they have since sold, and received only written obligations for the payment. Some parts, it seems, were allotted for public use, and partly cleared by the temporary residence of fishermen, and the occasional convenience of others, none of which offered to continue their holding, until the time of a man who, with his son, is settled in opposition to the general wish of the inhabitants. The central situation, and evident conveniency of the harbour, will point out the propriety of this, if not of more extensive locations for public uses; the otherwise unallotted tracts on the shore, in the vicinity of the harbour, are entirely composed of impenetrable thickets, and totally useless for any purpose.

The whole of the settlements at Seal Cove are claimed by the Messrs. M'Master, by virtue of purchase. The present occupants are generally emigrants from the United States. The settlements hitherto made on this tract, (though a good one, and the largest in a body of any on the shores of the island,) were always abandoned; but from the exertions of the present occupants, in uniformly cutting and clearing to the same extent in each lot, it promises soon to be a very regular and extensive settlement, and probably Government will confirm this cultivated land to its clearers by grant.

*Inner Two Islands* contain about five hundred acres, a large proportion of which is of a good quality and well timbered. It is entirely unoccupied and uncultivated; it was surveyed at the request of Mr. William Ross, who claims it as his location of 500 acres, by virtue of the family's former claims, long residence, and improvements of certain portions of *Grand Manan.* It forms the barrier to the harbour at Seal Cove, and affords various harbours and shelter for fishermen.

*Outer Two Islands* contain about two hundred acres, and are also unoccupied and uncultivated. The land in general is very indifferent on this island. It is claimed by Miss Elizabeth Ross.

*Harbour Island* contains about eight hundred acres, a large proportion of which is shrubby, and incapable of any improvement; it has been occupied by Mr. Gerrish and the Ross family now upwards of twenty years, and cultivated in every part capable of improvement to the extent of between 70 or 80 acres. Such parts of it as are anywise useful for timber or otherwise, to the extent of about 250 acres, are now claimed by the Ross family, and applied for in the name of the oldest son John Ross, as a part of his location of 500 acres, excepting two lots of about 20 acres each, applied for by Mr. Gerrish, one of which contains his dwelling-house, garden, and other buildings. It forms the principal barrier to the Grand Harbour, and is separated from the main island by a narrow passage or thoroughfare, navigable only by boats at two-thirds flood.

*Chancy's Island* contains about 250 acres. The soil of the major part of this island is naturally good; it has been occupied by a family of that name now upwards of twenty years, who maintain a stock of about twenty-five head of cattle, besides eighty or ninety sheep, and have 100 acres, nearly half the island, under excellent improvement and cultivation.

*White Head Island* contains about twelve hundred acres of very indifferent land, excepting about thirty or forty acres, which are tolerable, at Gull Cove, on the southern side of the island, and a marsh on the northern side, wherein eight or nine tons of what is called salt hay may be cut. It has hitherto been unoccupied and uncultivated, excepting about a couple of acres lately cleared at Gull Cove by a Mr. William Frankland, and a small log-house, into which he was about to move at the time of the survey. The famous fishing-bank for cod, called the Ripps, lies off this Cove, and the opportunity of traffic with the fishermen who frequent the Cove as a summer harbour, is the principal advantage attending this situation.

*Three Islands*, being a cluster of that number so situated as to form a safe harbour for boats and small craft, separately distinguished by the names of Kent, Hay, and Sheep Islands. ***Kent Island*** contains about one hundred and fifty acres, about twenty of which are cultivated, and occupied by a John Kent, an emigrant from the United States, for about these six years past. The occupant keeps a stock of twenty head of cattle, besides sheep, and a fishing schooner of eighteen tons. ***Hay Island*** contains about twenty-five acres of poor land, except a stripe of marsh, of about eight or nine acres, on the side next to Kent Island, which is inclosed and mowed annually for hay; it is connected by a bar with Kent Island, and is, together with Sheep Island, in the occupancy of the said Kent, under the general name of Three Islands. ***Sheep Island*** contains about twenty acres. The eastern end is a green sandy point, free from wood, but produces grass, which affords pasture for sheep. It is separated from the other islands by two small channels.

***Eastern and Western Green Islands*** contain about five acres each, free from the growth of any kind of wood. The soil of these islets is good, and naturally produces hay, which is annually cut and preserved. They are unoccupied, and claimed by Mr. Gerrish within his location of 500 acres.

***Great Duck Island*** contains between fifty and sixty acres, a considerable proportion of which, in a large rim round a tract of wood land in the middle, was naturally clear, which rim has been partly ploughed, and otherwise improved by the Ross family, into a handsome tract of meadow. It is not tenantable for want of a secure harbour for boats in the winter season. It is claimed by the Ross family, and included within the location of 500 acres to John Ross.

***Nantucket Island*** contains about seventy-four acres, some parts of which are very eligible for cultivation, and others naturally afford grass and pasture. There are about three acres cleared and occupied by a William Gatecomb, an emigrant about six years since from the United States, two years in the possession of the island, for which he gave fifty boxes of herrings to a former occupant, whose right to settlement was always resisted by Mr. Gerrish, and who now includes it within his application for 500 acres.

***High and Low Duck Islands*** contain about nine acres each; they, like Great Duck Island, have circular rims of cleared land, which, from the dung of wild fowls, naturally produce a luxuriant crop of weeds and grass, which are annually cut and preserved for hay. The water leaves the passage between these two islands dry at half tide; they are unoccupied, and included in Mr. Gerrish's application.

***Long Island*** contains about one hundred and twenty-five acres. A considerable proportion is good land and well timbered. There are about ten acres under improvement, cleared at different times by different occupants, and said to be very productive. It is at present occupied by a Charles Littlejohn, who came in April ——, into the possession by a purchase from a Levi Richardson, as he says, for three hundred dollars. He is a native of the province of Nova Scotia. His family only consists of his aged parents, who are said to have been the first occupants of the island.

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## *General Considerations on the Pyrenees.*

The geography of the surface of the earth may be confined to a varied succession of plains, hills, and valleys; and in the modifications which each of these have undergone in external form, consists the contrasted configurations of continental surfaces. While the history of the plains, in some places totally deprived of vegetable or animal life, in some traversed by rivers whose course is marked by the fertile products of industry, in others, as the prairies of America, covered with a virgin vegetation, and seeming only to wait for the hand of man, is so intimately connected with that of the progress of civilization,—that of the mountains recals the primitive history of the human race. Most probably high alpine tracts formerly cradled our species; at all times they have been the abode of races valorous in the defence of their country, and tenacious of the manners of their ancestors; and while their torrents and eternal snows are oftentimes the source of all abundance, they themselves form uncultivated tracts where all below is fertility, and they sometimes constitute the political, and often the natural boundaries between nations of men. Valleys, intimately connected with the history of mountain chains, and the vast extent of hydrographical basins, have also been the seat of arts and sciences; but no facts have yet occurred in proof, that high tracts have ever received either inhabitants or their laws from lowland districts.

The chain of the Pyrenees, into whose physical characters we are at present going to inquire, apparently extends itself from the ocean to the Mediterranean, in a direction which seldom deviates from the shortest line. The isolation may be considered as perfect on the north: the extensive and fertile valley commencing beyond Thoulouse, and terminating only in the Mediterranean, marked by the course of the canal of Languedoc, and comprising in its line the towns of Villefranche, Castelnaudary, Carcassonne, and Narbonne, effects a complete barrier to the too general views of those who suppose a junction of the Pyrenees, whether with the Alps or Cevennes, through the medium of the Montagne Noire. To the south, we have not had sufficient opportunity of observation to give any determinate opinion. Mr. Charpentier states that it is continued as far as Cape Ortegal in Gallicia. The limits may be considered as marked on the north by the superposition of the tertiary formations; to the south they have not been determined. Its length, as extending only from ocean to sea, does not exceed four degrees of longitude, its breadth varying throughout with the extent of the transverse chains. The quantity of surface which it may be supposed to occupy, has been estimated at 1198 square leagues. In its central part a solution of immediate continuity takes place, together with a divergence from a straight line, its western acclivity receding 1600 toises to the south, but in the same direction as the eastern acclivity. The general direction of the chain, with respect to the meridian, is constantly from E.S.E. to W.S.W. and that of the strata is most generally the same. On an investigation of their structure, the Pyrenees appear to consist of a series of bands of alpine limestone, old red sandstone, and transition rocks, reposing alternately on mica slate, or granite,—or a mass of intermediary rocks, locked here and there in stratified crystalline beds. The gneiss and mica slate, generally feldspathic, are on the one hand so intimately connected with the transition series, that Amé Boué did not think that their separation was possible, while their intimate relation (according to the same author) with the stratified crystalline deposits, and the accidents of the latter, led him to suspect that these were most probably of a date posterior to that of gneiss. Mr. Charpentier, considering the crystalline primitive rocks to form the base of the chain, supposes a gradation as marked by the succession of primitive, transition, and secondary rocks; and to account for their degradation, and frequent absence on the Spanish side, gives an ancient hypothetical section, by which the culminating point of the crystalline mass having been carried away with the other formations to the south, leaves the transition and secondary rocks predominating on the chain.

The crystalline rocks attain in the east an elevation never equal to beyond 1500 toises, while the transition series succeeding immediately in the continuation of the crest, rise to an elevation exceeding that sum, and continue without interruption to the Port de Glare, where the former again forms the crest of the chain. The elevation of the latter is here at its maximum; but the culminating point of the Pyrenees, was ascertained by the geodesical operations of M. Reboul and Vidal, to be not the Mont Perdu, but the easterly peak of the Malladetta, known under the name of Peak of Anethou. This latter does not form part of the crest of the principal chain, but is situated at the origin of a valley.

Coursing to the W.N.W. the crest leaves the culminating point of Mont Perdu to the south, and the Pic du Midi d'Ossau, Neouvielle, and Vignemale, to the north, presenting at the appearance of the overlying alpine limestone, accidents which give rise to the most striking and beautiful scenery. Beyond the Pic du Midi d'Ossau, the transition rocks are succeeded by the old red sandstone, which, alternating for short spaces with the former, continues to nearly the western oceanic extremity of the chain.

The crystalline rocks are not thus found constituting the greater portion of the crest, nor do they in those points attain an elevation much exceeding that of the transition or secondary series. The alpine limestone on the north-east of the chain, constitutes a series of parallel chains, continued to the Montagne des Corbieres, where it is succeeded by clay-slate and greywacke, by which the crest is continued, while it forms a series of transverse chains, met with again at the extremity of the transition rocks. The band of the latter reposing on granite mountains, re-appears on the other side, to form the crest of the principal chain, and by this disposition, the Pyrenees represent in their eastern portions three different chains, in which the band of transition rocks, forming the line of the principal crest, predominates over the crystalline series, lying at some distance to the north-east, or in the direction from which the waters should have effected the degradation of the first series.

In all cases, if we proceed by describing the variety in constitution or of combination in each separate protuberance, to give an idea of the geognostic structure of a chain of hills or mountains, we shall arrive at but an imperfect notion, even with the most minute details.

Taking, however, in view the physical characters of the range with the general principles of its internal constitution, we can, by tracing the elements of the disposition and accidents of the former in the departition and developement of its mineral constituents, ally in our description phenomena which are never separated in nature, and deduce some general notions on the origin of the mineral masses; for the variety of which the same mineral constituents are capable of assuming in their combination, renders it both a tedious and useless task to pursue such investigations to their ultimate point. But the departition which the same minerals assume, with respect to their geognostic superposition, or to their geographical distribution, is of the utmost importance in deductions on the physical characters of a geological tract; and whatever may have been the agents which may have produced the contrasted configurations on this tract, still the phenomena of internal structure, or the variety in external characters, will always afford physical indices of the nature of these influences; while by a study of any one of these alone, we may be led, from the want of proper indications, into the widest field of hypothesis. The deposition of alluvial tracts by water, the piling up of mountains of sand by the wind, the formation of basaltic columns by volcanoes, the rising up of forests of islands, whose architects are minute and almost invisible, finally cementing together to form extensive continents, are so many striking and well known features in geology; but the power that consolidates, or the hand that hewed out the giant forms that adorn the surface of the earth, has not yet been felt by man.

Besides the mountains forming the principal crest, there occur in the Pyrenees many others united by a common crest, and forming chains, running sometimes in a direction perpendicular to that of the chain generally denominated transverse or divergent. Others follow a course which is parallel to that of the principal crest, and are thus lateral or parallel chains. While the termination of the transverse chains generally takes place in the plains, or in the meeting of two vallies, that of the parallel or lateral chains takes place in the vallies of the chain. The most striking differences between the structure of the transverse and principal chains in the Pyrenees, occur in the Maladetta, where, while considerations founded on the phenomena of vallies, and on the physical distribution of the waters, mark the transition rocks as forming the principal crest, granite rocks strike out in a south-westerly direction, attaining an elevation of 1787 toises.* The chain of Mont Perdu, perpendicular to the crest, is also transverse to the limestone chain, and thus the Ara river courses parallel to the streams supplying

* A toise, according to General Roy, is equal to 1.06575 English fathoms.

the Cinca river. With these two exceptions, and the ridge of alpine limestone taking its departure from Mont Aistaince, (and the accidents they present mark their difference from other transverse chains,) all the rest that take their departure from the principal crest, are similar in structure to the rock of which they constitute branches. *

At the Som de Soube, the granite, topped with alpine limestone, crops out above the transition series, attaining an elevation of 1607 toises, forming in this case the crest of the chain. The transverse chains are constituted of transition rocks, reposing on older formations.

Transverse chains of a structure similar to that of the crest at their departure, may in their course be overlaid by other rocks. Thus the mica slate overlies all the transverse chains of granite originating between the Port d'Estaubas and the Port de Clarabide, as the transition rocks overlie the mica slate a little further down the chain. As mica slate is only met with associated with granitic rocks, so the primitive limestone is only seen forming detached masses on the same mountain rock, nor can its distribution be at all associated with any of the physical phenomena exhibited by the chain. No chains occur in the Pyrenees following a direction perpendicular to the principal crest, which are not either attached to it or to other parallel chains; and we believe that this fact is applicable to mountain chains in general. We do not think that the difference of formation, or the absence of any physical connection between two parallel chains in the immediate vicinity of one another, can satisfactorily establish their independence; but the isolation of a transverse chain, would always, *a priori*, decide upon its proper geographical relations. In most mountain chains, there occur on the lateral limits chains of a different structure, ranging parallel to the principal crest. This fact led one of the old geologists to divide geognostic formation, then mostly studied in mountain chains, into bands. Guettard describes a sandy band, a marly band, and a schistose or metallic band. These outlying chains are in most cases formed in rocks or deposits of a more modern formation than the principal crest. Bourguet, in his phenomena of the constitution of the globe, says the chains extending from east to west have shells and plants sometimes on them, while their branches extending north or south, are formed alone of shells, fish, plants, &c. But it is difficult to say whether he was alluding to their real direction with respect to the meridian, or to the relation of lateral and of transverse chains to one another.

In the Pyrenees parallel chains are generally of a character different from that of the principal; the chief parallel crest being constituted of alpine and of Jura limestone, the former of which, with few exceptions, always forms hills having a crest in the same direction. These exceptions occur in the Mont Perdu and the Valley d'Aure. The lateral chains formed by the transition rocks, have marked peculiarities, and their independence as chains is as strongly asserted by their physical characters as by their geognostic structure: such are the chains of the Corbieres, de la Barguillere, Mont de Pinet, &c.

The primitive crystalline rocks form several extensive lateral chains. Those in the east are continued by the Pic de St. Barthelemy to the valley of Saleat, presenting in their course cols or ports like the principal chain. The direction of the granitic mountains of Irsovia Mendé, or the line of its greatest extent, is nearly parallel to that of the chain. It results from the relation of transverse and lateral chains, that chains which are transverse to the principal have others perpendicular to themselves, and generally similar in structure, which may be parallel to the principal chain, the latter generally giving rise to one or more rivulets; and the relation of the lateral to the transverse chains must be the same as that of the former to the principal, the transverse being mostly of a similar structure. It also

* The memoir of M. Reboul, read to the Academy of Sciences in 1808, established that the calcareous beds of the Maboré and Mont Perdu, repose every where on granite or argillaceous schists, or on intermediary (transition) siliceous rocks.

results from this disposition that the generality of the Pyrenean vallies' originating from the crest of the principal chain, are transverse with respect to it, but longitudinal with respect to the transverse chains, which also originate from the main crest, while the vallies dividing the mountains, and forming the lines of the crest of the perpendicular chains, transverse with respect to them, are parallel with regard to the main chain, and to the vallies dividing the lateral or parallel chains. Most of the transverse vallies of the Pyrenees, as previously remarked by Ramond and Charpentier, present at their origin a vast basin in the form of an amphitheatre, or a succession of basins, which rise one above the other, so that the valley, instead of offering an uniform slope, rises as if by so many stages towards the crest of the chain. This arrangement occasions the mountain torrents descending from above, to form cataracts or falls; but this, as in fact the diminution in size of these basins, or oules (olla) as they are termed in the language of the country, we have always observed to be connected with other geognostic changes.

The vallies which divide the parallel chains, are alone truly longitudinal. They occur generally in the direction of the strata of the mountain, and the difference between the direction of the valley and that of the strata affects the formation of caverns. Charpentier has remarked in the Pyrenees, that the entry of vallies terminating in the plain, is sometimes large, sometimes narrow; but vallies terminating in another valley, are almost always narrowed at their origin, of which fact he does not, however, appear to have seen the geognostic causes, as the junction of one or more vallies generally takes place in a basin, and the extent of the latter is proportioned to the number and to the size of the outlets which terminate in them.

The sum of the maximum of elevation of the crest marked in the peaks or culminating points, and of the minimum marked by the transverse vallies and cols ports or passages, gives the mean height of the chain of hills. The determination of the mean height of the line of the crest by the mean height of the cols ports or passes, is even, according to the Baron de Humboldt, an abstract idea; and vague when there is grouping of mountains and no continuous chain. And we think that a nearer approximation would be gained to the mean height of the crest by a comparison of the maximum and minimum of elevation of the protuberances themselves, than by an hasty calculation founded upon the heights of such ridges or passes, whose depths are sometimes connected with accidents posterior to the formation of the chain. Some countries of mountains, as the Himmaleh, are traversed by large rivers. Chains (Dovrefeldt, &c.) are often divided by profound rents, which are sometimes empty veins, (Jameson, Von Buch,) while the basin of the crest may in other cases be filled with deposits of the coal formation, or other secondary or more modern deposits, (Alps, Liban.) The data upon which the calculation of the mean height of the crest of the Pyrenees has been founded are more or less empirical; for the country of mountains known under that name, consists of a series of parallel and lateral chains, from which the principal is difficult to be distinguished. When a country of mouutains, as the Grampians, consist not of one continuous crest, but of a series of crests, more or less parallel to one another, traversing the country at angles to the line of direction of the chain, the data of the calculation should be founded on the mean height of the culminating points and minimum of crest in each chain, which alone can give the mean height of the whole range, and in this case the transverse or divergent chains should be entirely neglected. From this disposition of countries of mountains, and one which appears very common, some apparent anomalies take place. Thus a chain that is divergent and transverse to the chains whose crests are to give the data for the calculation of the mean height of the range, may be parallel to the line of that range while at right angles to the principal crest. Charpentier had remarked on the Pyrenees, that the point of departure of transverse or lateral branches from the main, or even from lateral chains, is generally marked by an increase in elevation, (culminating point,) as the extremity of these branches, when not lost in the plain, is generally a peak of considerable height. The culminating points of lateral chains may surpass in height the elevation of the summits of the principal chain, while the mean height of the crest of the latter is greater than that of the former, as the height of the culminating points in one chain of mountains may exceed that of another, while the mean height of the crest may be greater in the latter, and this is the ground work of a difference between the Alps of Switzerland and the Pyrenean Mountains.

Superiority of height of crest, as well as pre-eminence of summit, may also exist in parallel or in transverse chains and not in the principal; and, as a general fact hitherto observed, the culminating points of countries of mountains are seldom in the centre of the chain but at the extremities; whilst, when the highest summits occur towards the centre, they almost invariably exist in small transverse branches, and sometimes between two parallel chains.

It must be observed here, that transverse chains may be parallel to one another while at right angles to the line of the crest: they are then parallel transverse chains, but not lateral ones, and the structure of the ridges most generally differs from that of the lateral chains. The same may be observed of the latter when opposed to the principal crest; but when the last is wanting, and the crest exists in a series of parallel ranges, the structure will be found similar, or at least pretty nearly of the same age.

The culminating points or the maximum of the line of the crests of the principal chains of mountains in Europe, in America, and in Asia, are, according to De Humboldt, as the numbers 10, 14, 18; that is to say, they follow pretty nearly a progression by differences whose relation is one half. But in the seven chains of the Alps, the Andes, the Himmaleh, the Caucasus, the Alleghanies, and Venezuela, the relation between the mean height of the crest and the culminating points is as 1 to $1\frac{8}{10}$, or as 1 to 2.

Mr. Ramond had already remarked that the crest of the Pyrenees is only a little lower than the mean height of the Alps, while that which characterizes the last chain is the great relative elevation of its summits; that is to say, the relation of these summits to the mean height of the line of the crest. From De Humboldt's calculations, founded upon the mean height of the passes or ports and that of the culminating points, the mean height of the line of crest is equal in the Andes to the culminating points of the Pyrenees, and in the Himmaleh to the culminating points of the Alps. From considerations founded on the same data, the relation of the mean height of minimum of crest to the culminating point would be, in the Pyrenees, as 1 : 184; in the Alps, as 1 : 2; in the Andes, as 1 : 1,8; in the Venezuelas, as 1 : 1,8; in the Caucasus, as 1 : 2; in the Alleghanies, as 1 : 1,8; in the Himmaleh, as 1 : 1,8.

Considerations founded on a physical conception of the height of chains, which will improve as the facts connected with their physical laws will be more perfectly developed, are of the highest interest to the oryctography of the earth. The graphic sections used by De Humboldt and others, and which are founded on simple barometric or geodesical operatious, have been of much utility in obtaining conclusions of this nature. M. Marquis Laplace was led to consider that the surface of the earth when liquid would be pretty nearly in a state of equilibrium; and remarks that, from the harmony which experiments on the pendulum offer with the results given by the mensuration of terrestial degrees, and with the lunar inequalities, it would follow that the mean depths of the sea might be of the same nature as the height of continents and islands. It must be evident that the mean height has little connection with the culminating points of mountain chains, while the mean height of the crests forms an indispensable accessory to the evaluation; and, as de Humboldt has remarked at greater length, the chains and mountains which attract the curiosity of the vulgar have much less importance in such considerations than the vast plateaus, and undulating plains, and alternating slopes, which influence, by their extent and their mass, the portion of the mean surface; that is to say, upon the height of a plain so placed that the sums of the positive ordinates are equal to the sums of the negative ordinates. There are other phenomena attached to the geography of mountain chains of more or less importance, and among these their aspect and outline form interesting features. One of the first phenomena which strike the eye of the observer on approaching a mountain chain, is the line of demarcation with the plains below. Thus the Pyrenees are bordered on the north by a plain which permits of their being seen at a great distance; while, on the southern aspect, transverse chains, succeeded by isolated masses, advance far into the kingdom of Spain. The plains of Lombardy stretch to the very foot of the Alps, forming a well marked line at the foot of the hills. The same occurs in the plains of Tartary; which, according to Cordier, probably attain an elevation of 3000 metres above the level of the sea—a calculation much exceeded by Barrow. The extent of the base is found to vary in different formations; but, as a general fact, mountains which do not form a part of a chain, or that are more or less isolated, have the most extended base. Almost all the accidents presented in the phenomena of the mountain chain of the Pyrenees, whether in their grouping, their alignation, their departition,* their approximation, the regularity of their acclivity, the uniformity of their height, the form of their summits, or in the general accidents which accompany them, are attached to similar circumstances. Leaving the extensive Landes to the north-west, the chain is approached, after crossing the Adour, through a country of hills of alpine limestone; their height is insignificant; their summits rounded; and their acclivities or their valleys clothed with luxuriant crops, or the scattered huts of the Basques. The granitic mountain of Irsovia Mendi presents itself at the foot of the Pyrenees; but its summit is rounded. Several hills of old red sandstone are traversed near St. Jean pied de Port, without any difference in outline being perceptible. From the latter town there is a great road to Mauleon, which recedes northward round long transverse ridges of transition rocks, from whose rugged heights are just perceptible the snow-topped mountains and secondary rocks which constitute the principal crest in this part of the chain. The green sward, crowning the outlying hills, effects a gradation with the plains below; the dark tint of the bare rocks on the acclivities, diminishes the intensity of the shades; while the eternal snows lose their lofty summits in the passing clouds.

The disposition generally assumed by the alpine limestone is that of gentle slopes in the direction of the inclination of its strata, with bleak precipices on the opposite side; continued oftentimes to a great distance in the line of the direction of the strata. In the pass between Limoux and Alet in the eastern Pyrenees, the strata descend in a line, parallel to the perpendicular aspect, to the banks of the river Aude: the transition rocks present sometimes the same features, particularly in the mountains of the Corbieres. In the latter chain, above the town of St. Paul, the uniformity of disposition is broken by a shift allowing a passage through the chain. The valley of the Corbieres is reached from Mirepoix through a glen, in which the road descends for more than a league at a considerable angle of inclination. It is rendered safe by piled walls of stones; huge precipices are seen below; and one or two caverns are met with in the ascent, from which we drove numerous *pipistrelles*, notwithstanding the proof of fires having lately illumed their dark gloom. The great valley, terminating in the horizon's brink, feeding for many miles no stream of magnitude, clothed with alternate fields of vines,† of maize, and of olives, presents all the characters of a plain, while on both sides the chains, presenting a bare perpendicular acclivity, descend into the vale beneath, (a fact long ago generalized by Bouguer,) or rear aloft their bare foreheads in aged majesty. Goats are here the companions of the raven and the eagle; while oftentimes the bay of the shepherd's dog, disturbing the wolf in the

* The study of physical geography is yet so novel, that we have been obliged to adopt terms scarcely yet in general use.

† It is this vale that furnishes the greater part of the excellent Roussillon wine.

brake, is heard in the mountains, at whose foot man appears a sightless and diminutive thing.

Mountains which have not an abrupt acclivity towards the valley which they border, seldom present an uniform slope from their base to their summit, being generally interrupted by plateaus or escarpements, which sometimes correspond with those of the opposite side.

The transition rocks, tame in their outline near the limits of the chain, become more and more bold as they approach the central districts, when they cannot be distinguished in their external aspect from the rocks constituting the remainder of the crest. In the disposition of the granitic blocks, vertically placed on almost all the peaks formed of that mountain rock, in a plane parallel to the general direction of the mountain chain, has been seen one of the strongest proofs of the stratification of that rock. The same disposition may be observed in the mountains formed of old red sandstone, in the vicinity of Alet, &c. It is almost needless to mention how much the external aspect of the mountains vary between the lateral and the principal chains. The latter present every where bold yet beautiful features,—the tints of a Guido with the colouring of a Raphael. These are no where more striking in their outline than in the central part of the chain. To him who has visited the Pyrenees, the names of the Port de Benasque, d'Oo, and the Col de Moines, recal scenes of irregular beauty and wildness, equalled in few parts of the world. It is of Gavarnie that the French say,

*Il nous faudroit ici Buffon pour la decrire*
*Et Delille pour la chanter.*

And the eloqnent and lamented Ramond says, "Figure to yourself a wall of rocks, from three to six hundred feet high, elevated between France and Spain, and physically separating them. Suppose again this wall, curved in the form of a crescent, with its convexity towards France; and finally imagine, that in the very centre Roland himself, mounted on his war-horse, wished to force a passage, and that with a single blow of his famous sword, he made a breach of three hundred feet in width, and you will have an idea of what the mountaineers call 'La brêche de Roland.'"

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## *Hydrography of Russia.*

THOUGH the southern part of Russia generally presents only a dry soil, in which many obstacles are presented to cultivation, the remainder of the empire is, on the contrary, well watered, and numerous lakes divide the plains, whose monotony is still more felt, as the activity of men has hitherto done little towards interrupting it.

Lake Baikal, which Herberstein calls Lacus Kythai, in the government of Irkoutsk is the largest, and is near 180 leagues in length, and its width varies from five to seventeen leagues. Surrounded by lofty mountains, it absorbs the waters of several rivers, and produces itself only one river. Lake Baikal is of a very great depth; but in many places its surface hides reefs that render its navigation dangerous. In Europe lakes become more numerous as we advance towards the north. Finland more especially offers a great abundance.

Lake Ladoga is the most important of European lakes; it extends between the governments of Vybourg, of Olonetz, and of Petersburg, and its surface, about 292 square miles in extent, forms a basin which facilitates the communications with the interior, and between the two seas. Lake Onega, more to the north, is much less considerable, being only 50 leagues long by 20 broad. The government of Olonetz, in which it is situated, reckons 1998 smaller lakes within its limits. Lakes Saima and Ilmen, the first in Finland, the other 10 leagues in length, and from 7 to 8 broad, in the government of Novgorod, are much inferior in dimensions to the Onega. Lastly, those of Bielo-Ozero, of Peipous, and of Pskof, are remarkable for their size. The first, situated in the government of Novgorod, and in a very cold climate, is 25 leagues in circumference, and Lake Peipous, called by the Russians Lake of the Tchoudes, situated between the governments of Pskof, of St. Petersburgh, and of Esthonia and Livonia, anciently formed the natural limits of Russia properly so called, and a kind of rampart against the Tchoudese tribes, as well as the sword-bearing knights of Livonia. It is 20 leagues long, by 15 broad.

These and other lakes feed immense rivers, which originate in vast reservoirs on marshy uplands, where the waters derived from the melting snow accumulate. By establishing a communication between the great seas which bathe on all sides the coasts of this colossal empire, where they form gulfs or bays, these rivers both receive in their course other great rivers originating in the less elevated parts of the lofty uplands, and a great number of lesser rivers also bring to them the tribute of their waters. In this multitude of currents of water, we can only describe the great rivers, taking in the first place those which follow a northern direction. They are, to begin by the west, the following:

The Onega. This originates in Lake Latcha, and traverses the eastern part of the government of Olonetz, as well as the western part of that of Archangel, to its junction with the White Sea.

Several rivers mingle their waters with it in its course, but the cataracts which interrupt its stream at different places, prevent its being rendered navigable,—rafts and small craft alone descend in spring time as far as the town of Onega.

It is not so with the northern Duina, which the Russians so name to distinguish it from the Duna, which in their language also receives the name of Duina. It is a very great river, which, when the harbour of St. Petersburgh was not in existence, formed the ordinary communication between Russia and the countries of the west by Archangel, and is at present of the highest importance to the commerce of Russia. It is formed in the environs of Oustioug-Veliki, town of the government of Vologda, by the union of the Joug with the Soukhonia. It traverses, on quitting the former government, that of Archangel in its whole extent, to empty itself, after a course of 140 leagues, into the White Sea. Its waters, every where considerable, are much increased by the junction of many rivers that unite themselves with it, as the Vouitchegda and the Pinega, and on its left the Vaga. The Soukhonia, which is its principal element, issues from Lake Goubinskii, near Vologda, capital of the government which it courses through, to its junction with the Joug. This last river is also very considerable, originating in the environs of Nikolsk, to the south of the same government. It courses over a space of nearly 90 leagues before its union with the Soukhonia, when it forms one of the greatest rivers in Europe.

The Mezen, which traverses immense solitudes, takes its origin in the marshes which cover the frontiers of the government of Vologda and that of Archangel; it waters this latter to its issue into the White Sea, near the town whose name is similar to that of the river.

The Petchora is a considerable river, whose source is on the western acclivity of the Uralian Mountains, in the northern part of the government of Perm. In a course of more than 100 leagues, it traverses large deserts belonging to the governments of Vologda and of Archangel, to the point where it throws itself, by several mouths, into the Arctic Ocean.

The Ob issues from Lake Teletski, in the territory of the Kalmuks, near the frontier of the Chinese monarchy, under the 52° of north latitude. Insignificant near its source, it at first goes by the name of By, and only takes that of Ob after its union with the Katounia river, which comes from the west; advancing afterwards to the north, it is more and more enlarged by powerful streams, and becomes more rapid. In the government of Tobolsk, which it traverses from north to south, in its whole length, it is already navigable though the Tom and the Ket, which, coming from the east, discharge themselves with other smaller streams. are only of an inconsiderable size; but in the centre of the government of Tobolsk, it receives on its right the Irtyche, which, taking its departure from the south, is itself increased by the Ichim and the Tobol. It afterwards divides itself into two branches, which unite before its exit into the sea.

The Jenissei has a still more considerable course, extending more than a thousand French leagues; its breadth is, near the town of Jenisseisk, more than 600 fathoms. Formed on the north of Mongolia, and under the 51° degree of latitude, by the union of the rivers Kemtchik and Ouloukem, it first bears the name of Kem, which the Mongolians give it. After its entry into the Russian territory, it constantly directs itself to the north, traversing the government of Jenissei in its whole length, almost in a straight line. Its principal feeding streams to the right are the lofty Toungouska, Toungouska beyond the rocks, and inferior Toungouska; to the left Abakan and Touroukhan. Its course is rapid, especially towards the middle, where it forms also several islands and many cataracts. It throws itself, after having formed a long bay with dispersed islands, into the Icy Ocean, at the northern extremity of the country of the Samoiedes.

The Anabara follows the same direction from south to north, so as to constitute the limit between the government of Jenisseisk and the province of Jakoutsk, after having watered, in a course of 120 leagues, inhabited countries, it throws itself into the Icy Sea.

The Jena takes its origin to the north-west of Lake Baikal, in the government of Irkoutsk. Its course is about 760 leagues in length, after having received, to the right, the Kirenga, the Vitim, and the Aldana, which by itself is very considerable, and to the left the Viloui, it empties itself into the Icy Ocean.

The Jana is formed by the pouring out of a little lake in the country of the Jakoutes, situated at a very little distance from the Aldana, and, after a course of 200 leagues, during which it receives a great number of rivers, it empties itself into the Icy Ocean by five different mouths.

The Indiguirka, also called Zapaia Kolyma, is a large river of the province of Jakoutsk, which originates in the mountains in the environs of the point where the Aldana turns to unite itself with the Lena towards the west. It courses for a distance of 300 leagues, is joined by several rivers, and finally divides itself into four arms to enter the Icy Ocean.

The Kolyma arises from the mountains of the environs of Okhotsk, towards the Eastern Ocean. After a course of nearly 400 leagues, it also empties itself into the Icy Ocean.

To the east a great number of rivers empty themselves into the gulfs of Pengina, of Kamtschatka, and of Okhotsk, but all of them of inconsiderable size; and, with the exception of the Anadyr, scarcely deserve to be mentioned. This river issues from Lake Joanka, situated in the mountains named Jablonnoi, and flows almost under the Pole. After having followed for some time, in the country of the Tchouktchis, a southerly direction, it turns to the north-east, and empties itself, after a pretty long course, into the Kamtchatdale Mediterranean, a little below the straits of Behring.

The Terek also flows from west to east, but discharges itself into the Caspian Sea. It is a rapid torrent, fed by the snows of Caucasus, and separates the independent tribes of Lesghistan from the Caucasian government. It flows under the 44° of latitude.

*(To be continued.)*

The American papers contain an official notice in regard to the Tortugas, a cluster of petty islands, or rather shoals, not far from the south point of Florida. Their whole length is about ten miles. Their surface is in general covered with bushes, but, being low and without any prominent feature, cannot at present be discerned at a greater distance than ten miles. On this spot, which is within the territory of the United States, Government have it in contemplation to establish a naval depot, which would give security to merchantmen engaged in the West India trade, and a retreat for invalids in the sickly season. It would also overawe the pirates who issue from the adjacent harbours.

# NATURAL-HISTORICAL COLLECTIONS.

## BARON CUVIER'S *Lectures on the History of the Natural Sciences.*

LECTURE VI.—SOCRATES AND HIS TIMES.—STATE OF SCIENCE UP TO THE TIME OF ARISTOTLE.—We have seen the rise and progress of the philosophical spirit among the Greeks, and its division into several sects. In the oldest of these sects or schools, rude ideas of matter formed the basis of all the speculations. In the second, something beyond mere matter was already looked for; some of its laws were discovered, and the powers of number and of harmony were invoked. In the third, metaphysical ideas assume the ascendancy: matter is held in contempt, its existence is even denied; bodies are merely illusions, and the entire universe is in the intellect. The fourth, from extreme dislike to these abstractions, falls into the opposite extreme, and admits nothing beyond matter and motion. Lastly, Anaxagoras raises himself to the idea of an intellgence by which matter has been arranged.

The most celebrated of the disciples of Anaxagoras was Socrates. The history of this philosopher is so well known that we need not be particular with respect to it. Selecting from among the doctrines of his master all that was elevated and useful, he attempted to establish a more complete reform, and laboured to direct philosophy into a path from which it should never have strayed. Rejecting all the suppositions that had been made, he wished to bring metaphysics within the controul of sound judgment, and to reduce physics to the empire of common sense and observation.

Socrates, after exhibiting during his whole life a model of virtue, furnished by his death an example of the respect which is due to the laws, by refusing to withdraw himself from the unjust sentence by which he was condemned. He had been accused of impiety, and although no person had ever formed a more sublime idea of the divine providence, he fell beneath the weight of the accusation. Perhaps his death was less the work of religious fanaticism than of political animosity. After the expulsion of the thirty tyrants, it was remembered that he had been the friend of one of them, of Critias. But this connection, which the love of science alone had formed, could never have made the philosoper deviate from the rule of conduct which he had traced to himself, and at all times he had been as firm under the suggestions of friendship as under threats and violence.

Socrates did not cultivate the physical sciences, and yet he contributed more than any one to give them the direction which they presently assumed, and he may be said to have paved the way to Aristotle. The Elean school, introduced at Athens, had there, by its being perverted, produced sophists, who, by dint of subleties, had contrived to throw uncertainty on the clearest ideas. It was to combat them that Socrates chiefly directed his mind. To force them to renounce the subterfuges to which they habitually had recourse, one of his principal means was to define with precision the value of terms. In this manner he created a strict language, and thus rendered important service to the positive sciences, by furnishing them with the instrument which was indispensable to them.

It is to Socrates that we owe the introduction of a very productive principle, by which the natural sciences have greatly benefited, namely, the *principle of final causes*, or, as it is now commonly called, of *conditions of existence.* He himself informs us, that this idea was suggested to him by reading a work of Anaxagoras *on the intelligence which has arranged the universe.* If the universe, said he, is the work of an intelligent being, all its parts must be in mutual accordance, and so disposed as to concur towards a common end. There results from this that each organized being must be connected with all the rest by necessary relations, and moreover that it must contain in itself all the conditions which may render it fit for performing the part assigned to it.

The principle of final causes has sometimes misled speculative minds, who have too easily thought they could, by means of this rule, dispense with the necessity of direct observation; but it must be allowed that it has more frequently led to useful discoveries, and that in all cases it has thrown an interest upon researches, which without it would have been too dry. Socrates, we say, was the first who exposed this principle, and he has even expressed his regret at not being sufficiently acquainted with the natural sciences, to have frequent occasion of applying it to them.

Socrates was born in the year 409, and died in 499 before the Christian era, three years after the Peloponesian war. He was contemporary with Pericles, Alcibiades, Xenophon, and Hippocrates.

The pupils of Socrates, after their master's death, left Athens, where they could not remain without danger, and withdrew to Megara and some other cities, to continue their philosophical labours there. They founded various schools, of which those best known are the Cyrenaic school, the Megaric, and the Cynic, but especially the Academic school, the influence of which has been so extensive.

Antisthenes, the founder of the Cynic sect, held that the object of philosophy was to teach man to find the true good, which he placed in virtue; and he maintained that it could only be come at by keeping in subjection all the inclinations.

The Cyrenaic sect, which was founded by Aristippus, maintained that the true good was to be found by indulging the natural inclinations in a moderate degree.

The Megaric sect proceeded in the footsteps of the Elean school, and lost itself in dialectic subtleties.

The Academic sect was founded by Plato, the youngest of the disciple of Socrates. Plato was only twenty-nine years old when his master died. After having in vain tried to defend him, he retired to Megara, and then to Cyrene. Being desirous of applying the time of his exile to the acquisition of knowledge, he resolved to travel, and went over to Egypt, where he became a pupil of the priests, who, notwithstanding the state of degradation to which they had been reduced under Cambyses, still preserved some traces of their ancient science. From thence he passed to Magna Græcia, and studied in the school of the Pythagoreans, under Timæus of Locres and Archytas of Tarentum. Before leaving Megara, he had exercised himself in dialecties under Euclid, who, like himself, had been a pupil of Socrates, but at a previous period. Thus when, on returning to Athens, he opened a new school, he had drawn from those which already existed all that could be useful to him for methodizing his doctrine, and presenting it in an advantageous manner.

The natural bent of Plato's mind led him to poetry and fiction more than to the sciences of observation and calculation. From his connection with the Pythagoreans, however, he had retained a great respect for geometry, and was desirous that it should serve as an introduction to philosophy. It is not always easy to determine what are his real doctrines; for he did not expose them in a didactic manner. It may be supposed, however, that in his dialogues where he commonly introduces Socrates as interlocutor, he has placed his own opinions in the mouth of his master.

Plato, in most of his writings, engages in the study of the human faculties, the formation of ideas, and the nature of the soul. Although he borrowed many metaphysical ideas from Anaxagoras, the Pythagoreans, and even the Elean school, the ground of his doctrine is yet new. He admits, for example, that the general ideas in man are not formed by means of abstraction, but that they are a remembrance of those which our mind possessed when it was united to the divine mind, of which it is only an emanation. General ideas, therefore, pre-exist in the divinity. At a certain time they penetrated matter, which was itself eternal, and from this impregnation results the soul of the world and the soul of all organized beings.

It will be seen that with such bases for his philosophy, Plato would necessarily be led to an *a priori* system of physics and natural history, which would consequently be very wide of truth. The results of his speculations on these matters are exposed in the *Timæus*, a treatise which, although rather obscure, is interesting on account of its being the oldest that remains to us of all that the Greek philosophers wrote on the natural sciences.

The dialogue commences with a recital which Critias supposes to have been made to Solon by an old priest of Sais, a city of Lower Egypt, which was considered in Greece as the country of Cecrops. This priest then relates that Sais was founded 10,000 years previously by a colony which had emigrated from Attica. Since that time, according to the relation, numerous deluges had taken place, and had destroyed all human monuments; but in the midst of these disasters, Egypt had been spared and still retained her annals. It is unnecessary to observe the absurdity which there is in supposing that a country scarcely raised above the level of the sea, could have been preserved during an inundation which covered higher lands. What is to be seen in it, is merely a confused, but universal, remembrance of great geological revolutions. We find others in the history of the Atlantis overwhelmed by the waters, and we should doubtless find many others, had not Plato disfigured the original tradition by adding to it ornaments purely fictitious. It is certain at least, that when he speaks of the wars of the inhabitants of that island, their constitution, &c. he indulges in his propensity to fiction, and does not express his real belief.

After Critias has finished his recital, Timæus speaks, and goes back to a much more remote cosmogony. The world, he says, was arranged by the Divinity: it proceeded from the Son, who formed it, and from the Father, who furnished its model. When the intellect which existed from all eternity penetrated matter, which itself had no commencement, there resulted from this mixture the mind of the universe. The world has therefore in itself the principle of motion. It has besides all the conditions of existence of organized beings, and is a true animal.

Timæus therefore admits matter as pre-existent to creation, and this opinion was generally that of all the ancient philosophers, even of those who believed in a divinity distinct from the universe.

The substance of all bodies, adds the Pythagorean, is composed of four elements, air, earth, fire, and water. Each of these elements owes the properties which it possesses to the figure of its molecules, which are pyramidal in fire, cubical in earth, octahedral in water, and icosihedral in air. Each of these solids is resolved into tetrahedrons, so that definitively it is of triangular pyramids that the universe is composed.

It will be seen how nearly these ideas approach to those which at the present day form the basis of crystallography. In fact, there is no fundamental principle of science that has not in this manner been guessed at by the ancients; but these principles have only been subservient to the advancement of science when they have been deduced from experiment and observation. Whenever they have been established *a priori*, they have been found completely sterile.

Timæus at length comes to the psychological and physiological part of his doctrine, for he makes no distinction between these two orders of phenomena, which to us seem so different. It must be recollected here, that before the time of Aristotle the greatest confusion prevailed in science. It was that wonderful man who first imagined a classification of human acquirements, and gave an example of it in his works.

God created the soul of the world by introducing the self-existent ideas into the material substance. From this mixture were formed the souls of organized beings, which are, with relation to the universal soul, as the drops adhering to the sides of a vessel are to the liquid contained in it. The human souls were distributed in the different planets. Those which had the earth as their residence were there in a kind of state of probation. The infernal gods were directed to clothe them with bodies, of which they had no need before.

Man received three souls: the reasonable soul, the sensitive soul, and the vegetative soul. The reasonable soul resides in the highest part of the body, in order to be nearer the sky, from which it derived its origin. The head, which is its place of residence, is rounded after the form of the world. The sensitive or passionate soul is placed in the breast, and its principal seat is the heart. By its impetuosity it would tend to predominate over the reasonable soul. To prevent this, the communications between the one and the other have been rendered difficult by the contraction of the neck. The gross or vegetative soul, occupied with material objects, resides in the lower belly. The two latter souls have each their moderator. The lungs, cooled by the air which they receive, are placed near the heart; the liver is placed in the neighbourhood of the stomach, the principal seat of the gross soul, and has near it the spleen, which is destined to receive the impurities that would prevent it from duly performing its functions.

After this singular system of physiology comes what might be called the zoological part of the treatise. Timæus tries to discover the cause of the diversity of the forms of animals, and exposes the system of the Pythagoreans respecting the Metempsychosis. At the first transformation, the unsteady and unjust men are changed into women; at the second they are metamorphosed into animals; and, according to their degree of culpability, become birds or quadrupeds. The most wicked, those who are no longer worthy of breathing air, are transformed into fishes. By means of successive transformations, Timæus explains the similarity that is observed among the animals of the different classes. This resemblance does not come merely from the circumstance that all have a like soul, but from the circumstance that each of them retains in its present state something of its previous state.

The soul of plants (and it must be remembered that, in its general acceptation, the word means nothing more than an internal principle of motion) presides over their preservation, their growth, and their re-production. Besides this vegetative soul, animals have the sensitive or passionate soul,—man alone has a reasonable soul.

We thus find very distinctly expressed in the Timæus these three principles of motion, which correspond to what have since been named *organic life*, *animal life*, and *intellectual life*. Yet we have not here science properly so called, or at least it is *a priori* science, and such as might be expected of a system of metaphysics like Plato's. In fact, if human knowledge consists of reminiscences, it is by separating himself from the world that man may expect to recover it; and in the search of truth he ought to engage in reflection and not in observation. It will easily be conceived with such a mode of proceeding, the Platonic school could not render much service to the natural sciences. It may even be said that it retarded them, by opposing in some degree the propagation of the doctrines of Aristotle.

In the Timæus, Plato exposes his own doctrine, which is easily recognized by the form of the dialogue. Thus the words which he places in the mouths of the different interlocutors are to be considered as the true expression of his sentiments, excepting in some parts, which are evidently allegorical.

The fictions which occur in the different treatises of that philosopher, are in part owing to the poetical turn of his mind, and in part to the necessity of veiling certain doctrines which it would have been dangerous for him to expose more clearly. Notwithstanding this precaution, Plato was accused of impiety, as Anaxagoras and Socrates had been before him; but he fared better than they, and continued to teach at Athens to an advanced age. He died at the age of eighty-one, in the year 348 before Christ.

Aristotle, a disciple of Plato, was his successor in philosophy. Before entering upon the history of that great man, who formed so remarkable an epoch in science, it will be proper to advert to some of his predecessors, of whom we have not yet spoken. Some of them belong to no particular sect of philosophy; others are of the school of the Asclepiadæ, which, as we have said, cultivated science only with reference to practical utility. Of the former Herodotus and Zenophon ought to be particularly noticed.

Herodotus, the oldst prose writer whose works have come down to us, was born at Halicarnassus in Caria, about the year 484 before Christ. He was a great traveller, having visited successively a part of the East, Egypt, and Greece;

and it is in his writings that we find the first positive facts in natural history. He has given a pretty good description of the Egyptian crocodile, and of several animals of the same country. He also speaks of the Hippopotamus; but what he says of it is less correct. Aristotle took advantage of these descriptions, and even copied some of them verbatim.

Xenophon speaks still more particularly of natural history. He was born in the year 445 before Christ, fifteen years after Socrates, of whom he was a pupil, and whose apology he published. He only devoted part of his time to study and to philosophical contemplations, having been a soldier and statesman. He was with the famous expedition of the ten thousand Greeks, whom the younger Cyrus had invoked as auxiliaries, and after the death of the principal officers, it was upon him that the command of the band devolved in their retreat towards Greece. Besides the account which he has left us of this expedition, we have various philosophical and historical books of his; but, of all his works, that which interests us most is a treatise on hunting, the *Cynegetics*, which he composed with the design of inspiring in the Grecian youth a taste for that exercise, which might be useful in the time of peace for forming them for the labours of war.

Xenophon, in this treatise, gives us accounts respecting certain animals, which we should in vain look for elsewhere. He treats of the different races of dogs that are employed in hunting, and of two kinds of hares that occurred in Peloponesus. He makes known the different sorts of snares, and describes the usual haunts of wild animals, their stratagems for eluding pursuit, and their means of defence. Without this book, we could only suppose a very important fact in zoology, which is, that certain races of wild animals have lived in climates very different from those in which we now observe them. In Xenophon's time, in fact, Macedonia and the northern provinces of Greece had lions, panthers, jackals, and some other species which at present are found only in Africa.

We have yet to speak of two writers whose works might have been useful to Aristotle, and who both belonged to the family of Asclepiadæ. These writers were Hippocrates and Ctesias.

Hippocrates, as we have said, was not the author of all the books that go under his name; but he certainly was the principal contributor to that admirable collection, which must be considered as a general view of the researches of the Asclepiadæ. He was born at Cos in the year before Christ 460, and died in Thessally, at the age of nearly 100 years. In the course of this long life, he had known Socrates, Plato, and even Aristotle, who lived at the court of the king of Macedonia when he was himself called there for the treatment of Perdiccas' disease. We have very few authentic facts respecting the life of this great physician. It is seen by his works that he had travelled much; but it does not appear that he ever went to Egypt. It is said that he resisted the splended offers which were made to him by the king of Persia, and that he wished to devote himself wholly to his country. It is also said that he delivered Athens of a very cruel epidemic disease; but it is to be thought that this was not the great plague of 430; for Thucydides, who has traced the history of that disastrous epoch, does not speak of Hippocrates, who must then have been in the full vigour of all his faculties.

Hippocrates is too well known for us to describe his merits. It is known how expert he was in knowing diseases, in distinguishing them by their symptoms, and in deducing from these symptoms the indications of cure. In what relates to medicine properly so called, he is almost always admirable; but, on the other hand, in anatomical knowledge his ignorance is astonishing. He was even behind Plato in this respect; at least his want of knowledge is here more manifest than Plato's, as he had to enter into more details.

Some of his errors are evidently the result of imperfect observation, but others of them have alsolutely no foundation whatever. His description of the veins, for example, is all imaginary. He speaks of a vein which goes from the forehead to the anterior surface of the arm, and another which, arising from the lateral parts of the head, goes to the back part of the arm. From beginning to end all is incorrect; and yet it is according to this alleged distribution of the blood-vessels that he is guided in prescribing his different bleedings; for, according to his ideas, the place of selection varies according to the symptoms of diseases.

Hippocrates considered the brain as a spongy organ destined to absorb the moisture of the body. He had no knowledge of the nerves; and when the word *nerve* occurs in his writings, he means by it the tendons, the ligaments, and, in general, the different white tissues. In his time it was almost impossible to acquire in Greece any tolerable ideas respecting the internal organization of the human body. To touch a dead body with any other intent than that of paying it the last rites would have been looked upon as a horrible profanation. It is true that in Egypt the custom of embalming was to a certain degree favourable to anatomical studies, but we have said that Hippocrates did not travel to that country. He did not, however, neglect to study all that could be known without the aid of dissection. The surgical operations which he performed, and the treatment of the diseases of the bones, must have pretty frequently afforded him opportunities of making osteological observations. It is, in fact, in this department that he has deviated least from the truth.

Hippocrates' physiology is not better than his anatomy. It is founded in a great part upon the theory of the four elements, and upon their properties, the hot, the cold, the dry, and the humid. It is entirely an *a priori* system, a work of imagination. But the moment we come to the medical treatment, the great observer again appears. In this department we find reflections as just as profound upon the influence of climate, season, and food.

Ctesias, like Hippocrates, was of the Asclepiadæ, but he was sprung from the branch that resided at Rhodes. He had followed the army of the Ten Thousand, and, after having been made prisoner on that expedition, he became the physician of Artaxerxes, at whose court he resided seventeen years. On his return to Greece, he published a history of Persia and Assyria, which he says he took from the archives of Ecbatana, and an account of India, which he also borrowed from the Persian authors.

In the latter work, of which there remain only a few fragments preserved by Photius, several facts in natural history occur. Mention is made of the elephant, an animal which was known to the Greeks only after the conquests of Alexander; the parrot, and the faculty which it has of pronouncing words; and the bamboo, which the author describes as a reed of such large dimensions that two men could hardly embrace it.

Ctesias is fond of exaggerations like this, and full of absurd stories. We must not, however, consider as entirely fictitious all the extraordinary recitals that occur in his book, many of them being founded upon distorted traditions or misunderstood figures. As an example of the latter, we may mention the history of the manticore, an animal with the head of a lion, three rows of teeth and a scorpion's tail. It is evident that Ctesias, in this case, has described as a real animal the symbolical being, the image of which he had seen represented upon the monuments of Persepolis. His description of the unicorn is in like manner founded upon the figure of a rhinoceros, which is of frequent occurrence in these sculptures. Distorted natural facts are also frequently recognized. Thus, we may judge that it is not oil, but naphtha, that covers the surface of certain lakes, and that it is not amber but gum that certain rivers carry along at determinate periods. In like manner may be explained the history of insects and flowers which form a purple dye, that of white and horned wild asses, &c. But we also find fables entirely without foundation, and which it would be useless to repeat here. These fables have been perhaps more attended to than the true descriptions, and have infected almost all the works that have appeared since.

Lecture VII.—Aristotle.—Aristotle was born at Stagyra, in the year 384 before Christ. His father Nicomachus, being physician to the king of Macedonia, Amyntas the Third, he was brought up with the young princes, and was in a manner the companion of Philip, who, shortly after ascending the throne, made choice of him as tutor to his son Alexander. The philosopher was then only twenty-eight years of age, and was still one of Plato's disciples, so that it might be thought he owed the distinction as much to the connection which existed between him and Philip, as to his merit, which could not then be sufficiently appreciated. It appears that at this period he had not yet opened school, and it is even doubted whether he professed publicly before the death of his master, which happened in 347.

Aristotle remained at Athens to the time when the war broke out between the king of Macedonia, and the Athenians. It is indeed asserted that he had accompanied Alexander so far as Egypt, but this does not seem probable, as the descriptions of animals belonging to that country, which occur in his works are borrowed from Herodotus, and reappear with the same errors. Aristotle opened his school at the Lycæum. He went there twice every day, and exposed in his morning lectures the elements of philosophy and the subjects which required no preliminary study, while in the evening ones he developed the higher parts of his doctrine. In this manner he taught for twelve or thirteen years, and during the whole of this time did not cease to correspond with Alexander. It would appear, however, that toward the end of his life, that prince got cool towards him. In some of his letters it is seen that that he sought to vex him by exalting Xenocrates. Some writers have even alleged that after killing Callisthenes, he reserved the same fate for Aristotle, but that Antipater, to whom he sent the order, refused to execute it.

Notwithstanding this coolness, Aristotle continued to enjoy an appearance of protection which ensured his tranquillity; but scarcely was Alexander dead when the Athenians threw off a constraint which fear had imposed upon them. The demagogues, who confounded in one common feeling their hatred for the king of Macedonia and his preceptor, the sophists whose miserable subtleties he had refuted, the platonists, whom he had abandoned, and whose doctrines he had afterwards combated, all seemed leagued against him, and stirred up a priest, named Eurymedon, who accused him of impiety. Aristotle, warned by the example of Socrates, withdrew wishing, he said, to spare the Athenians a new outrage against philosophy. He retired to Chalcis in Eubœa, and there died shortly after.

Before speaking of Aristotle's labours, it was necessary for us to retrace the principal events of his life, as it is certain that the station which that great man held in society was highly favourable to his genius. He had inspired in his pupil a taste for the natural sciences, and thus each successive victory of the conqueror enlarged the field of observation to the philosopher. It appears that in the course of his expedition, Alexander sent to Aristotle all the most remarkable productions of the countries which he visited. He did not even confine himself to this kind of assistance, and, to facilitate his means of collecting materials for his history of animals, he gave 900 talents, a sum amounting to more than three millions of our money. Pliny adds, that he placed at his disposal thousands of persons for hunting, fishing, and collecting the observations which he required.

Resources like these are no doubt immense, but the advantages which Aristotle derived from them are also infinitely above what might have been expected. Not only did he reduce the natural sciences to a method which could alone ensure their success, but he also, during a life which was not very long, collected more particular observations, and deduced more general laws, that the whole of his successors together were able to do, in the space of several centuries. Let it be added, that we can only judge in an imperfect manner of the whole extent of his acquirements, as a part of his works has been entirely lost to us, and the other has only survived in an altered state. Strabo, in the Third Book of his Geography, informs us what was the destiny of these books. Aristotle, when dying, had bequeathed them to Theophrastus, his favourite pupil and his successor in the school. Theophrastus again left them to Neleus, who carried them to Sepsis, a city of Asia Minor, then dependent upon the kingdom of Pergamos. The heirs of Neleus, fearing that they might be carried off by Attalus, who was then forming a library on the model of that of Alexandria, hid them in a cellar, where they were in part destroyed by the damp. Appelicon, who afterwards became possessed of them, filled up the vacuities; but unfortunately the persons whom he employed in this task were not very well qualified for it, and their restitutions have been more injurious than useful. Appelicon carried these books to Athens, where Sylla found them when he obtained possession of that city. They were then transported to Rome, and a grammarian, named Pyrranion, made numeroas copies of them. Andronicus the Rhodian superintended their publication, and divided them into chapters. This division, however, was injudiciously made, and the titles in many cases have no connection with the subject, or are taken from the most frivolous circumstance.

Of the two hundred and sixty works of Aristotle, of which Diogenes Laertius has preserved the titles, many are known to us only by name. Of those which are lost we have especially to regret a series of anatomical descriptions, in eight books, accompanied with painted figures, which corresponded to the text, and a collection *rerum naturalium*, disposed in alphabetical order, forming a dictionary of natural science, which, without doubt, contained nearly all the subjects of which Aristotle had given a general account in his other works. It consists of thirty-eight rolls, and must have formed a large 4to volume. Another loss to be deplored by those concerned with the history of the Greek republics was that of a collection of the constitutions of a hundred and fifty-eight independent states, which formed a kind of preparatory work to the author in writing his book on politics.

Aristotle embraces in his works nearly the whole range of human knowledge, but he does not confound the various departments as his predecessors had done. He assigns to the different branches of the sciences their precise limits, and the manner in which he has arranged them is so judicious, and so accordant with nature, that the labours of two thousand years have effected no change in it. We ought here to speak only of such of his works as belong to natural history, but we cannot refrain from mentioning the others, in order to give an idea of the prodigious acquirements of that wonderful man, whase genius was truly universal.

His first works relate to logic and physiology, and it was in fact natural that these studies should precede every other. In his books we find for the first time explained the rules of the syllogism, an art by means of which it may easily be discovered in what points a course of reasoning is deficient, by throwing it into certain determinate forms. Plato, it is true, in his dialogues, has made use of the syllogism, but only as it were instinctively, whereas Aristotle treats of in a didactic manner.

We then come to his works on rhetoric and poetry. Aristotle in them gives rules which he derives from observation, and which, for this reason, have not become obsolete; while all those which have since been attempted to be laid down in an arbitrary manner have been found false or insufficient, and have been successively abandoned.

It is also by the method of observation that the author proceeds in his works on morals and politics. In the latter, we find some ideas which are not now admissible, especially those which refer to slavery. But these ideas were so much those of the period in which he lived, that it cost Christianity many ages of continued efforts to establish more humane sentiments.

In his metaphysics, Aristotle treats of the being considered as existing by itself. Here we do not find the same clearness of expression as in his other works, which depends partly upon the circumstance that the subject is more abstract, and partly upon the circumstance that the author's ideas are less precise. Yet even here we do not find that Aristotle has been surpassed by his successors; and it is even to be remarked that, of all the parts of his works it was this which most contibuted to extend his influence, and to give him the ascendancy in the schools during the middle ages.

We now come to the parts which require our special attention, the books which treat of the physical sciences. They are numerous and varied, and we find: 1st, Eight books on physics, properly so called, four books on the heavens, one on meteorology, in which mention is also made of minerals, and one on colours; 2dly, Two books on the generation and composition of bodies, that is, on the motion of decomposition and recomposition of organized bodies) ten on the history of animals, four on their parts, one on the means of progression, two on their generation, and various treatises on waking and sleeping.

In all these works, Aristotle follows the same course as in his poetics, morals and politics, that is, he lays down no rule, *a priori*, but deduces them all from the observation of particular facts and their comparison. This method is but the application of his theory of the origin of general ideas, which is opposed to that of Plato. The latter, as we have said in analizing his Timæus, admits that the general ideas exist by themselves, and maintains that they are innate in man, in other words, that his mind possessed them when it was united to the divinity, and that when it finds them again, it is by a true reminiscence. The evident consequence of, this system is to condemn the senses to inaction, in order to favour the return of the mind by recollection towards its former state. Aristotle opposes this doctrine. With him there are no *innate ideas.* It is of the nature of the divinity to possess of itself all the general ideas; but man can only acquire them by abstraction, and as nothing occurs in his mind which has not first passed through his senses, all his knowledge necessarily takes its source in observation and experiment. From the simple fact of having laid down this principle in his logic, his whole philosophy assumes a peculiar character, and he has always the same mode of proceeding in the moral as in the physical sciences. For example, when he has to write on politics, instead of first creating an ideal republic, which serves him as a type, a term of comparison by which to judge of the goodness of the different existing governments, he begins with bringing together a great number of constitutions, compares them together, examines their influence on nations as made known by history, and at length arrives at general views respecting the effects of social institutions and the resources of states. This is the general method followed by Aristotle. It was necessary for us to make it known before proceeding to the examination of his treatises on the natural sciences.

Of those which we have enumerated, the first, which refers to *general physics*, is the weakest of all, as might have been expected. In fact, any great progress in that science cannot be made by attending merely to the facts which naturally present themselves, it being necessary, moreover, to experiment. Now, in Aristotle's time, this could not be done, for the arts were not sufficiently advanced to supply the means. There were only a few observations in unconnected groups, and it was impossible to generalize them in a high degree. Many principles laid down by our philosopher have been since found to be false or imperfect; but then they were truly the general expression of the phenomena known. He saw, for example, solid or liquid bodies fall towards the ground when they ceased to be supported, gaseous bodies rise trom the bottom towards the surface of water, and flame direct itself towards the sky; and he concluded, that air and fire have a tendency to ascend, earth and water to descend. We now know that these different motions are merely the result of a single power; but we only arrived at this discovery after new facts had shewn us the insufficiency of the first explanations. The same remark applies to the principle of the *horror vacui*, which has been so much ridiculed. Aristotle did not establish it *a priori*, but announced it as being the general expression of the facts known at that epoch. Had he seen water stopping in pumps at the height of 32 feet, and mercury rising in the Torricellian tube to that of 28 inches, perhaps, or comparing the specific gravities with the heights of the two columns, he might have been led to discover the true cause of the phenomenon. We may observe, that so long as experiment had not shewn the contrary, it was just as rational to suppose a disposition in bodies to pass wherever a vacuum had been operated, as to admit that they have a mutual attraction, which is now the opinion. The principle of the abhorrence of a vacuum has been found false; but it has nothing absurd in itself, and it could only seem so to persons who give a literal meaning to a figurative expression, which is precisely similar to many others which we employ without scruple, because language does not supply us with such as are perfectly rigorous.

Aristotle was much happier in the application of his method to the study of living objects. His *History of Animals*, in particular, is a noble production.

*(To be continued.)*

*On the Organic Composition of the Shell of Molluscous Animals; by* M. J. B. Robineau-Desvoidy.—In the Annales des Sciences d'Observation for February last, there is an elaborate memoir by M. Robineau-Desvoidy, in which he endeavours to prove that the shells of molluscous animals possess an organic structure, which refers them to the vertebral apparatus. "It might be imagined," says he, "that the discovery of the principle mentioned must have cost me long and laborious researches. But no; I had only to make use of my eyes. I betook myself to the rich galleries of the Natural History Museum of Paris, and after a few visits, the theory, thanks to its extreme simplicity, was completed." The author then states, that having embraced no opportunity of hearing public lectures on the mollusca since 1818, and living retired in the country, without access to books, he does not pretend to know all that may have been may been done in this department, and therefore, should he, in announcing his discoveries, speak of things already known, he is not desirous of any unmerited honour. "The principal results," he continues, "were communicated to the Natural History Society of Paris, in December 1827; I might therefore have delivered them to science before now, but I had to wait. The publication of my inquiries respecting the vertebral organization placed me in the most critical position, and under the influence of the treatment which this production receives, I could only look upon myself as similar to one of the Parias of India, who are condemned never to raise their heads in their native country. My judges did not even deign to make mention of me in the account given of a public meeting. My resignation was great, and I contented myself with crying: *Iræ hominum transibunt, utinam scripta nostra maneant!*"

The idea that the shell of molluscous animals might be referred to a vertebra, or a solid vertebral apparatus, might seem foreign to the circle of his previous studies, they having been confined to the articulated animals, in which he had traced the solid organs of the vertebrated or higher animals. These articulated animals presented a multitude of appendages, variously constituted. They had their periphery surrounded by calcareous apparatus, which might easily be compared to the solid bony frame, but not to the scales, of a tortoise. But the laws established according to this theory for regulating the mode of classification of these animals, suddenly cease when we cast our eyes upon the vast family of the mollusca, which have their organs contained in an often shapeless envelope, and which even present no traces of solid organs.

The author had already shewn that every vertebra or vertebral apparatus is originally composed of nine elementary pieces, to which he gave the names of *basial*, *costaux*, *polergaux*, *arthromeraux* and *arthroceraux*. He had also announced that the examination of the shell of molluscous animals shews that the *basial* piece may be formed of two, and that there may thus be five pairs of elementary pieces. In the present investigation we therefore come to the same results as in the researches respecting the vertebra of the articulated animals. But as in the external world, the vertebra of a molluscous animal performs no other office than that of containing and protecting the body of the animal, there results that none of these elements could have been broken or fractured, and that they even incessantly tend to form a *whole*, a *homogeneous* aggregate, of which it would be very difficult to trace and mark out the rudimentary pieces. The functions performed by the pieces of the vertebra in the molluscous animals differ entirely from those which they perform in the vertebrate and articulated animals; and therefore these pieces ought, in strictness, to receive different names. It being, however, of more importance, in the present state of science, to specify facts in a distinct manner, than to add to the already redundant nomenclature, the author continues to use the names proposed.

Before proceeding to the announcement of general propositions, he presents a detailed account of the shell in several genera which differ from each other in their general organization, as well as in the details of form; and remarks that having established his theory on the different sections in the collection of the Jardin du Roi, of which he has analyzed almost all the genera, and in many cases the greater part of the species, it will thus be easy to verify the facts alleged to have discovered.

The *Chitons* furnish the most positive and the most satisfactory results. They are essentially distinguished from the other mollusca, by generally having *eight* solid pieces, arranged after each other. Each of these pieces is evidently composed of three layers, super-imposed upon each other. These three layers are themselves composed of nine solid pieces. The first or outermost layer, which is formed of a single piece, is always superior or median upon the other two, which it covers more or less. In some species, as *Ch. Cymba, granosus,* and *fascicularis,* this piece is not closely united to the second, and may even be detached from it; but in *Ch. albidus, biradiatus* and *spinosus,* it is so united. This piece is the only one that exists in the *Chitonellus lævis* of Blainville. It corresponds to the basilar piece of the articulated animals. In the different species, the *second layer* of this apparatus is formed of two pairs of pieces placed laterally under the basilar piece, of a triangular form, adhering to each other, and with fibres running in different directions. These pieces widen from their base to their summit; they form a sort of roof over the animals, or rather they form of themselves a true shell. The basilar piece, or that of the first layer, is often intimately united to them. These two pairs of pieces correspond to the *costal* and *polergal* pieces of the articulate animals. The third or inferior layer, which is commonly lateral, is situated beneath the pieces of the second layer, and is applied directly upon the body of the animal. It is composed of two pairs of transverse pieces, placed the one above the other. These pieces are highly developed in the *Chiton albus,* in which they occupy the whole extent of the under part of the shell. In a New Holland species, they acquire the *maximum* of their development, extending beyond the edges of the shell, and seeming to form a new shell of themselves. In other cases they are very small, rudimentary, or deduced to mere spines or bony dots. They are then shifted outwards upon the edges of the second layer, which is directly applied to the body of the animal. At other times, these pieces do not appear to exist at all, as in *Ch. biradiatus, aculeatus,* &c. They are commonly *nacreous,* a fact which it is of importance carefully to note. Of these two pairs the upper corresponds to the *arthromeral,* and the other to the *arthoceral* of the articulate animals. The least important of these different pieces in the chitons, is the *basilar,* which is always placed upon the second layer, maybe detatched from it, and may be replaced by it. The pieces of the latter extend over the body of the animal in *conchoidal* pieces; while the *innermost pieces* are nacreous, and correspond to the nacreous parts of other shells.

In the *patellæ* the animal differs essentially from the chitons, in having a *single* solid or vertebral apparatus, convex externally, and concave within. Yet the shell of the patella is formed precisely in the same manner. The first layer, or *basilar* piece, is superior, and at the top of the shell. The second layer is composed of two pairs of pieces. The pieces of the upper pair, corresponding to the *costal* pieces, surround the *basial* at the outside, are more or less intimately united to it, and are always united to each other and to the upper edge of the pieces of the second pair. The pieces of this second pair, which correspond to the *polergal* pieces, are inferior to those of the first pair, united to them and to each other, and from the greater part of the external shell. In this manner, the first two layers of the shell of the patella are entirely external. But the third layer is internal, its upper surface being united to the other, and its under surface directly applied to the body of the animal. This layer is also composed of two pairs of pieces, which form two portions of distinct layers, *internal to the shell and* *nacreous.* They correspond to the nacreous pieces of the chitons, the *arthromeral* and *arthroceral* pieces of the articulate animals.

In the *pholades* we have the great advantage of seeing the pieces separated from each other. In the chitons and patellæ we have seen a shell constructed vertically with respect to the arrangement of these pieces. Among the latter there are several species in which the *basilar* piece tends to leave the apicial and median point of the summit of the shell, to place itself upon one of the edges, so that the shell is no longer regular in its different regions. In these tribes the molluscous animal is merely covered by its shell; but in the bivalve it is contained within its shell, the valves of which are frequently of the same extent and form. These valves have the faculty of opening, which is effected by the equal separation of their free edges, and the moving of the valves upon their hinge. In the chitons we saw shells whose different pieces are free at their lateral edges, (the anterior and the posterior;) while in the patellæ these pieces are united together to form a cone, which they necessarily do from their triangular form, their base being broader than their summit. From this difference in the uses of the shell, there results a great difference in the appearance of the relative position of the pieces of the shell in the different mollusca. Thus the first layer of the shell of a patella or a chiton is always superior, because the shell is always superior to the animal. But this first layer appears altogether inferior in the bivalve molluscous animal, which, in opening the two valves of its shell, is obliged to place its summit or first layer below. Excepting in this appearance of difference, which arises from the plane of position of the shell, the shell of a bivalve molluscous animal is nothing but the conical shield of a patella, of which the pieces of the second and third layer are not united by their lateral edges, and roll upon the piece of their first layer, which constitutes the hinge, or a portion of the hinge. If the hinge of a pholas be placed uppermost, we shall have the true segment of a chiton.

In the shell so placed we can easily distinguish the pieces pointed out in the preceding genera. The basilar layer of the chiton here forms a piece which is often remarkable for the diversity of its position and its modes of development. It is very broad in a small species named *Ph. terebra.* In almost all the species it is open and as if split into two behind; while anteriorly it commonly appears formed of a single piece. In the *Ph. clavata,* however, it is formed of two very distinct pieces, and these pieces are less external, and penetrate into the articulation. In the *Ph. dactylus,* these basilar pieces are also placed in the articulation, form two pieces similar to the *internal valves,* and are still distinct from the neighbouring pieces; but in the *Ph. dactyloidea* they are with great difficulty distinguished, being united to the other pieces of the shell; and in *Ph. costata* they are united in their whole extent. This genus, therefore, proves that the *basial* is originally composed of two distinct pieces.

The second layer of the shell of a chiton here forms the *large* or *external* valves. The two pairs of pieces which compose it may be independent of each other, and of the neighbouring pieces, as is evident in most of the pholades. The first pair of pieces of this layer, the *costal pieces,* forms the median portion of the valves, as may be seen in *Ph. clavata* and *crispata.* In the latter they form half of the valve, and in the *costata* nearly the whole. The second pair of pieces, the *polergal,* which, like the first, arise from the vicinity of the hinge, but more anteriorly, and from the anterior edge of the costal pieces, form the whole anterior and prolonged part of the outer valve. Most commonly the striæ or wrinkles of these polergal pieces do not affect the same direction as that of the costal.

Thus the large valves of a pholas are chiefly formed by the two pairs of this layer. We have seen that the basial piece may be united to them at the hinge; and we shall presently see how far the arthromeral pieces may be annexed to them. In the *Ph. cristata* the costal pieces behind and the polergal pieces before seem to form almost ths whole of the valves, as may be more easily seen from the circumstance, that their calcareous fibres descend in the same direction.

The two pairs of pieces of the third layer of the chitons, which are internal in most shells, have the following arrangement :—The first pair, the *arthromeral*, constitute the prominences, which are designated by the name of *nates*, or *umbones*. They arise from the posterior edge of the basial piece, proceed backwards and upwards, and may even extend to the middle of the large valves, of which they then become integrant parts. These pieces are smoother than the others. They soon enter into the interior of the shell; but they may be cast entirely outwards, and, in that case, form only an external and recurved lamina, as in *Ph. costata*, *dactylus*, and *cristata*. The second pair of pieces of this layer, the *arthroceral*, are altogether internal. They are often free and detached from the neighbouring pieces, in which case they form the *internal valves*. When they are adherent and intimately attached by their upper surface, they form the *cuilleron* or spoon-like process of each valve. Their inner surface is always *nacreous*, as is that of the first pair, from their entrance into the inside of the shell.

In short, the pholades present a basial piece, often free, and occasionally composed of two distinct pieces. The costal and polergal pieces commonly form the greater part, and often almost the whole of the large or outer valves; and then their fibres may have opposite directions. The arthromeral, which are commonly shapeless in the other bivalve mollusca, may here constitute a pair of entirely distinct and even external pieces, which form the nates, and tend to enter into the inside of the shell. They generally have a nacreous appearance. The arthroceral pieces, or internal valves of authors, are always nacreous, and sometimes free; but they are also united to the outer valves, and then form the cuillerons of authors.

If the calcareous pieces above described in the chitons, patellæ, and pholades, correspond to the vertebral elements of other animals, we have thus the five elementary pairs of pieces which enter into the composition of the vertebra, or of a vertebral segment; and thus the true theory of the shell is evolved.

All shells in existence, even the internal solid apparatus of the cuttle-fish, are formed upon a similar model, and may be referred to the above-mentioned pieces. Thus, the solens are merely pholades, whose internal pieces are narrowed, while the external pieces have undergone a very great elongation. In these animals, the basial piece is still external, but almost confined to the hinge. The costal and polergal pieces constitute the two plates of the valves, of which the costal form the antero-inferior part, and the polergal the whole upper and antero-superior part. The fibres of these different pieces run in different directions, by which they are easily distinguished. The internal valve of the pholades (the arthroceral pieces,) here constitutes a small spine situated towards the base of the shell; but the arthromeral pieces are represented by the turned back piece towards the base of this small spine, near the posterior edge of each valve.

Without this theory, the author thinks there are no means of explaining the structure of the bivalve mollusca, which are now so easily understood. The different pieces are indeed very different in their development in the different tribes, but they can easily be distinguished with a little attention; and even in the most embarrassing genera, analogy leads to a sure discrimination.

In the series of bivalve mollusca, the basial piece is generally confined in the hinge; the costal and polergal pieces at the exterior form the external portion or lamina of the valves; the arthroceral pieces, at the interior, constitute the nacreous plate, which is named the cuilleron; and the arthromeral pieces, which are are also nacreous and internal, commonly form the greater part of the articulation, and extend more or less into the inside of the shell. In their greatest development they surround the cuilleron, and give rise to the *pallial impression*, which indicates their true points of separation. In like manner, the polergal pieces may turn round upon the costal pieces to complete the external lamina of the valves.

Among the mollusca, the author finds several genera which really have two shells. The génus *Teredo*, for example, has an internal shell, and an external shell. The *internal shell*, or that of all the merely bivalve mollusca, is the precise shell already described and predominant in the pholades. All its pieces may be free and detached. Thus, the basial is single, the costal pieces and polergal pieces, which are very distinct in the *Teredo clava*, form the large valves; the arthromeral pieces are raised outwards, as in the *Pholas costata;* and the arthroceral pieces, as in the pholades, constitute two small internal valves. But the long tube, which envelopes the animal, cannot be rigorously determined by itself in the teredines. We must therefore have recourse to other genera, and the pholades assist in clearing up this difficulty. In fact, several pholades are double-shelled, as will readily be perceived. Under the large valves of these species, there occurs a new solid apparatus, which has been remarked and figured by several authors. It is composed as follows: 1*st*, There is a basial piece situated under the shell opposite to the first basial, between the lower edges of the valves. It is elongated, and may not be obvious. Then there are three pairs of solid pieces, often very small, and of different forms, which follow or accompany this basial piece. They represent the costal, arthromeral, and arthroceral pieces. In fact, the two pieces, which seem to constitute nearly the whole of this shell, are more developed and nearer the oral orifice. They are the two anterior pieces of this shell, the two polergal pieces in a state of great extension. Before this apparatus can be rightly understood, all the species must be examined, for in some pholades the pieces are not all evident, and in others they may not all exist. The tube of the teredo is formed of the polergal pieces of this second shell. The Septariæ and Fistulanæ are similarly constituted.

This theory of the shell of the bivalve mollusca renders that of the univalves perfectly easy, although without it we could not possibly obtain any satisfactory result. Thus, the Calyptreæ form perfect modes of the composition of the univalve shell as above explained. In the clochettes and cabochons, the basial, which is superior and very distinct in several species, at length disappears. The external pieces, or those of the second layer are disposed circularly around this basial piece; while the pieces of the third layer, which are distinct and always nacreous, are remarked within. The arthroceral piece of several cabochons detaches itself and remains free. It begins to twist, and then unites with the arthromeral, which is near it, and continues to twist in a spiral manner, thus forming the *axis* or *columella*. The external pieces are moulded upon this spire. In the fissurellæ, the basial piece is wanting, and there results the hole or aperture from which the genus takes its name. We have thus all the elements of a valve of the bivalve mollusca.

Most of the other shells called univalve are easily explained upon the same principles, if it be admitted that *their operculum is a rudimentary valve*, a fact which has already been advanced by several authors. These shells, however, ought not to bear a name which is only applicable to the Calyptreæ. There are indeed among the univalves several genera and many species which have no operculum, but which cannot be conveniently placed in another family or tribe.

The *anatifæ* have their organs contained in a single solid apparatus, which presents the following arrangement:—1. The basial piece, which is simple, attenuated, keeled, and placed longitudinally along the back. 2. The arthromeral pieces, situated at the upper part, triangular and in the form of valves. They open towards the summit for the mouth and branchiæ of the animal; and sometimes form the predominant pieces. 3. The arthroceral pieces situated under the arthromeral form the pieces which are generally the largest. They resemble two valves composed of a single element. These two pairs of pieces are always smooth, and resemble each other. Several anatifæ have no other pieces; but others have the costral and polergal pieces, which form the four solid laminæ observed at the lower part in many species. They are often rudimentary. The *otions* have only the basial piece and the two arthroceral. The latter are not distinguishable in the *cineras*.

The author then concludes with some general considerations. 1. If the results above stated are real, it is obvious that the shell of the molluscous animal confirms the principle already established, that *five pairs of elements enter into its compo-*

*sition*, each of these elements being easily determined. Thus the principle proposed for the composition of a vertebra, or a vertebral apparatus, in the higher animals and the articulated animals is completely confirmed, and is moreover enriched with positive proofs.

2. M. Geoffroy St. Hilaire had advanced that the *molluscous animal must be contained within its vertebra;* and it has been found by examination that it is actually contained in a single solid apparatus, which furnishes the positive elements of the vertebra.

3. This result of a single vertebra is decisive, and depends upon the organization of the mollusca, which are destitute of solid organs of sense or locomotion, these parts not being necessary to them.

4. The solid organization of the molluscous animals, compared with that of the articulated animals, enables us to see the advantage which those zoologists have, who, in their attempts at classification, have given to these organs a superiority over the other apparatus. In our days it has been attempted to debase the crustacea, and more particularly insects, beneath the mollusca. But it has been found that along the course of the digestive canal of the insect, there occur all the intestinal and glandular parts of the higher animals. The crustacea have been shown to possess a very complex circulatory apparatus, of a higher order than that of the conchifera. As to the nervous system in them, there can be no comparison between it and that of the latter, which is so greatly inferior. The circumstance that several acquatic larvæ respire by branchiæ, is of itself decisive as to the superiority of the articulated animals with regard to the respiratory system, it being a constant rule that organization proceeds from the simple to the complex. If all the facts observed tend to demonstrate that the more energy an animal possesses, the more active and powerful is its respiration, who will now venture to assert that the respiration of insects yields to that of an oyster? Thus the molluscous animal is inferior in these various respects.

5. Whatever name may be employed for the calcareous apparatus of the molluscous animals, there is a perfect similarity between it and the calcareous apparatus of the articulated animal. In the higher animals each of these apparatus is designated by the name of *vertebra*, and the same denomination is adopted by the author, although he neither means by the term an apparatus destined for the protection of the spinal marrow, nor considers it strictly applicable to the cranial vault or laryngeal apparatus of the higher animals, but merely designates by it any calcareous apparatus formed of five pairs of elementary parts, which may be infinite in its forms and uses.

6. The articulated animals are so constituted that their arthromeral and arthroceral pieces, which form most of their instruments, are the most distant from the basial, the most developed, and the most fractured. They are also the most perfect elements, since in them resides the first perception of external objects and the execution of the will. The molluscous animals are in a condition precisely the reverse. Their arthromeral and arthroceral pieces, which are always formed of a single piece, are internal and very near the basial. These elements do not require to be in connection with external objects; but their composition is nacreous, and formed of finer molecules than the other parts of the shell. The author does not venture to say that these two pairs of elements are connected with nerves possessed of more sensibility, or having a higher degree of incitability; but he thinks there is every reason to presume that they contain a little more phosphorus than the other parts.

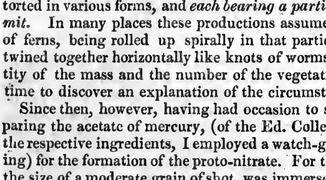
In fine, it may be remarked that, while there is considerable appearance of truth in this theory of the composition of the solid parts in the mollusca, many other principles might as well correspond with the phenomena exhibited by their structure, as that of the ten pieces of a vertebra: those of the tubular, the spherical, or the prismatic forms, for example; and any number below the decimal, will be found to have as many correspondences in the series of animal organization as that selected by the author. If a shell so homogenous in its structure as that of the limpet is resolvable, by analogy or imagination, into three layers, and several pieces, a compound shell, like that of the anatifæ, must equally be resolvable, should theory require it, into a single piece.

*Brodie Collections.*—The scientific attainments of the late J. Brodie, Esq. of Brodie House, are well known, and particularly his attention to botany. This spring his whole library and collections were sold in this town. With regard to the books, it is almost impossible to say where they are now dispersed, nor is it of much consequence, as one copy is of equal importance as to reference as another. It is different, however, with an herbarium, and we trust we render some service to botanists by having it now in our power to state the nature of Mr. Brodie's herbarium, and where it may in future be consulted. It may be classed as follows:—1. *A British Herbarium;* this consists of British Phanerogamous plants and Ferns. The collection is tolerably complete, as far as was known up to 1814; many of the specimens were furnished by Mr. T. Mackay, Mr. Sowerby, and Mr. G. Don, and many stations scarcely known for rare plants are affixed. It was purchased by David Stewart, Esq., 1, Gayfield Place, Edinburgh; and is to be arranged according to the natural orders. It was formerly arranged according to "Withering," and the "Flora Britannica." From this herbarium the classes *Diœcia* and *Polygamia* of Linnæus, as limited by Smith, had been removed by accident to the following. 2. A *Foreign herbarium*, comprehending about 1200 species of exotic phanerogamous plants, partly from gardens and partly wild specimens; along with it was the genus *Atriplex* and class *Diœcia* of the *British herbarium;* in *Diœcia* are about forty species of the genus *Salix*, from Sir J. E. Smith, and although generally without flower or fruit, may be of considerable use for identifying what are considered dubious species of that author. This collection, along with a few miscellaneous plants from C. Schmidt of Christiana, and G. Don of Forfar, was bought by Mr. Walker Arnott of Arlary, and is to be immediately incorporated, according to the natural orders, with his present herbarium. 3. *Musci*, now in the possession of D. Stewart, Esq. These were arranged for Mr. Brodie, according to the first edition of the "Muscologia Britannica," by Dr. Hooker, one of the authors of that admirable work; only *three* species were wanting to complete the series, and these we know the present possessor has in his power to add with most of the new ones in the second edition of the "Muscologia." 4. A tolerably perfect collection of the British species (most of them from Dr. Hooker,) of *Hepaticæ;* this, with all the following, now belong to Mr. Arnott. 5. *British Lichens*, upwards of 400 species. The specimens were partly collected and named by Mr. Borrer, Mr. Turner, Mr. Dickson, and Mr. G. Don, and are to be incorporated by Mr. Arnott, nearly according to the system of Acharius, with another very valuable collection, from the first lichenologist of this day, Mr. Schærer of Lauperswyl in Switzerland. 6. *Algæ*, the British species belonging to *Fucus* of Linnæus, were complete and arranged by Mr. Turner's "Synopsis;" the other tribes are also nearly complete, as far as the "English Botany" and Dilwyn's "Conferv æ" serve as catalogues. Of these, many specimens are from Mr. Turner, Mr. Borrer, Sir T. Frankland, (who almost alone could throw light on Hudson's *Algæ*,) Mr. Rashleigh, Mr. J. Woods, Mr. Sowerby, and Mrs. Griffiths; and the late Mr. Brodie himself made this tribe his particular study. A very few foreign species from Lord Seaforth and Prof. Mertens are also in the collection. The *Algæ* will be arranged according to Agardh's "Synopsis. We are authorized to state, that Mr. Stewart will permit any botanist to consult the "*British herbarium;*" and Mr. Arnott's herbarium, by far the most extensive and valuable in Edinburgh, as well as his library, have already long been open, and we trust will continue so, to every ardent follower of the "Amabilis Dea."

# NATURAL-PHILOSOPHICAL COLLECTIONS.

***On a Singular Crystalline Vegetation of the Proto-nitrate of Mercury.**** By W. B. O'SHAUGHNESSY, M.D.—As far as I am aware, the peculiar mode of crystallization to which the subjoined observations are devoted, has not yet received any particular notice. My attention was first directed to the subject, by the inspection of a mass of proto-nitrate of mercury, prepared by Mr. Smith of Lothian Street, as the preliminary step to procuring the acetate of that metal. It presented a strange and very peculiar appearance, a confused arborescence having taken place on the surface of the mass, consisting of multitudes of stalks contorted in various forms, and *each bearing a particle of metallic mercury on its summit.* In many places these productions assumed the aspect of the young fronds of ferns, being rolled up spirally in that particular manner: in others, they lay twined together horizontally like knots of worms; but, altogether, from the quantity of the mass and the number of the vegetations, I was much perplexed at the time to discover an explanation of the circumstance.

Since then, however, having had occasion to show my classes the method of preparing the acetate of mercury, (of the Ed. College,) with very minute quantities of the respective ingredients, I employed a watch-glass (*ww* in the subjoined engraving) for the formation of the proto-nitrate. For this purpose, a globule of the metal, the size of a moderate grain of shot, was immersed in ten drops of nitric acid; when the action ceased, a particle as large as a pin's head remained undissolved in the centre of the glass. In a few minues the spontaneous crystallization of the proto-nitrate (already familiar to all pharmaceutical experimentalists,) took place, producing a white laminated mass, (*nn*,) retaining nitric acid in its interstitial spaces, and bearing the undissolved globule of mercury on its upper surface, whither it was elevated by the insinuation of the crystalline laminæ from beneath. Having laid this aside for use next day, I found, in the evening, that an erect round stalk had shot up in the centre from the surface of the crystals, and bore on its top the drop of the metal, at the height represented in the engraving when intersected by the line




(*a*.) Next morning it had curled downwards again, still retaining the mercurial globule at its extremity, which now rested at (*b*,) and formed a complete arch. Next day fresh growth had taken place, the mercury again superior, when it finally ceased, and now remains at the elevation (*c*.) The specimen has now continued a fortnight in this situation, and the mercury remains perfectly bright, being seated in an hemispherical cup of the crystallized proto-nitrate at the extremity of the stalk.

* Dr. Wollaston shewed, a long time ago, that a metallic blade dipped into an acid or into a saline solution, does not undergo the same changes when suspended free from contact, as when it is touched by another metallic substance that is also immersed in the liquid. If, for example, we hold a thread or lamina of zinc in diluted sulphuric acid, a very slight chemical action is perceived; if we immerse, at the same time, a blade of platina or silver, the phenomenon remains the same, and the new metal undergoes no change. But if we establish a communication between the metals, out of the fluid, the chemical action becomes very marked,—globules of hydrogen are delivered from the platina or silver, and the zinc oxidates with still greater rapidity. The same experiment may be made with plates of copper and zinc, and, generally speaking, any metal, though it should have no effect on the fluid in which it is immersed, can take on action when brought in contact with another metal.

The curious kinds of vegetation known by the names of trees of Saturn, trees

The rationale of this curious excrescence now seems to me perfectly evident, as demonstrated by the preparation in my possession. In the first place, the inferior surface of the undissolved metal was acted on by the nitric acid remaining in the interstices of the general crystallization. By continued action of this kind the globule was elevated, and by capillary ascent fresh supplies of the acid were afforded, until the weight of the metal overpowered the moist pedicle on which it rested, and which accordingly arched over, and rested again on the general surface; again the same operation occurred here, till at length the growth was finally arrested by the total exsiccation of the mass.

I have since tried to procure this vegetation of the proto-nitrate by designed arrangement, and find I can always succeed in the formation of beautiful, though fantastic, excrescences, by adhering to the same proportions, and using the same little vessel employed in the experiment I have just narrated.

EDINBURGH, 18*th May* 1830.

*Discovery of Salicine, a powerful Febrifuge.*—AT the Academy of Sciences, on the 10th of last month, M. Magendie, in his own and M. Gay-Lussac's name, gave a very favourable report on a memoir by M. Leroux, an apothecary at Vitry-le-Francais, relative to a new substance which he has extracted from willow-bark, and to which he gives the name of *salicine.* This substance presents itself under the form of white crystals, having a very bitter taste resembling that of willow-bark. He considers it as a vegetable alkali, and thinks that by combining it with sulphuric acid he has obtained a sulphate of salicine. He has also ascertained that salicine possesses febrifuge properties. The commissioners, however, on repeating the observations of M. Leroux, found that the substance which he calls salicine is not an alkali. It does not saturate acids, but is decomposed by them; so that no sulphate of salicine exists. As to the medical properties of salicine, the commissioners have ascertained that they are in reality very powerful, and that the substance in question may be advantageously employed instead of quinine. M. Magendie administered it in doses of 18 grains per day, at three several times, six grains at each, and this quantity he found sufficient to repel intermittent fevers. At the request of the commissioners, experiments have been made with salicine in several of the Paris hospitals, and particularly in the Hôtel-Dieu and La Charité, and it has always been found that the quantity of from 18 to 24 grains, at the most, administered in doses of six grains, was sufficient to prevent the return of the accession. The dose of salicine necessary for obtaining this effect is therefore really inferior to that of quinine which would be required in the same circumstances. The commissioners were of opinion that M. Leroux' discovery is one of the most important with which medical science has been enriched of late, and recommended that the Academy should express the most entire approbation of his labours, encourage him to continue his researches, and advise him, in particular, to undertake the preparation of salicine on the large scale, that it may become generally used. Three pounds of the willow-bark yield an ounce of salicine; and if the extraction were carried on to a great extent, it is probable that the same quantity of bark would yield two ounces.

of Diana, &c. depend upon this principle, as has been demonstrated by Grotthuss, (Ann. de Chim. t. lxiii.) The tree of Saturn is formed by immersing a blade of zinc in a solution of acetate of lead. The zinc is oxidated, and at every moment that a lamina of metal deposits itself at the extremity of a branch, and gives it an additional growth, the oxygen which it has quitted combines with the zinc. The zinc and the lead constitute a pile which decomposes the acetate and oxide of lead, attracting the metal to the negative pole, the oxygen to the positive.

The same principle may be applied to the formation of the tree of Diana, obtained by pouring a concentrated solution of nitrate of silver on mercury, —to similar appearances obtained by immersing a blade of zinc in a solution of the hydro-chlorate of tin,—and to the phenomena which have been the object of Dr. O'Shaughnessy's interesting communication. ED.

***Separation of Lead and Manganese from the Substances in which they occur.*** AT a late meeting of the Academy of Sciences, M. Becquerel read a notice on the means of separating lead and manganese from the compounds in which they occur. M. Becquerel employs electricity as a very delicate re-agent, not only for discovering the presence of manganese and lead in solutions, but also for extracting them with ease, in such a manner as to leave no trace of them, and without the apprehension of their bringing over other metals with them. A solution of acetate of iron and manganese is poured into a capsule, and there are immersed in it two platina plates in communication each with one of the poles of a voltaic pile. Decomposition of the water and disengagement of gas immediately take place. The oxygen, by going over to the positive pole, superoxidizes the manganese, which then abandons the acetic acid, and is deposited upon the positive plate of platina. A thousandth part of a grain of acetate of manganese is rendered sensible by this procedure. Nitrate and sulphate of manganese and iron lead to the same result, because the peroxide of manganese is insoluble in acetic, nitric, and sulphuric acids, while the peroxide of iron easily dissolves in them. Whatever metals may be combined with the manganese, they are easily separated from it. The author mentioned, among others, manganese and zinc, the separation of which is difficult by the ordinary chemical means.

The separation of lead from other metals requires a modification of the above method; because the oxide of lead being easily reduced, the metal immediately goes over to the negative plate of platina, as well as the other bases which occur in the solution. With the low tension piles the same inconvenience is not experienced, because the oxide of lead is not transported to the negative pole. This observation has induced M. Becquerel to adopt an apparatus which allows the lead to be super-oxidized, without there remaining in the solution any trace that can be rendered sensible by the most delicate re-agents.

*Non-interference of different Electric Currents.*—Professor Marianini has been led to examine what might take place when electric currents are so directed as to cross each other, with a view of ascertaining whether there might be any interference; but he finds none, and in this respect, draws a strong analogy between electricity and light; the rays of the latter, as is well known, crossing each other in *almost* all directions, as if quite indifferent.

At first, by attaching two zinc and two copper plates to the sides of a cube of wood, and connecting them into cross pairs by wires, and plunging them into a vessel of acid, it was found that whether one or both pairs were connected, not the slightest difference resulted in the strength of the current in the wires when examined by a magnetic needle: here, therefore, was no interference.

Whether the currents were equal, or unequal; of one, or of many hundred pairs of plates; put in action together, or successively; when three currents were used in place of two; when they were made to intersect each other at acute angles, or to pass parallel to each other; even when they were made to pass through the same metallic communication—still no interference or alteration was observed.

M. Marianini considers these effects as favourable to the Franklinian theory of electricity. In a note, he also quotes other effects, which he thinks far more easily explained by the theory of one electric fluid. In an electro-motive pair, if the negative plate be more deeply immersed in the fluid, the effect is greater than if the positive plate be immersed. If a plate of tin, or some other metal, 18 or 20 square centimetres in surface, be formed, at one side, with a narrow projecting band, and then placed so that the plate is in one vessel of water (*a*), and the band in another (*b*)—if then, a plate of zinc be placed in the vessel (*b*), and a plate of copper in (*a*), neither of them touching the metal—if then a galvanometer be connected with the zinc and copper plates, a feeble deviation will be obtained; but if the zinc and copper plates be reversed, a much stronger effect will be procured.

"It is in vain that I endeavour to explain this fact by the theory of two electric fluids, since, if on the one hand, when the plate of zinc is in (*b*), the passage is rendered difficult for the vitreous fluid, and facilitated for the resinous fluid;

on the other, when the copper plate is there, the passage is rendered difficult for the resinous fluid, and facilitated for the vitreous. There is no reason, therefore, for a difference of results. But in the theory of one fluid, it is easy to conceive, that, in the first case, the electric fluid which is diffused, as if by radiation, through the liquid, would find the passage more difficult than in the second case, and consequently the electro-magnetic effect, which is known to depend principally upon the rapidity of the electric current, should be less in the first case than in the second." *—*Ann. de Chimie*, xlii. 131.

*Physiological Phenomenon produced by Electricity.*—Professor Marianini of Venice has stated, in a memoir published some time since, that a difference existed in the contractions of a frog when the electricity acted immediately upon the muscles, and when it acted upon the nerves which presided over the muscular motions: the former were called *idiopathic convulsions*, and the latter *sympathic convulsions*. The difference consists in this, that the former contractions occur in whatever directions the current of electricity traverses the muscles, whilst the latter takes place only when the current which traverses the nerves proceeds in the direction of their ramification.

From this it follows that, when a current traverses a limb in the direction of the nerves, the two shocks should occur together; but, when it proceeds in the contrary direction, only the idiopathic convulsion should be produced. In the first case, therefore, the contraction should be stronger than in the second.

If the right hand be in contact with the positive pole of a voltaic battery, and the left hand equally in contact with the negative pole, a contraction is felt in both arms every time the circuit is completed, but stronger in the left arm than in the right. If the direction of the current be inverted, the right arm feels a more powerful convulsion than the left.

If a hand be in contact with the positive pole, and a foot in contact with the negative pole, the circuit will be in the direction of the nerves of the leg, but not in the arm; and the contraction is much stronger in the leg, where the two effects are simultaneous, than in the arm, where the idiopathic effect only is felt. The same effect takes place if the electricity is passed from the shoulder to the hand, from one foot to another, from the knee to the foot, &c. &c.

This striking difference varies in different persons, especially in those who are paralytic. The current from eighty pairs of plates, being passed from the hand to the shoulder of a person struck with hemiplegia, the muscles of the arm were scarcely contracted at the same place, where the convulsion was very strong, when the current was passed from the shoulder to the hand.

Sometimes this difference existed only in one limb.—A woman, who had lost the use of the lower limbs in consequence of an inflammation of the spinal marrow, felt the left foot contract with most force when it touched the negative pole of the pile; the right foot contracted with equal force, whether it was in contact with the positive or negative pole. This effect appeared to be due to a loss of nervous sensibility in the right foot, so that they had become indifferent to the direction of the electric current.

If a finger be immersed as far as the second joint in water, connected with the positive pole of a battery containing twenty-five or thirty pairs of plates, and the circuit be completed by touching the negative pole with a metallic cylinder, held in the other hand wetted, a shock is felt in the finger, not extending beyond the second joint; if the direction of the current be reversed, the shock is felt in the third joint. Upon giving attention, it will be found that the first shock is made external, and accompanied by a distressing sensation; whilst the second shock is more deeply felt, and is accompanied by no particular sensation at the place where the finger touches the water. The effects are accounted for by the supposition that, when the finger touches the negative pole, the simultaneous occurrence of

* Vide a paper on this subject by our correspondent Mr. Kemp, in the 1st vol. of this Journal, p. 91.

the two convulsions causes the stronger contraction; and that, when the finger touches the positive pole, the electricity which traverses the nerves proceeds in a direction contrary to their ramification, and, in place of producing a shock, occasions the peculiar sensation.

If two metallic cylinders be covered with wet cloth, and one being held in each hand, contact is then made with thirty or forty pairs of plates, moderately active, besides the shocks which are felt each time the communication is completed, there is a particular sensation in the palm of the hand, communicating with the positive pole. This sensation has been very distinct in some persons sensible to the effect of electricity; and they compared it to that pricking sensation often felt in the hands or feet when the nerves have been compressed for some time together.—*Bib. Univ.* xlii. 287.

*Bromuret of Carbon.*—The following account of this substance is extracted from a work on brome and its chemical combinations, by M. Ch. Lœwig.

Bromuret of carbon may be prepared in two ways. According to the first method, brome is mixed with alcohol at 36° Baumé. The mixture heats strongly, and, if brome is still added, a moment of sudden effervescence supervenes, accompanied with disengagement of vapours of hydro-bromic acid and free brome. After the liquid has cooled, there is added an alcoholic solution of caustic potash, until discoloration is produced; water is then poured in, and the alcohol is evaporated at a gentle heat. When the liquid begins to cool, there separates a small quantity of a yellow oil, heavier than water, and, immediately after, a concrete crystalline matter. The alcoholic solution may also be diluted with a large quantity of water, and, in this manner, the concrete substance equally separates with the oil.

This combination, however, may be obtained in greater quantity by the following process. Brome is put along with ether for a certain time, and the mixture is then distilled. At first there only passes hydrobromic acid, and then comes very clear oil, which falls to the bottom of the liquid that has already passed. When the distillation has been continued for some time, it is interrupted, pure potash is added to the residuum, and it is diluted with water. There is then deposited a voluminous white mass, which is washed with water upon a filter. It is then melted at a very gentle heat, and allowed to harden by cooling.

This bromuret of carbon forms white opaque scales, greasy to the touch, like camphor, and friable. Its smell is highly aromatic, resembling that of nitric ether; its taste is sharp, like that of peppermint. In the fluid state it is transparent and colourless. It burns as long as it is in contact with flame, and disengages vapours of hydro-bromic acid. It is heavier than water, melts at a slight degree of heat, evaporates at 100° C., and sublimes under the form of needles, having a pearly lustre. It is but feebly dissolved by water, to which it communicates its smell and taste. When the water is at 50° C. it is dissolved, and at a higher degree it is in part evaporated with the vapour. Alcohol and ether easily dissolve it, and the solutions are not rendered turbid by nitrate of silver. Alkalies have no action upon it, even at the boiling temperature. Sulphuric, hydrochloric, and nitric acids, have no effect upon it. When the melted bromuret of carbon is submitted to a current of free gas, chloruret of brome is immediately formed. On heating it with the oxides of iron, copper, zinc, &c., there are obtained metallic bromurets, and carbonic acid gas. By making it pass over these metals in the state of vapour, there are obtained metallic bromurets and charcoal.

It is to this latter property that M. Lœwig has had recourse for analyzing the bromuret of carbon, which is composed of 9.01 carbon, and 91.99 brome, the atomic weight of the latter being =941.1.

## MEETING OF SCOTTISH NATURALISTS.

A FEW of the zealous and active naturalists of our northern metropolis and its neighbourhood, have conceived the laudable design of inviting a general assembly of the naturalists of Great Britain in Edinburgh, during the present summer, with the view of organizing an annual meeting, somewhat after the German model. The idea, as we have been informed, originated with Dr. Fleming, Dr. Graham, Dr. Greville, Mr. Walker Arnott, Mr. James Wilson, and Mr. Neill; and every one who has since heard of the happy thought, has entered earnestly into the desire for its execution. Application has been made to Professor Jameson, as the head of Natural History in Scotland, to take the direction of the meeting, and to permit the elegant apartments of the Museum of the University to be thrown open for the reception of all those who receive the appellation of scientific men. And we rejoice to have this to say in favour of our Professor, (of whom it may be imagined we have no overweening admiration,) that he is reported to have joined most cordially in the views of his friends, and will exert himself in every way to promote an object which must be so serviceable to science and so honourable to Scotland. Every thing now smiles upon the undertaking, and we trust, in our next number, to be able to congratulate this city on the success of a spirited attempt which gives promise of a new era in her annals. Our southern friends had better be on the *qui vive*, for the metaphysical nation is becoming clear-headed, and threatens soon to take a lead in the cultivation of natural science.

The advantages of such a meeting as is contemplated need no explanation: if it were only the service that must be derived from the immediate communication of scientific men, and the extension of their acquaintance with congenial minds, there would be ample benefit gained; but if personal intercourse and a convivial meeting could be made to banish, even for a time, the jealousies and animosities which have so long branded the names and characters of naturalists, every man who deserves the respect of his fellows would anxiously seize the means. For it is a lamentable fact, that our science, in itself so peaceable and gentle, should be constantly associated with disputes and malignities which appear to be altogether unaccountable, unless we suppose that an hypertrophy of intellectual power necessarily produces an atrophy of moral worth.

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## LITERARY NOTICES.

Lesson is preparing for publication a Picturesque Journal of a Voyage round the World, in the Corvette La Coquille...The Emperor of Russia has accorded a grant for the continuation of the publication of the Memoirs of the Imperial Society of Moscow...A Journal of Natural History, Chemistry, &c. has also been set on foot in the same town.

*List of New Books.*

Colleccion de los Viajes y des cubriminientos que hicieron, per mar los Espanoles dêsde fines del Siglo XV. Madrid....Handbôekje op eene Reis den Rjin opwaarts tot Spiers. 1 vol. 8vo. Amsterdam....De Heerlijke Voorden van de Moczel; by Sprenger Van Eyk. 1 vol. 8vo. Rotterdam...Herbetreise durch Scandinavien; by Willibald Alexis. 2 vol. 8vo. Berlin....Itineraire et souvenirs d'un Voyage en Italie, en 1819 et 1820. 4 vols. 8vo. Paris...Bericht nber eine Reise nach den Westlicken Staaten Nordamerikas. 8vo. Elberfeld...Reis door een Gedeelte der Nederlandsche Bezettingen in Oost-Indie; by J. C. Baane. 1 vol. in large 8vo. Amsterdam...Reise door weinig bekenden Zuidelijken Molukschen Archipel, etc.; by D. H. Kalf. In large 8vo. Amsterdam...Pratische Mineralogie Zum Selbststudium; by J. H. G. Rieth. 8vo. Voight...Flore de la Moselle; par M. Holandre. 2 vol. 18mo. Metz...Monographia Rhizospermarum et Hepaticarum, Auct. J. Corda. In 4to. Prague...Uber die Springmœuse, etc. M. Lichtenstein. 4to. Berlin...Molluscorum Borussicorum Synopsis, Auct. Dr. G. Kleeberg. In 12mo. Kœnigsberg...Hannibal's Passage of the Alps; by a Member of the University of Cambridge...Hooker's British Flora...Macgillivray's, Withering's Botany.

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# NATURAL AND GEOGRAPHICAL SCIENCE.

JULY 1830.

## ORIGINAL COMMUNICATIONS.

ART. I. *On the Physiological Effects of the* Aconitum ferox. By JONATHAN PEREIRA, F.L.S. Member of the Royal College of Surgeons in London, and Lecturer on the Materia Medica and Chemistry.

HAVING been requested by Dr. Wallich to determine what are the physiological effects of the root of the *Aconitum ferox* on the system, I undertook a series of experiments for this purpose, the results of which are given in the second part of Dr. Wallich's splendid work, "*Plantæ Asiaticæ rariores.*" The objects of the following paper are, to give an account of the experiments themselves, and of the inferences which may be drawn from them.

Dr. F. Hamilton, in his "*Account of the Kingdom of Nepal,*" p. 98, mentions that large quantities of the root termed by the Nepaulese *Bish* or *Bikh,* and *Hadaya Bish* or *Bikh,* are annually imported; and that this root is a most virulent poison, whether taken into the stomach or applied to wounds. He adds that it "is in universal use for poisoning arrows; and there is too much reason to suspect for the worst of purposes. Its importation would indeed seem to require the attention of the magistrates. The Gorkhalese pretend that it is one of their principal securities against invasion from the low countries; and that they would so infect all the waters on the route by which an enemy was advancing, as to occasion his certain destruction. In case of such an attempt, the invaders ought no doubt to be on their guard; but the country abounds so in springs that might be soon cleared, as to render such a means of defence totally ineffectual, were the enemy aware of the circumstance."

In commenting on Dr Hamilton's account of this poison, Dr. Wallich says, " His statement of the belief of the Goorkas, that the Bikh would protect them from foreign invasion, and his opinion that such a kind of defence might be easily frustrated, have been fully verified during the late war with Nipal. In the Turraye, or low forest-lands, which skirt the approach to that country, and among the lower range of hills, especially at a place called Hetounra, quantities of the bruised root were thrown into wells and reservoirs, for the purpose of poisoning our men and cattle; the attempt, however, was very soon discovered, and effective precautions taken to prevent the occurence of any serious mischief."

Dr. Wallich was informed by Henry Colebrooke, Esq. " that the Bikh is employed in the northern parts of Hindustan for destroying tigers. Arrows poisoned with that drug are shot from bows fixed near the tracts leading to their watering places; and it generally happens that the animal is found dead at the latter."

Dr. Hamilton believed that the Bikh was a species of *Caltha*, but Dr. Wallich (*Wall. apud Seringe Mus. Helvet.* I. p. 160. t. 15. f. 43, 44. *Decand. Prodr.* I. 64.) has shown that it is a species of *Aconitum*, to which on account of its virulent properties he has given the specific name of *ferox*. The following are its characters:—" *A. ferox*: floribus racemoso-paniculatis, villosis; galeâ semicirculari, anticè acutè porrectâ, deorsùm attenuatâ; cucullorum sacco longo, angusto, calcare inclinato, labio elongato, recurvo; filamentis alatis, subsagittatis, ciliatis, ovariis, capsulis ramisque villosis; foliis quinquepartito-palmatis, subtùs pubescentibus, lobis inciso-pinnatifidis, basi cuneatis, lobulis acutis, divaricatis."

The specimens of the root of the *Aconitum ferox* which Dr. Wallich sent me, had been in his possession ten years. We may therefore very fairly conclude that they had lost part of their poisonous properties, although, as will presently be seen, they still were very active. One portion of the root was powdered, a second portion digested in boiling rectified spirit, and a third in boiling distilled water. The infusions were separately evaporated to the consistence of soft extracts.

During the time that the spirituous infusion was evaporating, I several times tasted it, and did not at first notice in it any thing peculiar. At the expiration of ten minutes, or a quarter of an hour, however, a peculiar biting and numbness came on in the tip of the tongue and in the lips. Shortly after the soft palate became affected; a sensation being felt, as if the velum and uvula were elongated, and rested on the dorsum of the tongue; to relieve this frequent attempts were made to swallow. So powerful and unpleasant was this sensation in the soft palate, that I became rather alarmed at it; at the end of about a quarter of an hour, however, it entirely left me. The numbness of the lips and tongue continued for eighteen hours.

Dr. Boott experienced the same affection of the throat, and of the tongue and lips, from tasting a small portion of the alcoholic extract. Dr. Wallich, who took a still smaller portion, experienced only the numbness of the tongue and lips. This sensation was also felt by Dr. Falconer and Messrs J. & G. Greeves. It is deserving of notice that Mr. Brodie experienced a remarkable sense of numbness of the lips and gums, which did not subside for two or three hours, from chewing a small quantity of the leaf of the *Aconitum napellus*. My assistant, Mr. Lunn, experienced a peculiar tingling sensation in the nose, from powdering a small portion of the root of the *A. ferox*. This sensation produced occasional sneezing, and lasted for four hours.

All the experiments which I am now about to relate, were made in the presence of Dr. Falconer, Assistant-Surgeon on the Bengal Establishment, (to whom I am much indebted for acting as secretary on the occasions,) and my brother Mr. Jer. Pereira; and most of them in the presence also of Messrs. G. & J. Greeves.

Exp. 1. *Feb.* 14. 1830.—Five grains of the powdered root were attempted to be introduced into the throat of a small rabbit, by means of a glass tube. In consequence of the struggles of the animal, part (estimated at two grains) was wasted in the attempt. In one minute there was difficulty of breathing; the animal appeared to be in pain; and two or three drops of fluid, mixed with a little of the powder, dropped from the mouth. In three minutes the difficulty of breathing was much increased, and to which was added a flow of saliva from the mouth. In twelve minutes, the posterior extremities were much weakened, if not paralyzed: the animal remained in whatever position he was placed in. At the end of seventeen minutes, he could not support himself in the erect posture. In eighteen minutes, convulsions of the throat and of the posterior extremities; and a little urine passed. The limbs became relaxed, and the animal was apparently dead at the end of nineteen minutes. At twenty minutes, the contents of the intestines were evacuated.

*Galvanism.*—At thirty minutes after death the voluntary muscles were found to be susceptible of the galvanic influence; and the vermicular motion of the intestines was much increased by it. Slight contraction was produced once only in the muscular fibres of the heart: other attempts to produce this effect failed.

*Dissection.*—The left side of the heart was found empty: the right filled with blood. Lungs florid red. Pulmonary arteries distended. Part of the powder was found in the trachea. The stomach was filled with food.

*Remarks.*—As part of the powder had got into the trachea, no very accurate inferences could be drawn as to the peculiar operation of this poison. Subsequent experiments, however, proved that the general symptons were in all the cases similar.

Exp. 2.—One grain of the alcoholic extract was introduced into the peritoneal sac of a small rabbit. In two minutes the posterior extremities were weakened: in three minutes, the breathing became difficult, and of a peculiar gasping kind: in three minutes and a half, the head was drawn back: in five minutes the animal was slightly convulsed, and fell on his side: in six minutes convulsed, and made ineffectual attempts to rise: the breathing was very laborious. At the end of eight minutes the posterior extremities, when pricked, gave no evidence of possessing sensation: In nine minutes general convulsions came on, and at nine minutes and a half the animal was apparently dead. At this time the pupils were much dilated, but in three minutes after began to contract.

*Galvanism.*—Six minutes after death the voluntary muscles were susceptible of galvanism; but this susceptibility soon ceased. Contractions were excited in both auricles of his heart, and the right auricle repeated its contractions after the poles of the battery were removed. The effect of galvanism on the muscular fibres of the ventricles was doubtful. I thought that I perceived slight contractions, but they were not noticed by others.

*Dissection.*—Right side of the heart distended with dark-coloured blood; left side empty. Lungs florid red. Pulmonary arteries distended.

*Remarks.*—The first and prominent symptoms here, were the weakness of the posterior extremities and the difficulty of breathing. On feeling the chest, it appeared to me as if spasm of the diaphragm came on at each inspiration. The drawing back of the head did not appear to be altogether involuntary, but as if it were to fix the head, and thereby assist the breathing. The convulsions in this and the other experiments, were very different to those produced by strychnine: in the former cases they were quite temporary, whereas those produced by strychnine last for several seconds.

Exp. 3.—One grain of the spirituous extract (a little drier than in the last experiment) was introduced into the subcutaneous cellular tissue of the left lumbar region of a rabbit. Immediately after the experiment, the animal continued to eat, but at the end of six minutes refused to do so. At seven minutes the fæces were evacuated: at eight minutes grinding of the teeth; head drawn back; a little saliva flowed from the mouth. In nine minutes the movements of the animal became unsteady; and at nine minutes and a half he became unable to support himself; convulsions. In ten minutes the posterior extremities were insensible: in eleven minutes the convulsions became much more active, particularly in the posterior extremities; repeated faint cries. At thirteen minutes the animal was lying on its left side, and was free from convulsions. At fourteen minutes violent action in the abdominal muscles: fourteen minutes and a half, convulsions in the posterior extremities: urine passed: pupils much dilated. At the expiration of fifteen minutes the animal was apparently dead: shortly after which the pupils began to contract.

*Galvanism and Dissection.*—The phenomena were the same as in the last experiment.

*Remarks.*—As I had anticipated, the poison took longer time to produce death, when introduced into the subcutaneous cellular tissue, than when introduced into the sac of the peritoneum. I may remark that the repeated faint cries mentioned here, appeared to all who witnessed the experiment, to be, in part at least, the result of the involuntary action of the respiratory muscles.

Exp. 4.—Two grains of the *watery* extract were introduced into the peritoneal cavity of a full grown rabbit: part of the extract was diffused over the wound, in consequence of the exudation of some fluid from the abdominal cavity. In two minutes the animal appeared to be slightly affected: seemed uneasy, and licked the wound. In five minutes stretched out his hind legs: respiration hurried. At the end of nine minutes the urine was passed; and at ten minutes one or two efforts were made to swallow. In fifteen minutes staggered. At seventeen minutes and a half, the head was drawn temporarily to one side. At twenty minutes appeared much enfeebled: frequent convulsive gasps: unable to support itself: laid stretched out: fore legs principally affected: respiration irregular. At twenty-five minutes was unable to rise: strong convulsions: faint cries: pupils much dilated: eyes much protruded. At twenty-seven minutes the animal was apparently dead. Immediately afterwards the pupils began to contract. Galvanism was not tried.

*Dissection.*—The appearances were the same as in former experiments.

*Remarks.*—This experiment demonstrates that the *watery* is less powerful than the *spirituous* extract. It must, however, be recollected that the animal in this case was stronger than those operated on in the former experiments, and that part of the poison was diffused over the wound. We must not hastily conclude, from this experiment, that the active principle of the root is more soluble in spirit than in water. The greater activity of the spirituous over the watery extract, may arise from water dissolving some proximate principles, (such as gum,) which are not soluble in spirit; for the quantity of spirituous extract obtained was very small as compared with that of watery extract obtained from the same weight of the root. In this experiment the fore legs were first affected, whereas in the former experiment the hind legs appeared first and principally affected.

Exp. 5. *Feb.* 16.—One grain of the alcoholic extract, placed on a small piece of cabbage leaf, was introduced into the back part of the mouth of a small rabbit, care being taken that he swallowed the whole of it. The animal had been kept twenty-four hours without food, except that just before the experiment it eat a small piece of cabbage leaf very voraciously. After the extract had been put into his mouth, he made no attempt to eat a piece of cabbage leaf which was placed before him, although he approached it as if for the purpose of doing so. The only effect that we observed to be produced by the poison, was continued chewing as if the animal was ruminating, and which lasted for about an hour.

*Remarks*.—Although I anticipated that a comparatively slight effect only would be produced when the poison was introduced into the stomach, yet I was surprized to find no remote effect whatever (at least as far as we could judge) produced.

Exp. 6.—Two grains and a half of the spirituous extract, softened by two or three drops of rectified spirit, were placed in a small brass stop-cock tube, inserted into the jugular vein of a strong and good-sized dog. To this tube was afterwards attached a small syringe containing tepid water, so that by pressing on the piston rod, the water would be expelled, and passing into the tube, would drive the extract before it into the vein. The greatest precautions were taken to prevent the introduction of air. That part of the tube below the stop-cock, and which was within the vein, had been filled with water previous to its introduction into the vessel. That part of the tube above the stop-cock was filled by the softened extract, and the nozzle of the syringe. All the persons present were satisfied that no air was introduced into the vein. All the fluid (including the softened extract of the tepid water) thrown into the vein, did not exceed two drachms. Immediately after the injection the animal began to struggle violently. In one minute violent convulsions came on; the respiration became difficult; and the contents of the bladder and rectum were evacuated. In three minutes the animal was dead.

*Dissection immediately after Death*.—The jugular vein was dissected down to its junction with the subclavian. On puncturing it, a whitish-looking fluid mixed with blood escaped, followed by a clot of blood. The right side of the heart was distended with blood: the left quite empty. The inferior and superior venæ cavæ, and the pulmonary artery, were also distended. The blood was partially coagulated. The muscles of the chest quivered under the dissecting knife. The lungs were of a florid red colour.

*Remarks*.—The whitish-looking fluid found in the lower part of the jugular vein, was evidently formed by the mixture of the spirituous extract with the water of the syringe and the blood. That the symptoms and death of the animal arose from the peculiar action of the poison, I think can hardly be doubted. Yet there are three circumstances which may be brought forward against this inference. 1. The possible introduction of air; 2. The small quantity of spirit mixed with the extract; 3. The water thrown into the vein. As I have before said, the greatest care was taken to guard against the introduction of air, and I, as well as every one who witnessed the experiment, were perfectly satisfied that none was introduced. As to the spirit and water introduced into the vein, although the death of a strong dog could hardly be attributed to the small quantity of these liquids, yet I resolved to try what the effect would be of throwing a mixture of these liquids into the vein. The experiment was performed, and will be detailed presently. I need only state here, that it proves most satisfactorily that the inference above drawn was correct.

Exp. 7.—One grain of the spirituous extract was introduced into the peritoneal cavity of a small rabbit, which had been kept twenty hours without food. At the end of one and a half minute, the animal licked the wound and laid down. In two and a half minutes the breathing became difficult; slight stupor: the head was held erect. In three minutes the head became quite bent back on the spine; convulsions. At four and a half minutes the hind legs were partially paralyzed. At five minutes the animal uttered plaintive cries; moved about with difficulty, drawing the hind legs after him in a kind of spasmodic manner: breathing slow and gasping. In seven minutes fell on his side: in nine minutes quite vertiginous: in ten and a half minutes tetanically convulsed. At the end of eleven minutes the animal was dead.

*Remarks.*—This experiment was made with the view of confirming Exp. 2. It will be observed that the symptoms were precisely similar. The only difference between the two experiments is, that in Exp. 2. the animal became affected half a minute sooner, and died one and a half minute earlier.

Exp. 8. *February* 19.—Present Dr. Falconer, and my brother Mr. Jer. Pereira.

Three grains of the spirituous extract, enveloped in a little cabbage leaf, were placed in the throat of a small rabbit, so that the animal was obliged to swallow it. The only effect observed was the continual chewing, as noticed in Exp. 5. At the end of four hours the animal was killed, but as the stomach was found distended with food, no inferences could be drawn as to the local action of the poison.

*Remarks.*—The experiment was made with a view of observing whether the poison exerted any local irritating action; but unfortunately no inferences can be drawn from it, for the reason above mentioned. It is to be recollected that rabbits do not vomit, and therefore the absence of this symptom proves nothing. If it be true, as Messrs. Morgan and Addison assert, that all poisons operate by producing sympathetic impressions, it is quite clear from the experiments now related, as well as numerous others on record, that the stomach is *not* an organ the most susceptible of sympathetic impressions. That many of the most active poisons produce slighter effects when applied to the stomach than when applied to other parts, is well known. The only possible ways that I am acquainted with of explaining this phenomenon are: 1*st*, By supposing that the stomach is less susceptible of sympathetic impressions than most other parts; 2*dly*, By supposing that the poison operates by absorption, and that the venous absorption of the stomach is less than that of other parts; 3*dly*, It is possible that the poison may be digested and converted into chyme.

Exp. 9. *March* 14.—Six grains of the spirituous extract were introduced into the stomach of a full grown strong dog, that had been kept fasting for twenty-four hours. The only effect noticed, and even that was doubtful, was strong shivering amounting almost to convulsions. This only took place once.

Exp. 10. *March* 21.—Present Mr. Jer. Pereira, Mr. Lunn, and Mr. J. Greeves.

This experiment was made to confirm Exp. 6. About three drachms of fluid, consisting of water with a little spirit, were thrown into the jugular vein, but no obvious effects were produced. To render it still more satisfactory, double the quantity of fluid was thrown in at the end of half an hour. No effects observable.

From the experiments now related, it appears to me that the following inferences may be drawn:—

1*st*, That the root of the *Aconitum ferox* is a most virulent poison.

2*dly*, That both the spirituous and watery extracts are poisonous, the former much worse so than the latter.

3*dly*, That the poison exerts a local action on the nerves of the part to which it is applied.

4*thly*, That its remote action is on the nervous system.

5*thly*, That the intensity of this remote action is in proportion to the absorbing powers of the part to which it is applied.

6*thly*, That the immediate cause of death is asphyxia.

7*thly*, That this poison diminishes the irritability of the heart.

8*thly*, The symptoms produced by it were, difficulty of breathing, convulsions, and paralysis of the extremities.

9*thly*, As far as my experiments have been carried, there appears to be a great analogy between the effects of this species of *Aconitum* and the *A. napellus*. Dr. Wallich informs me that the *A. ferox* is used in India as a therapeutic agent in rheumatic cases. Now the *A. napellus* has been used in these cases in Europe,—a circumstance which tends to confirm the supposition, that the effects of these two species of *Aconitum* are similar.

*Aldersgate Street, London, May* 1830.

ART. II.—*Notes on* Aspidium aculeatum, *and its Allies.* By G. A. WALKER ARNOTT, F.L.S. F.R.S.E. &c.—(*In a Letter to the Editors.*)

GENTLEMEN,

FAVOUR me with the insertion of the following remarks in your Journal, respecting this tribe of ferns:

1. *A. aculeatum,* Sm. is the plant of Linnæus, and I think also of Swartz. *A. aculeatum,* Willd. is intended to contain both *A. aculeatum* and *lobatum* of Smith, but principally refers to the latter. Dr. Hooker's *A. aculeatum* is entirely *A. lobatum,* Sm. but the observation, "I have seen some plants which might almost be considered to unite the two," given under his *A. lobatum,* (British Flora, p. 443.) applies I believe to the *A. aculeatum* of Smith.

2. *A. lobatum,* Sw. seems that of Smith, but *A. lobatum,* Willd. and Hook. (I allude to the British Flora,) is *A. angulare,* Smith.

3. *A. angulare,* Sm. and Hook. is not *A. angulare,* Willd. I rather suspect it to be *A. orbiculatum,* Desv.

4. *A. Plukenetii,* Loisl. and De C. is a variety of *A. lobatum,* Sm. with the frond pinnate, the pinnæ being deeply pinnatifid, which has given rise to the query in De Candolle and Duby's "Botanicon gallicum," if all these and *A. lonchitis* be not states of one and the same species?

The above may have their synonymes thus arranged:—

1. *A. lobatum,* Sw. and Sm. Eng. Bot. t. 1563. (not Willd. nor Hook.) *A. aculeatum,* Hook. (exclus. syn. Sw. and E. Bot.) and Willd. (exclus. of many synonymes,) almost entirely, and also of most foreign botanists;—*A. Plukenetii,* Loisl.

2. *A. aculeatum,* Lin. Sw. and Sm. Eng. Bot. t. 1562. and Willd. (scarcely at all;) *A. lobatum, intermediate variety,* Hook.

3. *A. orbiculatum,* Desv.; *A. angulare,* Sm. Eng. Flora, and Hook. Brit. Flora, but not of Willdenow; *A. lobatum,* Willd. and Hook. (exclus. all syns.)

But are these species? I fear not. The chief character between *A. lobatum* and *A. aculeatum,* is the decurrent pinnules of the former, and the distinctly petiolate pinnules of the latter; but I have seen specimens very much between the two: and these also have neither the compact frond of the one, nor the loose frond of the other. Again, as to *A. aculeatum,* and what I call *A. orbiculatum,* there is also an intermediate state, in which the serratures are deeper and more pointed, and the pinnules more acute than in *A. orbiculatum,* but not so much so as in *A. aculeatum.* The *A. appendiculatum* of Gay, (I am not sure if it be published under this name,) which that botanist gave me from Veviers in France, and with which he hesitatingly suspected "*A. aculeatum,* Sm. but certainly not of Sw. or Willd." to be the same, appears to me to be also intermediate, partaking of the short pinnules of the one, but the acute pinnules of the other. This state has been gathered by Dr. Johnston at the Pease-bridge in Berwickshire.

## ART. III. *Notes on the University of Christiania.* By JAMES F. W. JOHNSTON, A.M.

THE city of Christiania has been too much praised. In itself it has nothing to repay the traveller for the fatigue of an hour's stroll through its streets. I do not remember a single building,—the castle excepted; for all castles derive from association a kind of interest which does not attach to mere architectural magnificence,—except this one I do not recollect any building in Christiania which would be worth visiting in any other city. But all cities are judged of by the country in which they are situated, and by the circumstances under which they are seen. The houses are all of stone, and this is grandeur enough in Norway. My first impressions of Christiania were produced and confirmed during a period of incessant rain, and when fine weather came I could see nothing to admire in its dull streets. But these remarks include all my objections to the capital of Norway. Its situation is beautiful and picturesque beyond description. Copenhagen is a finer by far and more cheerful-looking city, and it stands in a rich country, but it is a flat, and tame, and interminable country. Stockholm is a more majestic city, and its situation is abundantly romantic; and the view from the lofty spire of St. Catherine's church, stretching over the city and the lake Maeler, with its twenty thousand isles, amply repays the labour of climbing to its summit; but the city is heavy, and, hemmed in by everlasting woods of pine, has a gloom about it, which the bright sun of summer does not wholly expel. Christiania is a plain town, with straight streets crossing at right angles, but unadorned and without pretension; yet I have seen few finer sights than this city presents, viewed either from the lofty hill by which the traveller from the east and south approaches it, or from the summit of the Ergeberg, on the opposite side of the lake, when the sunbeams are gilding the mountain sides, or playing among the leaves of the trees that stretch far up the valley, or rest on the white chimnies of the city, fringing the lake beneath our feet. In fine weather, a month could be delightfully spent in the neighbourhood of this capital; for the Fiord, with its numerous arms and inlets,—the rich low grounds that not unfrequently skirt them,—and its many bold and wooded promontories;—and on land, the fertile and richly cultivated valleys, with sweet villas and villages, lying scattered at different distances from the city, hemmed in all of them by lofty mountains, which seem to thrust up their dark pine woods into the clouds, render boating or walking on a cool summer evening as pleasant in Christiania, as it can be in any other part of the world.

The Royal Norwegian University of Christiania, was founded by the present king of Denmark, Frederick VI. so late as the year 1812, and the royal ordinance by which its present constitution was established, is dated at Gottenburg 28th July 1824. Previous to 1812, students from Norway were all educated at the University of Copenhagen. The professors are eighteen in number, of whom two belong to the faculty of theology, one to that of law, four to the faculty of medicine, and eleven to that of philosophy. This last number includes the professors of chemistry, natural history, and mineralogy. There are besides one lecturer on medicine, and on philology four lecturers and two assignati.

The University is yet in its infancy, and the funds for its support still in some measure unconsolidated. These funds are derived from tithes, from bequests, from lands, and other similar sources. The funds settled upon it being at present burdened with annuities, renders it necessary to obtain a yearly grant from the Storthing, the native parliament, which has hitherto been very liberal. The regulations of the University are nearly the same as those of the University of Copenhagen. Each professor delivers a public course of lectures gratis; for private lectures he may take a fee, but few of them find it worth their while. The only fixed sum payable by the student is five specie dollars, about 17s. Sterling, to the library, when he is first admitted to the University. There are two sessions annually, commencing in February and August, and the holidays are limited by statute to two months and a half in the year. The number of students enrolled in the session commencing in August last was about 550. The preliminary examination, *examen artium* as it is called, similar to the Blackstone examinations at Glasgow, is rather strictly gone about. Of 120 who presented themselves for matriculation at the above session, ten were rejected. Where no fee is obtained from the student, there is no inducement to pass any who are unqualified. These examinations are public, and were going on during my stay in Christiania, but I had already seen something of them in Copenhagen, and felt therefore little curiosity to witness a second exhibition. The alumni in Scandinavia are no whit more ready at their answers than we find them at home.

The University buildings in Christiania have nothing imposing in their exterior. They are shabby rather, though not much inferior to the University buildings in Copenhagen. They were not built indeed for the University, but must have been erected long before. The intention of King Frederick in 1812, was to have established the University not in the city, but in the suburbs of Christiania. For this purpose a beautiful spot called Toien was purchased, so situated as to command a view of the old town (Opslo) to the east, and of the new town (Christiania) to the west. But in 1813 a change took place in the currency, and the money which had been collected was too small to permit the plan to be carried into execution. The botanic garden and the museum only were erected on this spot, and other buildings in the city were sought out for class-rooms. The present, therefore, may be considered as a temporary locality, to be changed for a better when their funds become more flourishing.

My visit to Christiania was a sudden thought, and I came therefore unprovided with letters. It was only a week before, when I reached Wenersborg, on my way from Gottenburg to Stockholm, that I resolved on making a detour to the capital of Norway. I found in consequence, the wet weather, which prevailed for several days, more disagreeable than it might otherwise have been.

Of men of science there was but one I wished much to see—Professor Hansteen;* and he was then absent on his well-known magnetical expedition. In regard to this gentleman the Norwegian Parliament have behaved with great liberality. They have advanced him in all, to enable him to perform his tour, about £3000 English—a large sum to be devoted to one object of general science by a country so circumscribed in its finances as Norway is.

Esmarck, to whom mineralogy owes the knowledge of several new species, was also absent on a tour in Denmark. I lost in consequence the pleasure of seeing his cabinet of minerals; and, what I regretted as much, of obtaining his advice as to the most profitable mode of disposing of the short time I could devote to the mineral riches of this interesting country.

Keyser is professor of physics and chemistry; but he is a man of no industry. He works none; and instead of dedicating himself to the sciences, and joining his efforts to those of other men to remove the limits of knowledge one step further back, he employs himself in forming schemes for getting away from Christiania. He dislikes the place, and hence the place has ceased to be very fond of him. I wonder at his dislike to Christiania; for his country house is one of the sweetest of the many sweet spots that lie within two or three miles of the city. He contrived, after the cession of Norway to Sweden, to get himself appointed one of the Commissioners for settling the amount of the Danish National Debt and other charges which should fall upon Norway, and in this office he spent three years at Copenhagen. People said that he staid longer than he needed to have done; and from that probably arose part of the bad odour in which he still stands. The secret of a great many people's idleness is, that they *do not need to work;* but one would think that the high name of Scandinavia in physics and chemistry, would incite most professors of those sciences in that country to try to do something; yet it is a remarkable fact, that, high as Sweden stands as a cultivator of the science of chemistry, yet the professor of that science at Lund is a mere drone, and those at the University of Upsala are little better.†

* Professor of Applied Mathematics.

† I am in hopes that should this ever meet the eye of Walmsted, who was appointed to a chair some three years ago in Upsala, it will set him about employing his talents to some better purpose than in the mere arranging of mineral cabinets,

I made an attempt to see Keyser's laboratory,* and he also did me the honour of calling upon me. But we missed each other; and severe domestic affliction was an ample excuse for my having no subsequent opportunity of seeing him during my short stay. It is to the credit of the Norwegian Storthing, that they have provided a splendid philosophical apparatus for their national University. "It is so fine," said Berzelius to me, when I visited him in Stockholm, "that all the apparatus of the three Swedish schools put together would be nothing like it." On account of this apparatus, chiefly, I regretted not having made the acquaintance of Keyser—for every experimental philosopher knows how interesting it is to see the workshops and tools of his fellow labourers in different parts of the world.

What a fine field there is for a diligent analytical chemist in Norway!—and how would the patriotic Norwegians honour the man who, from the far north, should send forth the voice of discoveries that should do honour to their beloved land! The Norwegians are a brave people—a kind people—and an intelligent people—what hinders then that they should become also a learned and scientific people? Their minds must be alive to high thoughts; for their very mountains speak sublime things to them.

Rathké is professor of natural history,—a kind gentlemanly man, and who has seen a good deal of other countries. "It is my duty, as it is my pleasure, to pay attention to strangers," he said to me; and I accordingly found him willing to devote to me as much of his time as his other duties would permit.

The Museum,† which is under his care, is, like the university, still in its infancy, and is not therefore very extensive. The objects of curiosity are chiefly minerals and birds. The minerals are dirty, and in bad order; and many of the birds are very indifferently got up. Zoology has more attractions for Rathké than mineralogy; the superintendence of the mineralogical part of the museum should therefore he confided to Esmarck. What the museum wanted in interest, however, the Professor made up for by his desire to please and gratify; and I owe him this testimony for his gratuitous attentions. Professor Jameson is well known in Norway, and Rathké was anxious to acknowledge the honour done to him by his being elected a member of the Wernerian Society, of which Professor Jameson is president.

The Botanic Garden is also under the superintendence of Rath-

* That some little is done, or ought to be done, in the rudiments of practical chemistry, may be inferred from the "Catalogus Lectionum"—"Laboratorium Universitatis Chemicum tempore utrinque commodo iis patebit qui experimenta chemica agere cupiverint."

† So much has lately been said of museums, and admittance to them, in this Journal, that I may insert the following two lines from the Catalogus Lectionum already quoted:—"Musæum Historiæ Naturalis et Hortus Botanicus Universitatis, horis commodis patebunt iis qui *voluerint* collectiones inspicere."

ké as professor of zoology and botany. Incessant rain is not favourable for the survey of such gardens, and therefore I did not see that of Christiania. It would seem, however, to be in a flourishing state; for, though commenced by Siebke so late as 1815, it already contained in 1823, when the last catalogue was published, 930 genera, comprising nearly 5000 species. Both the museum and the garden were kindly assisted with duplicates from the University of Copenhagen; and the seeds and plants transmitted by Horneman gave its first importance to the rising institution.

Botany is the favourite and prevailing study in Norway, though this depends chiefly on its forming an important branch of medical education. The extent in which the term *prevailing* is to be taken, will be understood when it is added, that a *good class* for natural history may amount to 20, and a good chemistry class to an equal number. Professor Esmarck, who teaches mineralogy, geology, and oryctognosy, has a good class when it is from 10 to 15. The medical faculty would appear to be the best educated in Norway, as a course of theology or jurisprudence may be completed in three, while a medical course occupies from five to seven years. This is, however, to obtain the title of doctor—a degree which is seldom taken in the other faculties.

Of the various examinations which are undergone by the students before receiving their degrees and leaving college, I may here mention, as unknown among us, the *Bergsexamen* (mining examination.) This examen is thus specified in the statute: "At the Bergsexamen, the candidate, partly by written and partly by spoken proof, shall give evidence of his proficiency in the pure mathematics, namely, geometry, stereometry, trigonometry, algebra, equations, spherical-trigonometry, the first principles of the infinitesimal calculus—in applied mathematics, with their most direct application to machinery—in physics and chemistry—in oryctognosy and geognosy—in metallurgy—in mining, and in the reducing of ores. The candidate shall also give proof of readiness in architectural and machinery drawing." This examination has been instituted for the purpose of sending forth men capable of directing mining operations on the most scientific as well as the best practical principles. It were vain to talk of such examinations at our universities, where many of the subjects are not taught. To things merely practical, the application of science to the arts, little attention is paid in our public institutions. And perhaps it is better that we leave practical men to learn these things where they are in daily operation; for then only can they be properly and completely taught.*

* "In dyeing, for instance," said a well known *polyartist* of this city to me one day, "I have known a man who went always by his book. He put in so many ounces of this and so many pounds of that, but *he cou'dna get things to do ava.* I recollect one day he made up a blue vat after this fashion, but it *wadna work.* He was sure he had put in the right weights, so he didna ken what to do wi't.

Norway is the land of minerals—an inexhaustible and hitherto not half-explored field of mineral productions—yet there is no other way of obtaining them but that of visiting the localities where they are found. There are no dealers in Christiania, and the absence of Professor Esmarck shut me out from the only chance I had of procuring a few rarities. The only mineral I contrived to pick up in Christiania was a specimen of the chromate of iron, from Ferasen, near Rooras, which the director of one of the mines was kind enough to give me. In this locality it has been long known, but, until lately, was mistaken for common iron ore. It occurs in large veins, and in quantity is represented to be inexhaustible. It is found occasionally crystallized; the massive has much resemblance to the well known American chromate.

The interesting nature of the geological formations around Christiania, have long ago been made known by Von Buch. Several circumstances prevented me from giving them any thing more than a general examination. Among these, continued rain, and an anxiety to reach Stockholm, were not the least. After waiting in vain for fine weather at Christiania for several days, I dedicated the little time I could remain in Norway to an excursion to the silver mines of Kongsberg—a few notes relative to this excursion will form the subject of a future article.

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ART. IV. *Account of Péron's Peninsula, in Shark's Bay, Western Australia; with Remarks on its capabilities and fitness to receive a small Fishing Settlement: compiled from various sources.* By a Gentleman in the service of the Hon. East India Company. (*With a Map, iu which the French names are preserved.*)*

Péron's Peninsula is that extraordinary tongue of land which juts out from the west coast of the continent of Australia, in an immense gulf called Shark's Bay, the term *Bay* being here highly improper.

Weel, it was the market day, and some o' the Galashiels men were in, so he gangs awa an' brings down twa o' them to look at his vat. The tane o' them pits his han' intil the blue, an' lifts up a wee drap in his loof, and looks through to the light as he let it run out again. 'See what *you* think o't, John,' he then says to the tither ane. John taks up a wee drap an' looks through't. 'I think it's owre cauld.'—'I think sae too, John; throw in anither shoolfu' o' lime.' And in half an hour it was as fine a working vat as ye cou'd see. 'That's what I ca' *rule-o'-thumb* men,' added the polyartist; 'far better tradesmen nor your *weight-an'-measure* folk."

* From the general interest of this communication, we have been induced to forego the principle we laid down in the outset, of not admitting any article amongst our "Original Papers," which was not authenticated by the author's name. But as this account of Péron's Peninsula merely professes to be a com-

This peninsula is included between 113° 24′ and 114° E. longitude, and 25° 30′ and 26° 15′ S. latitude. Its length from north-west to south-east is about fifty miles, and its general breadth varies between twelve and fifteen. The isthmus of Taillefer, by which it is joined to the continent, is about a mile and a quarter broad.

Captain Baudin's expedition appears to have been the first, after Dampier, that visited this place,* the desolate appearance of which has been pourtrayed by M. Péron, the amiable zoologist of that expedition, as extreme, and the climate, both as to the heat by day and the cold by night, as perfectly insupportable.

The expedition under Captain Freycinet was its next visitor,† and M. Arago, in his narrative of that voyage, thus describes its appearance: "The coast, from the moment we first saw it, exhibited nothing but a picture of desolation; no rivulet consoled the eye, no tree attracted it; no mountain gave variety to the landscape, no dwelling was seen to enliven it: every where reigned sterility and death. Its outline is uniform, without breaks, almost without difference, and always very low. In the evening the sun sets; no voice disturbs the silence of this melancholy solitude; a sharp cold benumbs the limbs. In the morning the sun re-appears: a consuming heat oppresses us; we seek repose and find nothing but fatigue. What a frightful abode!"‡ "Several of our people attempted different excursions on the Peninsula, without finding a single rivulet of fresh water. It is to be presumed, therefore, that the poor natives drink only salt water, and live wholly on fish and a kind of pulse resembling our French beans, that is met with here and there in the interior."

The number of natives seen on this peninsula by M. Péron did not exceed thirty. They were armed with assagays and clubs; and during the stay of the expedition, their general conduct evinced a disposition to hostility and treachery, and in fact on one occasion they actually succeeded in forcing one of the boats to quit

pilation, the sources of which are open to examination, and as it is judiciously drawn up, we comply with the author's request to withhold his name.

In our first volume, p. 446, will be found a similar analysis of the information which is scattered through different works, respecting the country on the banks of Swan River. Ed.

* The Geographe anchored in Dampier's Bay on the 2d July 1801. On the 3d a most violent gale of wind (it being the depth of winter there) obliged the ship to quit the roads and put out to sea; and during the nights of the 3d and 4th, they were in great danger of being cast upon some of the numerous shoals and sand-banks near Cape Shoals. They were finally obliged to sail from thence to Timor on the 6th of July. The Naturaliste arrived in Dampier's Bay on the 16th of the same month and year, and remained there until the 4th September. The Geographe was again there from the 16th to the 26th of March 1803.

† The Uranie arrived in Dampier's Bay in August 1818, and remained there to the latter end of September.

‡ Vide "Narrative of a Voyage round the World," by J. Arago.

the place and return to the vessel, by rushing down to the shore with loud shouts. The bay was from that circumstance named *Attack Bay.*

M. Arago was however rather more successful in procuring a short intercourse with a party of fifteen of the natives, who divided themselves into three bands; one of them had a small dog. As usual, their conduct displayed extreme fear, suspicion, treachery, and a disposition to hostility. "They are of a middling stature; their skin is as black as ebony; their eyes are small and lively; they have a broad forehead, flat nose, large mouth, thick lips, and white teeth; their chest is tolerably broad; their extremities are slender; their motions quick and numerous; their weapons not very dangerous; their agility is surprising; their language noisy. Some of them are tatooed with red; and the woman we saw, had her forehead tatooed, and was, like the men, perfectly naked."

In one of M. Arago's excursions, he found ten or a dozen ruined huts on the north shore, near Point Shoals. These huts are formed of a few branches, crossing each other, covered with brushwood and clay; they are six feet high, four or five broad, and three and a half above the ground. The entrance is almost always on the side facing the wind that most commonly blows. The natives make their fires in the centre, and sometimes around the hut. On some high points of land they erect also a kind of observatory, formed of a few trunks of trees, on which they post themselves to observe the distant country.

The articles obtained from these Indians by the French, consisted of a club, a very dirty fan, (probably a leaf of the fan palm from the interior of the continent,) some cassowarys' feathers, two bladders painted red, filled with very fine down, and an assagay of hard wood, six feet long, but not very sharp. "After our barter, we pretended to follow them, in order to try their courage, when they disappeared with astonishing swiftness."

In another account of Freycinet's expedition,* the description of Peron's Peninsula presents rather more encouraging features, if we carefully select all the circumstances, and particularly if we consider some of the articles in the possession of the Indians, with reference to the question, "Whence were they procured?" If we collate such incidents as bear a favourable aspect, and unite all these together, it will appear to any person who has resided in a hot climate, that the whole account of this spot has been drawn up under the great disadvantages of a hurried stay, apprehensions of being surprized or attacked by the natives, a constitution not equal to encountering the heat of a nearly tropical sun, and lastly, a want of sufficient provisions.

* "Nautical and Geographical Account of the Voyage of the Uranie," by L. Freycinet.

It appears by the latter account, "that although the shores of this Peninsula are sterile, yet it was remarked that at short distances there were vallies where the *vegetation was magnificent;* and that the human species seemed to be pleased with these favoured spots, as there were a great number of natives' huts, one of which was very spacious."

"Point Guichenot is, in particular, as well as the shores in its vicinity, covered by a multitude of trees, of which the verdure and the dimensions announce a vigorous and active vegetation. Little interior salt lakes communicate with the sea in this place, (probably similar to our "Backwaters" in Malabar,) and render this spot truly enchanting." Birds of a great number of species, appear to delight so much in this solitude, that when the French arrived, the trees, the ponds, and even the points of land, were all covered with them; but the presence of men soon frightened them away, for on another visit none were to be seen. "In fact, extinct fires, natives' footsteps, certain proofs of the recent presence of dogs, and several other kinds of quadrupeds, informed them of the motives of their flight."

Capes Rose and Roland are similar in profile, each to the appearance of an angle of a bastion; and from the latter cape to Point Shoals the coast resembles a line of fortifications, the cliffs descending in a slope to the shore at an angle of 45 degrees. The upper surface is a calcareous rock, a mixture of grit stone and petrified shells. The rocks of the whole peninsula are of this calcareous and shelly sandstone, and may be available for the purposes of building. There is also clay for brick-making, and the myriads of sea-shells afford an inexhaustible supply for burning into capital lime.

"The breadth of the peninsula at the north-west end, from Point Shoals to Cape Lesueur, is twelve miles."

The north-west coast of the peninsula, like that of the east, is composed of sand-hills eighty feet high, of a red colour, peaked and intermixed with grit stone. A few wretched plants spring from the soil, but in several places vegetation appears with greater vigour, and furnishes more abundant productions.

Several ponds of salt water, in general of a circular form, occupy a part of the surface, and salt was found on the margin of the pond nearest to the observatory. A haven, named *Montbazin*, extensive in length and tolerably spacious, but so much encumbered with sand-banks, (or supposed to be,) that it seemed doubtful whether a boat could navigate it, reaches to the ponds. It was ascertained, during an excursion in search of the natives, that this great sheet of water communicated with the sea.

It is from a rough sketch by M. Gabert, that the ponds and haven of Montbazin have been traced in the map; but as he had no instruments, the shape of these waters, and particularly the place of their embouchure, is doubtful. This creek is, however, a very curious cut, (*coupure,*) and the French think that the unknown parts of Shark's Bay contain similar openings.

The surface of the peninsula, with the exception of the wood near Point Guichenot, as viewed from the top of one of the hills at Point Shoals, presents an immense tract of level ground, sandy and barren, only broken by Montbazin Haven, which extends in the direction of the coast. The whole peninsula is seen from the above hill. Of five lakes passed by the French in their excursions, three were dried up. The ground was every where sandy, red in some places, covered with shells, and encumbered with parasitical brambles. The footsteps of some unknown animals were noticed, but they only saw one kangaroo. In returning to their camp, they saw a prodigious number of seals, which contended no doubt with clouds of pelicans, assembled at the south point of the cove in Seal's Bay, for the sovereignty of the place.

Thus far the description of the peninsula. Its naked sandy soil, which is expressly said to be "not contrary to vegetation," and its want of fresh water, are disadvantages which may in my opinion be overcome by degrees, by the perseverance of a party stationed there on board ship, whose first business should be to sink one or two wells, and cut a tank or cistern; for as it is well known that no trees (except the cocoa-nut and mangrove) will vegetate in a soil saturated with salt water, we may confidently rely on coming to plenty of fresh water, by digging in the vicinity of the trees above Point Guichenot, a spot so fertile in vegetables of large growth. Neither would the party be in want of manure, where the waters teem with such an abundance of fish of various descriptions, which make the best manure. Shells also, and all sorts of rubbish thrown up by the sea, when burnt, afford good manure. It would be best at first to import timber for the roofs and other portions of buildings, instead of cutting down the wood of the place, which, with other trees to be planted, it would be good policy to preserve.

It appears singular to me, that it never struck the minds of the French, that possibly the absence of the natives, which was often remarked for long periods, was occasioned by their journies to the mainland for fresh water. They might also carry supplies of water in bladders with them in their visits to the peninsula; for I should myself consider that their residence there was only occasional and temporary, during their fishing seasons, or in the absence of other food elsewhere; and that they would be found in greater numbers in the interior of the mainland, perhaps settled in the vicinity of some fresh water streamlet.

But be the peninsula never so sterile, it is amply compensated by nature in the profuse productions of its surrounding waters, which abound in prodigious quantities of fish, and especially in large whales of the profitable kind.

Captain Freycinet states, that Dampier's Bay offers good holding ground for an anchorage, (with plenty of firewood on shore, and an inexhaustible stock of sea turtle on the shoals and shores.) The landing is, however, difficult at times. M. Arago says, "The point of Dampier's Bay, where we are now lying, affords a secure anchorage, though the south-west winds blow here with violence; but the sea never runs very high. Landing is extremely difficult, on account of the sand-banks, which stretch into the sea for a league; indeed it is scarcely practicable, except at high water. Accordingly, a boat that was sent ashore the day after our arrival, (August 1818,) was swamped half a league from the land, and it was not without infinite trouble that we got the still ashore, and the tents that were to form our camp." But these sand-banks do not appear any where else in Dampier's Bay, but at the south cove called Seal's Bay, so that it is probable the landing may be easier elsewhere.

Pearl oysters are found in the greatest abundance among the surrounding small islands, and might recompence advantageously the researches of a pearl fisher. At seven in the morning the French used to collect their oysters: the reefs were studded with them, and, as the tide was out, they were not obliged to go into the water.

The prodigious number of whales proves that a commercial speculation in a fishery would be successful, and the subject is adverted to by the French voyagers, in several places in their works, with much confidence.* The amazing shoals of these fish struck the French with astonishment. During the three months of July, August, and September, they literally crowd the harbours, and endanger the boats.

Although turtle are plentiful all the year round, yet the month of August is the season when the shoals and sand-banks to the east of Faure island are covered with sea turtle, from which circumstance they were named Turtle Shoals. Some of these animals weighed from 250 to 300 lbs.

Faure Island lies about two miles to the east of Cape Petit, and is nine miles long, six or seven broad, and 21 in circumference. There are several easy landing places in the little bays on its eastern side. An indistinct view of the unexplored coast of the continent is obtained from the highest point on the island.

Supposing a party were to be stationed on board a vessel, for the express purpose of sinking a well and cutting a tank on the peninsula, the employment of stills to distil salt water for drink, would only be necessary during the first summer season, by which time one or more wells and a cistern might be finished. The French, with one still, distilled eighty pints per diem, which was sufficient for the thirty men they had on shore, and it was not disagreeable,

* "Voyage de Découvertes aux Terres Australes." Par Péron. 2d Ed. 8vo. Paris, 1824. Vol. I. Pp. 238, 395. Also "Navigation et Geographie." Par L. Freycinet. 4to. Paris, 1815.

but only had a smoky flavour, which was dissipated by stirring and aerostating: this still was very imperfectly constructed. Capt. F. says, "had it been complete, it would have produced 400 pints of fresh water from salt water in twenty-four hours, a quantity sufficient for the daily wants of 200 men."

I am quite aware that the difficulty of perhaps having to work through a deep stratum of sandstone, will be objected to my proposition of sinking wells; but I am not without experience on this particular subject. At Bangalore I sunk a well through red earth and pipe-clay to a depth of 30 feet, which work was done by no more than two men. And, at Bellary, I had succeeded in sinking a well through nothing but granite to the depth of 10 or 12 feet, and should have perfected it, had I not been removed to another part of India. I therefore know that an operation of this kind only requires a determined and persevering mind; neither does it consume such a length of time as might be supposed. I believe that a well might be made near Point Guichenot in thirty days, to the depth of as many feet, through solid sandstone the whole way; as well as that a tank or reservoir might be cut in the rock or excavated in the soil, if dimensions sufficiently capacious to save enough water, in one rainy season, to last a small community till the return of the next. And the rubbish, during the operation, might be carried aside in baskets or barrows, as in India, in default of better conveyances.

Fish, turtle, eggs, &c. in abundance, would afford a constant supply of fresh provisions, and that, too, of a nutritious quality, until hogs, goats, and possibly buffaloes, (imported from India,) increased sufficiently to afford a change of provisions.

I have not the least doubt in my own mind, but that any kind of vegetables, and especially our Indian sorts, (brinjauls, bandikies, yams, &c.) would grow in the soil of the little valleys; and the party might also try the planting of several kinds of timber and fruit trees; and, besides avoiding a wasteful destruction of the little wood at Point Guichenot, they might increase their stock of timber by planting during the rainy season, selecting only such wood as thrives best in the soil. It is astonishing how easily cuttings, stakes, and young trees, take root during the wet seasons, and how speedily they grow in a warm climate.

Although the most profuse waste of firewood has been going on at that place by the natives, in the large fires they make to warm themselves, without ever planting a single tree, yet nature fills up the waste by this speedy growth.

The anchoring grounds within the islands of Dirk Hartog, Doore, &c. which shut in Shark's Bay, are safe, and well situated for ships passing up and down the coast requiring occasional shelter; in fact, Capt. P. P. King says, that this bay affords the only safe anchorage on the whole line of the west coast of Australia; of course exclusive of Cockburn Sound. Probably, on further examination of, and a better acquaintance with the haven of Montbazin, it will be found capable of making a good boat harbour; and, if so, it would seem as if Providence pointed out the very spot for a fisherman's village. A party once established, and occasional assistance rendered them, in the way of live stock, seeds, and young trees, as well as domestic articles, the hand of industry would in a few years work such a change around the little settlement as would ensure its permanency; for it cannot be doubted but that the soil of the little valleys, where "the vegetation was magnificent," may be cultivated to advantage. Besides the fishery, the pearl trade, and seal-skins, it is not impossible but that a traffic, perhaps, for many other articles from the interior, not now known or thought of, might be established, and the place thus support itself by its trade.

Perhaps the best plan for the establishment of the fishing settlement, would be for Government to grant the exclusive privileges of the harbours and waters of Shark's Bay to a firm of British merchants for fifty years. It would then be worth their while to sink some capital in improvements; and, as they would be sovereigns of the place, they might levy a toll, or harbour dues, on all ships trading or putting in there, the same as is done at the Cape of Good Hope. This, together with the profits of the speculation, would soon bring back the first outlay, and continue an advantageous concern.

But even if the experiment should not be attended with success, it would, at all events, be an excellent post for fitting out a land expedition, for the exploration of the neighbouring parts of the continent; and as soon as the examination was completed, and no more could be done for geography in that quarter, the place might be abandoned. The natives would be left somewhat improved by the short intercourse, and be more friendly to Europeans,—a result, that may be attended in future years with the happiest effects.

M. Péron ascertained, beyond a doubt, by procuring some teeth and bones, that the dugong of the Indian Ocean was an inhabitant of the waters of Shark's Bay. Our ancient navigator Dampier, who also collected some bones of the same kind of animal here, thought it was a hippopotamus; but, as Péron justly observes, these amphibia are never found separated from fresh water rivers, and cannot exist in sea water. The dugong, on the contrary, is not an amphibious animal, and cannot exist out of salt water; it resides continually in shallows at the bottom of the sea, where it has been seen feeding on the herbs in numerous troops.*

In conclusion, the prodigious diurnal vicissitudes of the climate of Shark's Bay, from the burning heat of the mid-day sun to the excessively cold dews of the night, previously spoken of in this

* Leguat, Vol. I. p. 94-96. Also the Edinburgh Journal of Natural and Geographical Science, Vol. I. p. 161, for some account of the dugong.

paper call from me the following remark, viz, that excepting the nights in India not being quite so cold, I consider the climate at Péron's Peninsula, as described by the historians of the French expeditions of discovery, to be exactly similar to that of India: and I feel confident, that Europeans would in time become enured to it as well as the natives, because they would enjoy much greater advantages; inasmuch as they would have the protection of good houses and clothes against the cold of the nights; be fed with better food; and their occupations and fatigues by day be less severe, and under some regulation.

Had these voyagers resided some years in India, and been accustomed to a hot climate, they would probably have represented the physical characters of this peninsula and its climate as not quite so bad; at least they would not have made it out to be so murderous as they thought it; but, being fresh from sea, and unfitted to support the heat on land, (like many others who live on board ship, and in the constant enjoyment of a moist atmosphere and occasional fresh sea breezes,) it felt, and appeared to them, as altogether a spot so dreadful as to be perfectly uninhabitable.

If due allowance be therefore made for the circumstances under which the place has been so imperfectly explored; it will not appear either so impossible or so dreadful a site for a small colony of fishermen; and the utility thereof, and the benefits which may grow out of it, are incalculable.

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*Note.*—It is remarkable that none of the writers give the names of the trees on Péron's Peninsula; but there is a passage in one which says the vegetations is similar to that on the south coast.

Dampier, in his bucaniering voyage, says that he found several little wells of fresh water, (or holes,) close to the sea shore, in New Holland, about the latitude of 16° (N.W. coast.) And I can state, from my own knowledge, that, on various parts of the coast of Southern India, I have seen wells of fresh water within a few yards of the sea; and the sands in which they were dug are nearly as low as the surface of the briny wave itself. This fact makes me feel still more confident of the possibibility of coming at fresh water on Péron's Peninsula by digging.

# SCIENTIFIC REVIEWS.

*Elements of the Economy of Nature, or the Principles of Physics, Chemistry, and Physiology, founded on the recently discovered Phenomena of Light, Electro-Magnetism, and Atomic Chemistry.* By J. G. M'Vicar, A.M. 8vo. Pp. 630. Adam Black, Edinburgh, 1830.

Mr M'Vicar is a gentleman and a scholar. He is moreover a man of genius, and, better still, an amiable man, possessed of a strong and searching mind, led—through a maze of erroneous speculations perhaps, yet still led to the great end of all true philosophy—to sublime and reverend views of the Framer of universal nature. Ever since we knew any thing of Mr. M'Vicar, we have thought well of him; and though there is very much in his book of which we disapprove, yet even for his book we think the better of him. There is a vein of deep thought running throughout the whole, a wide knowledge of nature and natural phenomena, and general views extending still wider, which bespeak a man who *can* do something, and to whom therefore Science has a right to say, you must do something. Whether the production of the book now before us be the best way in which its author could have employed himself, is a matter on which we fear there will be but one opinion.

Such regard we entertain for Mr. M'Vicar personally; and we have been thus open and honest in expressing it, as we mean to be equally open and honest in examining the views and statements of the book before us. It is a curious and interesting book, but at the same time rather heavy and difficult to be read,—written in a style occasionally flowing, but more generally stiff and harsh, and often singularly obscure, especially where the author propounds his peculiar views, as if his mind were labouring to bring out some lofty thought, which he can only half express, perhaps because only half conceived. But we shall pass from the manner of the book, and turn to the matter of it, with which perhaps we have more to do. One word only in regard to the general confidence of our author in propounding his opinions. We like him all the better for advancing his opinions boldly; for we hold that few men have ever attained to literary or philosophic greatness, who felt not, long before, from some inward and irrepressible burnings, that they were destined to and deserved their fame; and yet we are bound to say, that the self-confidence of an author, whatever it may do to himself, will carry no conviction to the public that his speculations are deserving of being received.

*Elements of the Economy of Nature,*—such is the title of the book. It professes to unriddle all the phenomena of nature from the movements of the planets, and the evolution of light and heat to the hidden motions of atomic matter in developing the material forms of the various orders of animated beings. Through this wide field we cannot follow it; but conceiving that the first and surest test of the system here propounded, is to be found in its application to atomic chemistry, we shall confine ourselves at present to this, the main department of the work, reserving the physiological portion, should time and occasion permit, for consideration in some future number. In this branch of science alone can we grapple with the mechanical forms, particles, and molecules the author has built up. In animal and vegetable physiology we have few definite data to guide us, so that while physics have long shaken off almost entirely the dominion of hypothesis, these branches of knowledge still remain an open field for theoretical speculation.

The work is divided into four books. The first treats of the *structure and action of matter;* the second of the *radiant medium;* the third of *chemical and natural substances;* the fourth of *animals and plants.* Before entering upon the third book, which occupies about 300 pages, it will be necessary to lay before our readers a view of the principles on which the illustrations of Mr. M'Vicar are founded. It is a matter of disadvantage to the reader of his book, that he has not himself set out with a concise view of his system, separating what is *assumed,* what is *inferred,* and what is *demonstrated,* but has so involved it, and mixed it up with other matter, that he has at length found himself obliged to refer to page 508, for an outline which had more properly formed an introduction to his whole work. So far as we have been able to understand him, however, we find the following positions maintained:—

1. There are two kinds of matter,—*hard or atomic matter,* and *motorial* or *subtle matter.*

2. The ultimate atoms of *hard* matter are impenetrable, elastic, highly angular, uniform in size, and have the form of the regular tetrahedron.

3. The *subtle* matter every where invests the atomic matter in quantities which are variable and specific. The form of an atom invested by its subtle matter is a perfect sphere.

4. The *radiant medium,* that which fills up the intervals between all dense bodies, consists of these spheres symmetrically related and fixed in their positions by their mutual attractions. It is "the common vapour of concrete matter."

5. Subtle matter attached to the *angles* of atomic matter, gives rise to the phenomena of attraction and permanent adhesion,—to those of *gravitation,* of *aggregation,* of *crystallization,* of *cohesion,* and of *magnetism:* attached to the *surfaces,* it gives rise to the phenomena of repulsion and rarefaction, to *light, electricity,* and *galvanism.*

6. *Heat* consists in a tremulous motion in the atoms of bodies.

7. When the attractive power predominates over the repulsive, the atoms of hard matter unite in different numbers and posi-

tions, constituting different forms; and hence result the various kinds of matter we meet with in nature.

Besides these there are many other subsidiary positions or suppositions, to which it is unnecessary for us to advert. We are to consider the fundamental position, that the ultimate element of all kinds of ponderable matter is one and the same, and, then, the forms assigned to the various chemical bodies in the work before us.

We willingly grant the praise of sublimity to the ancient opinion, that all ultimate matter is simple and one, and we think that the speculative mind might be so lifted beyond itself by the thought, as to generate conceptions regarding the framer of the universe of the most exalted and heart-purifying character. We are not therefore opposed to it; on the contrary, we can occasionally indulge it, and feel ourselves made better by the high and reverend thoughts to which it gives birth. But here we would stop, and we think the man acts idly, and is guilty of wasting time and talents, who, in grappling with this lofty opinion, would bring it down, and connect it in detail with the forms and qualities of matter. We have ourselves indulged in theory regarding the atomic constitution of bodies, but we never once equalled ourselves to the daring task of pronouncing, *a priori*, thus, and thus has nature wrought. We came not down from above to survey the mysteries of the economy of matter, but climbing up by the slow and patient, yet sure method of induction, we endeavoured to find out the limit to which our present strength would carry us, satisfied that what we could not now achieve, future minds more able or more fortunate might possibly accomplish. That man will ever reach that clear and definite knowledge which this book pretends to convey, we do not believe,—that he will ultimately come infinitely nearer than his narrowed vision now permits him, we are fully persuaded; and were it not that we are borne up by the conviction, that the "first bound of the emancipated spirit" will be gladdened by the revelation of all the hidden mysteries and machinery of the material universe, we should look forward with envy to future times, and esteem those men the happiest who lived to see most of what the human mind could do.

But the truth is that the human mind will never, in this life, be able to compass universal nature. Already has the field of science become too wide for the comprehension of one intellect, and as it stretches out every day still wider, it will become every day more difficult to assign general laws to which all phenomena can be reconciled. Mr. M'Vicar is a high-minded man, and he possesses a general if not a minute knowledge of natural science, to which few can pretend; but in the only department, that of atomic chemistry, which, having vindicated to itself in some measure the title of an exact science, was fitted to put his opinions to the test, we consider him to have completely failed. And he has failed, we conceive, not from lack of talent in himself, but from the utter impossibility of succeeding by the method he has adopted. He may comfort himself by the words of Virgil,

> "Si Pergama dextrâ,
> Defendi possent, etiam hac defensa fuissent;"

or by the ancient quotation of Longinus,

> "*μεγάλων ἀπολισθαίνειν ὁμῶς εὐγενες ἁμάρτημα*;"

being assured that naked theory will rarely pass now for true philosophy, and that while theoretical views are little regarded, even when propounded by experimental men, they are not likely to call forth greater attention from the pen of a merely speculative philosopher. Another thing we must say. Had our author called his book an *attempt,* we should have felt bound to notice it favourably as an able and ingenious attempt. Had he sent it forth as a *view* of the way in which nature *may possibly* have gone to work, we should have said it was a curious and interesting production, and highly deserving of being read; but advancing, as he does, so decidedly, and laying down the law as if nature had kindly called him to her councils, we are obliged to show upon what shallow and insufficient grounds he has generally proceeded.

We shall state then first what we are prepared to admit on the subject of atomic chemistry.

1. We admit as *probable* that the atoms of all bodies are angular, and for this simple reason, that cleavage, carried as far as we may, never shows us any thing but angular fragments.

2. That these angular atoms are all definite geometrical forms.

3. That the ultimate atoms of whole families of bodies, while they differ both in mechanical and chemical properties, agree in having the same geometrical forms; or, in other language, are isomorphous.

4. That a chemical atom denotes probably several ultimate atoms.

5. That a limited variety of atoms, differently arranged and united in different numbers, may produce compounds possessing very different properties, as we find to be actually the case in the animal and vegetable kingdoms.

6. That the simple or undecompounded substances of chemistry, *may* therefore be compound, and *may possibly* be formed in favourable circumstances, though we have as yet no experimental proof of such being the case.

Thus far we are warranted in going; our third and fifth positions being the only ones that have been demonstrated.

Mr. M'Vicar, from certain considerations connected with its form as the most perfectly angular, *assumes* the regular tetrahedron to be the shape of his universal atom. Invested with subtle matter, these tetrahedrons form the radiant medium,—this also is of course assumed. Two of these tetrahedrons united by two planes form a double triangular pyramid, which is the base of all ponderable matter. This figure is called a bi-pyramid; the central part, where the bases of the pyramids meet, is called the equator, and the apices of the pyramids are the poles of the figure.

Now, having obtained this element, the forms of the different kinds of matter are deduced in the following way:—

*Hydrogen.* "Of all known bodies, we naturally expect to find that hydrogen gas possesses the most simple structure. Every circumstance induces the belief that it is more immediately connected with the radiant medium than any other. Now, of all the combinations of the atoms of matter, none is so immediately obvious as that produced by two atoms applied base to base. This is a particle of hydrogen gas,—its atomic weight is two!"

*Water.* "When six particles of hydrogen unite by their equators, there results a senate molecule of most admirable symmetry. This senate molecule of hydrogen is a particle of water. That water consists entirely of hydrogen, may be shown by decomposing it in a very highly electro-negative medium, adverse to the development of an electro-negative form." The atomic weight of water is consequently 12. But it "often aggregates into ternate molecules.* Next to this there is the septenate molecule, which consists of a particle in the centre, with six around it, one on each of its edges. But that which performs the most important part in the economy of nature is the senate molecule, which results from the approach of six, and contains in the centre a hexagonal pore.—A double molecule, in which one particle is above another, the poles not being in contact, also frequently occurs." After all this, we are astonished in the following page to find the following:—"*A single particle of water is, doubtless, very much too small for being seen,* so that we cannot obtain sensible evidence that it possesses the form which is here assigned to it!" Why, one would have thought he had actually seen, as he has assisted in getting up, these forms; and yet the proof of the whole is, that when built up according to a certain fashion of Mr. M'Vicar's, these aqueous particles constitute forms similar to those observed by Mr. Scoresby and others in snow-flakes and crystals of ice.

*Oxygen.* When by any means a particle of hydrogen is driven out from the circle of six which constitute water, the circle is of course diminished to five particles, and the "spendyloid form which results is named oxygen. Its atomic weight is 10." For this no proof is pretended to be given; but it is assumed, we suppose, that water, consisting of six particles of hydrogen, if we take away one, the remaining five must of course constitute oxygen, because water is decomposable into oxygen and hydrogen. But our author has

* In the language of this work a *particle* is synonymous to the chemical atom,—*a molecule* is made up of several particles.

added two remarkable facts to our former knowledge of this matter: *first,* "that the decomposition of water into the two free gases now considered, is probably only a chemical experiment, and never occurs in nature to any great extent," (p. 238.); and *second,* that oxygen "is never met with in nature in a free state, nor can it be insulated in the laboratory; its properties are consequently unknown," (p. 241.) Chemists generally consider oxygen gas to be constituted of the radical oxygen, and caloric, which does not affect its chemical properties; but Mr. M'V.'s heat is merely vibration, and his oxygen consequently is an entirely new substance.

*Vital or Empyreal Air.* Oxygen "always affects the aeriform state, and thus exposed to the incidence of radiant matter, an atom perches in its pole as hydrogen does, and the *oxygen becomes vital air.*" The only thing in the shape of a reason for this compounding of vital air, we find in the following lines:—

"When we consider the unipolar electrical state of a particle of oxygen, and the susceptibility of an atom of the radiant medium contiguous to its pole, to have an opposite state induced upon it, we will not hesitate for a moment to believe, that, as soon as oxygen mingles with radiant matter, it will unite with it as it does with hydrogen, by receiving an atom in its pole." P. 241.

*Nitrogen.* "Suppose, by a violent compression in the direction of the equator, that a particle of hydrogen is driven in towards the centre, its presence there forms a mechanical obstacle to the evolution of the form of oxygen, and the five remaining particles are under the necessity of uniting by their apices, and a form results, possessing symmetry enough to exist for some time. This is a particle of nitrogen."

Thus azote is a result of the decomposition of water, "and that such decomposition," says Mr. M'V. "must take place abundantly in the ocean, both on its confines with its own basin and the sunbeam, we can scarcely doubt." We confess we not only doubt, but we absolutely discredit all such fanciful resolutions and compositions; and, supposing them actually to take place as here described, we have not a particle of evidence before us to prove that figure evolved as above, has any claim to represent the form of azote. But our author finds the five particles which constitute azote, capable of three arrangements, of which he deigns to inform us, that "the two small forms continue in the ocean, but the large symmetrical one is aeriform." Such writing requires no comment. But nitrogen has also other forms. "It is not only developed in the decomposition of water, but is an abundant product of animal assimilation. While it remains in the organization of animals, however, there is every reason to believe that it exists in a solid state, or as an icosaedron; and if so, the icosaedron may be regarded as the characteristic form of the animal structure." And so it is concluded, of course, that the icosaedron *is* the characteristic form of the animal structure. And yet this is a fair specimen of the kind of reasoning as to forms, which constitutes the essence of the whole book before us. When we saw the great parade of new and nameless forms displayed in the plates; and in the references found one to indicate an atom of oxygen, another an atom of phosphorus, a third an atom of chlorine, &c. all as faithfully and accurately drawn as if the atoms of these substances had actually sat for their likenesses to Mr. M'Vicar, we felt as if philosophy had achieved a great discovery, and we suspended all opinion on the facts of the case, till we should search the work itself for the evidence from which these forms derived their character; but we searched the book in vain, and we can find no evidence for any one form better or more trust-worthy than what we have quoted above. They are in fact, all of them, mere fancies from first to last, little better than the scratches of the Row prophets, which they choose to call Chinese.*

Could our readers desire a finer tissue of gratuitous supposition than the following, which occurs in page 33?

"If nickel and cobalt recognize the magnetism of iron, and are really magnetic in a similar manner, it is to be inferred that some considerable part of their form is isamorphous with iron. As to that very general attraction of small bodies, exercised by the magnet, in as far as it is purely an attraction, arising solely from the influence proper to the angles of particles, it seems to arise from the iron which they contain; for where is there a body that may not contain iron? And, as to those south and north magnetic poles which are found at the summit and base of most bodies, the iron, in their composition, may be the means of enabling us to recognize such an interesting fact, becoming thus, by its universal diffusion, to the magnet, in reference to the attractive influence, what light is to the eye in reference to the repulsive, but it is not to be inferred that the iron in them alone possesses these polarities. This mutual disregard, however, bears in its quantity a certain relation to the quantity of difference between the dissimilar bodies; and it may be that there is scarcely any form in nature that might not acknowledge the influence of a vigorous magnet, by attractions and repulsions. As to rotation, it is probably the effect of the re-action of the subtile matter of dissimilar bodies, though much more eminently in those which are most nearly allied."

It may be amusing to our readers to see how one or two more of the atomic forms are deduced. That of *Carbon* is attained by the following summary process:—

"In our inquiries into the atomic constitution of natural bodies, we are naturally anxious to find a form to suit the properties of carbon, which, after water itself, performs the most curious and admirable part in developing the beautiful series of organic forms. We have seen that there is something very eminent in the structure of water and nitrogen, the other organic elements; doubtless we may expect the same in carbon. Now, the form into which atoms of matter resolve themselves most simply, after hydrogen itself, is that of a pentagonal bipyramid, for which the mind immediately contracts the prejudice that it is carbon. Its atomic weight is 5." P. 313.

* A new religious sect, whose devotees claim the gift of tongues, has recently sprung up at a place called Row, in the west of Scotland. "This celestial gift, it appears, consists in uttering certain articulate sounds, without any meaning attached to them, but which are supposed to be a language; and in forming on paper certain marks or characters, supposed to be either letters or words."

*Silicon.* We are sure our readers will feel grateful to us for the information we are the happy instruments of conveying to them, by quoting the following passage from page 432.

"When describing the structure of the radiant medium, it was shewn that eight atoms, circumscribing an octaedral cavity, might be regarded as its molecule. Of all the forms of the universe, this, then, may be regarded as the most extensively diffused; and though, in the radiant medium the atoms are prevented from cohering, yet where atoms are sufficiently near each other, this form, composed of eight atoms, with an octaedral cavity, may be constantly expected. It is that which bears the most intimate relationship to the matter which occupies the celestial spaces, and this, as well as the ease with which atoms may group in this form, will induce to its evolution. It is very natural to assume that this body must be silicon, which is, of all substances in the earth, by far the most universally diffused."

We have neither time nor space to refer to all the inconclusive conclusions as to forms which the book contains; for one of the very worst, we refer to *Alumina*, pages 448-9. The following on *Iron* is too exquisite to be omitted.

"It has been shewn, that a particle of alumina consists of atoms circumscribing a cavity, which is a hexagonal prism; that the base of potass consists of atoms circumscribing a pentagonal bipyramid; that the base of silica consists of atoms circumscribing a tetragonal bipyramid; that the base of lime consists of atoms circumscribing a triangular bipyramid. What form shall possess such eminence in nature as to be composed of atoms circumscribing a tetraedal cavity, which is the form of the ultimate atom itself? This is iron, a substance so universally diffused in nature, that it would be difficult to find any natural body whatever, in which we could positively say that there was no particle of iron in it." P. 463.

And on the distribution of iron we have the following: "Such are some of the forms of combination in which iron is most frequently found in nature and in the laboratory; but to trace the modes of its existence minutely would require volumes. It is perhaps generated at the first breath of the youngest creature in the world, and it is abundant in the oldest granite"!!! Children breathing iron! Truly we have reached the iron age at last. And yet all this is philosophy; it forms part and parcel of the economy of nature. But it is ridiculous to treat such fantasies with any thing like serious attention. Lest our readers, however, should think we select the weakest portions, we request as many of them as can lay hands upon the book, to read the chapter upon iron, which professes to be one of the greatest efforts it contains, and to judge for themselves of the ease with which whole hosts of phenomena are accounted for and explained. Mr. M'Vicar's atomic forms are in truth little better than a tissue of random guesses, upon which the powers of an ingenious and gifted mind have been idly wasted; for we reckon as merely accidental, or, more properly perhaps, natural coincidences, all the instances of agreement between the combinations of which his forms admit, and those actually found in nature,—coincidences which would probably be found by assuming any other form for the ultimate atoms, and building them according to known physical laws.

It is strange that any man should place such reliance upon forms deduced in the way above shown, as to permit himself to call in question, or to modify the results of experiment. And yet there is hardly a received atomic weight which the book before us does not state to be more or less in error, and few chemical compounds in which the ratio of the composing atoms has not been hitherto misunderstood. Nay, the author has even found out new compound bodies, and given them names, without having even seen or knowing how to form them, and all because he finds that a certain number of particles of two *assumed* forms, which he *supposes* to represent certain substances, are capable of being built together into a figure of more or less symmetry. To the knowledge of two of these compounds, Citrogen and Pyragyne, or Pyragynic Acid, we shall introduce our chemical readers.

Of citrogen it is said, "We cannot avoid the conclusion that particles of carbonic acid abundantly generated from a violent combustion or otherwise, should apply themselves to each other in the nascent state, so as to generate other molecules than those of mineral fixed air. Thus two particles of fixed air might retain a particle of carbon in the cavity between them, which is conformable; and if the molecule only attained to this structure when escaping from the region of combustion, in this state it might ascend into the gasometer. Such a form is completely isamorphous with common fixed air, and none of the tests for carbonic acid would be sufficient to distinguish it. To prevent circumlocution, it may be called Citrogen, for a reason soon to be perceived. Its atomic weight is 35." P. 336.

And of pyragyne the author writes, "In all cases where oxygen is supplied in abundance, and where the conditions are most favourable to combustion, a completely burned sort of carbonic gas may be expected, in which there are three particles of carbon and four of oxygen." This he calls pyragyne or pyragynic acid. Experimental chemists are content to wait for the discovery of substances before they name them, but your theoretical men can give to any "airy nothings a local habitation and a name." We dislike all prophetical hints and anticipations either from practical or fanciful men; and we see no claim any philosopher, either ancient or modern, has to the title of a wise man, merely because out of fifty idle guesses one or two turn out at last to be true.

The ratio of the elements of chemical compounds, is deduced by our author after the following manner:—Silicon has a certain form noticed above. Five particles of this form must be built up with four of oxygen before any symmetrical figure can be obtained; therefore silica is a compound of 5 silicon + 4 oxygen. All known combinations, and many unknown, are deduced in this way, and were we sure of our fundamental forms, nothing could be safer or more accurate; but while these forms are all fanciful, nothing can be more useless or absurd.

Mr. M'Vicar has a high reverence for antiquity. He admires Plato, because he threw out the conjecture shown in the book before us to be true, (!) that the form of flame is a pyramid. He quotes Boyle as an admirable man, on account of his chemical results; and Boerhaave has no small share of his adoration. He laments the disuse of old names too. "It is to be regretted," he says, "that the names given by the fathers of the science are so completely forgotten; for it is not right, without some good excuse, to change a name which has been given by any one to the substance he has discovered or first described." Kind, good soul! And therefore we find him talking of calx, and argil, and vitriolate of iron, and ferrane, and phosphorane; and therefore, no doubt, he hopes that when his new carbonic gases are discovered, they will be called citrogen and pyragynic acid. We cannot, of course, compel other chemists to adopt a particular nomenclature, but should it be our own lot to fall in with these two non-descript gases of Mr. M'Vicar's, we shall certainly so christen them.

One meets with little passages now and then in the course of the work, at which one cannot help smiling. Speaking of the formation of bodies from their ultimate elements, the author quotes the experiment of Sir H. Davy, in which, during the decomposition of water by the galvanic battery, in an agate vessel, he obtained notable quantities of soda, and adds,

"He satisfied himself, however, that it was derived from no other source than the cup, because he did not obtain any, when the water was acted on in gold vessels. But the silica of the agate has a great affinity for soda, and would dispose to its evolution according to well known and acknowledged principles, while gold has no such affinity. *Hence, though soda was not developed in the gold, it does not follow that it was not developed in the agate.*" P. 240.

And in page 312, he says,

"Spirit of salt, or oil of vitriol, united to ammonia, may be handled without the fingers suffering, and this we ascribe to the circumstance, that the acid is neutralized by the alkali. But if our fingers, like those of a calcined statue, happened to be made of lime, we might almost as well handle spirit of salt as sal ammoniac; and it would be true, that, in as far as our sensations were concerned, the acid united to the sal ammoniac was as little neutralized, as with our present fingers we find it to be when it is united to water."

But we must bring our remarks to a close, adverting first to two errors in matters of fact which we have happened to meet with. All the experiments hitherto made, tend to show that ammonium, or that compound of azote which forms an amalgam with mercury, consists of one atom azote and four atoms hydrogen. Mr. M'V. (p. 309.) takes away hydrogen from his ammonia, in building the form of his ammonium, and makes it to consist of one azote to two of hydrogen.

In page 465, he says,

"Crude or cast-iron, in the solid state, possesses rather a less volume than in the liquid state; but solid cast-iron floats on liquid cast-iron like wood upon water, and even when pressed to the bottom of a pot of liquid metal, it rises to the top. These phenomena indicate that we are not acquainted with the specific gravity of iron, when it is not affected by the terrestrial magnetism."

We know not upon what authority Mr. M'V. makes this statement as to the volume of cold cast iron, but we should have thought that the circumstance of its swimming on melted iron would have led him at once, without hesitation, to an opposite conclusion. For the fact is, that cast iron is classed with ice, bismuth, antimony, and most saline solutions which occupy a greater space when in the solid or crystallized, than when in the liquid state, being exceptions to the general law of expansion by change from the solid to the liquid state; and it is to this very property that iron owes its great utility in founding. Its expansion on cooling causes it to take a good impression, and thus the most delicate figures may be cast in iron, while in gold or silver they must be struck.

There are many other topics discussed in the work under review, into the consideration of which we should have been happy to accompany our author. But we have already trespassed beyond our usual space. In the meantime, having done so much for theory, we would urge Mr. M'V. to turn his attention to experiment, and his opinions will speedily undergo modification. It is not impossible to combine large views with minute experimental research, (though it is stated by Mr. M'V. that " to limit our researches by actual experiment, is to exclude ourselves from the inquiry;") but we think it is impossible now for any one so to master the wide field of science, rambled over in the volume before us, as to enable him to lay down the law of nature in regard to her most minute and most abstruse phenomena. We are not averse to a little theory: it is, on the contrary, pleasant and refreshing, as connecting at once and relieving the dryness of mere experimental results; but it must be rational and chastened theory, such as is derived from experiment, as waters from a fountain, and which, like the stream skirting the mountain ridge, shall at every step receive fresh accessions from similar sources; and, disappearing not for a time like the fabled rivers of classic Greece,—not losing itself utterly among sands as in eastern deserts, shall preserve a continuous and unbroken course, showing a manifest and consecutive connection with its parent spring, till it reach its legitimate and final destination. From other theory than this, it is the boast of our age to have escaped, and the splendid results due to the inductive method, must be forgotten ere it will trust itself again to the sophism of *a priori* speculation.

## On the present state of Science in Great Britain.

### No. IV. *Wernerian Natural History Society.*—(*Resumed.*)

In the eighth number of this Journal, for May last, we expressed our satisfaction at having " instigated an investigation, by the independent members of the Wernerian Society, into the singular condition of their mis-directed institution ;" and it was our intention not to have made further allusion, for the present, to the proceedings of the Committee which had been appointed, leaving the zealous members to pursue, systematically and undisturbed, the good work of reformation which was begun. But we find ourselves unexpectedly forced from our meditated silence, by the appearance of a sort of official document which has has recently obtained circulation under rather an equivocal form.

The history of the Wernerian Society, with respect to the subjects of which we have before spoken, is simply as follows :

So far back as 1824, complaints were occasionally heard in the Society, against the inefficiency of the system by which it was regulated ; for it was found, in particular, that the advantage to be derived from the library of the Society could not be shared by the members, as the room in which it was reported to be contained was not open to them, except on the days of the Society's meetings ; and when any applications for books were made, the general answer was that they were not in. And in December of that year, Mr. Falconar of Carlowrie moved that the Council make particular inquiry into the state of the library.

A committee was accordingly appointed by the Council for this purpose, but for reasons hereafter to be stated, nothing was done. After the lapse of three years, (1827,) the system continuing as heretofore, Mr. Falconar again found it necessary to bring the matter before the Society, and the committee were requested *to expedite their report.* About a month afterwards, however, though the committee had not yet given in any report, a meeting of Council was called by the secretary, under the president's direction, and a list of the books was given in by Mr. James Wilson, the librarian. It was then agreed that, *as a preliminary step*, a notice be added to the next intimation of the Society's meetings, earnestly calling upon members who may have borrowed books from the Society, to return them without delay. And in this *preliminary* condition matters remained till this present year, (1830,) the interval being marked by no new circumstance, except the election of Mr. Macgillivray to the newly created office of assistant librarian, in November 1828.

In the beginning of the present year, we were led by circumstances to examine into the condition of the Wernerian Society, as one of the scientific institutions which had formerly been held to be of considerable importance in this country,—an institution which was favourably known to us by several volumes of transactions which it had published during a period of seventeen years, and more particularly by the numbers of celebrated names which swelled its list of members. The investigation which we conducted, soon showed to us that the Society had been for some time in a dormant state,—that no transactions had been given to the public for the last five years,—that the members were unacquainted with the state, or even the present existence of a library or museum, though many donations were known to have been presented to the Society,—and that, as is almost invariably the result of laxity in the forms of a public body, and of permanency of office in the executive powers, several abuses had crept into the management of the Society, which required correction before any thing in science could be done. For instance, it was well known that the president, who is the editor of a scientific journal, was in the constant habit of appropriating to his own use the papers which ought to have formed part of the Transactions ; and if a member asked the librarian for any particular volume, (which was of very rare occurrence,) it was found that the books had never been delivered over to him,—that he had no catalogue of the library,—and that he did not even possess the key of the case in which it was believed that a portion of the library was contained.

From these facts it was evident that some change was required, if Edinburgh was to possess a Natural History Society, which might bear any equality to the rank and respectability of the University, in whose bosom it was placed. And, as we had entered upon the task of ascertaining the state of science in this country, it became a duty with us to make known the results of our inquiries, which accordingly appeared in No. V. (p. 352,) of this Journal, for February 1830. We therein published statements which have only been corroborated by subsequent information, and we then challenged contradiction from those best acquainted with the Society's affairs.

About this time a busy activity pervaded the Wernerian Society. The abuses became a subject of conversation; and, in the month of April last, Mr. Falconar, for the third time, made an effort to stay the progress of the Society's ruin. The Council was in consequence again directed to examine into the state of the library, and to procure a new catalogue of the books, &c. in the Society's collection; and an inquiry into the state of the funds was also set on foot. A committee of the Council was appointed to the duty, and their labours are now in progress.

From the above narrative, whose accuracy is open to refutation by any one who can dispute it, it will appear sufficiently clear that we have already done some little service, at least in our own city. And after having congratulated ourselves upon success, we could not but be surprized to find that a circular had actually been put forth, for the mere apparent purpose of depriving us of the credit of having occasioned the renewal of the investigation into the library, and, in addition, an inquiry into the nature and condition of the Museum of the Society. Had this document confined itself to a statement of facts, without indulging in party-coloured explanations, we should have passed it over unnoticed; but the ridiculous attempt to rob us of any little merit we may have obtained by our labours, together with the doubtful form under which the circular appears, seem to require from us a brief analysis of its true scope and design.

The apology for this publication is contained in the following words:

" *Erroneous notions* being in circulation regarding the *occasion* and *objects* of the inquiry into the state of the Library and Collection of the Wernerian Society, the following *correct statement,* taken from the Minute-book of the Society, seems called for."

Now, we think the occasion and objects of the investigation will be tolerably understood from the above details; but we give the document at length.

" On the 4th December 1824, it was ' moved by Mr Falconar of Carlowrie, and seconded by Dr Charles Anderson, and unanimously agreed to, That it be an instruction to the Council to make particular inquiry into the state of the books belonging to the Society, and to have a list made up without loss of time.' (*Minute-book*, p. 230.)

" ' Thereafter, the Council having met; in pursuance of the preceding instructions, appoint Mr G. A. W. Arnott, Mr Alex. Adie, and Dr Robert Knox, a committee to make inquiry as to the state of the books belonging to the Society, and to take steps for getting a complete list of the books made up and printed for the use of the Members.' (*Min.* p. 231.)

" Mr Arnott having gone to the Continent, the Committee delayed to report; and after the lapse of three years (during which period, however, such Members as demanded books were furnished with them,) Mr Falconar and Dr Anderson brought the matter again before the Society, 15th December 1827, and the Committee were ' requested to expedite their report.' (*Min.* p. 279.)

" About a month afterwards, Professor Jameson directed the Secretary to call a meeting of Council on this business; and accordingly, on 26th January 1828, ' the Council met and took into consideration the state of the books, &c. belonging to the Society. A list of the books made up by James Wilson, Esq. the librarian, was laid before the meeting. It was then agreed that, as a preliminary step, a notice be added to next billet, earnestly calling upon Members who may have borrowed books from the Society, to return the same without delay. It was likewise agreed that, thereafter, the librarian, or a member of the Society acting in his place, should be requested to attend on each Saturday on which the Society meets, at One o'clock P.M., for the purpose of giving out and receiving books.' (*Min.* p. 281.)

"Mr Macgillivray had hitherto assisted in arranging and keeping the books, without holding any office in the Society; but at the election of office-bearers for the year 1829, (held on 29th November 1828), 'Mr Macgillivray was elected assistant librarian,' (*Min.* p. 290); and this appointment, it was hoped, would both relieve Mr Wilson, and promote the object in view, of facilitating access to the books.

"Although books were as heretofore furnished by the Librarian to Members requiring them, difficulties, it appears, still occurred, arising chiefly from the circumstance of the Society not possessing a separate apartment of its own, which might *at all times* be accessible to the members. On 17th April 1830, therefore, in consequence of a letter addressed to the president, (signed among others, by Mr. Falconar the original mover for the Committee of 1824, and by Mr. Arnott, the senior member of that Committee), it was 'agreed that a Meeting of the Society be called for Saturday 24th April, to take into consideration the present state of the library, and other matters connected with the Society.' (*Min.* p. 307.)

"Accordingly, on 24th April, 'the Society met, R. Jameson, Esq. P. in the chair; and after hearing such Members as inclined to deliver their opinion, the following resolutions were moved by the Rev. Dr David Ritchie, 1. That the Council of the Society (viz. Professor Jameson, P.; Mr Witham, Dr Adam, Dr Greville, Mr Falconer, V. P.; Dr Boggie, Rev. Dr Brunton, Mr Stark, Dr Aitken, Sir A. Nicholson, Dr Gillies, Rev. Dr Scot, Dr Anderson, with the Librarian, Treasurer, and Secretary *ex officiis*, and with the addition of Mr G. A. W. Arnott) be directed to examine into the state of the library; to cause to be made up a new catalogue of the books, &c. in the Society's collection, with a note of such articles as appear missing; and to suggest what regulations may be suitable for the management of the library in future; and, as soon as they are ready, to call a general meeting of the Society, to receive their report. 2. That the Treasurer be directed to furnish to the Society as soon as he can, a state of the funds realized, and also of the sums due to, and debts due by, the Society, as far as ascertained.—These resolutions were seconded by Dr Walter Adam, and unanimously adopted by the Meeting.' (*Min.* p. 308.)

"With the view of following up these resolutions, the Council met on the 1st of May; and, 'after some consultation, it was unanimously agreed, that the following gentlemen be appointed a Committee for the purposes mentioned in the minutes of the Meeting of 24th April last, viz. Professor Jameson, Mr. Falconar, Dr. Gillies, Mr. Arnott, with Mr. Wilson, librarian; Professor Jameson, convener, and three to be a quorum. The Committee to meet on Thursday 3d June next, at Twelve o'clock.' (*Min.* p. 309.)

"PAT. NEILL."

Of this detail, which from its demi-official form, and numerous quotations from the minutes, we might suppose to be accurate, almost every paragraph which is not actually an extract, is either a misrepresentation, or a true representation of a censurable fact.

In the first place, it is stated in the 3d paragraph, that "*Mr. Arnott having gone to the Continent*, the Committee delayed to report; and after the lapse of three years, (during which period, however, *such members as demanded books were furnished with them*,") the matter was again brought before the Society. Now it is notorious, and we have the authority of Dr. Knox, a member of the Committee, to assert, that they did not delay because Mr. Arnott was gone to the Continent, for the Committee was quite independent of Mr. Arnott's presence, and, moreover, there was abundance of time before his departure for the transaction of all the business. The truth is, that *the Committee were not permitted to enter the room* * where the books were said to be kept. And on application to the li-

* It is generally stated that, on the institution of the Wernerian Society, it was entered as a clause in the code of laws, that all specimens presented to the Society should be deposited in the Museum of the College, for the behoof of the members; a sort of bargain which was made for the use of the Museum apartments, in which the Society at that time met. It has turned out to be rather an unequal barter, however, under the present circumstances; and we would

brarian, they found that the books had never been delivered into his possession, and that consequently he had no catalogue, and indeed knew nothing about them. Here, then, was a hopeless case; they neither knew what to look for, nor where to look; though suspicion pointed to the place where most of the books might be found. The committee were culpable in not reporting to the Society, at this time, on the true condition of things.

Again it is said, that "such members as demanded books were furnished with them." A mere equivocation! for during the whole period of the Society's existence, there have not been above twenty applications from members for the use of books,—and for the best reasons;—they did not know what books were in the Society's library, and no access to the room was permitted except on the days of meetings; and that no books were given out on such days, is evidenced by the minute quoted in the 4th paragraph, that in 1828 it was agreed "that *thereafter*, the librarian, or a member of the Society acting in his place, should be requested to attend on each Saturday on which the Society meets, at one o'clock P. M. for the purpose of giving out and receiving books." We only ask the fabricator of the tale, to show to any one of the members the book which contains the receipts for volumes borrowed, if the mummery of procuring such an useless book has been observed; and it will at once testify how many members "were furnished" with books from the library.

In the 5th paragraph we find it stated that "Mr. Macgillivray had hitherto assisted in arranging and keeping the books, *without holding any office* in the Society." We need say no more, in explanation of this most unwarrantable assumption, than that Mr. Macgillivray was the "private secretary" of Professor Jameson, the president of the Society, and that it shows plainly enough who had the use of the books.

But in 1828, "Mr. Macgillivray was elected assistant librarian," though he was not at that time an ordinary member of the Society; "and this appointment, it was hoped," says the circular, "would both relieve Mr. Wilson, and promote the object in view, of facilitating access to the books." Mere *persiflage!* Why, the books were not in Mr. Wilson's care, and access to the room continued to be as impossible as before.

In the 6th paragraph, the writer's boldness increasing with the apparent successfulness of the historical details, the equivocation is repeated in a less deceitful form. "Although books were as heretofore furnished *by the librarian to members requiring them*," (it is fortunate for the truth of this statement that NO *members required them*; indeed that, during his whole officiate, the librarian has not given out twenty volumes,) "difficulties, it appears, still occurred, arising chiefly from the circumstance of the Society not possessing a separate apartment of its own, which might *at all times* be accessible to the members." We have already stated that the room was *at no time* accessible to the members, except on the days of meeting.

Thus far it has been managed to keep within the bounds of truth, but a trying fact came now to be stated, which, if candidly acknowledged, would negative the whole tenor of the document. "On 17th April 1830, in consequence of a letter addressed to the president, (signed, *among others*, by Mr. Falconar, the original mover for the committee of 1824, *and by Mr. Arnott*, the senior member of that committee,) it was "agreed that a meeting of the Society be called for Saturday 24th April, to take into consideration the present state of the library, and other matters connected with the Society." Here the great object of the circular is divulged; for the sole purpose of denying the true cause of the appointment of the present committee, by connecting it with the old committee of 1824, has all this trouble been taken. What sensations, then, will the framer of that statement feel, when we declare, upon evidence and with confidence, that *Mr. Arnott did not sign that letter*, and that *no other names were attached to it than*

recommend the Council to look into it, *and particularly to order the laws to be printed forthwith*, for it certainly is the merest drivelling to put one's head blindfolded into the despotic yoke.

*those of Mr. Falconar and Dr. Gillies,* which latter gentleman had no connection whatever with the old committee.

Paragraph 7th. "On the 24th April the Society met," and "the following *resolutions* were moved by the Rev. Dr. Ritchie, 1. that the Council of the Society be directed to examine into the state of the library," &c. &c. This statement again is incorrect. It is of no service now to ask why the Council did not perform their duty, without being continually urged and re-appointed; but it had become evident that the surest way to carry the business through, was to have a special committee for the purpose, and the attempt was made at this meeting;* this proposal, however, was overruled by the president, and the Rev. Dr. Ritchie, seconded by Dr. Walter Adam, moved, *as an amendment on the previous motion for a special committee,* and not as an original resolution, that the Council, to whom Mr. Arnott was afterwards added, be directed to examine into the state of the *books, &c. in the Society's collection.* As most of the active members of the Society were on the Council, the amendment was allowed to pass; but since that period, the Council have appointed a committee from their own number to perform this onerous duty. At the time of the re-appointment of the Council to the investigation of the library, it was suggested by a member that the *Museum* of the Society came under the general duty delegated to them,—"the books, *&c. in the Society's collection.*" And such is the fact, as shown by the quotation: but this was too sore a subject; and the president could not prevent himself from interfering, with the remark, that they had already enough on their hands with the library, and they had better complete that first. Of course, the Council will do their duty to the Society, and not permit themselves to be blinded to the actual words of the motion by such a manœuvre.

The 8th and concluding paragraph states that "the Council met on the 1st May," and "appointed a committee for the purposes mentioned in the minutes of the meeting of 24th April, viz. Professor Jameson, Mr. Falconar, Dr. Gillies, Mr. Arnott, with Mr. Wilson, librarian; *Professor Jameson, convener.*" But who had the indelicacy to name the president convener, when it was well known that against him the inquiry was, in point of fact, directed? *He named himself, though another gentleman was proposed.*

Such is the nature of this circular, which has apparently cost so much labour and management in the manufacture. And it would show want of candour on our part did we not afford it the highest encomium for neatness of execution and general fitness to deceive. But it is fortunate for us, in our office of Censor, that we were bred to the study of natural history, where the analytical powers of the mind are in constant exercise, and where it is a principle that all the individual facts must be examined before the generalities can be allowed.

But the most unaccountable circumstance connected with this document remains to be noticed. Nobody knows whence it came, nor to whom it is addressed. It certainly bears the signature of Mr. Neill, the Secretary of the Wernerian Society, and has been directed to several members of the Society. But these facts make the matter doubly mysterious. By whom was the circular ordered to be printed? Did the Council see it necessary to go the expense, however trifling, of explaining to the Society "the occasion and objects" of their appointment? Surely the Society, when it met on the 24th April, was sufficiently aware of its own motives, not to require any explanation from its Council, why it delegated to that Council a particular duty. But we know that the Council did not direct the publication of this circular, and did not even know of its existence till it was sent to the several members. Was it, then, the act of Mr. Neill, whose name is subjoined? We cannot suppose it; for it certainly is not customary for secretaries to take upon themselves to dictate to the society which they serve, on these mat-

* The Council of the Wernerian Society has been hitherto rather an inefficient body; but their excuse is, that they have never been summoned to meet, except on some very extraordinary occasions. At all events, we know that the President has had all the trouble of performing their duties.

ters; and that he did not commit himself in such an unadvised action on his own responsibility as a private member, we think we know too much of Mr. Neill for one moment to conceive. Indeed we consider it but justice to that gentleman and to ourselves to state, that though from his office he has the misfortune to have his name mixed up with these transactions, not a thought of blame can attach to him, except for want of firmness to resist the "foul devices" which are sometimes "whispered in his ear." We trust we shall not offend that retiring delicacy which so eminently distinguishes him, if we join the voice of all who know him, in the profession of unlimited esteem for his character and talents. "There are several societies," says Mr. Babbage, "in which the secretaries and other officers have very laborious duties, and where they are unaided by a train of clerks, and yet no pecuniary remuneration is given to them. Science is much indebted to such men, by whose quiet and unostentatious labours the routine of its institutions is carried on."—(*Decline of Science in England.* Preface, p. xii.) And such a man is Mr. Neill.

If, then, Mr. Neill did not subscribe his name to these statements from the dictates of his own will, he must have been induced or obliged to do it by some other person; and this seems the more probable that the usual form in such circulars is in this case neglected. The customary mode of signing similar official papers is "*By order of the President,* Pat. Neill, *Sec.*" But this authority has been cunningly removed from the signature, and "PAT. NEILL" stands in isolated singularity at the bottom of the page.

It is not clear, then, from what source this circular has emanated. The Council, however, ought to inquire into it; for the attempt to influence the minds of members and others during an investigation which might come to assume considerable importance,* is as wicked as to tamper with a jury in the discharge of a duty where conscience is the arbiter.

But we have stated that it is equally incomprehensible to whom the "correct statement" is addressed. That it cannot be intended for the attending members of the Society is palpable, for they knew well enough what they were about; and we have been unable to learn that it has been received by any of the absentees. We presume, then, that it has sprung from the suggestion, that *Iræ hominum transibunt, sed scripta nostra maneant;* and upon the same principle we now answer it by the above analytical investigation into its truth or falsity.

Several of our friends who have seen the circular, though they were fully aware of its true bearing, have suggested the propriety of our taking no notice of it, as they were afraid that our interference, under the present circumstances, might have an injurious effect on the labours of the committee; and that besides betraying an apparent hostility to the interests of the Society, we should, by exposing the misdeeds of any of its members, excite a degree of odium against an institution to which Scotland had looked up with pride, and of which she still formed the highest expectations. But we know the value of publicity in defining the limits of good and evil; and we could only reply to our advisers, in the sentiments of Babbage, that *the party* which governs it, is not the Wernerian Society; and that the justness of their remarks could only have applied, if the whole body, on becoming acquainted with the system we have exposed, had, by ratifying it by their approbation, appropriated it to themselves: an event which has not, however, occurred. (Introd. p. xiv.)

* The custom in Societies is, if the librarian is unable to show any receipt from a member, or otherwise to account for works missing from the library, that he be responsible for their value; but no responsibility can rest on Mr Wilson, as the books were never delivered over to him. The Wernerian Society will therefore have to look to those who had immediate custody of the books, for the supply of any deficiences which cannot be accounted for. We trust there will be no serious losses discovered on comparing the articles in the library and museum with the list of donations and purchases in the Secretary's minutes.

# GEOGRAPHICAL COLLECTIONS.

## *Notice of the Island of Tristan d'Acunha in the Atlantic.*

Mr. Earle, who gave a description of this island, lived at Tristan d'Acunha with the Governor Glass and his family. There were then on the island four men, two women, and some children, who subsisted miserably by killing seals and selling refreshments to ships. Since that period they have quitted the island, and a farmer and his wife from England, who were going to New South Wales, have established themselves there. The following account of the appearance of the island, and the manner of the inhabitants' living, is from a letter in the Sydney Gazette.

"The circumstance which first offers itself to my memory of the voyage, (to Calcutta,) is having touched at Tristan d'Acunha, probably the largest and most fertile of a group of three islands, which are situated between the Cape of Good Hope and South America. Tristan d'Acunha is about eight leagues in circumference. The shores of the two other islands are so dangerous, that they can only be approached in the calmest weather. One has the name of Nightingale; the other is called Inaccessible. The appearance of Tristan d'Acunha, to the north-east, is very striking. At the foot of an almost perpendicular mountain of 9000 feet in elevation, and covered with thick shrubs, exists a beautiful plain of a vast extent, which borders the shore.

"We had scarcely cast anchor when we saw two men approaching us in a little boat. As soon as they were on board, they expressed to us the extreme pleasure which they felt at our visit, for no ship had come near them for several months. They told us that they were the only men who lived on the island, and that the wife of one of them was the only woman. The husband was an Englishman, and had been at one epoch of his life a rich farmer in Yorkshire; but being ruined by a series of misfortunes, he and his wife had been induced by an old acquaintance, captain of a merchant vessel, to accompany him, without paying any thing for their passage, to New Holland, to endeavour to retreive their fortunes. The ship having occasion to touch at Tristan d'Acunha, the farmer and his wife were so charmed with the country, that they determined to remain on the island instead of continuing their voyage. After having vainly sought to turn them from this project, the captain gave them European grains, two cows, sheep, poultry, and what other provisions they had on board, and, obliged to depart, they bade a sorrowful farewell, and left them to their lot.

"They were the only human beings on the island; but it was evident that there had been somebody fixed there a few months previously; for they found a hut ready to receive them, and several acres of land that bore the traces of recent culture.

"They had scarcely inhabited the island the space of one year, when a Dutch vessel stopped there to procure water, and one of the crew, who was displeased with the captain, hid himself in the island till the departure of the vessel. He was received with kindness by the Yorkshire farmer, and remained with him to the moment of our arrival. The Dutchman was then disgusted with the life which he led at Tristan d'Acunha, and he begged our captain to take him on board, when he would work as sailor to pay his passage. The captain having yielded to his request, the man appeared as pleased as if he had escaped from prison. He, however, showed to his companions the greatest regret at leaving them.

"After having offered to the farmer some amusing books, some woollen clothes, a couple of barrels of powder, a quantity of flour, rice, and biscuit, we accompanied him to the shore, and we were enchanted with the air of satisfaction and of prosperity which reigned in the habitation. His wife, both good-looking and cleanly dressed, received us at the entrance of the house. In answer to our questions, she assured us that, as they had no children and few relations, they had not the slightest desire to return to England for some time; but that when the infirmities of age should overcome them, they would quit with joy, on the first favourable occasion, their solitary residence, to pass the remainder of their existence in their native country. They were then in the flower of their age, and perfectly satisfied with their lot. They listened with a sort of pride to our encomiums on their flourishing condition, and our surprize at seeing the land so well cultivated. The climate being perfectly temperate, and the soil light, they had given all the desired perfection to a great variety of European, as well as tropical fruits and vegetables. They had in their yard the two cows of which we have already spoken, many English pigs, some sheep, goats, and poultry, enough to afford them a daily supply. They seldom killed the wild boars, wild goats, or a species of black-cock which abounded in the island.

"In the deep waters among the rocks, several species of fish were found. The mountains were literally covered with water hens, petrels, albatrosses, and the different feathered tribes which are met with in the South Atlantic. As seals are very abundant there, our insular inhabitants had preserved a great quantity of skins, to exchange them for other merchandize with the ships which might touch at Tristan d'Acunha. We ourselves having obtained our supply of fresh water at one of the limpid fountains of the mountain, we bade good-bye to this little romantic isle and its two interesting inhabitants."

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### *Hydrography of Russia.*—(*Continued from* p. 212.)

Few of the great Asiatic rivers can course to the south, because they have their origin at the northern foot of the great mountains which separate Russia from Mongolia and Mandjouria. It is not the same in Europe. In advancing from the east to the west, the first we meet with is the *Oural*, which forms the limits of the two continents. This river, formerly called Jaik, and Rymnus by the ancients, has its source on the western acclivity of the chain of mountains to which it owes its present name, under the 54th degree of north latitude. After flowing some distance to the west, from the fort of Orsk to that of Ouralsk, it turns to the south, to empty itself, after a course of about 700 leagues, which divides the Bachkirs and the Kirghese in the vicinity of the Caspian Sea.

To the west of this river we meet with the *Volga*, whose long course is of so much importance for the internal commerce of Russia, and for the markets of its two capitals. This river is the longest in Europe; for it traverses a distance of about a thousand leagues, while the course of the Danube has only about 450 leagues of development. It takes its origin from a lake situated at the foot of the forest Volkhouski, in the government of Tver, in the environs of Ostuchkof. Originating as a rivulet at Reif, where it becomes navigable, it is not more than 90 feet in width. Thence it flows constantly to the east, though with considerable windings to Kasan, where it attains a width of 600 feet. Its principal navigation begins at Tver. Afterwards it traverses Ouglitch, Rybinsk, Jaroslarl, Kostroma, Nigni-Novgorod.

The *Kama*, a considerable river which descends from the Ural, joins the Volga in this place, after a very long course. In the environs of Saratof, it is above 1200 feet wide, and near Astrakan its width is nearly five leagues at high water. From Kasan it directs itself constantly to the south, and after having received, on the right, the Oka and the Soura, and on the left the Tvertsa, the Mologa, the Chexna, the Kostroma, the Ounga, the Vetlouga, the Kama, and the Saneara, it throws itself by seventy arms into the Caspian Sea.

Its course is through beautiful hills, regular, calm, and often limpid, but at the time of the melting of snows, it often is the cause of great ravages. More than 5000 boats charged with productions, annually descend this river, so abundant in fish. The ancients called it Pha, and sometimes Araxes; its Tatar name, which signifies abundance, is Idel, Edel, or Adal, and the Merdouins at the present day call it Rhan.

The *Don*, if we judge by the direction which it follows for the greatest length of time, would appear to intend throwing itself, with the Volga, into that immense mediterranean lake to which its dimensions have given the name of Caspian, in the environs of Tsaritsine; it appears even to wish to mingle its waters with those of its majestic rival, whose bed, lower than hers by about 50 feet, is not at a distance of above fifteen leagues, and is separated by a tract of sandstone. This river, celebrated in antiquity by the name of Tanais, was formerly regarded as constituting the limit between Europe and Asia.

It is from three to six hundred fathoms in width, but its depth being very inconsiderable, and its course very slow, it is not of much importance to the internal navigation. Its bed contains nevertheless neither rocks nor large stones, but is formed of sand, marl, and chalk. Sand-banks and little islands are often met with. The Don issues from Lake Ivanof, and in the government of Toula it successively receives the Voronege, the Khoper, the Medveditsa, and the Donerz, and after some long windings, and a course of about 230 leagues, it empties itself by three arms into the Sea of Azof, below the town of that name, a putrid and marshy sea, which is almost indebted to this river for its existence.

The Dnieper, by the ancients called Borysthenes, is more to the west, and discharges itself into the Black Sea, between Otchakof and Kinbourn, after having formed a bay of fifteen leagues in length, and from about half a league to two leagues in width.

The sources of this great river, which for a long time formed the natural limit of Russia, are very near those of the Wolga, both being in the marshes of the government of Smolensk. It runs in a westerly course to Orcha, when it takes a southerly direction. Its course, of a very safe navigation as far as Smolensk, is interrupted a little lower by cataracts formed by masses and blocks of granite. It afterwards becomes navigable for a distance of about 400 versts to the sea. It is more than 360 leagues in length, and at Keif is traversed on a bridge which is 3583 feet long. The rivers which feed its stream are, to the left, the Sokb, the Dessna, and the Soula; to the right, the Beresina, the Pripetz, the Rass, a river which receives the same name as the empire, and the Boug, a river which, originating in Podolia, empties itself into the bay or lake formed by the Dnieper. This last becomes navigable at Drogobouge; its bed is deep; its borders very elevated; and its waters rapid. It also abounds in fish.

The Dniester, called Tyras by ancient geographers, issues from a lake situated in the Carpathian mountains in Gallicia. On entering Russia near Kamenetz, it follows a south-easterly direction, to empty itself into the Black Sea.

Up to 1812, it formed the boundary of Russia against the Ottoman monarchy, but the peace of Bucharest placed this frontier on the Pruth and the Danube. The Dniester is navigable, and offers to the provinces, formerly Palish, an outlet for their corn. It forms at its mouth, like the Dnieper, a lake between Akerman and Ovidiopol.

Lastly, several of the Russian rivers flow to the west. They are, to commence with the most southerly, the Kuban, the Niemen, the Duna, and the Neva.

The *Kuban* forms, with the Terek, the limits of the empire between the mountaineers of Leghistan; the courses of these two rivers form nearly a straight and uninterrupted line. The *Kuban*, called *Wypaius* by the Greeks, descends from the mountain of Châto, one of the most elevated of the Caucasus. Like most of the Russian rivers, it is confined in a narrow bed. It begins by flowing to the north, then turning to the west, it empties itself by one arm in the Black Sea, and by the other into that of Azof. This last is more rapid than the other, which, slow and less deep, is very navigable for all vessels that do not draw much water.

The *Niemen* is one of the principal means of communication between western Russia and the other countries of the north; for on it all the commerce of Lithuania and of Podolia is transacted. It forms the limit between Russia and Prussia, from Grodno, when it begins to flow to the north, as far as Jourbourg, at a short distance from Tilsit, when, at the same time that it enters upon the territory of the kingdom of Prussia, it takes the name of Memel, which it carries afterwards to its mouth in the Baltic Sea. Its source is in the government of Minsk, but before arriving at the frontier, it again traverses those of Vilna and of Grodno.

The *Duna*, called by the Russians *Zopadnaia Dvina*, that is to say Western Dvina, and by the Lettons *Daugava*, originates near the sources of the Volga, in the forest of Volkhonski, in the government of Tver. From Velige, where it is already navigable, to beyond Vitebsk, it courses parallel to the Dneiper and the resulting opening.

After a navigable course of 250 leagues, which is slightly interrupted by some cataracts in the vicinity of Dunabourg, it empties itself into the Gulf of Riga, a little below the sea-port of that name, at Dunamunde, where its width is imposing; but at its mouth sands prevent large vessels ascending as far as the great bridge of Riga, about 900 feet long. Though its affluents (the Toropsta, the Bolderaa, &c.) are not considerable, this river is of great importance to commerce.

Lastly the *Neva*, which traverses the beautiful capital of the north, aud gives to it a new character of beauty, has a course of only fifteen leagues through the government of St. Petersburg from Lake Ladoga, to which it serves as an issue to the Gulf of Finland, into which it empties itself before Cronstadt by several arms. This majestic river, though it divides itself into Neva, Great and Little Nefka, and several other arms that water Petersburg, is every where broad, navigable, and rapid, and it is unfortunate that its limpid and healthy waters should sometimes threaten the existence of the capital.

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### *Establishment of the Trial by Jury amongst the Native Inhabitants of the Island of Ceylon.*

Few civil improvements have ever been introduced among a people of a more extensively beneficial nature than the communication to the native inhabitants of Ceylon, (the only settlement in India that is directly under the government of his Majesty,) of the right of acting as jurymen on the trial of their own countrymen for criminal offences, and the consequent resolution of the proprietors of slaves in the same island, that all children born of those slaves, after a certain date, should be born free. The following passages, which we extract from a key published with an engraving of Mr. Ackerman's, convey a brief but perspicuous history of the two interesting occurrences to which we have alluded :—

" Sir Alexander Johnston, when first member of his Majesty's Council in Ceylon, having conceived that the best mode of insuring the stability of the British authority in that part of the world was, to admit the natives to share the benefits of the institutions of our free country, was deputed in 1809, by the governor and council, to submit, in his official capacity, to his Majesty's ministers such measures as he thought best calculated to accomplish this object. The ministers having approved the measures thus recommended, caused a charter to be issued under the great seal of England, granting to the natives of Ceylon the right of sitting upon juries, and of being tried by juries of their countrymen. Sir Alexander having returned in 1811, with the appointment of chief-justice and president of his Majesty's council in Ceylon, lost no time in carrying the provisions of this charter into effect; and it was at his suggestion that the proprietors of slaves in the island, by way of manifesting their gratitude to the sovereign of a free nation for having granted to them and their countrymen the rights of freemen, unanimously resolved, that all children born of their slaves after the 12th of August, the anniversary of his Majesty's birth, in the year 1816, should be considered as free, and be brought up at their expense till the age of fourteen; thus associating for ever in the minds of their posterity, the memory of his majesty with all the blessings which are to be derived from a state of freedom.*

"The introduction of the trial by jury among all the classes of the natives of Ceylon, without distinction, has been the means of gradually removing the religious jealousies which prevailed among them, and habituating the people of all the different religions, and of all the different nations of Asia, resident in the island, to attend together the proceedings of the supreme court, both as jurors and spectators.

"Owing to the continual intercourse kept up between the natives of Ceylon and the people of Hindoostan, the privilege granted by his Majesty to the former soon became generally known and desired throughout the British empire in the East; and, induced by the success which had attended the introduction of the measure in that island, the parliament, by an act passed in 1826, extended the same right to the natives of all the British territories in India. Hence, the trial by jury is now become an object of general interest to more than one hundred and twenty millions of people, inhabiting countries containing upwards of three hundred thousand geographical square miles, and extending from the Gulf of Cambay to the rivers Ganges and Burrampooter, and from the Himalaya mountains to Cape Comorin."

At a time when the future government of India is a subject of public discussion before both houses of parliament, it must be an object of great interest and curiosity to trace the origin and progress of measures which must ultimately produce the greatest moral and political change in the feelings and conduct of the natives of India. Of a few of the benefits which have already been derived from them, the following extracts from a letter written at his own request to the presisident of the board of control, by Sir Alexander Johnston, in the year 1825, will give some idea.

"The native jurymen, from knowing the different degrees of weight which may safely be given to the testimony of their countrymen, decide upon questions of fact with so much more promptitude than Europeans could do, that, since the introduction of trial by jury, no trial lasts above a day, and no session above a week or ten days at farthest; whereas, before the introduction of trial by jury, a single trial used sometimes to last six weeks or two months, and a single session not unfrequently for three months. All the natives who attend the courts as jurymen obtain so much information during their attendance, relative to the modes of proceeding and the rules of evidence, that since the establishment of jury trial, government have been enabled to find amongst the half-castes and native jurymen some of the most efficient and respectable native magistrates in the country, who, under the control of the supreme court, at little or no expense to government, administer justice in inferior offences to the native inhabitants. The introduction of the trial by native juries, at the same time that it has increased the efficiency and despatch of the courts, and has relieved both prisoners and witnesses from the hardships which they incurred from the protracted delay of the criminal sessions, has, independent of the savings it enabled the Ceylon govern-

* The number of slave proprietors (being in fact the whole of the slave proprietors in Ceylon) who agreed to this resolution was 761: and the number of full-grown slaves, male and female, to whom the resolutions applied, was about 10,000.

ment to make immediately on its introduction, since afforded that government an opportunity of carrying into effect, in the judicial department of the island, a plan for a permanent saving of ten thousand pounds a year. No man, whose character for honesty or veracity is impeached, can be enrolled on the list of jurymen; the circumstance of a man's name being upon the jury roll, is a proof of his being a man of unexceptionable character, and is that to which he appeals in case his character be attacked in a court of justice, or in case he solicits his government for promotion in their service. As the rolls of jurymen are revised by the supreme court at every session, they operate as a most powerful engine in making the people of the country more attentive than they used to be in their adherence to truth. The right of sitting upon juries has given the natives of Ceylon a value for character which they never felt before, and has raised, in a very remarkable manner, the standard of their moral feelings. All the natives of Ceylon, who are enrolled as jurymen, conceive themselves to be as much a part as the European judges themselves are, of the government of their country; and therefore feel, since they have possessed the right of sitting upon juries, an interest which they never felt before in upholding the British government of Ceylon. The beneficial consequence of this feeling is strongly exemplified in the difference between the conduct which the native inhabitants of the British settlements on Ceylon observed in the Kandian war of 1803, and that which they observed in the Kandian war of 1816. In the war between the British and Kandian government in 1803, which was before the introduction of trial by jury, the native inhabitants of the British settlements were, for the most part, in a state of rebellion; in the war between the same governments in 1816, which was five years after the introduction of trial by jury, the native inhabitants of the British settlements, so far from showing the smallest symptom of dissatisfaction, took, during the very heat of the war, the opportunity of my return to England, to express their gratitude through me to the British government, for the valuable right of sitting upon juries, which had been conferred upon them by his present Majesty.

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" The difference between the conduct which was observed by all the proprietors of slaves on Ceylon in 1806, which was before the introduction of trial by jury, and that which was observed by them in 1816, which was five years after the introduction of the trial by jury, is a strong proof of the change which may be brought about in public opinion, by the judges availing themselves of the opportunity which their charging the jury on the first day of session affords them, of circulating among the natives of the country such opinions as may promote the welfare of any particular class of society. As the right of every proprietor of slaves, to continue to hold slaves on Ceylon, was guaranteed to him by the capitulation under which the Dutch possessions had been surrendered to the British arms in 1795, the British government of Ceylon conceived that, however desirable the measure might be, they had not a right to abolish slavery on Ceylon by any legislative act. A proposition was, however, made on the part of government by me to the proprietors of slaves in 1806, before trial by jury was introduced, urging them to adopt some plan of their own accord for the gradual abolition of slavery: this proposition they at that time unanimously rejected. The right of sitting upon juries was granted to the inhabitants of Ceylon in 1811. From that period I availed myself of the opportunities which were afforded to me when I delivered my charge, at the commencement of each session, to the jurymen, most of whom were considerable proprietors of slaves, of informing them of what was doing in England upon the subject of the abolition of slavery, and of pointing out to them the difficulties which they themselves must frequently experience, in executing with impartiality their duties as jurymen, in all cases in which slaves were concerned. A change of opinion upon the subject of slavery was gradually perceptible amongst them; and in the year 1816, the proprietors of slaves of all castes and religious persuasions in Ceylon, sent me their unanimous resolutions, to be publicly recorded in court, declaring free all children born of their slaves after the 12th of August 1816; which in the course of a few years must put an end to the state of slavery which had subsisted on Ceylon for more than three centuries."—*Lit. Gaz.*

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*Remarks on several Icebergs which have been met with in considerably low latitudes in the Southern Hemisphere*, by CAPT. HORSBURGH, Hydrographer to the East India Company, were communicated to the Royal Society at the Meeting of the 4th February last.—The journal of the ships belonging to the East India Company, the author observes, during the whole of the last century, contain no accounts of icebergs having been seen in the course of their navigation in the southern hemisphere, although several of these ships proceeded into the parallels of latitude 40°, 41°, and 42°. But, during the last two years, it appears that icebergs have occasionally been met with by several ships in their passage, very near the Cape of Good Hope, between the latitudes of 36° and 39°. The particulars relating to these observations are detailed in the paper. The most remarkable occurred in the voyage of the brig Eliza from Antwerp, bound to Batavia, which, on the 28th of April 1828, fell in with five icebergs in latitude 37° 31′ S., longitude 18° 17′ E. of Greenwich. They had the appearance of church steeples, of a height from 250 to 300 feet; and the sea broke so violently against these enormous masses, that it was at first suspected that they might be fixed on some unknown shoal, until, on sounding, no bottom could be discovered.

It is remarkable, that, in general, icebergs seem to be met with in low latitudes nearly at the same period of the year, namely, in April and May, in both the northern and southern hemispheres, although the seasons are reversed in these two divisions of the globe. In order to account for the origin and accretion of the southern icebergs, the author thinks it probable, that there exists a large tract of land near the antarctic circle, somewhere between the meridian of London and the 20th degree of east longitude, whence these icebergs have been carried in a N. and N.E. directions, by the united forces of current, winds, and waves, prevailing from S.S.W. and S.W. Bouvet's and Thompson's islands are not of sufficient magnitude; and Sandwich land ond Kerguelin's island are too remote to be the source of the icebergs lately observed in the vicinity of the Cape. From their unprecedented descent during the last two years, it is most probable that the disruption of these masses of ice from the places of their formation, was the effect of some powerful cause, of rare occurrence, such as an earthquake or volcano, which has burst forth and convulsed the inaccessible regions of the south, leaving no other testimonials of the event than some few fragments of ice, scattered at a distance in the Indian Ocean.

*Esslingen Society for Botanical Excursions.*—In the 16th Volume of the *Bulletin des Sciences*, we observed an announcement that the Society of Esslingen proposed to send out a botanist, in 1829, to explore the Pyrenees, and that another would be charged to collect for the shareholders the plants of Dalmatia, many of which are new. We have now the greatest satisfaction in stating, from an article in the *Hesperus* (24th Jan. 1830,) that the projects of the Society have been executed with the greatest success. The notice contains an enumeration of the principal plants collected in the two countries visited in 1829, amongst which there are a number which botanists must be anxious to have in their herbariums, especially when the specimens have been so well selected and prepared as those which M. Endress has brought from the Pyrenees. This zealous traveller has many times braved the greatest dangers, and even death, to procure the most curious species of the Eastern Pyrenees, in which part alone he has made his collections. The Society being about to explore the other portions of the Pyrenees, we shall thus have a very complete collection of the Flora of this interesting chain of mountains. M. Endress proposes consequently to visit next summer the High-Pyrenees; in autumn he will devote his attention to the coast of Bayonne, passing the winter there, and going in the spring to the Low-Pyrenees; the rest of the year will be employed in examining the botany of the countries which the traveller has not been previously able to visit. The execution of this plan will depend, however, on the will of the present members of the Society, and of those who shall continue to join it, and co-operate by their subscriptions to the developement of its activity. The committee request them, in consequence, to give their support as soon as possible, and transmit their subscriptions.

We understand, in the interim, that a project is formed for a great botanical expedition to the southern hemisphere in 1832 and 1833, the announcement of which will be published as soon as it is definitively settled.

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## *Notice of the Fellatahs.*

THE *Gazette Universelle d'Augsburg* has published the following particulars concerning the Fellatahs, from a letter of Mr. William B. Hodgson, attached to the American consulship in the Barbary states.

It is very probable that the Fellatahs will found in future times a very great empire in Soudan, and that this power will play the principal part in the civilization of Africa. If the Sultan Bello abolished slavery in his states, it would be a great step made towards a better state of things. The example given by a great nation, and the influence of its monarch, would soon force the inferior tribes to imitate him; and if once the barbarous wars which these tribes carry on among themselves, for the purpose of obtaining slaves, were done away with, nothing would be opposed to the civilization of these countries; for commerce, which from that moment would establish itself on the coast of Africa, would bring life around every thing. Maroc, Algiers, Tunis, and Tripoli, would thus lose their rich commerce of slaves; and as the Africans could no longer, as in our days, come and exchange in those states their slaves for merchandize of all kinds, they would prefer the more commodious markets of the coast of the Atlantic, to the perilous journies across the deserts. This consideration has in no way escaped the barbarian governments: on the contrary, we know how much they have used their influence, as African nations, to deprive Christians of all free access among them. The American colony of Liberia is called by its position to take a great part in this revolution of commerce, and to draw great advantages from it.

Though Captain Clapperton has already given some detailed information on the history and character of the Fellatahs, the subjoined remarks will not be found void of interest.

The Fellatahs are so named by the Negroes, but they themselves use the term Fellan, or more exactly Faulan; but as this nation is anthropoklepthe, as well as the Tuaryckes, and as it carries away negroes for the purposes of slavery, Fellatah appears to be a term of reproach, like that of Serdu, by which the Negroes designate the Tuaryckes. At Senegal, and on the borders of the Gambia, they are called Fulah and Puhls. Mungo Park designates them under the first of these names, and Mollier under the second. The Fellatah nation extends from the Atlantic to the frontier of Darfour. It speaks every where the same language, of which the following are words, with the singular and plural terminations. The orthography and pronunciation is after that of the English language.

| | *Singular.* | *Plural.* | | *Singular.* | *Plural.* |
|---|---|---|---|---|---|
| Water, | Deam. | | Moon, | Lauro. | |
| Fire, | Gheabingol. | | Man, | Gorkoo. | Gorhai. |
| Sun, | Nandjee. | | Woman, | Debbo. | Eroubai, |

| | Singular. | Plural. | | Singular. | Plural. |
|---|---|---|---|---|---|
| Head, | Horee, | Koiee. | Horse, | Putcho, | Putchee. |
| Eye, | Yeteree, | Gitee. | Cat, | Musoro, | Musodee. |
| Hand, | Djungo, | Djundai. | Bird, | Sondo, | Chiullee. |
| Dog, | Rawane, | Dawaree. | Day, | Handee, | Nejandee. |
| Cow, | Naga, | Nai. | Night, | Djemma, | Baldee. |
| House, | Sodo, | Oure. | Year, | Dungoo. | Doobee. |

The adjectives do not change their genders. The personal pronouns are,

| | | | |
|---|---|---|---|
| I, | Mee. | We, | Mechom. |
| Thou, | Ah. | You, | Ancon. |
| He, | Kanke. | They, | Kambai. |

Possessive Pronouns.

| | |
|---|---|
| My head, | Hazee am. |
| Thy hand, | Djuago an. |
| His house, | Sodo mako. |

This vocabulary proves that the Fellatahs are not of Arabian origin, as pretended by a writer in the *Revue Britannique* for January 1829, nor of Berber origin, as Mr. Mollien appears to think. This nation apparently descended from the elevated plateau where the Niger takes its origin, and whose climate appears to be temperate. As the Fellatahs neighbour on Abyssinia, it is probable that they have some relation with the Fallaschas of that country. Bruce says that the latter are Jews, and speak the ancient Ethiopian language, but this language is very little known. The negro idioms have a particular character. An examination of the language of Tibbou, Bournou, Haoussa, and Timbuctoo, prove that they have no declensions either for the genders or for the plural number. Perhaps even their verbs are not conjugated. If we compared the language of the Tuaryckes which inhabit the north, and that of the Fellatahs to the south, with the simple and uncultivated idiom of Soudan, perhaps we should find that there exists as much difference between the languages of Africa, as between the colours of its inhabitants, and that, like them, they may be divided into white and black. This examination might throw a great light on the history of the development of the human species.

*Situation and Rural Economy of the Kirgheses of Omsk.* By the Sotnick of Cossacks Makhonin.—These Kirgheses, about thirty years ago, lived with their flocks out of, but not far from the frontiers of Russia; but the want of subordination to their chiefs, and the disastrous incursions to which their topographical and social situation exposed them, determined them to subject themselves for always to Russia. Government assigned to them a sufficient extent of Steps, when gradually they increased to the present number of 3900 individuals of both sexes. In the deplorable state to which they were almost all reduced, they first sought to gain a subsistence by working for the Russians, then their lot gradually bettered, more especially by bringing up cattle, the only kind of economy which they were acquainted with, and for which these nomades appear to be born. Their flocks increased successively to the present period; and this tribe of 3900 souls possesses 27,080 horses, 5285 horned beasts, and more than 450,000 sheep. These Kirgheses are further, rich in carpets, stuffs, and other domestic effects, and objects of dress in use among the people of Asia.

On several points of the line in which are placed the Russian military posts, some of the rich Kirghese have made, and continue to make, with more or less success, a certain number of agricultural attempts. The example which the nomadic tribes have before their eyes of the happy, and often rapid, progress which the Cossacks make in agriculture and in several branches of European rural economy, fixes more and more the attention of the nomadic tribes of these countries, stimulates their intelligence, tends to tear them from their vagabond life and habits, and to fix them to the soil without destroying the instinct and native talent of the Kirghese for pastoral occupations. This example will sooner or later make them unite the advantages of the cultivation of fields.

This influence of civilization has been hitherto slow, and far from being general; nevertheless it begins under happy auspices. The contempt and aversion of sedentary employment diminishes every day; and, without presuming too much for the future, we may expect that the solid enjoyments which these occupations procure to the Russians who deliver themselves over to them, will not be long in supplanting the sterile jealousy of their neighbours, and causing it to be succeeded by a wish to participate in these advantages, by devoting themselves to a peaceable industry.—*Agricultural Journal of Moscow.*

*Account of the Polish Jews.*—"As none of them are engaged in agriculture, they are but rarely to be found in the villages; and being thus assembled in the towns and cities, which are but few, they seem in most of them to form a very large majority of their population. The men have, for the most part, much finer countenances than the other Poles; their forms are better as well as their attitudes and paces; and the long, flowing black dresses which they commonly wear, form altogether a striking contrast with the appearance of their slouching, loitering, idle neighhours. Their eastern countenances and complexions, and the waving beards of many, especially of those advanced to middle age, presented a new and striking feature. They seemed to be always in motion, and yet doing nothing; and it was natural to inquire how such numbers of them could procure the means of subsistence, especially as their wives and daughters seemed to be decorated with jewels or ornaments much more expensive than were to be seen among the inhabitants of the same class in the neighbouring provinces of the Prussian dominions which had just been passed through. It appeared extraordinary in a country where the laws prohibited them from possessing land—where their own indisposition to a rural life prevented them from renting and cultivating that of others—that they should not address themselves to some manufacturing or handicraft pursuits: but such the editor had reason to believe was the case; and all of them subsist by being the retail distributors of the labour of their neighbours in some way or other. They have in their hands all the intermediate operations of the commerce of the country, to such an extent, that every one who wants either to buy or to sell any commodity performs the operation, however minute, through the instrumentality of his Jew. A lady of the highest rank in Poland affirmed, that if she wanted to purchase household linen, clothes, or furniture, she was obliged to employ her own Jew, or she was sure to be cheated. This kind of trafficking habit, though it leads to great wealth with some few individuals of the nation, leaves a great part in the most miserable state of poverty—a state which can only be encountered by the extreme of frugality, approaching to a kind of half starvation; whilst the rags and filth which cover their persons are hid from the eye of the observer by the long dresses of black stuff, which composes their principal but cheap garment.—*Levi and Sarah, a Polish Tale, from the German of J. M. Niemcewicz.*

*Miscellaneous Intelligence.*—Dr. Von Siebold, whose imprisonment in Japan we had the unpleasant task of announcing in a late number, has been set at liberty, and is, we are happy to find, arrived at Batavia.—Mr. Caillé has published a letter in the *Moniteur* of the 4th May, professing to refute all the doubts expressed in the Quarterly Review, with respect to the authenticity and correctness of his journey to Timbuctoo, "a journey of which a rival nation," he says, "entertains a little jealousy, at the unexpected success of an undertaking, in the prosecution of which it has expended considerable sums, and lost so many distinguished men."—The *Estafette d'Alger,* to be published in Africa, will contain, besides the details of the campaign, pictures of the manners, customs, &c. of the African tribes, and lithographic representations of plans of battles, costumes and scenes of the country.

# NATURAL-HISTORICAL COLLECTIONS.

## Baron Cuvier's *Lectures on the History of the Natural Sciences.*

Lecture VII. (*Continued.*) Aristotle's History of Animals.—The *History of Animals* is truly a masterpiece. On reading this treatise, it is difficult to understand how the author could have obtained from personal observation so many generalizations, so many aphorisms whose accuracy is perfect, but of which his predecessors had never formed the slightest idea. This book is not, properly speaking, a treatise on zoology; it is a summary, which bears the same relation to this branch of natural science as the *Philosophia Botanica* of Linnæus holds in another department.

The first book treats of the parts which compose the body of animals, which are described, not by species, but by natural families, detailing the peculiarities of each group. Such a labour could not have been performed, had not the author possessed very clear notions on the classification of beings. However, as he has not deemed it necessary to trace a zoological gradation, some individuals have pretended that his work is destitute of method. Such a reproach only evinces a very superficial mind in him who advances it.

The whole of the commencement of this first book is in some degree detatched from the rest, and is intended to serve as an introduction. It is principally composed of general propositions presented without development, but in so clear a manner that any one may understand them, and easily apply them to the natural objects with which he is acquainted. The object of the author has evidently been to fix the attention, by thus assembling in a small space a great number of remarkable results, and to give, in the first place, an idea of the interest which will be found in the study of nature. The most part of these aphorisms indicate the observation of an immense number of particular facts, as may be judged from the following, which we select.

All animals, without exception, are furnished with a mouth, and possess the sense of touch; but these characters are the only two which are indispensible, and we cannot find a third which is not absent in some species.

Amongst terrestrial animals, there are not any which are fixed to the earth; amongst aquatic animals, on the other hand, we know many which are fixed.

Every animal which has wings has also feet. (The author relies upon this observation in denying the existence of dragons, which had been represented as winged serpents.)

Amongst winged insects, many are furnished with stings. Those which carry this organ in the anterior part of the body have never more than two wings; those which have it posteriorly possess four.

Such propositions, it is well known, cannot be formed *a priori;* they are necessarily based on a profound observation of facts, and indicate an almost universal examination of animals.

In this same introduction, Aristotle establishes the foundations of his classification. He divides animals according as they have blood or as they have not; in other words, he separates red-blooded from white-blooded animals. The animals with red blood are quadrupeds, serpents, birds, fishes, and cetacea. Although both the two latter classes live in the water, and resemble each other somewhat in external form, Aristotle, in connecting them, is far from confounding them. He knew the nature of the cetacea as well as we know it now; he knew that these animals have warm blood, that they bring into the world a living offspring, and that they nourish their young with milk from their mammæ. He established also amongst the quadrupeds a well-marked division into viviparous and oviparous; the latter, said he, in their internal organization and their tegumentary system, have a great analogy with the serpents. From this subdivision, we find the different groups very naturally allied, and it is only in their arrangement that there is any thing to revise.

The white-blooded animals are the mollusca, crustacea, testacea, and insects. This division, certainly, is not altogether irreproachable; however there was not a better till the time of Linnæus. Amongst the mollusca, Aristotle particularly designates the *Octopus*, the *Loligo*, the *Sepia*, the *Argonauta*, remarking that this latter is not attached to its shell. He describes in detail all the parts of these animals, and speaks even of their brain; which is very remarkable, since it is very few years ago that the existence of such an organ in the mollusca was determined.

The subdivisions which he establishes amongst the animals with white blood are still better than his principal divisions; in the insects, for example, it is altogether the classification of Linnæus. He distinguishes the insects according as they are winged or apterous; and of the former composes three sub-orders, distinguished by having wings to the number of two or four, or having them covered with horny cases (*elytræ.*) He then explains what he means by *genus* in zoology, and gives, as an example, the *solipeda*, which he constitutes of the horse, the ass, and the wild mule of Syria (*nemionus.*) It is indeed a perfectly isolated genus, and one of those which we would at the present day select for illustration.

Aristotle, after this introduction, which is presented, as he himself remarks, as a bait to lure towards the study of natural history, passes to the description of the different parts of animals, commencing with the human body, which serves him for a term of comparison, and for the base of his nomenclature. He treats first of the great regions, and of all that is external; then he passes to the examination of the internal parts. There his observations ceased to be so exact. However, the great features of organization were well known to him, and he even appears to have been better informed on some details than most of those who have followed him. He knew, for instance, the Eustachian tube, and speaks of it in the passage where he refutes Alcmeon, who contended, as we before stated, that goats respire by the ears. He commences his descriptions with the brain, and states, that this organ is found in all red-blooded animals without exception; but that, amongst white-blooded animals, it is only found in the mollusca. Man, he adds, of all animals, possesses the most voluminous brain. He describes very well the two membranes which envelope this organ, and the different nerves which leave it to be distributed to the eye. But to this single point all his neurological knowledge was confined; he was ignorant both of the distribution and use of the nerves. Herophilus was the first who had somewhat exact ideas on this part of anatomy. Aristotle speaks of the veins whose principal trunks have their origin in the heart; he distinguishes well the venæ cavæ from the pulmonary vein; he describes also the aorta from its origin to its division at the inferior part of the trunk. But he did not know that the arteries contain blood; and seems to have thought that the air penetrates to the heart, an organ which he describes as having only three cavities. He treats of the stomach, the omentum, the liver, the spleen, the bladder, the kidneys and their appendages; he says that the right kidney is placed higher than the left. All these descriptions, although incomplete, and even false in many points, prove at least that he had seen the viscera of which he speaks.

Aristotle next occupies himself more particularly with animals, and first speaks of their limbs. In describing those of the elephant, he remarks, how the length of the fore-legs, and the nature of the joints, render it difficult for this animal to drink and to gather nourishment from the earth; he shows that the trunk supplies this inconvenience, and becomes an useful organ of prehension. Moreover he knew that this trunk is a true nose. He continues, and gives very interesting details on the modes of reproduction of this quadruped, on the differences of the sexes, &c. Buffon has contradicted him on many points, but almost always incorrectly, as is proved by the observations recently made in India.

Aristotle then considers animals under the relation of the distribution of hair. Amongst those which carry a mane, he cites the bonasus, which is the aurochs, (*Bos urus*,) and then three animals of India, the hippelaphus, the hippardium, and the buffalo. The hippelaphus, or horse-stag, has been recently found by MM. Diard and Duvaucel; the hippardium, or hunting leopard, has also been unknown till within these few years. It was in the Royal Menagerie, but Buffon never saw it. As to the buffalo, we know that it was only introduced into Europe at the time of the Crusades. Aristotle describes it in such a manner that we cannot mistake it; he speaks of its colour, of the direction of its horns; he says that it differs as much from the common bull as the wild boar differs from the pig. In speaking of the camel, he already designates the two species, the one proper to Arabia, the other to Bactriana: the last could only be known to the Greeks by the conquest of Alexander.

After having terminated all that relates to the hair, he speaks of the horns, and, on this subject, he lays down general principles whose accuracy has been confirmed by all succeeding observations. Let us instance the following:—

No animal has horns which has the foot undivided; but the inverse rule does not hold; and thus the camel, which has a divided foot, bears no horns.

Those animals which have divided feet, horns, and no teeth in the upper jaw, all ruminate; and, reciprocally, there is not a single ruminant which has not all those three characters.

Horns are hollow or solid: the former are persistent, the latter caducous, and renewed every year.

Our author next speaks of the teeth,—of the manner in which they are renewed in man and in animals,—of the different forms which they have in the different species, according to the nature of their food, being sharp and pointed in the *carnivora*, flat and grinding in the *herbivora*. In some animals certain teeth protrude, and form tusks; but no animal is armed at the same time with tusks and horns. In the elephant, the tusks of the female are small, and directed towards the ground. Here again is one of the propositions wherein we would have thought that Aristotle was wrong. The Indian elephants, indeed, do not exhibit any difference in this respect indicative of sex; but the African elephant, which is that described by our philosopher, has really the peculiarity mentioned.

There comes then a description of the hippopotamus, which accords very ill with the rest of the book. It is very probably by Herodotus, written at first on the margin by one of the early possessors of the work, and afterwards inserted in the text by a less intelligent copyist. We have many examples of similar interpolations.

Before terminating what relates to viviparous quadrupeds, Aristotle speaks of the apes, which he considers as intermediate between animals and man. He points out very clearly the principal characters of their organization, the structure of their hands, and designates many species, some of which have a tail, others which do not possess one. He passes then to oviparous quadrupeds, gives the characters which are common to all, speaks of the nature of their integuments, and on this occasion describes the crocodile of Egypt, remarking the hardness of its scales, the length of its teeth and their form, the disposition of the organ of hearing, and lastly, noticing the principal habits of the animal.

The classification which Aristotle establishes for birds, is very good in the principal divisions: it is exactly Brisson's. He determines the analogy between their wings and the anterior extremities of quadrupeds. He speaks then of the form of their feet, and of the differences which we observe in them,—of the third eyelid,—of the faculty possessed by many of these animals, especially by those whose tongue is fleshy, of articulating some words. He remarks that no bird is armed, at the same time, with spurs and with claws. This again is one of those general propositions which one is astonished to find in the science almost at its birth.

Aristotle comes at last to the fishes, and there he is truly admirable, giving proof of knowledge on many points superior to our own. He makes known, in different parts of his book, as many as 117 fishes, although his object in this work was not to enumerate species, but only to present general results. Amongst the facts which he relates, many are still in doubt; however, from time to time, new observations teach us the justice of some of his assertions, even of those which seem the most hazardous. He says, for example, that a fish named *phycis* makes a nest like birds. For a long time the thing was treated as a fable; however, very recently, M. Olivi discovered that a fish named the goby (*Gobius niger*) has similar habits. The male, in the season of love, makes a hole in the sand, surrounds it with fucus, making a true nest, near which his mate waits, and which he never leaves till the eggs which have been deposited in it are hatched.

Aristotle, in the part where he speaks of the sensations, is particular in mentioning the animals which are deprived of any organ of sense, and those in which these organs present certain peculiarities. Thus, on vision, he speaks of the eye of the mole, which is hidden under the skin, but is similar in its configuration to that of other animals, and is furnished by a nerve, which is evidently of the fifth pair. On taste, he speaks of the fleshy palate of the carp. He treats of the hearing of fishes, and determines that water must serve as a medium for the transmission of sound. He shows that insects also enjoy the faculty of hearing, and even that they have the sense of smell, since they are driven away by certain odours, and attracted by others. In speaking of the voice, he distinguishes properly the true voice, which comes from the air driven out of the lungs, and the different noises which some animals make. He describes, on this occasion, the musical apparatus of grasshoppers and that of locusts, which consists of a very different mechanism. He speaks also of the voice of the parrot, and of the disposition of the tongue of frogs, which instead of being, as in most animals, free anteriorly and fixed behind, has its root attached to the anterior part of the jaws, and its point directed towards the palate.

In treating of waking and sleeping, Aristotle speaks of the hibernation of many animals, and of the sleep of fishes. He enters into details on this subject, which we should have much difficulty to verify at this day. But he was placed in very favourable circumstances for obtaining information on these animals. Greece abounds in gulfs and straits full of fish; the inhabitants of the coast would therefore devote themselves to fishing at an early period. It appears, it is true, from certain passages of Homer, that anciently this profession was despised; but this prejudice did not exist long. Considerable fisheries were established, and salt fish became an important article of commerce. It is on account of the riches which this kind of labour brought to the inhabitants of Byzantium, that their port received the name of the *Golden Horn.*

In the part where *generation* is in question, we find very extended and very just observations. Aristotle speaks here of the membranes in which many mollusca envelope their eggs, and describes them in the octopus and sepia. He exposes the metamorphoses of insects, which, before acquiring their last form, pass through the states of larva and of chrysalis. He knew also those incomplete metamorphoses in which the larva differs from the perfect insect only by the absence of wings, and undergoes only a single transformation. He speaks of insects which are found in the snow; and gives a multitude of most interesting details, whose accuracy is perfect. He admits, however, spontaneous generation in these animals, and thinks that when the constituent elements are found in certain proportions and in favourable circumstances, they may give origin to living beings; but it must be recollected that at this period such an error was almost inevitable: the microscope alone has been able to undeceive us. He speaks of the economy of bees, and says that some persons consider the *king* to be assuredly a female. He describes the kind of cell constructed for these privileged individuals, which shows that he had observed the interior of hives, although it is certain that he had not been able to make use of glass, which so much facilitates such an examination. He treats then of the domestic economy of wasps, of hornets, of mason-bees, of drones: he describes the singular covering which envelopes the larva of the *Phryganea*, and speaks of the spiders which carry under the abdomen the capsule which contains their eggs. In treating of the animals of a superior order, he makes a very proper distinction between eggs with a hard shell, as those of crocodiles and of tortoises, and eggs with a soft envelope, as those of serpents. He says that serpents, which bring their young into the world alive, have also eggs, but that these eggs are hatched in their insides. He knew perfectly the development of the chick during incubation, describes it day by day, and speaks of the heart as the first point which appears, of the veins which then extend from the superior to the inferior parts of the body, and of the allantoid vesicle which soon encloses the whole egg. It must be remarked that all these observations were made with the eye alone, and that the slight errors which we find, arise entirely from Aristotle not having had the assistance of magnifying glasses. He remarks, in speaking of the eggs of fishes, that the allantoid membrane does not exist in them, nor in those of any animals which respire by branchiæ. He admits moreover in fishes, what he allows also to insects, spontaneous generation, and cites, in support of that opinion, facts which appear conclusive, such as the sudden appearance of an immense quantity of little fish, which the Greeks, on account of this supposed origin, named *aphia*, and to which, in the interior of France, a name is still given which refers to the same idea; they are there designated by the term *nonnats*, (*non nati.*) What he says of eels is certainly not exact; but we ourselves, notwithstanding the labours of Spallanzani, have yet much to learn with respect to the reproduction of these animals.

Aristotle examines the changes produced by age in animals and men, and, on this occasion, he gives excellent counsel to mothers. He passes then to the habits of animals, indicating the influence of their modes of life, of external circumstances, of climate, of seasons, and of the medium in which the different species live; and he mentions the food proper to each. His account of fishes is especially interesting, and would be extremely useful to us, if, when we wish to consult it, we were not frequently stopped, on account of his nomenclature not being well known. He treats of the influence of temperature on the migration of birds; speaks of those which migrate; of the periods of their removal, and of the order they follow in flying. He speaks also of the migrations of fishes; of the tunny, of the mackerel, of the pilchard; and states that legions of fishes enter into and pass out from the Black Sea. He follows them in their route across the Propontis and to the Archipelago. It appears that he had observed them on the coasts of Thrace, and especially at Byzantium. He mentions that the same fish at different periods receives different names; that, for example, the fish which was known in the Black Sea under the name of *cordylus*, took at spring the name of *pelamis*, and at length that of *thynnus* when it arrived in the Archipelago. He treats of fishes which do not show themselves in the winter; and also of other animals which appear at certain periods of the year, as the *bobac*, or Polish marmot. He speaks of the diseases of fishes, and he appears to be much better informed on this subject than we. In describing the different kinds of industry of animals, he makes known the means by which the frog-fish (*Lophius piscatorius*) allures small fish to devour them; he speaks of the shock which the torpedo gives when it is taken in the hand; of the manner in which the sepia hides itself from the pursuit of its enemies, by discolouring the water with its ink. He pursues this investigation in the class of insects, and dwells upon some of them, particularly on the spiders; then, passing to the birds, he describes the different methods in which they construct their nests; mentions that there are some species which do not make any; and, lastly, gives the history of the cuckoo, which lays its eggs in another's nest.

It may be conceived, from this analysis, how rich and abundant in information is the History of Animals. There is, nevertheless, in this book a fault which detracts much from its utility to us. Aristotle, like all ancient naturalists, seems to have thought that the language which he spoke must be eternal, and that the words would never change; and he contents himself, in general, with merely naming the species. The only descriptions, properly so called, which he has given, are of the elephant, the camel, the crocodile, and the cameleon. Some other animals, it is true, are indicated by characteristic traits, and could not be mistaken; but more frequently we are reduced to conjectures founded on some circumstances in the history of the animal, or upon properties which the author assigns to it; we collect the different passages which relate to it; we compare them with each other, and with those which we find in contemporary authors; we even connect with them statements borrowed from authors of a posterior date; but, in this latter case, much circumspection is required, since the signification of words is liable to vary with the times. We may observe, indeed, that the names were changed between the time of Aristotle and that of the Athenæum, and much more have they been changed till our time. However, the zoological nomenclature of the modern Greeks may often be made serviceable in discovering the animals of the ancients.

Scaliger has given a good edition of the History of Animals; but the best of all is that published, in 1811, by M. Schneider. The translation of Theodore Gaza is often quoted, but it is very inexact. This translator was a Greek who went to Italy after the taking of Constantinople by the Turks; he had a bad knowledge of Latin, so that every time he found in Pliny a passage borrowed from Aristotle, he transcribed it literally. It appears that he had but a bad copy of the Greek text.

There is a French translation by M. Camus; the text is nearly that of Scaliger. The translation is as good as one could expect from a man who was not a naturalist; but the volume of notes which is subjoined only obscures the subject.

The other books of Aristotle relative to natural history are much less clear than that of which we have been speaking. They are more mingled with discussions on technical terms; the Greek tongue is adapted to this sort of debate,—an inconvenience which is common to all languages which are faithful to etymology. Every word, indeed, offering, as it were, an abbreviated definition of the thing, necessarily carries with it the impress of those false notions which were entertained when it was formed. Thence comes the necessity of defining every term; thus we see Greek writers explain, distinguish, and subdivide their words *ad infinitum.* They pushed the thing to an extreme; and Aristotle himself, as we have remarked, falls sometimes into this error. However, those of his works which have this reproach, appear to have been much anterior to his History of Animals, and were probably only a sort of preparatory exercise. This applies particularly to the *wonderful facts,* which are nothing but a collection of notes disposed without order, but which possess much interest from containing different extracts from lost works. There is a good edition of it by Beckmann.

A book upon plants has been attributed to Aristotle; but it appears that this work is apocryphal.

LECTURE VIII.—Most of the great conquests of which history speaks, have been wrought by the arms of demi-savage hordes, who, precipitating themselves upon civilized nations, have brought ignorance and barbarism in their train. The expedition of the Greeks under Alexander has an entirely different character: in it we see a people, already far advanced in civilization, enlightening every place to which they penetrate, and at the same time causing a reflux to their own country of every thing which others offer of the beautiful or useful. It was indeed during the progress of this conquest that Greece was enriched with many new animals,—that it received elephants, which were shortly used in the armies of many of the princes of the west,—peacocks, whose brilliant plumage excited so much admiration, that they were first exhibited for gain,—and, lastly, parrots, of which the species then brought to Greece still preserves, amongst naturalists, a name which refers to the period of its introduction: it is the *psittacus Alexandri,* the green parroquet, with the pointed tail and scarlet collar.

However, if the Greeks had not been led by an enlightened prince, their expedition would have been no more useful to the progress of science than the thousands which had preceded. But Alexander, in accordance with the advice of Aristotle, was surrounded by philosophers especially charged to observe all the productions of the countries through which the armies past; and thus, instead of the fabulous tales of Ctesias, authentic accounts were given by qualified men, who were placed in the most favourable circumstances to see and study every thing. Amongst those who were members of this mission, we must particularly distinguish Callisthenes, who, before his departure, was already known by many scientific works, especially by a book on plants, and by an anatomical description of the interior of the eye. The result of his observations is not known to us, owing to his tragical end; however, it is probable that his researches have not been entirely lost to science, and that, to the moment of his disgrace, he had kept up a constant correspondence with Aristotle, who was at once his master and his parent.

The scientific explorations were not confined to the provinces through which Alexander passed; and when the neighbouring countries were visited by his lieutenants, some *savans* were almost always added to the expedition. Thus, when after having descended the Indus, the king of Macedon ordered Nearchus to pursue his route by sea, he associated with him the philosopher Onesicritus. The fleet, traversing a sea which the Greeks then for the first time saw, sailed towards the west to Harmozia, a port situated near the mouth of the Persian Gulf. In her course she had frequent communications with the people who lived on the coasts, and the narrative of the voyage contains many descriptions of plants and animals, which were observed whilst touching at different places. There is a notice, for instance, of the tree which bears cotton, of the royal or striped tiger, of the whale, the jaws of which were used by some of the natives in the construction of their houses.

Alexander died at thirty-two years old, in the year before Christ 323. His empire, which extended from the Adriatic Sea to the Indus, was soon dismembered, and his lieutenants contended for the fragments. For some time every thing was in confusion; but Perdiccas having been killed, and afterwards Antigonus and his son Demetrius Poliorcetes having been defeated at the battle of Ipsus, three kingdoms were established, which promised to be durable. Cassander reigned in Macedon, Seleucus in Syria and the neighbouring countries, Ptolemy in Egypt. Of these princes, the first alone seems not to have loved the sciences and letters: he governed Greece, tyrannized over Athens, and diminished the taste for study. But it was not the same with the others. Not only did they protect letters, but they even cultivated them with some success. Ptolemy, who had been a captain under Alexander, and who moreover, it is said, was his natural brother, wrote a history of the conquest, and it was upon this narrative that Arrian founded his work.

Ptolemy and Seleucus both applied themselves to the formation of a library on the model of that of Aristotle, and perhaps after the advice which he had given them at an earlier period. Before this philosopher, some individuals had collected books as a means of amusement, but no one had thought of it as an instrument in the study of the sciences. He was the first who formed a collection of books for consultation when needed. His library, which seems to have been very extensive, was afterwards united to that of Alexandria by Ptolemy, who bought it of Neleus.

The empire of Seleucus was the largest; but it was soon broken up into the kingdoms of Pergamus, Cappadocia, Pontus, Bithynia, and Bactriana. The kingdom of the Ptolemys, on the other hand, was the smallest, but it was the most tranquil, and it soon came to flourish by the same means as led to the prosperity of Egypt under the ancient dynasties. He extended it by conquests in the south, and it was incontestibly the richest, the most industrious, and for a long time the best governed of all those which had been under the empire of Alexander.

Ptolemy established his library at Alexandria, a city which was in its infancy, but which already spoke of future grandeur. He collected there a great number of learned men, to whom he assigned salaries and dwellings near the library. Thus each of them, free from all personal cares, could devote himself entirely, and without distraction, to study. This institution, which received the name of *Museum*, was from its birth in the most favourable circumstances which any learned society could desire. Besides the illustrious protection of a prince, and the use of a vast library, it was in a geographical position whose advantages can scarcely be appreciated. Alexandria had become in a few years the general commercial mart for the whole circumference of the Mediterranean, of Central Africa, of Arabia, of Persia, and of India : thus there came from all sides the productions of foreign countries, and the narratives of travellers. The labours of the members of the Museum were then crowned with the most happy success. But it must be remarked here, that this was a continuation of Greek science and not of Egyptian learning ; for the philosophers whom Ptolemy collected, brought with them knowledge of a very superior order to that which they found in this country, where external oppression and civil wars had long since extinguished the lights of science.

The second of the Lagides, Ptolemy Philadelphus, who commenced to reign in the year 285 before Christ, was no less favourable to learning than his father. He had been instructed by a disciple of Aristotle, Strato, surnamed *Physicus*, on account of his passion for natural history; and he himself imbibed much taste for this science. Feeble by birth, he sought in study a compensation for the pleasures of which his constitution had deprived him ; but, even in this kind of amusement, he exhibited a regal magnificence. Strato had written a book on true and fabulous animals. Ptolemy himself cultivated zoology, and for that purpose founded a menagerie, the first which had existed, and without doubt also the most splendid which ever was seen. Not only had he at his command immense riches, but he was so situated as to be able to assemble the productions of all the known world. The commerce which Egypt maintained with the interior of Africa gave him facility in procuring all the animals of that country which came by land or descended the Nile ; those of Europe and Asia Minor arrived by the Mediterranean; those of India by the Red Sea.

To obtain an idea of the riches of this kind which Alexandria contained, it would be sufficient to read an account of a fête which was celebrated by the King of Egypt in honour of his father. As Ptolemy Soter had travelled in India, it was wished to allude to his expedition in representing, in the solemnity, the triumph of Bacchus. The train of the god presented a collection of rare animals, such as all the sovereigns of Europe, if they united their efforts, could not at this day assemble. There were cars drawn by elephants, and others by stags, bubals, ostriches, and oryxes. There were camels laden with aromatics and with all the most precious products of the east, Ethiopian sheep, white stags of India, leopards, panthers, ounces, white bears, and twenty-four lions of the largest size. We were for a long time astonished to hear of white bears in this procession, not knowing of any except in the polar seas, and we sought to explain how Ptolemy had been able to obtain them from these distant parts ; but, some time since, M. Ruppel informed us that white bears exist in Lebanon, and no doubt those of which we speak came from these mountains.

Such a collection could not but be very useful to those who were engaged in natural history. A menagerie, moreover, was well placed in Egypt, where it had been the custom so long to rear animals in the temples, and observe their habits, and embalm them after death. And Alexandria possessed good anatomists and zoologists as long as the peripatetic philosophy prevailed. But, for the present, we must leave the *savans* of the museum, and return to Athens to follow the history of philosophy.

*Uses of the Vesicular Appendages of the Janthina.*—The Janthina is a pelagic molluscum, and moves by means of two little lateral expansions, but which, though they serve for locomotion, are not sufficient to keep the animal suspended in the water. Nature has, however, supplied this want by a contrivance of which we have no other example amongst the mollusca, though it often occurs in the acalepha, animals of an inferior order. This contrivance consists of a dense group of little air-vesicles of a sub-cartilaginous and diaphanous substance, attached to the posterior part of the foot, and by means of which the animal constantly floats upon the surface of the water.

This cluster of vesicles has, moreover, another use, now first made known; it serves also to contain the ova of the molluscum, of which we have counted as many as one hundred and eighty, suspended in a line, on the inferior surface of one of the vesicles. Sir Everard Home, then, is mistaken when he says that the ova of the Janthina are fixed around the shell by a glairy substance.

Many learned naturalists have supposed this mass of hydrostatic vesicles to be the rudiment of an operculum. Certainly this organ is absent in the Janthina, and it may be allowed that the vesicular appendages supply its place by filling up the opening of the shell when the animal is retracted; but these vesicles do not adhere in the same manner, nor have the general situation of the operculum, since instead of being above the posterior part of the foot, they are below it.—RANG, *Manuel des Mollusques*, p. 25.

*Maturation of Fruit.*—At a late Meeting of the Academy of Sciences, M. Couverchel read a paper on this subject. After giving an analysis of the investigations that had already been made, he remarked in what particulars they agree with his own, and then exposed the theory to which his numerous experiments have led him. According to the author, two periods are to be distinguished in the history of the fruit. The first comprehends its development and the formation of the principles which enter into its composition. In this first period the influence of the plant upon the fruit is indispensable. The second comprehends the ripening properly so called, and is effected by the reaction of the constituent principles of the fruit. In this second period, the acids, favoured by heat, transform the gelatine into saccharine matter. The phenomena are in this case purely chemical; they are independent of vegetable life, and, in fact, most kinds of fruit will ripen after being detached from the tree. The author finds this theory so much the more probable that it agrees with another series of experiments in which he has been engaged, respecting the transformation of fecula into sugar. He remarked the resemblance which these two operations present; and, submitting to the examination of the Academy two new products which he has obtained in treating fecula with vegetable acids, and only varying the proportion, he gave to the first, which is allied to vegetable jelly, the name of *normal gum*, on account of its simplicity, and the property which it has of furnishing only oxalic acid when treated by nitric acid. The other, which possesses all the properties of grape sugar, may easily be confounded with that substance. The author, to prove the resemblance which he pointed out as existing between the two operations, maturation and the conversion of fecula iuto sugar, remarked that the gelatine, in both cases, always precedes the saccharine matter, and that it is the first of these substances that produces ripening. M. Couverchel's experiments on the juices of fruits, and in particular on the juice of the grape, appear very remarkable; and show the possibility of improving wines of inferior quality otherwise than by the addition of substances foreign to their composition, and deleterious in respect to the health. He then described some of the methods which he had sought for the preservation of fruit, and pointed out the circumstances to be avoided in order to attain this important object.

*Essential Characters of the Roots and Stems of Plants.*—In whatever medium they are developed, *roots* are always deprived of vital knots symmetrically disposed at their surface, and consequently of foliaceous appendages. The multiplication of their branches is purely accidental. *Stems,* on the contrary, are always provided with vital knots on their surface, symmetrically arranged, or accompanied by a foliaceous appendage,—an organ sometimes reduced to a rudimentary state, or altogether wanting. Potatoes, the bulbs of the *Solanum tuberosum,* are not roots, as generally supposed, but stems expanded at their extremities, and with the interior converted into feculent cells mixed with fibres. And the same phenomenon is observed in the bulbs of the Jerusalem artichoke, (*Helianthus tuberosus.*) But the Batatas, (*Convolvulus Batatas,*) is a true tuberculous root.—Turpin *in Mem. du Mus. d'Hist. Nat. An. X. Cah. I.*

*Marcel de Serres' Zoological Periods.*—Three principal causes, says M. Marcel de Serres, * the lowering of the temperature, the retreat of seas, and inundations, have modified the surface of the globe, and destroyed a certain number of beings, which in the beginning inhabited that surface. The most powerful of these causes, the diminution of temperature, appears to have acted the first; and its effects have also been most extensive, since the continents were thereby solidified; after which certain animals and plants must have ceased to exist as the temperature of the earth decreased. The second, or the retreat of seas, has also left numerous traces of its action. Regular in its effects, it has not, like inundations, produced deposits out of the series, which do not exhibit that uniformity and constancy found in deposits which were left by the seas as they retired from the surface of our continents.

The other causes which may have modified the crust of the globe, have been very limited in their effects, and have by no means exercised such a powerful influence on living beings as those of which we have spoken.

When we observe the fossil remains of organized bodies, it is evident to us that they have been deposited in the earth by successive generations, the most simply organized being buried in the most ancient beds, and the most complicated in the most recent. We remark also that the remains of the same order, or of the same formation, and more especially of the same stratum, have a particular resemblance to each other, and a general difference from those of superior or inferior deposits, or of other formations; and this difference becomes greater as the deposits are more distinct, and farther separated in a vertical direction. Thus, the organized bodies which have successively inhabited the earth, are, with some exceptions, the more different from those now living, as their remains are found inclosed in deeper strata, or as they have lived in times the more remote from the present epoch.

Organized beings having succeeded each other according to certain laws, the most evident of which is their having appeared more slowly in proportion as their organization was more complicated, are therefore as varied as the nature of the strata which contain them; whence, periods of animalization and of vegetation may be distinguished in the fossiliferous formations.

In studying fossil animals in the order of their creation or of their distribution, which indicates their successive formation, three great periods seem to be distinguishable. The first, or the most ancient, comprizes the space of time which elapsed from the precipitation of the transition series, (or *inferior secondary,* according to the language of M. de Serres,) to the deposition of the middle secondary formations. In this period, avertebral animals are singularly in excess over the vertebrated, which are reduced to a few traces of fishes; the aquatic species far exceed in number the terrestrial species; and some insects are the only animals with aerial respiration which have appeared at this epoch. The second period contains the entire series of secondary formations, (middle and superior;) it presents a greater number of vertebrata, but principally of aquatic reptiles, with some ter-

* Géognosie des Terrains tertiaires, &c.

restrial species. Besides these animals with aerial respiration and cold blood, one genus of terrestrial mammalia and many insects, are the only beings of this period which had need of dry land. The third period, connected in some degree with the present epoch, abounds in organic remains; the terrestrial mammifera, with the mollusca and the insects, which live on the surface of the land are more numerous, compared with the species which have lived in the waters, as their remains are found in the more recent strata. In inferior numbers in the middle formation of the tertiary series, where they only begin to appear, the terrestrial mammifera afterwards predominated over the marine species of the same class, and at last almost exclusively composed the population which perished at the time of the dispersion of the alluvial formations which cover and terminate the series of tertiary deposits.

*Analysis of Phonolitic Rocks.*—M. Gmelin divides volcanic rocks into two classes, the *basaltic* and the *trachytic*, between which the *phonolitic* rocks are intermediate. The phonolites are composed of feldspar and a zeolitic substance, which is most commonly mesotype. These two minerals may easily be separated from each other, by treating the rock, reduced to an impalpable powder, with muriatic acid of medium strength for twenty-four hours. The zeolite is decomposed, and the feldspar is unchanged. We separate from the latter the silica with which it is mixed, by boiling it in a solution of carbonate of potass, and the analysis of the residue may then be made by dissolving it with carbonate of baryta.

By this process M. Gmelin has arrived at the following results:

1. *Phonolite of Hohenkräken*, in the Hegau; of a clear brownish gray, specific gravity 2.504. The zeolitic portion contains in 100 parts, silex 43.44; alum 22.89; soda 13.67; potass 5.45; lime 2.44; protoxide of iron 2.66; oxide of manganese 1.19; sulphuric acid 0.22; water 5.77. The feldspathic part is composed of silex 66.55; alum 15.86; soda and potass 9.44; lime 1.27; protoxide of iron 4.63; oxide of manganese 0.98. The specimen analyzed contains 55 parts of zeolite.

2. *Phonolite of Pferdekuppe*, in the Rhöngebirge; of a greenish-gray, decomposed at the surface, sp. gr. 2.605. This analysis accords in a remarkable manner with that of the phonolite of Hegau. It gives 13.7 of zeolite.

3. *Phonolite of Abstrode*, in the Rhöngebirge; similar to the preceding, and decomposed at the surface to the depth of three lines. The unaltered part contains 15.8 of zeolite; the altered portion contains 0.42 of matter soluble in acids.

The preceding analyses show, in the most decisive manner, that the phonolites of Hegau and of Rhöngebirge are mixtures of feldspar and mesotype. The former predominates in the rocks of Rhöngebirge; those of Hegau, on the other hand, contain a greater proportion of mesotype. The part upon which acids act, approaches in its composition sometimes to natrolite, at others to mesolite or mesoline; but it always contains a less proportion of water. The composition of the other portion agrees precisely with that of feldspar, and may be represented by the formula,

$$\left.\begin{matrix} N \\ K \end{matrix}\right\} S^3 + 3\, A\, S^3.$$

The phonolites contain a greater quantity of zeolite in proportion as they are lighter, and as they contain more alum. When the rocks are changed by the action of the air, they are transformed into almost pure feldspar, and the zeolitic portion is decomposed. We may say that the phonolites are characterized by the abundance of potass and soda, as the basalts are by the great proportion of protoxide of iron and of magnesia which they contain.

The phonolitic formations are known to be extremely fertile, and particularly adapted to the cultivation of the vine. It is probable that this may arise from these rocks imparting to the soil a great quantity of alkali during decomposition. —*Naturwissench. Abhandlungen*, Vol. II. p. 133.

*On the Chromophorous Globules of the Cephalopodous Mollusca.*—The entire surface of the cephalopodous mollusca, and particularly the superior and lateral portions of the body of these animals, are speckled by a great number of little follicles, or globules, or little coloured circles, about the size of a grain of sand, but varying in magnitude according to the species, and their degree of development. Even the iris of these mollusca is richly ornamented with coloured follicles, which add an additional splendour to its brilliant metallic lustre.

Each of these spots is of a single colour. The principal tints which are found in the species inhabiting the Mediterranean, are yellow, red, brown, indigo, and sky-blue, all varying in their degree of intensity. And the follicles may be divided into as many orders as there are colours.

The number of the orders of follicles, which is found in each species, varies; in some they all exist; in others we do not find so many; but, except in the *Sepia Rondeletii*, we never see less than two. They are distributed over the skin of the animal, at equal distances; and, although the number of follicles of each colour be different, they are so combined that each part of the body of the animal is provided with them in an admirable proportion.

The seat of these coloured follicles is the *cutis*, and especially the *rete mucosum*. They are accordingly covered by the epidermis, which is smooth and transparent; they have no visible connection with any vascular system, nor with the part of the body which is immediately below them. M. San Giovanni, who first accurately described* these spots, considers them to be a system of organs, which he has named the *chromophorous* or *coloriferous* organs. The colour which they possess is not produced by any circulating or encysted fluid, but is inherent in the tissue.

But what is most remarkable in these spots is the alternate contraction and expansion which they exhibit on very slight irritation, even long after the death of the animal.

During life, when the animal is in a state of repose, the vesicles are contracted and are not visible. When it is excited, by being touched with the hand, or otherwise irritated, the coloured vesicles show themselves, and are instantly in motion, appearing and disappearing with the velocity of lightning; sometimes they are like spots on different parts of the body, and sometimes like waves, which rapidly move across its surface. M. San Giovanni states that each of these vesicles is composed of a skin, having the structure of felt, and is provided with a circular aperture, which can open and shut probably by means of a circular muscle, and which enables us to see to the bottom. "And," he continues, "their expansive and contractive power, during life, is owing to their particular structure, which is subjected to the influence of the nervous system, with which they are connected by means of delicate filaments, scarcely perceivable with the aid of the microscope; for every motion in them ceases when the skin is separated from the body." Subsequently, however, to the publication of San Giovanni's first memoir, more favourable opportunities for observation have occurred to our friend Dr. Coldstream of Leith, who, in November 1826, read the result of his investigations on the subject before the Royal Medical Society of Edinburgh. The conclusions at which the author arrived, agreed in the main with those of the other observers, with the important exception, that he found the spots to possess motion even in pieces of the mucous coat which had been removed from the animal. Hence their dependence upon the nervous system was disproved, nor could Dr. Coldstream, by the most careful microscopic examination, discover the slight-

* This structure seems to have been first observed by Carus, in 1821. (Vide Act. Acad. Nat. Cur. Vol. XII. p. 320.) In 1822, Blainville alluded to it in his Anat. Comp.; but it was reserved for Dr. G. San Giovanni of Naples to investigate minutely this peculiar system, which he described in 1824, in the Giornale Encicl. di Napoli. A second memoir by the same observer has been recently published in the Ann. des Sciences Naturelles, XVI. 315, the results of which we give in the text.—Ed.

est trace of any nervous filaments in connection with the spots. And the author further remarks, that though viewing the phenomenon under circumstances more advantageous than those which occurred to San Giovanni, namely, when separated from the body of the animal, and under the microscope, with a strong reflected light passed through the mucous membrane while the spots were in action, he could not succced in discovering any opening in them, even during the greatest dilatations; indeed, the spots seemed almost as opaque when dilated as when contracted.

"That I might ascertain," says Dr. Coldstream, in his unpublished memoir, "whether or not the motions of the spots were *now* (after apparent death had taken place) carried on by the influence of external agents, independently of any nervous power emanating from the animal itself, I cut, from a part of the mantle where the contractions and dilatations were very strong, a piece of the membrane or layer containing the spots, about 2-10ths of an inch square; this I separated completely from the animal, and placed it in a watch-glass immersed in sea-water in another vessel. To my astonishment, I saw that the spots in the separated portion continued in as lively motion as when connected with the animal. No change, either in the velocities or extent of their motions, could be perceived. Some spots just on the edges of the separated piece, seemed to have been half cut through by the scissors with which I removed it; such did not contract; but all the others in the piece moved in the very same manner as before.

"I now removed the watch-glass, containing the separated portion, to the stage of a microscope, and examined the spots with powers of 100 and 150. This, however, gave me no advantage. I saw nothing more than I had previously observed with the naked eye. San Giovanni has compared the appearance of the structure of the spots to that of felt; but I could not satisfy myself that this was the case in those examined, although I passed through the membrane a very strong light. I saw that the spots were very thin bodies, attached to the mucous coat of the integument; that they had no connection with the epidermis; that, in dilating, their edges passed over, or under each other indiscriminately; that their edges were extremely sharp and well-defined; that they never were increased in thickness during dilatation; and that no vessels carrying coloured fluids entered them. I could not discover, indeed, any thing like either vessels or nervous filaments connected with any part of the integument of the animal, and I feel assured, that from the great size of some of the spots which I had under the microscope, I must have seen at least a few vessels carrying dark-coloured fluids entering the mucous coat, had it been from such a source that the increase in size of the spots was derived.

"The separated piece of the mucous coat, with the palpitating spots, remained under my microscope, exposed to a strong reflected light, for three quarters of an hour, during which time I could perceive no alteration in its appearance, or the strange phenomena it presented. While the motions of the spots were very brisk, I suddenly removed it to a dark place, where it remained fifteen minutes. On bringing it again to the light, I found that all motion had ceased; most of the spots were in a state of contraction; but, on allowing it to remain for three minutes exposed to a moderately strong light, the dilatations again commenced, and were carried on unceasingly for a very considerable time. I repeated these experiments with other pieces of the spotted membrane, and always with similar results. At the end of nearly two hours from the time when some of them were removed from the animal, the spots were dilating; but, in the course of a few minutes afterwards, motion finally ceased."

In his second memoir, recently published, (Ann. des Sciences Nat. XVI. 315.), M. San Giovanni shows that every species of cephalopoda, besides its peculiar zoological characters, is distinguishable from all the others, as well by the different orders of chromophorous globules, as by the different intensity of the colours of these globules. And he gives the following instances from species inhabiting the Mediterranean Sea, two of which are now first described.

1. *Loligo vulgaris* has three orders of chromophorous organs, yellow, rose-red, and brown. Those of the first order are less numerous and smaller than the others; those of the second are more numerous and of greater size; the third, or those of brown colour, are the largest of all, in greater numbers than the first, but less numerous than the second. On the superior part of the head and body small globules of all the orders of colours exist. On the confines of the lateral parts, and on the inferior surface, yellow and red are alone seen.

2. *Loligo sagittata* has four orders of chromophorous globules, saffron, rose-red, deep blue, and light blue. The superior part of the head, of the sac, and the arms, are ornamented with deep blue and light blue in different proportions; the lateral and inferior parts of the body and of the wings are of a saffron and rose colour; and the arms present all the four colours.

3. *Sepiola Rondeletii* is the only example, amongst all the cephalopoda observed by our author, in which there exists a single order of chromophorous organs over the whole of the body. They are all brown approaching to black.

4. *Sepia officinalis* has two orders of coloured globules, ochre-colour and deep chestnut, which are in equal proportions. Those of deep chestnut-colour are so accumulated on the skin which covers the shell that the ochre-coloured globules cannot be perceived, and they give almost a black colour to the surface; but these two orders become separately visible on the fringe, the head, and the arms, where they are least numerous.

5. *Octopus moschatus*, like all the species of this genus examined by M. San Giovanni, has only two orders of globules, saffron and deep chestnut-colour. The latter predominate on the superior surface, whilst the former prevail on the inferior surface.

6. *Octopus leucoderma*, San Giov., has two orders of chromophorous organs, light chesnut and ochre-colour, the former larger than the latter. The sclerotic is also covered with these coloured globules.

7. *Octopus macropodus*, San Giov., has three orders of coloured organs, saffron, deep chestnut, and deep blue approaching to black. The iris of this new species is distinguished not only by blue or ultramarine colour, but also by deep chestnut-coloured globules, which are found in no other part of the body, and which produce an admirable contrast with the elegant colour of the membrane on which they move.

8. *Octopus vulgaris* is furnished with four orders of globules, saffron, red (lees of wine,) blackish, and bluish. The superior part of the body is covered with pale-red, blackish, and saffron-coloured globules. On the head the blackish globules are in great numbers, and the saffron globules abound only in the circumference of the eye. The iris presents red and bluish globules.

9. *Argonauta Argo* unites all the orders of globules which are found in the other cephalopoda; which gives a great variety of colours to the surface, varying with every change of light.

*Chronological Table of the most important known encroachments made by the Sea, since the Eighth Century; by* M. ADRIEN BALBI.

A. D. 800. About this period, the sea carried off a great part of the soil of the island of Heligoland, situated between the mouths of the Weser and the Elbe.

800—900. During the course of this century, many tempests made a considerable change in the coast of Brittany; vallies and villages were swallowed up.

800—950. Violent storms agitated the lakes of Venice, and destroyed the isles of Ammiano and Constanziaco, mentioned in the ancient chronicles.

1044—1309. Terrible irruptions of the Baltic Sea on the coasts of Pomerania, made great ravages, and gave rise to the popular tales of the submersion of the pretended town of Vineta, whose existence is chimerical, notwithstanding the imposing authority of Kant and other learned men.

1106. Old Malamocco, then a very considerable city on the lakes of Venice, was swallowed up by the sea.

1218. A great inundation formed the gulf of Jahde, so named from the little river which watered the fertile country destroyed by this catastrophe.

1219, 1220, 1221, 1246, and 1251. Terrible hurricanes separated from the continent the present isle of Wieringen, and prepared the rupture of the isthmus which united northern Holland to the county of Staveren, in modern Friesland.

1277, 1278, 1280, 1287. Inundations overwhelmed the fertile canton of Reiderland, destroyed the city of Torum, 50 towns, villages, and monasteries, and formed the Dollart; the Tiam and the Eche, which watered this little country, disappeared.

1282. Violent storms burst the isthmus which joined Northern Holland to Friesland, and formed the Zuyderzee.

1240. An irruption of the sea changed considerably the west coast of Schleswig; many fertile districts were engulphed, and the arm of the sea which separates the isle of Nordstrand from the continent was much enlarged.

1300, 1500, 1649. Violent storms raised three-fourths of the island of Heligoland.

1300. In this year, according to Fortis, the town of Ciparum, in Istria, was destroyed by the sea.

1303. According to Kant, the sea raised a great part of the island of Rugen, and swallowed up many villages on the coasts of Pomerania.

1337. An inundation carried away 14 villages in the island of Kadzand, in Zealand.

1421. An inundation covered the Bergseweld, destroyed 22 villages, and formed the Biesbosch, which extends from Gertruydenberg to the island of Dordrecht.

1475. The sea carried away a considerable tract of land situated at the mouth of the Humber; many villages were destroyed.

1510. The Baltic Sea forced the opening at Frisch-Haff, near Pillau, about 3600 yards broad, and 12 to 15 fathoms deep.

1530—1532. The sea engulphed the town of Kortgene in the island of North Beveland, in Zealand. In the latter year, it also raised the E. part of the isle of S. Beveland, with many villages, and the towns of Borselen and Remerswalde.

1570. A violent tempest carried off half of the village of Scheveningen, N.E. of the Hague.

1625. The sea detached a part of the peninsula of Dars, in Pomerania, and formed the isle of Zingst, N. of Barth.

1634. An irruption of the sea submerged the whole island of Nordstrand: 1338 houses, churches, and towns were destroyed; 6408 persons and 50,000 head of cattle perished. There only remained of this island, previously so fertile and flourishing, three small islets named Pelworm, Nordstrand, and Lütje-Moor.

1703—1746. In this period, the sea raised the island of Kadzand more than 100 fathoms from its dikes.

1726. A violent tempest changed the *saline* of Arraya, in the province of Cumana, part of Colombia, into a gulf of many leagues in width.

1770—1785. Storms and currents hollowed out a canal between the high and low parts of the island of Heligoland, and transformed this island, so extensive before the 8th century, into two little isles.

1784. A violent tempest formed, according to M. Hoff, the lake of Aboukir, in Lower Egypt.

1791—1793. New erruptions of the sea destroyed the dikes and carried away other parts of the island of Nordstrand, already so much reduced.

1803. The sea carried away the ruins of the Priory of Crail, in Scotland.

*Bull. des Sci. Nat.* Jan. 1830.

## NATURAL-PHILOSOPHICAL COLLECTIONS.

*On the Chemical Composition of Cheese.* By M. R. BRANDES.—It results from M. Brandes' researches on the chemical composition of cheese, made in the farm-houses, that in 4 oz. there are as follows :—

| | | |
|---|---|---|
| 1. | A gelatinous animal substance, or caseous matter somewhat modified by aposepedine (caseous oxide,) common salt, and phosphate of lime, - - - - - - - | 10 grains. |
| 2. | Aposepedine, - - - - - - - | 65 |
| 3. | Aposepedine combined with ammonia ; an animal matter soluble in water and precipitable by the tincture of galls ; acetate of ammonia ; muriate of soda, and traces of phosphate and sulphate of soda, - - - - - - - - | 379 |
| 4. | Sebacic acid and sebate of ammonia, - - - - | 165 |
| 5. | Sebacic acid and oleic acid combined in part with ammonia, - | 15 |
| 6. | Aposepedine with ammonia and a gelatinous animal matter, - | 30 |
| 7. | More or less altered caseous matter, with sebate of lime, and traces of phosphate of lime, - - - - - | 165 |

The other parts contained in the cheese consist of water and seasoning, such as cummin-seed.

The principal mass of a well prepared cheese, then, consists of aposepedine combined with ammonia, of free aposepedine, of sebacic acid and sebate of ammonia, of a gelatinous animal matter, and of caseous matter more or less modified. In the caseous fermentation there is formed, besides aposepedine and the sebacic and oleic acids, a great quantity of ammonia, which combines with those acids, but which is partly dissipated when the mass is dried or heated. It is almost beyond doubt that aposepedine is formed at the expense of caseous matter ; but we have less clear notions of the formation of sebacic acid, whose proportion is very great. M. Brandes remarks, that the composition of decayed and poisonous cheese has no appreciable difference from that of wholesome cheese ; that sebacic acid cannot be considered as the poisonous principle, and that it consequently remains a subject for investigation to ascertain the difference between the two.—*Archiv. der Apotheken-Vereins.* xxix. 71.

*Extract from a Letter of Professor Harding to Dr. Tiarks, dated Gottingen, December* 19, 1829. *Read before the Astronom. Soc.*—"I observed the observation of Aldebaran on the 9th December, and the sky being perfectly clear, I obtained the moments of immersion and emersion with extreme precision. The first creeping out of the star at the emersion was easily perceived, by the contrast of its red light with the white light of the moon's limb ; and I think that the observation of the emersion is as accurate as that of the immersion. I devoted all my attention to the observation, with a view to the well-known phenomenon of the star's remaining visible some seconds on the moon's disc, which has been repeatedly observed in this star, and which I have myself seen several times. I remained at the immersion, as well as at the emersion, 10 seconds before the telescope without turning my eye off, but nothing of the kind was seen."—*Ann. of Phil. June* 1830.

*Supposed New Vegeto-Alkali—Chinioïdia.*—MM. Henry, jun. and Delondre have made numerous experiments to determine whether such an alkali really exists as that which Serturner has named Chinioïdia, and they have arrived at the following conclusions :—

1st. That there remains little doubt as to the non-existence of chinoïdia, and that it appears demonstrated that it is only a modification of quina and cinchonia combined and rendered uncrystallizable by a peculiar yellow matter. These modifications cease, when after a long time and much care it is either separated or destroyed and crystallization takes place.

2nd. That the yellow resinous matter which accompanies quina more than cinchonia, appears to change its properties much; this yellow matter the authors succeeded in destroying, but without being able to collect it separately in a perfect state. It appears to differ from the yellow colouring of the bark, which is fixed by alumina, oxide of lead, and of tin.

3d. That this yellow matter especially influences the crystallizations.

4th. That the most certain method of clearing the mother waters from it, are the addition of turpentine, repeated precipitation and solutions in the acids, and concentration by cold.

The experiments were made by MM. Henry and Delondre, and always with the same results; they operated upon the mother waters remaining after the treatment about two hundred thousand pounds of yellow bark, and they always separated from this suspected matter the portion of quina and cinchonia, the crystallization of which it had prevented.—*Journal de Pharmacie*, March 1830.

*Aurora Borealis.*—In the evening of the 19th, soon after sunset, as bright a light appeared in the horizon about the magnetic north as the crepuscule immediately above the sun; and as the twilight withdrew, the aurora increased in brightness. At 9 P.M. it showed a steady flame colour, and was comprised between the N.W. and N. by E. points of the horizon, and about nine or ten degrees in altitude.

At 11 o'clock a vertical line of light, whose bearing was N. by E. $\frac{3}{4}$ E. emanated from the aurora, and in a few minutes afterwards other corruscations emanated from it between N.W. and N., but they often dissappeared, and rose again to an altitude exceeding that of ε Cassiopeiæ. At a quarter before 12, seven cocolumns of light of various widths appeared at once, and continued several minutes; the wind blowing fresh from the westward seemed to give them a slight inclination from a perpendicular towards the east, and they did not finally disappear till between one and two A.M. In the course of the evening several bright meteors descended from over the aurora, and in a few hours afterwards a heavy gale came on from the S.W. and continued nearly four days. This meteoric phenomenon was also seen in Scotland, but from the interposition of clouds it did not display any vertical columns there, only faint corruscations in the horizon. Whatever gaseous quality an aurora borealis may possess, whether hydrogenous, electric, or magnetic, or a mixture of any of these, here (London ?) it is very generally, if not the cause, a prognostic of a strong gale of wind from some quarter.—*Ann. of Phil.* June 1830.

*On the Difference in the Height of Spring Tides.*—The first, second, and third tides after the new moon on the 24th of April were considerably higher in Portsmouth Harbour than the first three tides after the new moon on the 24th of March; yet the new moon in March was nearer to the earth's equator than the new moon in April, and of course her attraction of the water was greater than in the former month: the sun in March was also nearer the earth than he was in April, and his attraction proportionably greater. The moon's horizontal parallaxes in the Nautical Almanac at the time of these new moons, are the same within *one second*, and the greatest for the year till the last day of October; yet the difference in the height of the spring tides at these times was fifteen inches greater immediately after the last new moon. It would be difficult under these nearly coinciding circumstances to account for this unusual swell of the tides, without referring to, and taking into consideration the state of the weather, and the position and strength of the wind which influenced it. In March only three-fifths of rain fell here; and the evaporation was nearly as great as that of the present month, and the weather remarkably calm. In April between three and four inches fell, and a SW. gale from over the Atlantic blew strong two days before and two days after the last new moon, which in connection with this depth of rain, must have caused the swell and comparative difference in the last spring tides on our shores. A remarkably low ebbing of the tide, six feet lower than is usual at the same age of the moon, occurred here the third day after the new moon in March.—*Ibid.*

*On the Formation of Formic Acid.*—M. C. G. Gmelin has prepared formic acid from cane sugar, sugar of milk, starch, wood, the root of the *althæa*, mucic acid, &c. by distilling those bodies with dilute sulphuric acid and peroxide of manganese; but the formic acid thus obtained is always impure. He has, however, obtained it in a high state of purity, by distilling alcohol with sulphuric acid and oxide of manganese. But to prevent the formation of ether, dilute alcohol must always be employed; common spirits of wine is the most convenient. Concentrated alcohol produces not only sulphuric ether, but also formic ether.

M. Gmelin has not been able to prepare formic acid by the use of acetic acid. The fibrin of the blood furnishes a very impure formic acid.—*Annalen der Physik. und Chemie.* xvi. 55.

*On Artificial Crystals of Oxide of Iron.*—M. Mitscherlich has examined crystals of oxide of iron, found in a pottery furnace at Oranienbourg. They were in very obtuse rhomboids, and resembled the specular iron of volcanoes, having the same brilliancy, hardness, streak, and other properties. The smaller crystals, composing extremely thin plates, were transparent and red, like micaceous iron. The faces were brilliant, the angles could be measured, and were the same with those of the natural crystal. So greatly do these resemble the crystals from volcanoes, that the same theory of formation may be applied to both. The first are formed in a pottery furnace, in which the vessels, when baked, are glazed by means of common salt. The clay used consists principally of silica, alumina, and a little oxide of iron. The salt is volatilized, and water coming in contact with the surface of the vessels, new compounds are produced, the water is decomposed, muriatic acid is formed, and the soda produced unites with the silica to make the necessary glass. As to the oxide of iron, its history will be best understood by an experiment or two. If a mixture of salt, oxide of iron, and silica, be heated to redness in a tube, and water in vapour be passed over it, much muriatic acid is formed, but very little chloride of iron, and crystallized oxide of iron will be found in the mass: but if muriatic acid be brought in contact with ignited oxide of iron, water and chloride of iron are formed, and sublime; if the chloride of iron come in contact with more water, muriatic acid is first developed, then chloride of iron, and a residue of crystallized oxide of iron remains. The formation of chloride of iron by the action of muriatic acid upon oxide of iron appears, therefore, to depend upon the proportion of water present. M. Mitscherlich applies these experiments and principles in explanation of the manner in which volcanic crystallized oxide of iron is formed—all the conditions necessary, according to the above view, being present in those cases, where heretofore it had been supposed the oxide of iron, as such, had been actually sublimed.—*Bull. Univ.* B. xix. 245.

*Account of a curious phenomenon of revolving motions, produced by the combination of Alcohol with Laurel Oil.* By Dr. HANCOCK.—To exhibit a singular spectacle which seems to bear some analogy with the motions of the planetary orbs, take a vial of laurel oil and drop into it, at different intervals, some rectified spirits of wine, when the most interesting results will be observed to ensue; a circulation presently commencing, of globules of alcohol up and down through the oil, which will last for many hours, or for days, (how long is unknown.) A revolving or circulating motion also appears in the oil, carrying the alcoholic globules through a series of mutual attractions and repulsions,—the round bodies moving freely through the fluid, turning short in a small eccentric curve at each extremity of their course, passing each other rapidly without touching; but after a time, they seem to acquire a density approximating to that of the lower stratum, which appears to be an aqueous portion, separated by the ethereal oil from the alcohol; and this assimilation taking place, the globules, after performing many revolutions, will fall flat upon the surface, and unite with the lower or watery stratum.

The orbits of those small globules being confined by the glass are very eccentric. In the course of the experiment, I observed particles of the fluid to separate in larger globular portions; these commenced a similai revolution, and smaller ones quitted their course and revolved about the larger, whilst the latter still pursued their course after the manner of primary planets and their secondaries. This, however, can only be well understood by seeing the experiment, which is easily performed, and well worth the trouble; as it appears to me, that, if attentively studied, it might furnish important deductions, and serve, we know not how far, towards an illustration of the celestial motions.

In the present case, the revolving motion of these globules appeared to be, not as we are accustomed to regard the planetary motions, as the effect of a direct attractive and repulsive power, in combination with a projectile force, but as revolving in a circulating medium, attended by an emanation from the globules themselves.

This experiment was performed with a small vial. Perhaps a larger one would render the result more perspicuous.—*Brewster's Journal. No.* V. p. 51.

*Power of metallic rods or wires to decompose water after their connection with the galvanic pile is broken.*—In the experiments which I undertook in 1806-7, in company with Mr. Hisinger, we had found that rods of metal which were employed to decompose water by means of the galvanic pile continued to develope gas after their connection with the pile had ceased,—a circumstance which seemed to indicate a continuance of electrical state, though these rods showed no action upon any other portion of liquid, even of the same kind, than that in which they had been placed during their contact with the pile. This observation, which I had almost forgotten, has been lately confirmed by Pfaff, who has also added to it several others of a similar kind. We might suppose such effects to be produced by a residual polarity, both in the liquid and the metal, showing itself, as long as it continued, by a continuance of chemical action; but some of Pfaff's experiments seem to oppose this idea, for he found that the addition of ammonia to the liquid, by which all its internal polarity was destroyed, did not deprive the wires of their effect. The metals which acquire this property in the highest degree are zinc and iron, next to which is gold. He attempts to explain the phenomenon, by supposing that the continued passage of the electrical stream had brought the elements of the water nearer to a state of separation, so that a very slight influence was sufficient to destroy their union. It must be confessed, however, that we cannot at present advance a satisfactory explanation.—Berzelius, *Arsberättelse*, 1829, p. 33.—*Ibid.*

*Detection of alloy in silver by the magnetic needle.*—Oersted has made an ingenious and novel application of the magnetic multiplier. He finds that if a good electro-magnetic multiplier, with double needles, be suspended by a hair or a thread of unspun silk between two pieces of wrought silver, differing only one per cent. in the quantity of copper they contain, so sensible an effect is produced upon the needle as to render this a more accurate method of proof than the common touch-stones. Small trial plates are made of different degrees of purity, and the piece to be tried is compared with them in the following way: A thin piece of woollen cloth is dipped in muriatic acid, and laid upon the trial plate, after which the piece to be tried is brought into contact with the acid and the wire of the multiplier. The deviation of the needle shows which contains the most alloy, and another trial plate must be employed till the needle cease to be affected, when both are of equal fineness. In coming to a conclusion on this point, however, several circumstances are to be taken into consideration. Wrought silver goods are generally deprived of a portion of their copper by the action of acids, so as to render the surface finer than the inner part of the metal; the proof plates, therefore, must be prepared in the same way. Another source of error in the indications of the needle, are the unequal polish and size of the two pieces of metal; the latter of these is especially difficult to overcome when the surface of the metal to be proved is not plain. When, instead of muriatic acid, a dilute solution of caustic potash is employed, and the result is unlike, it is shown that copper is not the only alloy, but that brass is present; and the potash solution renders that which contains brass so positive, that it seems considerably purer than the trial plate. This is the case also in a very high degree when the alloyed metal contains arsenic, for example when what is called white metal has been used for an alloy. This mode of proof is exceedingly interesting in a scientific point of view, and cases may occur in which it can be employed with advantage; but the sources of error can scarcely be ever so completely done away with as to make it a practical instrument in the hands of the silversmith, as Oersted seems to expect.—*Ib.*

*Iron Pyrites.*—It is known to mineralogists that common or octohædral pyrites and the white pyrites, which from their difference of form were considered by Haüy as different species, were found by Berzelius to be identical in composition, or at least that no such difference existed as to warrant their being considered as different species. The explanation then given by Berzelius has been confirmed by later experiments, and he has published the following additional remarks: "When a portion of common pyrites was permitted to fall asunder, I found it to be caused by the formation of a small quantity of protosulphate of iron, which burst asunder the crystallized mass. When the salt was dissolved in water no trace of free sulphur was obtained, from which it appeared, that the efflorescing pyrites contains particles of F *e* S (sulphuret of iron,) which, changing to the state of salt, tears asunder the rest which undergoes no change. When the small quantity thus changed into sulphate of iron is compared with that which remains unaltered, I did not think that the results of analysis could be obtained to such a degree of accuracy as to determine the matter with certainty. I have since obtained a satisfactory proof of the accuracy of this explanation. I heated carbonate of iron gently in a stream of sulphuretted-hydrogen. There were formed first *sulphuret*, and afterwards *bisulphuret* of iron. The experiment being stopped before all the iron was changed into bisulphuret, a pyrite was obtained, which in a few days fell asunder in all directions, and changed into a woolly mass of vitriol of ten times its former volume. Sesqui-sulphuret of iron prepared from the oxide has not this property. It seems, therefore, highly probable, that the falling asunder of the common pyrites arises from the electro-chemical action of the electro-negative bisulphuret upon the sulphuret which is here and there mixed with it in small particles.—*Ibid.*

*Buccina,—a new principle in Box-wood.*—An apothecary of Bordeaux announced to the Pharmaceutical Society of Paris, at its last sitting, that he had discovered in the wood, and particularly in the bark, of the box-tree, an alkaline principle, to which he gives the name of buccina. It is in the form of powder, and neutralizes acids, forming uncrystallizable salts: it has a very strong sudorific action and bitter taste. M. Dupetit Thouars, in making this statement at the Philomathic Society, remarked that buccina might perhaps be advantageously used in the manufacture of beer, "for there is more box-wood than hops employed in making almost all the beer brewed in Paris."—*N. M. Mag.* xxx. 112.

# CATALOGUE RAISONNÉ.

Reflections on the Decline of Science in England, and on some of its Causes. By CHARLES BABBAGE, Esq. Lucasian Professor of Mathematics in the University of Cambridge, &c. Pp. 228. FELLOWES, London 1830.

We have been prevented, by the press of matter in the department of "Reviews," from publishing in the present No. our opinion of this important volume. We can only say on this occasion, that as the application of any power is, *cæt. par.*, as valuable as the invention of any other, this work is calculated to give an impulse to science in this country, by no means weaker than that which came from the hands of the immortal Bacon. Mr. Babbage deserves well of his fellow-labourers for stepping down from his chair to expose the practices of those from whom other things might have been expected. He has conferred a benefit on England which can never be forgotten, and which he was admirably fitted to perform. The periodicals of London seem desirous of passing the book over in silence: not so the freemen of the north. Dr. Brewster has thought it worth while to print 35 pages *verbatim* from this work in the No. of his Journal for the present month, (why did he omit the note which bears such high testimony to the character of Dalton?) and to us it will become a text-book.

It will be seen even from our present No. that we have been some time yoked to the same drudgery as Mr. Babbage has undertaken; and we now rejoice in such a coadjutor. In the mean time, let every one who is desirous of perusing one of the most gentlemanly but complete exposures of nefarious doings and lamentable incapacity amongst men of scientific repute, which perhaps was ever penned, immediately buy the book; and let every one who would support the character and reputation of his country, buy the book.

An Outline of the First Principles of Botany. By JOHN LINDLEY, F.R.S. L.S. & G. S. &c. Professor of Botany in the University of London. LONGMAN & Co. London, 1830.

In this excellent little work, the principles of botany are compressed into 106 24mo. pages. The matter is arranged under the following divisions: Elementary Organs, Compound Organs, Root, Stem, Leaf-buds, Leaves, Hairs, Food and Secretions, Flower-buds, Inflorescence, Floral Envelopes,—Male Organs, Stamen, Disk,—Female Organs, Pistillum, Ovulum,—Fruit, Seed, Flowerless Plants. The whole is disposed in the form of numbered paragraphs, a plan which affords the greatest possible facility of reference from one part of the work to another. The reader will be able to form some idea of the manner in which Professor Lindley has executed his work, by the following specimen:

227. The Flower-bud (143) consists of imbricated, rudimentary, or metamorphosed leaves, the external or inferior of which are usually alternate, and the internal or superior always verticillate, or opposite; the latter are called *floral envelopes* and *sexes*.

228. As every flower-bud proceeds from the axilla of a leaf, either fully developed or rudimentary, it therefore occupies exactly the same position with respect to the leaf as a leaf-bud.

229. The leaf from the axilla, of which a flower-bud arises, is called a *bractea*, or *floral leaf;* and all rudimentary leaves, of what size or colour soever, which appear on the peduncle between the floral leaf and the calyx, are called *bracteolæ*.

230. But in common language, botanists constantly confound these two kinds, which are, nevertheless, essentially distinct.

This little book is in reality the only philosophical and precise original introduction to botany in the English language; but it is, after all, only an outline, and we trust the author will lose no time in filling it up, and giving it that air of importance, in the eye of the public, which it justly merits.

## Letter relating to the Figure of the Earth. By JAMES IVORY, Esq. M.A. F.R.S. &c.—*Phil. Mag. April* 1830.

Mr. Ivory writes this letter as a statement of what he has contributed to the theory of the figure of the earth, and to assert his claim to his peculiar notions.

He considers himself to have demonstrated the insufficiency of Clairault's theory, by showing that it inadvertently neglects the attraction between certain portions of an homogeneous planet, supposed fluid: and by this means omits to take into account pressures prevailing in the interior of the mass, and vanishing at the surface, which cannot but have an influence on the figure of equilibrium; and further states, that he gave the true conditions for the equilibrium of a homogeneous planet in a fluid state, deduced *a priori* from the principle of hydrostatics, without neglecting any cause tending to change the figure of the fluid, in the Phil. Trans. for 1824.

It is now well known that the equation given by Maclaurin, of the surface of a spheroid, (supposing that a fluid homogeneous planet is in equilibrium when it has the figure of an oblate elliptical spheroid of revolution,) has two different solutions. To account for the existence of two figures of equilibrium which would result from this equation, Mr. Ivory examined the forces in action in the interior of the mass, and found that two different sets of surfaces may be traced within the fluid, each of which is possessed of the property of the level surfaces in Clairault's theory, that is, the intensity of pressure is the same at all these points. The two sets of interior surfaces have different relations to the outer surface, and one set only can properly be called level surfaces.

Lastly, Clairault resolved the problem a long time ago with respect to the equilibrium as applied to a heterogeneous fluid, but retained only the first power of the ellipticity. Mr. Ivory states himself to have published, in the Phil. Mag. for July 1826, a solution which takes in the second power of the oblateness, by a method which may be extended to any power of the same.

## Linnæa, a Botanical Journal. By Dr. D. F. L. SCHLECHTENDAL, July and October 1829. 8vo. Berlin.

These two numbers contain, amongst other papers; 1st, the continuation of the description and classification of the *Synantheræ* of the Herbarium of Berlin, by F. Lessing; 2. a review of the *Hepaticæ* of the Cape, by Lehmann; 3. remarks on the *Cratægus* and *Rumex* of the flora of Germany, by Fingerhuth; 4. descriptions of new or rare cryptogamous plants, (*Cæeoma, Uredo,*) by Fr. Rudolphi; 5. new genera of phanerogamous plants, by Hemprich and Ehrenberg; 6. varieties or hybrids of indigenous plants, by Lasch; 7. an enumeration of mushrooms (*Hymenomyceti pileati*) recently found in the march of Brandenburg, by Leasch; 8. a general view of the flora of Mexico, by M. Schiede.

## *Zeitschrift fur Physiologie,* Gazette of Physiology. By TIEDEMANN and TREVIRANUS. Vol. III. Part 2. 1829.

This Part contains, amongst other memoirs; 1. anatomy of the *Aphrodita aculeata,* LIN. by G. R. Tréviranus; 2. on the fractures of bones, and the sutures which they form, by S. Th. de Sœmmering; 3. on the formation of neuters in the *Hymenoptera,* and principally in bees, by G. R.

Tréviranus; 4. description of the brain, and of the spinal marrow of a monster by excess, by Tiedemann; 5. description of three bi-corporate monsters, by Mayer of Bonn; 6. new observations on the posterior extremities of the serpent, and on the scales of the *Cæcilia*, by Mayer; 7. are light and heat developed during the life of plants? by L. C. Tréviranus; 8. action of musk on plants, by Goeppert; 9. analysis of the milk of women, by Meggenhofen.

The Edinburgh Journal of Science; conducted by David Brewster, LL.D. &c. No. V.—N. S. July 1830.

The original papers in this number are, 1. Account of steam-engines in Cornwall, by W. J. Henwood; 2. Experiments on laurel oil; and account of a curious phenomenon of revolving motions, produced by the combination of alcohol with laurel oil, (Vide p. 302. *supra*,) by Dr. Hancock; 3. Description of a new rain-gage, by M. Adam; 4. On fossil remains in the Velay, (Vide p. 308. *infra*,) by Dr. Hancock; 5. On the double chlorides of gold; by J. F. W. Johnston; 6. Observations on some passages of Dr. Lardner's treatise on mechanics, by the Rev. W. Whewell; 7. Meteorological observations made at Kendal, by Mr. S. Marshall; 8. Register of the barometer, thermometer, and rain-gage, at Canaan Cottage, near Edinburgh, by A. Adie, Esq.

*Structure et Formation, &c.* Structure and Formation of the Operculum in Gasteropodous Pectinibranchial Mollusca. By M. Ant. Duges.—*Ann. des Sci. Nat.* Oct. 1829.

The author divides these opercula into three classes, the *cochleiform*, *valviform*, and *patelliform*. The first (the *spiral* of De Blainville) belong to to the *Naticæ*; the second (the *toothed* and *laminated* of Bl.) are found in certain *Murices*, *Fusus*, *Buccinum undatum*, &c.; the third (*concentric* or *scaly* of Bl.) belong to the *Paludinæ*.

According to M. Dugès, it is always the collar and not the foot, as has been stated by some writers, which forms and nourishes the operculum; it is sometimes the whole circumference of the collar, but more frequently its posterior part, which is the organ of production. The columellar border, and posterior extremity of the operculum, are consequently the parts where the increase takes place; the oldest portions are driven outwards and forwards, whence result the spiral convolutions of some, and the scaly disposition of others.

Synopsis of the Organic Remains of the Ferruginous Sand Formation of the United States, with Geological Remarks. By Samuel G. Morton, M.D. of Philadelphia.—*American Journal of Science and Arts.* No. II. Vol. XVII.

By most of the geologists of continental Europe, the ferruginous sand, including iron sand, weald clay, green sand, and chalk marl, is considered as a lower division of the chalk, while in this country it is more generally supposed to be a link in a distinct formation, intermediate between the chalk and the oolites. This formation occupies, in North America, a great part of the triangular peninsula of New Jersey, formed by the Atlantic, and the Delaware and Raritan rivers, and extends across the state of Delaware, from the city of that name to the Chesapeake: appears again near Annapolis in Maryland, at Lynch's Creek in South Carolina, at Cockspur Island in Georgia, and at several places in Alabama, Florida, &c. The mineralogical characters, and the mineral contents of the American beds, do not appear to present any remarkable differences from similar formations in other countries. Many new shells are, however, enumerated as characteristic; among which are six chambered univalves; (there are no well determined species of simple or spiral univalves.) The species of bivalves belong chiefly to the genera Tarantula, Gryphæa, Astræa, and Exogyra of Say, but they are not very numerous. Some well determined genera of Echinideæ, Crustacea, and Zoophytes, are also mentioned.

Inquiry into the circumstances under which the Remains of some Fossil Animals were accumulated in the volcanic soil of the Velay, in France. By S. Hibbert, M.D. F.R.S.E. &c.—*Ed. Journ. of Science*, No. V.

The lowest rocks of the Velay are crystalline, and are surmounted by sedimentary deposits, probably of quadersandstein. This district was subsequently the seat of a series of lakes, which deposited formations of sandy clays, potter's clay, marly and gypseous beds, &c. characterized by the mollusca and mammifera of the tertiary formations. These are succeeded by a deposit of brown coal, consisting, according to Dr. Hibbert, of birch, willow, alder, &c. with fresh water fish, frogs, lizards, and numerous insects. This brown coal alternates with vegetable and earthy matter. It is covered (at Roche Lambert) by white micaceous sand and clay, with fragments of quartz and feldspar, or by quartzose sand, (at Aubepin,) with hydrate of iron. It appears that the forests *not* covered with these sands, are those which contain the bones of various species of Cervi, of the Rhinoceros leptorhinus of Italy, and the Hyæna spelæa. Volcanic eruptions broke forth at this period, marked by trachytes and basalt; and torrents of lava, ejections of scoriæ, and deposits of tufa, spread themselves over the country. The brown coal, (at Collet, Ronzal, &c.) alternates with trachytes, phonolites, basalts, and volcanic cinders. Dr. Hibbert accounts for some of these alternations, by supposing the Loire to be dammed up at the gorge of Chamelieres by dikes of lava, and to have formed two lakes, in which these deposits were formed, and he has ingeniously applied the same theory to account for many other interesting facts connected with the volcanic and transpoted soil of the Velay.

Notice of a Submarine Forest in Largo Bay, in the Frith of Forth. By the Rev. Dr. Fleming of Flisk.—*Brande's Journ. March* 1830.

The rocks on which this forest rest, belong to the medial order, and are accompanied by traps. The soft bed on which it is immediately incumbent, consists of brown laminated clay, which may be referred to lacustrine silt. Sands and fine gravel cover the deposit, also of fresh water origin; and over them is a bed of peat, composed of the remains of land and fresh mater origin. The trees interspersed are generally birch, hazel, and alder. The nuts of the hazel were likewise observable. The clay is now burrowed by the Pholas candida, and the peat contains a Spio, named by the author *S. emarginatus*. The author connects the phenomena presented by these quaternary formations, with the supposition that the space now occupied by the German Ocean was formerly a fresh water lake.

*Sur une nouvelle, &c.* On a New Species of Fossil Bear, *Ursus Pitorii*. By Marcel de Serres, in a Letter to Baron de Ferussac.—*Bull. de Sci. Nat. Jan.* 1830.

The bones of this bear were found, with the remains of other carnivora, in the caves of Fauzan, by Mr. Pitorre, and have belonged to a larger animal than the Ursus spelæus, in whose company Marcel de Serres thinks that it occurs in the caverns of Sundavig in Prussia. The author has not been enabled to examine the bones of the head; but the lower maxillary and the teeth furnished marked differences from the U. spelæus, and approximated to existing species. It has been found, like the U. spelæus, in deposits which also contained remnants of pottery.

# PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

## EDINBURGH.

The Royal, the Wernerian, and the Royal Physical Societies, have terminated their Sessions.

*Society of Arts for Scotland.*—The following communications have been read and exhibited to the Society since 17th February 1830:

3d March 1830. 1st, a model and description of a cart to be propelled by levers and cranks, acted on by the weight and force of one man, without a horse. By William Allan, Morningside.

2d, Description of a slow motion for the beam compass. By Mr. Edward Sang, teacher of mathematics, Edinburgh, M.S. Arts.

17th March. 1st, An account of the latest improvements in the turning lathe, including the slide-rest, and apparatus for drill-turning; as also an account of the planing-engine and apparatus, with engravings. Communicated by John Robison, Esq. Sec. R.S.E. and M. S. Arts.

2d, Drawing and description (as amended) of a simple, cheap, and accurate rain gage. By Matthew Adam, A.M. rector of the academy of Inverness, and Assoc. S. Arts.

3d, Description of a pendulum chronometer, in which the arbors of the wheels move on friction rollers, and the pinion leaves are made so as to revolve by the impulse of the wheel teeth, which are of a peculiar form. Made by David Whitelaw, watch and clock maker, 16, Prince's Street, Edinburgh, for the late Andrew Waddell, Esq. Hermitage Hill, Leith. Communicated by Mr. Waddell.

31st March. 1st, Observations on the application of heated air to the warming of dwelling-houses, and of churches, hospitals, and other public buildings; with remarks on various kinds of stoves used for this purpose. By Mr. Robert Ritchie, ironmonger to his Majesty, High Street, Edinburgh. Models of the stoves, &c. were exhibited.

2d, Description of an improved levelling rod. By Mr. James Flint, civil engineer, Terrace, Edinburgh. The rod was exhibited.

3d, Additional observations on safety windows for upper stories of houses. By Thomas Johnston, ink-manufacturer, Glasgow.

14th April. 1st, Remarks on the eidograph, pentagraph, &c. were read; by Mr. Professor Wallace, F.R.S.E. and Memb. S. Arts. The instruments were exhibited.

2d, Notices of various plans of applying heat, either by common fire-places, or by steam apparatus, were communicated. By Mr. Robert Ritchie, ironmonger to his Majesty, High Street, Edinburgh. Models of various stoves, &c. and of a drying-house, were exhibited.

3d, Notice of an apparatus for facilitating the making of infusions by hot water, and particularly from coffee. By John Robison, Esq. Sec. R. S. E. and M. S. Arts.

28th April. 1st, Notice respecting Mr. Cuthbert's elliptic metals for reflecting microscopes. Communicated by Dr. Brewster, F.R.S.E. and M.S. Arts.

2d, Investigation of the spherical aberration of a diamond lens. By Mr. Andrew Pritchard, London, Hon. Memb. S. Arts for Scotland. Communicated by Dr. Brewster, F.R.S.E. and M.S. Arts.

3d, Description of the improvements of the common mortice lock. By Mr. James Williamson, Melrose, Assoc. Soc. Arts. The lock was exhibited.

4th, Description of a method of destroying vermin on fruit trees, bugs, &c. by means of steam. By James Grieve, coppersmith and brazier, 20, Greenside Place, Edinburgh. The apparatus was exhibited.

5th, Notice regarding the improved steam indicator and old test. By John M'Naught, engineer, Glasgow.

6th, Memorial on the construction of chimnies, so as to prevent smoke. By Alexander Mollison, Eglinton Street, Glasgow.

7th, Notice of a Swiss lock, of a neat, simple, and efficient construction, made by Mr. Cormack, smith, Chalmers' Close, for, and presented to the Society by Sir Alexander Muir Mackenzie of Delvin, Bart. The lock was exhibited.

## LONDON.

*Royal Society.—April* 29. A paper by J. W. Lubbock, was read on the Variations of the Elliptic Constants, and several works were presented.

*May* 6. A paper on the occurrence of Iodine and Brome in mineral springs, by Dr. Daubeny, Professor of Chemistry in Oxford, was read.

*May* 13. A paper was read, entitled, An Essay on the Preserved Bodies of Aboriginal Peruvian Indians, by W. T. Carter, M.D., Surgeon R.N.

*May* 27. The president informed the meeting that he had written to Mr. Babbage, requesting him to attend on this evening, in pursuance of a resolution adopted on Thursday se'nnight. Mr. Babbage, in answer to the president, states his unwillingness to become a party to such discussions as took place on the occasion alluded to: adding his opinion, that the meetings of the Society ought to be, as they were intended, devoted to philosophical enquiry, and not to angry debate. In this view the president concurred; and having recited one of the by-laws in support of it, he said that he trusted the matter would be allowed to rest.* Dr. Roget then read a paper, by Mr Costello, on the instruments used in operations of lithotrity, illustrated by cases.

*Linnæan Society.—May* 4. There was read an examination of M. Virey's observations on aëronautic spiders, published in the *Bull. des Sci. Nat.*

*May* 22. The anniversary meeting of this society took place this day, Lord Stanley in the chair. As is the customary practice, Mr Bicheno communicated to the meeting the accession of fellows which had taken place during the past season; likewise the deaths which had occurred during the same period; amongst these we observed the names of Dr Hamilton, Major-General David Stewart, the venerable Chevalier de Lamarck, professor of zoology in the Jardin du Roi, Professor Brotero of Coimbra; Dr Tozzetti of Florence; Dr Schaub of Cassel, and several others. Twenty-one fellows had been elected during the year. Mr Forster stated that the amount of subscription for the library, herbaria, &c. of Sir J. E. Smith, once belonging to Linnæus himself, and now purchased by the Society, amounted to upwards of L.1400; that the Society's other receipts for the year amounted to L.1600, which exceeded the outlay by L.200. Several gentlemen set the example of an annual subscription in aid of the balance due to the executors of Sir J. E. Smith. Earl Brownlow, Professor Buckland, George Bentham, Charles Stokes, and William Yarrell, Esqs., were elected into the council. The other officers stand as heretofore.

*Geological Society—March* 19. Extracts were read from a paper entitled "Reference to a Geological Map and Section of Pembrokeshire," by Alfred Thomas, Esq.

The first of two letters addressed to R. I. Murchison, Esq. Sec. "On the Lacustrine Basins of Baza and Alhama in the province of Granada, and similar deposits in other parts of Spain," by Colonel Charles Silvertop, F.G.S., was then read.

* Dr. Roget published an answer to certain of Mr. Babbage's charges, in the last number of the Ann. of Phil., but Mr. Babbage has since reiterated his accusations.—Ed.

*April* 2. A paper on the Geology of Weymouth, and the adjacent parts of the coast of Dorsetshire, by the Rev. Dr. Buckland, and Henry Thomas de la Beche, was read.

*April* 16, The reading of the paper on the Geology of Weymouth, and the adjacent parts of the coast of Dorsetshire, was concluded.

A paper entitled "Description of a New Species of Ichthyosaurus," by Daniel Sharpe, Esq. F.G.S., was then read.

## PROVINCIAL.

*Newcastle Natural History Society.*—At the monthly meeting of the Newcastle Natural History Society, on 18th May, the Vicar of Newcastle in the chair, it was resolved that the Anniversary Meeting shall be held on the first Tuesday in August, and not in June, as before intended. By this re-arrangement it was hoped more country members would be able to attend; and the Transactions of the Society, now printing, be more complete. The receipt of presents was then acknowledged. Several Engravings to illustrate Mr Selby's paper on the new Swan (Cygnus Bewickii) having been presented by that gentleman to the society, prints of them were laid on the table; for them, and his valuable present of bird-skins, the thanks of the meeting were unanimously voted to him. An account of the situation of several Hazel Nuts found in an old mine near Alston, while driving a drift for lead ore, was communicated by Mr Pattinson, of that town; they were diffused through a mass of gravel, in the limestone strata, of about a cubic foot thick. Some observations, by Mr Francis Forster, on the geology of Racheuch Crag, were then read; they went to prove, from the various particulars of the basalt, &c. in the neighbourhood of each, that the crag was a continuation of the Dunstanborough range. Mr Hutton read a postscript to his paper on the new Red Sandstone of the county of Durham, below the Magnesian Limestone.

## FOREIGN.

*Acts of the Geographical Society of Paris.—Sitting of 4th Dec.* 1829.—M. Yosy, on the point of undertaking a journey in America, expressed a desire that the Society would provide him with instruments, as had been done in the case of other travellers. A Bunten's barometer was accorded to him.

M. Jomard communicated a letter from M. C. Moreau, relative to a *fac simile* of a map in the British Museum, executed in the 10th century, and explained by Mr Playfair.

M. de Vins de Peysac addressed to the Society a census of the population of the Havannah in 1828, by Don Manuel Pastor.

M. Warden communicated a statistical table of the population and revenue of the province of Cercada (Department of Lima.) The same author suggested that the commission should decide on several MS. maps of the coasts of Peru, submitted to the Society by Captain Skiddy.

M. Jomard exhibited specimens of the work of the young Ethiopians educated under his direction.

*Sitting of the 18th Dec.*—M. Raboteau, Professor of Geography, wrote to the Society to call its attention to Georama, which was threatened to be destroyed. Several members were authorized to visit the establishment and report.

Dr Reinganum of Berlin transmitted two manuscript notices by Mr Buschmann, entitled Description of Vera Cruz, and Index Geographicus Regnorum Mexici et Guatemalæ, &c.

M. Yosy presented a Memoir by M. Auber, on the Geology of the Island of Teneriffe, &c.

Captain D'Urville deposited at the board a map of the Bay of Tasman, laid down during the expedition of the Astrolabe.

*Academy of Sciences.—Meeting of 15th February, 1830.*—The Baron Roussin was elected to the place vacant by the decease of Mr. de Rossel.

Mr. Latreille was elected Professor of Entomology to the Museum of Natural History.

Mr. Navier read a letter from Colonel Raucourt, "On the temperature of the Neva, and on the formation of ice at the bottom of that river."

Messrs. Robiquet and Boutron-Charlat informed the Society that they had obtained Benzoic acid, in a neutral state, from the oil of bitter almonds.

Messrs. Puissant, Dupin, Damoiseau, and de Prony reported favourably on the globes and planispheres of M. Miller.

Messrs. Desfontaines and Mirbel reported favourably on a memoir on the Capparideæ, by Mr. Cambessides.

Mr. Geoffroy St. Hilaire reported also favourably on a memoir on the organiztion of the Crustaceæ, by Messrs. Laurencey and Meyraux.

Mr. Navier reported very favourably on a work of Mr. Beaudemoulin on Hydraulics.

*Meeting of 22d February.*—Baron Cuvier read a memoir, being considerations on the Mollusca, and on the Cephalopoda in particular.

Mr. Mirbel reported favourably on a memoir on the families of plants, with parietal placentas.

*Meeting of 1st March.*—Mr. Geoffroy St. Hilaire read a memoir on the character of the doctrine of uniformity of organization, called Theory of Analogies.

Mr. Dalton was elected to the place vacant by the decease of Sir Humphrey Davy.

*Meeting of 8th March.*—Mr. Auguste St. Hilaire was elected to the place vacant by the decease of Mr. Lamarck.

Mr. Puissant read a memoir, being a new application of the calculation of probabilities.

Mr. Becquerel communicated the discovery of sulphuret of lime in a bed of argillaceous marl, accompanying the gypsum formation of Montmartre.

Messrs. Freycinet and Beautempre de Beaupré reported favourably on Captain Dillon's work.

Mr. Serullas read a memoir on the mutual action of iodic acid and morphine, or of the acetate of that base.

*Meeting of 16th March.*—Mr. Chevreul announced the reception of a letter from Berzelius, in which he communicated the discovery of butyric acid in human urine.

Mr. Serullas read some observations on the chloruret of iodine.

Mr. Roussin reported favourably on Mr. Beltrami's work on Mexico.

Mr. Girou de Buzareignes read, in the name of his father, some experiments on the generation of plants.

Mr. Gerdy read a memoir on the mechanism of the motion of the limbs and of the body in the act of leaping.

Mr. Milne Edwards addressed a memoir on a particular disposition of the branchial apparatus in some crustacea.

*Meeting of 22d March.*—Baron Cuvier read a memoir entitled considerations on the hyoid bone.

Mr. Geoffroy St. Hilaire read a memoir, entitled "On the application of the theory of analogies to the organization of fish."

*Meeting of 29th March.*—Mr. Boubée read a memoir, being general considerations on the animals that lived at the different geological epochs.

Mr. Soubeiran read a memoir on the arseniurets of hydrogen.

Mr. Geoffroy St. Hilaire read a memoir on the hyoid bone.

## MISCELLANEOUS INTELLIGENCE.

*University of Edinburgh.*—Dr. Christison, in his lectures on Medical Jurisprudence, has adopted the only system of education which can reward the labour of the teacher by the proficiency of the pupil. He gives regular examinations on the subjects upon which he has lectured, and stimulates emulation amongst his students, by giving cases or theses as a constant exercise. Dr. C. promises, on many accounts, to sustain and add to the reputation of the University.

Dr. Graham, on a recent occasion, during his lectures on Botany, pronounced a well-merited eulogium on the East India Company for their princely liberality in the promotion of botanical science. We find that their garden at Calcutta occupies a surface of several hundred acres, and there are more than 300 labourers employed in it. A number of collectors, paid by the company, are constantly travelling over the countries subjected to its dominion, and continually enriching the garden and collection. This collection is immense, and has been the source of numerous discoveries. Dr. Roxburgh, at a former period, gave a glimpse of the treasures it contains ; and Dr. Wallich is now opening them to view. But besides the great labours of Roxburgh and Wallich, there are others which have been protected or encouraged by the Company. Messrs. Kœnig, Heyne, Carey, Patrick Russel, Röttler, Klein, Wight, Finlayson, &c. have traversed various parts of India, with the view of studying its vegetation. All the collections of dried plants which had been made by these travellers for nearly fifty years past, were sent to London, and presented to the Company's museum. The immensity of these materials made the directors feel that it was impossible to render them useful without the co-operation of a great number of observers. By an order remarkable for its liberality, the Court of Directors has instructed Dr. Wallich, who is now for a time in London, to distribute these valuable collections as presents to the principal botanists of Europe, taking proper measures to secure the publication of them. This liberal distribution has already commenced, and it is probable, that from this act of generosity of the Company, we shall see within a few years the whole of the plants collected in the East Indies increasing the mass of known vegetables. The number of them is estimated to be at least from 7000 to 8000 species, and every one may easily conceive how many facts, ideas, and new analogies will result from this increased addition to our present botany. " The East India Company," says M. De Candolle, " has thus acquired the most honourable title to the gratitude of the savans of all countries ; and we are very sure that every friend of science will applaud this great act of liberality, and join with us in expressing his gratitude."

*Meeting of Scottish Naturalists.*—We are gratified in being able to inform our readers, that the proposal we mentioned in our last number is to be carried out. A private meeting of the naturalists of this neighbourhood will this summer be held over the festive board, and arrangements will then be made for organizing a general meeting on ensuing years.

Dr. Wallich has been elected a member of the *Academie Royale des Sciences de l'Institut de France.*

The Royal Academy of Sciences at Berlin has elected Messrs. Poisson and Arago corresponding members of the Academy, in the room of Laplace and Volta, deceased.

*Necrology.*—M. Fourier, Member and Perpetual Secretary of the Academy of Sciences, died on the 19th of May, in his sixtieth year. He was one of the *sa-*

*vans* who accompanied Buonaparte in his Egyptian expedition, and wrote the preface to the great *Description of Egypt.* His *Theory of Heat* gained him the prize of the Institute, and has since been completed by a Series of Memoirs published successively in the Memoirs of the Academy of Sciences. The last which has been printed contains many new views, the result of experiment, and very important calculations on the temperature of interplanetary space, the decrease of terrestrial heat, &c. He was engaged at the time of his death in preparing for the press a large work in two volumes, entitled *Analysis of Algebraic Equations.* M. Arago has been appointed Perpetual Secretary in his place.

M. Gosselin, the celebrated geographer, died at Paris on the 7th of February last, at the age of 78 years. His principal works are: 1. *Géographie des Grecs analysée, ou les Systèmes d'Eratosthène et de Ptolémée, comparés entre eux, et avec nos connaissances modernes,* 4to., with nine plates, 1790: 2. *Recherches sur la Géographie Systématique et Positive des Anciens,* 4 vols. 4to.; besides a variety of memoirs inserted in the Class of History of the *Mémoires de l'Institut,* and in the *Mémoires de l'Academie des Inscriptions.* He assisted also in the labours of the French translation of Strabo.

Soemmering, the celebrated anatomist, died in March last, at Frankfort, aged seventy-six.

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## LITERARY NOTICES.

Mr. Witham of Lartington, in a work now in the press, proposes to exhibit microscopic representations of the internal structure of several fossil vegetables, which occur in the coal fields of England and Scotland, and in the Lias formation, accompanied with others of those recent vegetables to which they seem to bear a decided resemblance. By these representations and their descriptions, it is hoped that the existence of dicotyledonous plants in the coal formation, will be satisfactorily proved. Mr. Witham, it is well known, has occupied much of his time in the investigation of organic remains; and this specimen of the results of his labours, cannot fail to be gratifying as well as instructive to geologists. We have seen some of the drawings, and have pleasure in bearing testimony to their great beauty...The Foreign Review is joined to the Foreign Quarterly...A new series of the *Journal des Voyages* has commenced this year; and it is much improved...Dr Graham has published a Synoptical Table of Genera, to be appended to Hooker's British Flora, for the use of students...Mr. Sillery, the poet, announces a philosophical work on the creation, (it is a pity he has chosen such a poetical subject for his *debut* in philosophy.)...M. Geoffroy Saint Hilaire has presented to the Academy, a volume, entitled "Principes de Philosophie Zoologique," in answer to M. Cuvier.

### *List of New Books.*

Babbage on the Decline of Science in England, 8vo., 7s. 6d. bds...Hall's General Atlas, L.8 : 18 : 6...Niebuhr on the Geography of Herodotus, 8vo., 6s. ...Mosely on Hydrostatics and Hydrodynamics, 8vo., 12s...Burckhardt's Notes on the Bedouins, &c. 4to., L.2 : 12 : 6...Domeier's Road-Book of Germany, 18mo., 10s. 6d...Macvicar's Elements of the Economy of Nature, 8vo., 16s... Lardner's Cyclopedia, vol. vii. Cities and Towns...Main's Villa and Cottage Florists' Directory...Stoker's Botanical Commentaries, 8vo...Eschschulz, Dr. F. System der Acalephen. 4to. Berlin. 12s...Reugger, Dr. J. R. Naturgeschichte der Saeuegethiere von Paraguay. 8vo. Basil. 9s.—Withering's Botany, by Macgillivray, 12mo. 10s.

THE

# EDINBURGH JOURNAL

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# NATURAL AND GEOGRAPHICAL SCIENCE.

AUGUST 1830.

## ORIGINAL COMMUNICATIONS.

### ART. I. *An Account of the Eruptions of the Volcano of Peuquenes, in the Andes of Chile.* BY JOHN GILLIES, M.D. M.W.S. &c.*

The Volcano of Peuquenes has of late years excited considerable attention in consequence of its frequent eruptions. It is situated in the western ridge of that part of the Cordillera of the Andes, which separates the province of Mendoza from Chile, at the distance of a few miles to the south of the route across these mountains, called the road of the Portillo, or the little door, from that part of the ridge over which the road passes, having some resemblance to a gateway. This route, at certain seasons of the year, is preferred by many travellers to the more frequented one of Uspallata, as, besides several other advantages, it is considerably shorter. On the other hand, being more elevated and farther to the south than the ordinary road, the snow renders it impassable for mules during a greater portion of the year; it is seldom open, even in the most favourable seasons, longer than from Christmas to the end of April.

At this place the Cordillera of the Andes consists of two parallel ridges running nearly south and north, and separated from each other, for the distance of about twenty miles, by the extensive valley of the river Tenuyan. The eastern or Mendoza range is the most elevated, being at the Pass of the Portillo about 14,365 feet above the level of the sea. This chain extends, with very little interruption, from the River of Mendoza, in a southerly direction,

* Read before the Wernerian Society April 17. 1830.

as far as the River Diamante, a distance of about 140 miles. The western or Chilian range, in which the volcano is situated, has an elevation, where it is crossed by the road, of only 13,210 feet. This ridge extends also a considerable way northwards, whilst a little south of the pass it is continued in a south-easterly direction, and at length joins with the eastern or Portillo range, constituting the southern boundary of the valley of the Tenuyan. This river coming from the north, from the base of the mountain of Topongato, decidedly the most lofty of the Chilian Andes, collects the various streams which water this extensive valley, and reaching the north-eastern base of the Volcano of Peuquenes, sweeps towards the south-eastern extremity of the valley. It then crosses the Portillo chain by a deep chasm or valley, which it seems to have formed for itself, at the distance of about twelve miles south of the pass of the Portillo, and has its exit to the extensive plains of Mendoza, which extend along the eastern base of the Andes. The elevation of the bed of the river Tenuyan, where it intersects the road which crosses the valley, is 7,530 feet above the level of the sea.

From the base of the volcanic mountain on the western and south-western sides, there take origin the Rio del Yeso and Rio del Volcan, which constitute the principal northern branches of the river Maypu in Chile. Travellers crossing from the eastern to the western side of the valley of the Tenuyan, have the summit of the volcano concealed from them by a portion of the same mountain, which juts considerably into the south-western part of the valley; but when upwards of half way from the river to the pass of Peuquenes, a very good view is obtained of it, at the distance of from 8 to 9 miles south by compass. Its summit has a rounded appearance on its eastern side, but to the westward it is rather less elevated, and its surface appears more level: the summit is generally covered with snow, and its elevation cannot be less than 15,000 feet above the level of the sea.

As far as I could learn, no one has yet visited the crater of this volcano. It is stated that the peons in charge of the cattle which graze in the valley of the Tenuyan during the summer months, occasionally ascend the mountain, on the side next the valley, in search of their stray cattle; but having accomplished their object, they have never been prompted by curiosity to visit the crater itself. Although this does not appear when viewed from the valley to be an enterprize of great difficulty, it is reported, that about twenty-five years ago, some Germans made a fruitless attempt to reach its summit from the Chilian side.

Public attention seems to have been principally directed to this volcano, since the occurrence of the great earthquake, which, on the evening of the 19th November 1822, converted the busy port of Valparaiso, and various other places in Chile, into a heap of ruins, and which was felt, though with diminished violence, at

Mendoza, on the eastern side of the Andes, and even as far eastward, as the province of San Luis.

I have been unable to obtain any evidence of its having been in a recent state of activity prior to that event; but since then its eruptions have been very frequent, and have attracted the notice of the inhabitants both of Mendoza and Chile. These eruptions have principally consisted of immense quantities of volcanic ashes or pumice, thrown up in a state of such minute division, and of so little specific gravity, as to be carried by the wind to immense distances. These volcanic products, however, generally fall in the greatest abundance on the mountains and vallies in the neighbourhood, more especially to the eastward. In the valley of the Tenuyan such occurrences have been frequently witnessed by those individuals who pass part of the year there in attendance on their cattle, and likewise by the miners, who live during the whole year near the summit of the lofty mountain of San Pedro Nolasco, in Chile, situated about 30 miles S.W. by W. of the volcano. On my visiting these mines in 1826, I was informed by the principal miner, in charge of the silver mines, who had been resident there during a number of years, that he had seen many of these eruptions since the occurrence of the earthquake already mentioned, and more especially during the preceding year: that they generally commenced with a loud murmuring noise, followed by an explosion, and the eruption of volcanic matter, forming at first a dense cloud over the volcano, and then gradually subsiding, and disappearing in the direction in which the wind might blow at the time, which was almost always eastwards; and he likewise remembered, that although the ashes rarely fell upon any part of the mountain of San Pedro Nolasco, yet the nature of the erupted matter was rendered sufficiently apparent by the gray or ash-coloured tint which it gave to the snow on the tops of the mountains in its vicinity, during some time after the occurrence of an eruption.

During my residence in the city of Mendoza, distant upwards of 90 miles to the N.E. of the volcano, I had only once an opportunity of personally witnessing the fall of one of these showers of volcanic ashes at so great a distance from the place where it had been ejected. This event took place on the 15th December 1824, at 5 P.M.; the day was fine, with a cloudless sky, and a moderate breeze coming from the south-west. For some time before the fall of ashes took place, a dark insulated cloud had been observed in the sky in the direction of Peuquenes, but had altogether disappeared on its occurrence. I succeeded in collecting a small portion of the ashes from the flat roof of a house, and on examination found it to consist of minute particles, of a grayish colour, of small specific gravity, and in appearance not unlike common pumice-stone reduced to powder. On inquiry, I was informed that on various occasions showers of ashes, of a similar description, had fallen at Mendoza. And on the 22d July 1827, one took place, which fell under the observation of an intelligent friend, who brought me a small portion of the ashes collected on that occasion, which I found to correspond exactly in appearance with what I had myself collected on the 15th December 1824.

A very favourable opportunity presented itself to me, of witnessing another eruption and shower of ashes from the same volcano, on the 1st March 1826, while on a journey to Chile by the route of the Portillo. This journey I was induced to undertake, for the purpose of accompanying a much valued friend, who had come from Buenos Ayres in a very precarious state of health, on which account I recommended this route as the most eligible for an invalid at that season. We had passed the preceding night at the Totoral, a farm house on an estancia, or cattle estate of one of my friends, pleasantly situated on the northern banks of the river Tenuyan, and distant about 65 miles south of the city of Mendoza. In reaching this place, we had travelled on the preceding day along the plains which skirt the Cordillera of the Andes on the eastern side, and in a direction nearly parallel with the mountains, the base of which at the Totoral was distant about 20 miles. We had now therefore to cross the plain in the direction of the pass of the Portillo, bearing from us in the direction of W.S.W. distant about 36 miles. At a little distance to the south of this pass, was to be seen the deep chasm formed across that part of the Andes, along which the river Tenuyan issues from among the mountains.

As our party had been considerably augmented by the accession of another of our countrymen, and two gentlemen of Buenos Ayres, proceeding to Chile on a mission from the Government of that country, a good deal of time was spent in making arrangements, and getting ready to start on so long a journey, so that we did not leave our resting-place until 7 o'clock. The morning was fine and agreeable, the sky free from clouds, and a moderate breeze coming almost in a direct line from that part of the mountains towards which we were travelling. We had not proceeded far on our way, when my fellow travellers, as well as myself, were much annoyed by some minute particles getting into our eyes, and causing considerable uneasiness. At first we imagined that it was occasioned by small particles of sand; but a little reflection soon satisfied us that the breeze was not sufficiently strong to raise up in the air the grains of sand which appeared on some parts of the plain, over which we were travelling; and in this state of uncertainty, one of my fellow travellers, who was covered with a dark-coloured poncho, riding near me, afforded me the means of unveiling the mystery, as I perceived, on looking towards him, that the atmosphere betwixt us, was crowded with innumerable minute flocculent particles of a gray or ash colour, but which, owing to their minuteness, had not before been perceived. It being necessary at the time to keep up with the rest of the party, who were somewhat in advance, I could not delay a sufficient time to collect any considerable portion of these particles, which I immediately concluded to be volcanic ashes; but while continuing to pursue my journey, I succeeded in securing a small portion, by spreading out the fore part of my poncho, though they were so light that the breeze carried the greater part of them again into the air almost as fast as they fell. The little, however, which I did procure, was sufficient, on examination, to satisfy me of its identity with what I had before collected at Mendoza. These particles were wafted in quick succession by the wind to the eastward, and on looking attentively towards the mountains, I perceived, in the direction of a peaked part of the ridge intervening between the pass of the Portillo and the exit of the river Tenuyan, a dark, hazy cloud, which was evidently altogether composed of the same volcanic ashes, as it appeared exactly in the direction from which the breeze came, and there was no where else to be seen any trace of clouds. It continued visible until near nine o'clock, becoming gradually fainter until it altogether dissappeared. Soon afterwards the shower of ashes also ceased, having continued without intermission, for nearly two hours, from the time of our first observing it, during which we had travelled over an extent of about eleven miles. I found on further inquiry of our attendants, that the dark cloud had been noticed by some of them before our departure from the Totoral, but that it had not excited particular attention, until we found ourselves enveloped in the shower of ashes.

Soon after it had ceased, we reached the estancia of the Cienega de Zapata, where we remained a short time, during which, on conversing with the capataz or overseer about the shower of ashes, he informed me that he had witnessed the same phenomena which had attracted our attention: that a short time before sunrise, being on foot, he had heard a distant murmuring noise among the mountains, which was soon followed by a dense column, of a dark appearance resembling smoke, which rose up behind the peaked part of the mountain already mentioned,—that it had gradually subsided into the dark cloud we had afterwards noticed, and was then carried by the wind further to the eastward; and that it had certainly come from the volcano of Peuquenes, which we would afterwards see on our crossing the valley of the Tenuyan, and the western ridge of the Cordillera. When we reached these places a few days afterwards, the volcano was pointed out to us by our guides, at a distance from us of about six miles, but then all was in a state of quiescence, and we saw no traces of the recent eruption.

I have been favoured by my friend Mr. James F. W. Johnston, with the following analysis of the volcanic matter which fell at Mendoza.

" The substance sent has the external appearance of a gray pumice powder, for which at first sight it might be taken. It behaves differently, however, before the blowpipe, and is of greater specific gravity, (sp. gr. 2.25.) Water separates a light gray dust with which it is invested, but without dissolving it. The microscope shows the remainder to consist of two parts, the greater of which is composed of small grains of angular quartz, scratching glass,—the less of similar grains of a dark red substance, retaining its colour when heated, and of less specific gravity than the quartz. These red particles are not attracted by the magnet, but are slowly acted upon by muriatic acid, aided by heat. The substance, therefore, consists chiefly of a quartz sand, mixed with grains of one or more compound minerals; and if it has proceeded from a volcano, has probably been the dust of the various volcanic products, collected first on the sides and in the hollows of the crater, and afterwards dislodged and committed to the winds by some eruption more violent than usual."

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ART. II. *Remarks on Mr. George Don's opinion on the varieties of the Scotch Fir,* (Pinus Sylvestris.) By the REV. J. FARQUHARSON, F.R.S. (*Extracted from a Letter to the Editors.*)

I EMBRACE this opportunity of making known the results of very numerous observations which I have recently made on the extensive fir plantations in this neighbourhood, in reference to Mr. Geo. Don's opinions, first made known to me by your note to my paper "On the Native Forests of Aberdeenshire," Vol. II. p. 6. Every opinion on botanical questions bearing the sanction of that distinguished name, must be treated with high respect; and it is with great deference that I suggest conclusions at variance with his. I find that the horizontal branches, and relatively broad and glaucous leaves, and smooth bark, are very extensively characteristics of such trees, in our fir plantations, as have accidentally abundant room for a free growth. Ought they not, therefore, to be accounted rather symptoms of healthy vegetation, than marks of different species, or even varieties? I can discover no leaves without minute serratures; and although in the broader leaves the serratures are frequently a little turned in from the margin towards the flat side of the leaf, yet the rule is not uniform. In regard to the cones, I find several instances where they vary as much in form on the same tree as they do through the whole plantatious; and on the same tree also I find them often varying very considerably in smoothness.

The paucity of the cones, on healthy and vigorous trees, is in accordance with one part of the economy of other species, which seldom produce much fruit while they are going strongly to wood.

But even granting that there are permanent varieties, or distinct species of the Scotch fir, and the full validity of those distinctions which Mr. Don has indicated, I am yet enabled to state one circumstance, which leaves the argument against thick planting in its full force. I have examined very carefully the old trees at Haughton, and find they differ very much among themselves in respect of all these distinctions, and yet on inquiry I learn that no inferiority has been observed in the wood of any of them, and they all appear equally healthy.

Whether, therefore, they are all to be deemed of one variety, or whether they must be considered as consisting of several distinct varieties, or even species, the circumstance of their standing originally thin on the ground, has enabled them all to live to that extended age, which a comparison of trees of different ages in the native forests, shows to be necessary to the perfection of the wood.

*Alford, June* 16. 1830.

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ART. III. *Account of the Series of Islands usually denominated the Outer Hebrides.* By WILLIAM MACGILLIVRAY, A.M. &c. —(*Continued from* Vol. II. p. 166.)

SECT. VII.—*Wild Animals. Birds.*

THE birds of the Outer Hebrides, if not very numerous in respect to species, are yet exceedingly so in respect to the individuals of which many of these species are composed. As might be expected, the aquatic birds predominate, and in many parts their numbers are truly astonishing. On the other hand, the sylvicolous birds are few in species, as well as in individuals. But before entering upon any general remarks on the subject, I shall present a list of the species which I have myself observed, appending to it those which rest upon the authority of individuals resident in the country. The arrangement of Temminck is preferred, it being apparently the best known, and as natural as any other.

1. *Rapaces.*

1. *Falco Æsalon*, the *Merlin*, vernacularly named *Clamhan beg*, is not very uncommon in some parts of the range.

2. *Falco Tinnunculus*, the *Kestril*, also named *Clamhan*, is by no means common.

3. *Falco fulvus*, the *Golden Eagle, F. Chrysäetos* of Linnæus, *An Iolair dhubh*, or black eagle of the islanders, is very abundant over the whole range. It is generally smaller than the next species, but is much bolder and more active. An adult individual, probably a male, shot by myself, measured only five feet six inches between the tips of the wings; but I have seen otherswhich measured nearly seven feet. They occasionally destroy sheep of the small or native breed, and frequently carry off lambs. Their ordinary food consists of grouse, sea-birds, salmon, marine fishes, and

carrion. They nestle in cliffs overhanging the sea, and, more frequently than the other species of eagle, in rocks among the mountains.

4. *Falco Albicilla,* the *Cinereous Eagle, Sea Eagle,* or *White-tailed Eagle, An Iolair ghlas,* or gray eagle, is still more abundant. The extent of wing of an individual which I examined in Harris, was seven feet four inches, but I saw another in the parlour of the minister of South Uist, which he informed me measured nine feet. This bird lives partly by rapine, but chiefly on carrion. Fish constitutes a principal part of its food. Hence it is often seen on the shores, and by the streams and lakes. In the lambing season it often commits great havock, but seldom carries off lambs unless from an eminence, and when the wind is high, as it experiences considerable difficulty in rising from the ground. It breeds in the inaccessible parts of cliffs overhanging the sea, and sometimes on inland rocks, as well as on islands in lakes.

On the subject of eagles, it may not be amiss to mention that the Hebrideans do not distinguish between the young and the old birds of *F. fulvus,* naming both the black eagle, although they distinguish between the young and old of *F. Albicilla,* naming the former *An Iolair riamhach,* or red and brown eagle, and the latter *An Iolair ghlas,* or gray eagle. They are too well acquainted with the bird, however, to fall into the error of museum observers as to specific distinction between the old and young.

5. *Falco Nisus,* the *Sparrow-Hawk, An Speirag,* is not rare in any of the large islands.

6. *Falco Milvus,* the *Kite,* is very rare.

7. *Falco rufus,* the *Moor-Harrier.* Of this species I once saw an individual in Harris.

8. *Falco cyaneus,* the *Hen-Harrier, An Seabhag,* is not uncommon, and sometimes carries off chickens when they have strayed to a distance from the huts. In this exploit, however, he is excelled by the more sagacious raven.

2. *Omnivoræ.*

9. *Corvus Corax,* the *Raven, Biadhtach, Fitheach,* is astonishingly common in all parts. It roosts and nestles in high rocks on the sea-shore, as well as in the interior, and feeds on carrion of all kinds, fish, poultry, eggs, grain, grass, &c. In autumn the ravens become subgregarious, when they make great havock in some places among the barley. At other times they are commonly seen in pairs, excepting for some weeks after bringing their brood abroad, when the whole family fly about together. I have seen one with patches of white in its plumage, and, about fifteen years ago, an individual entirely white was seen in the island of Pabbay. When grampuses or other large cetaceous animals are stranded, it is astonishing to see the numbers which congregate from all parts. The raven is the first to find out a dead sheep among the hills. He

begins his feast by picking out the eyes, and afterwards the tongue, if he can easily get at it: the perinæum is next attacked, and lastly the abdomen, from which he drags out the intestines and devours them. When a horse dies, from thirty to fifty soon gather about him, and continue to make daily visits until the bones are picked. The raven wages a kind of distant war with the eagle, two of them generally harassing the latter bird when it appears in the neighbourhood of their abode, on which account ravens are never shot by the islanders during the breeding season. When a raven has lost his mate during this season, even after the young ones are far advanced, he is observed to procure a stepmother for them with great celerity.

10. *Corvus Cornix,* the *Hooded Crow, Feannag,* in Lewis named also *Starrag,* is as common as the raven, and resides and nestles in the same places. It frequents nearly the same places, but is more especially piscivorous, and does not venture to appear along with the raven at a carrion feast, while the latter in like manner gives place to the eagle. Some ornithologists have imagined the carrion crow to be a variety of this species. In the Outer Hebrides, the latter bird is utterly unknown, and the young hooded crows are invariably of the same general colours as the old; nor, although I have seen many thousands of these birds, have I ever observed any remarkable variation in the tints of their plumage.

11. *Corvus frugilegus,* the *Rook, An Rocuis,* is not a resident species, but sometimes appears in severe weather during the winter season.

12. *Pyrrhocorax Graculus,* the *Red-legged Crow,* is not uncommon in the Barray Islands, at the southern extremity of the range, but is not met with elsewhere. It nestles in cliffs.

13. *Sturnus vulgaris,* the *Starling, An Druid,* inhabits rocks and caverns chiefly on the western shores. In some places, as in the islet of Copay, it breeds in holes in the grass, which do not appear to have been formed by itself, but to be the deserted retreats of rats. Their food consists of worms and insects, which they pick commonly from among cow-dung. They are seen attending the herds in large flocks, often perching on the backs of cows, horses, and sheep. In winter they are granivorous, assemble in immense flocks, and frequent the fields and cornyards. Six or ten may easily be killed at a shot, and they are instantly after decapitated, the natives having a notion that poison is contained in their head.

### 3. *Insectivoræ.*

14. *Turdus pilaris,* the *Fieldfare,* appears in small numbers in the beginning of winter, but rarely, and I have never seen it, after Christmas.

15. *Turdus iliacus,* the *Redwing,* also appears in winter, and I have seen individuals in spring, and even in summer.

16. *Turdus musicus,* the *Throstle, An Smeorach,* is extremely abundant at all seasons. In summer it resides on the hillsides, in the valleys, and along the rocky shores. In winter it frequents the cornyards, and is seen running along the walls for the sake of the snails and worms which abound there. In some places it occurs abundantly at this season along the shores, feeding on the common welk, *Turbo littoreus,* and the *Trochus conuloides* of Lamarck, which are very common. The song of the throstle has an exquisitely pleasing, but melancholy effect, in the summer evenings, among the desert glens, and along the solitary shores of the Hebrides.

17. *Turdus Merula,* the *Blackbird, An Lon-dubh,* is very uncommon, but I have seen several individuals at various times.

18. *Cinclus aquaticus,* the *Dipper, An Gochan Uisg,* is of rare occurrence, being seldom seen excepting in winter, when it descends from the hills and moors, along the streams.

19. *Sylvia Rubecula,* the *Redbreast, Bru-dhearg,* is extremely rare, insomuch that an individual is hardly seen by a person in the course of several years.

20. *Sylvia Troglodytes,* the *Wren, An Dreadhan donn,* is pretty common, breeding along the heathy margins of the rills, and resorting to the cornyards in winter.

21. *Saxicola Œnanthe,* the *Wheatear, An Clacharan,* appears about the end of April, and disappears in September. As in other parts of Scotland, it is seen chiefly about stone walls, in which it nestles. It also sometimes nestles in holes in the sand-banks. It is very abundant, and in May the children commit great havock among its eggs, which they go in search of, not for the purpose of blowing and stringing them, but for eating.

22. *Saxicola Rubicola,* the *Stone-chat,* is not very uncommon in summer on the sides of the hills. It is a bird of passage, as is the next species.

23. *Saxicola Rubetra,* the *Whin-chat,* is also sometimes seen.

24. *Accentor modularis,* the *Hedge-sparrow,* is frequently seen about houses in winter.

25. *Motacilla alba,* the *White Wagtail, Breac-an-t-sil,* is rare, being only an occasional visitant in spring.

26. *Anthus pratensis,* the *Common Titling, An Glasian,* is extremely common every where, and is permanently resident.

27. *Anthus aquaticus,* which bears the same name, is also common.

4. *Granivoræ.*

28. *Alauda arvensis,* the *Common Lark, An Uiseag,* is the only species of the genus which occurs. It is very common.

29. *Emberiza Miliaria,* the *Common Bunting, An Spairig,* is also common.

30. *Emberiza Schœniculus*, the *Reed Bunting*, generally resides on the heaths, where it breeds, but approaches the houses in winter.

31. *Emberiza nivalis*, the *Snow Bunting*, arrives about the end of October, when it is seen in great flocks moving southward. These flocks do not seem to remain through the winter, although numbers are often seen at that season.

32. *Fringilla domestica*, the *Common Sparrow*, is extremely rare, being to be found only among the ruins of Kilbar, in the island of Barray.

33. *Fringilla Linaria*, the *Common Linnet*, *Am Bician*, is common, breeding on the heaths, and frequenting the fields and corn-yards in large flocks in winter.

5. *Zygodactylæ.*

34. *Cuculus canorus*, the *Cuckoo*, *A Chuag*, is not uncommon. It is here, as elsewhere, reported to deposit its egg in the nest of the titling.

6. *Chelidones.*

35. *Hirundo riparia*, the *Sand Martin*, is the only species of this order that occurs in the Outer Hebrides.

7. *Columbæ.*

36. *Columba Livia* of Temminck, the *Rock Pigeon*, *An Calman.* This species has the bill blackish, the orbits flesh-coloured, the irides orange, the legs and toes carmine purple, the claws black: the general colour of the plumage is leaden or light blue, the back, from near the shoulders to near the tail, white, as is the under surface of the wing. The neck all round is beautifully glossed with green and purple, more especially in the male. There are two black bars on the secondary quills. The tail-feathers are tipped with black, and the outer web of the outer one is white. The length is 14 inches, the extent of wings 24. This is unquestionably the original of the house-pigeon. It inhabits the caves and crevices along the coast, accompanied by the starling and shag. It commences breeding in March, and has several broods dnring the summer. Being a gregarious bird, it is an excellent subject for the sportsman. I have heard of eighteen having been killed at one shot, and I myself have killed twenty-three at three successive shots. In winter they form large flocks, feeding on the stubble lands. In summer they feed chiefly upon *Helix ericetorum* and *Bulimus acutus*, which are very abundant in the sandy pastures, as well as upon grass.

8. *Gallinæ*

37. *Tetrao scoticus, Red Grouse, Cearc-fhraoich,* or heath-hen, is very abundant in all the large islands.

38. *Tetrao Lagopus,* the *Ptarmigan, An Tarmachan,* occurs near the summits of most of the mountains exceeding 2000 feet in height. The ptarmigans of the Outer Hebrides seem smaller than those of some parts of the mainland of Scotland; but I have not been able to find any good specific differences in them.

9. *Grallatores.*

39. *Calidris arenaria,* the *Sanderling, An Scraillig,* does not seem to breed in the Outer Hebrides, but appears in flocks upon the sandy shores in autumn and winter.

40. *Hæmatopus ostralegus,* the *Oyster-catcher, An Trileachan,* is common along the shores.

41. *Charadrius Pluvialis,* the *Golden Plover, Feadag,* breeds on the heaths, where it is very common. In autumn vast flocks assemble upon the sands, and in frosty or snowy weather the shores are often seen covered by them. It is chiefly to this bird that the Hebridean sportsmen direct their attention, it being to be met in flocks abundantly from the middle of autumn to the beginning of April.

42. *Charadrius Hiaticula,* the *Ringed Plover, A Bhōag,* is also very abundant along the sandy shores, where it breeds.

43. *Vanellus cristatus,* the *Lapwing, A Churracag,* is not common, but is met with occasionally at all seasons.

44. *Strepsilas collaris,* the *Turnstone,* is seen in small flocks, along the rocky shores, from October to April.

45. *Ardea cinerea,* the *Common Heron, A Chorra-riabhach,* is not uncommon, especially in winter; but I have not been able to ascertain that it breeds in these islands.

46. *Numenius Arquata,* the *Curlew, Guilbnach,* occurs abundantly along the shores in autumn, winter, and spring, retiring to the heaths in summer to breed.

47. *Numenius Phæopus,* the *Whimbrel, A Guilbnach Bheag,* or little curlew, appears on the sandy pastures about the middle of May, and remains for about five weeks, but does not seem to breed. It feeds on *Helix ericetorum* and *Bulimus acutus.*

48. *Tringa variabilis,* the *Dunlin* or *Sandpiper, An Gille-feadaig,* or plover's page, has received its vernacular name from the circumstance of its being generally found in summer along with the golden plover on the heaths, where it breeds. At this season it has a large black spot on the breast, similar to that assumed by the plover. In autumn the sandpipers collect in flocks of immense extent, and betake themselves to the sands, where they remain until spring.

49. *Tringa maritima,* the *Purple Sandpiper,* is seen in small flocks along the shores in winter.

50. *Totanus Calidris,* the *Redshank,* is seen along the shores in winter.

51. *Totanus Hypoleucos,* the *Common Sandpiper,* is a summer visitant, and breeds along the margins of the lakes.

52. *Totanus Glottis,* the *Greenshank,* is a permanent resident, and also breeds near the inland lakes, but in winter frequents the sea-shore.

53. *Scolopax Rusticola,* the *Wood-cock, An Fudagag,* is sometimes seen in winter along the rills, but is not abundant.

54. *Scolopax Gallinago,* the *Common Snipe, An Naosg,* is excessively numerous. It breeds on the heaths, and in winter betakes itself to the lower grounds. In fine moonlight frosty nights, in the beginning of winter, I have seen hundreds of snipes wading in the little pools at the edges of the sand-fords.

55. *Scolopax Gallinula,* the *Jack Snipe,* is rare.

56. *Rallus aquaticus,* the *Water Rail,* is also rare.

57. *Gallinula Crex,* the *Land Rail, An Trēan,* is very abundant in the low grounds, where it is chiefly to be found in the great patches of *Iris Pseudacorus* and *Spiræa Ulmaria.* It arrives in May, and disappears in August.

58. *Gallinula Chloropus,* the *Water-Hen,* is common in the numerous pools and marshes of the Uists and Benbecula, and is also met with in Harris.

### 10. *Pinnatipedes.*

59. *Fulica atra,* the *Coot, An Lach-bhlar,* or bald-duck, is also abundant in many of the lakes, pools, and marshes. At the marsh of Nisbost, in Harris, I have observed that in frosty weather it betakes itself to the sea.

60. *Podiceps auritus.* Of this species I received an individual from a gentleman in North Uist, but it does not seem to be common.

61. *Podiceps minor,* the *Little Grebe,* is not uncommon in the Uists, and occurs occasionally in other parts.

### 11. *Palmipedes.*

62. *Sterna Hirundo,* the *Common Tern, An Stearneag,* is very abundant in summer, breeding on the sandy shores and in rocky islets.

63. *Larus glaucus,* the *Great Glaucous Gull,* is not at all uncommon on the west coast.

64. *Larus marinus,* the *Great Black-backed Gull, Farspach,* breeds on the headlands and in islets. It feeds chiefly on fish, but, like the last species, partakes with the raven and eagle of carrion of all kinds, and in winter may be seen scouring the hills in search of it.

65. *Larus argentatus,* the *Herring Gull, Faoilag,* is a very common species in all parts.

66. *Larus fuscus,* the *Lesser Black-backed Gull,* is of rare occurrence.

67. *Larus canus,* the *Common Gull, Faoileag,* is met with every where along the coasts.

68. *Larus tridactylus,* the *Tarrock,* named in Barray *Seathag,* in other parts *Ruideag,* is only found in some of the great breeding-places of the sea-birds, where it arrives in May.

69. *Larus ridibundus,* the *Black-headed Gull, Faoileag-a-chinn-duibh,* arrives at the same time, but breeds chiefly on islets in lakes.

70. *Lestris parasiticus,* the *Feaser, Am Fasgadear,* or the squeezer, is common enough from May to October, aud may be seen pursuing the gulls and terns in all the channels and fords. It breeds on tufts in marshes and the islets of lakes.

71. *Procellaria glacialis,* the *Fulmar, Am Fulmar,* I have only seen cast ashore after storms.

72. *Procellaria pelagica,* the *Stormy Petrel,* breeds in the island of Shellay in Harris, but is rarely seen in the Outer Hebrides.

73. *Anas segetum,* the *Bean Goose, An Ciadh,* breeds in some of the small islands in great numbers, and remains during the winter.

74. *Anas Bernicla,* the *Brent-goose, An Cathan,* appears in the beginning of winter in great flocks, and disappears in spring.

75. *Anas Cygnus,* the *Wild Swan,* occurs in flocks during the winter in some of the larger lakes in the Uists, and appears occasionally in different parts of the range during that season.

76. *Anas Tadorna,* the *Shield Duck, Craigh-ghiadh,* is not uncommon in summer and autumn, frequenting the sandy shores.

77. *Anas Boschas,* the *Mallard, An Lach,* is not very common.

78. *Anas mollissima,* the *Eider Duck, Colchd,* is not uncommon on the west coast, and breeds in the Flannan Isles and many other islets, as well as sometimes on the headlands.

79. *Anas fusca,* the *Brown Duck,* is sometimes seen in the sounds.

80. *Anas glacialis,* the *Long-tailed Duck, An t-ian-bhōchail,* occurs in small flocks, very abundantly, in the early part of summer, along the coasts.

81. *Anas Clangula,* the *Golden-Eye,* visits the islands in winter, and is seen, generally in pairs, on the lakes.

82. *Mergus Merganser,* the *Merganser,* I have seen only on some of the larger lakes in summer.

83. *Mergus Serrator,* the *Red-breasted Merganser, An Siollt,* appears in spring in prodigious flocks, and again in autumn ; but whether it breeds in the country I have not ascertained.

84. *Carbo Cormoranus,* the *Cormorant, Scarbh-buill,* is not uncommon in some of the smaller islands.

85. *Carbo Graculus,* the *Common Shag,* or *Scart, An Scarbh,*

is very abundant in all parts. It resides and breeds in the caverns and chinks, as well as on the shelves of the maritime cliffs.

86. *Carbo cristatus,* the *Crested Shag, An scarbh beag,* is nearly as common as the last.

87. *Sula alba,* the *Solan Goose, An Sulair,* is to be seen in vast numbers along the coasts, but it does not breed in any part of the range. The nearest breeding-place is St. Kilda, and it is probable that most or all of the individuals seen along the coasts of the Outer Hebrides, retire thither every evening. In fact, they are seen before sunset winging their way westward in strings, and soon after sunrise coming up the sounds in the same order.

88. *Colymbus glacialis,* the *Great Northern Diver, Am Murbhuachaill,* is common during the summer. Many individuals are to be seen in winter, but at that season I have never observed one with the adult plumage.

89. *Colymbus septentrionalis,* the *Red-throated Diver, An Learg,* breeds by the lakes in the interior, and at other seasons is met with in the sea, near the shores.

90. *Uria Troile,* the *Common Guillemot, An Lamhi,* is very abundant, and breeds in many of the islands.

91. *Uria Grylle,* the *Black Guillemot, An Gearra-breac,* is also abundant, breeding in islands, and on the rocks overhanging the sea.

92. *Alca Torda,* the *Common Auk, Am Falc,* breeds in some of the islands, and is very abundant.

93. *Mormon Fraterculus,* the *Puffin, An Coltir-cheannach,* breeds in holes in some of the islands, where it is abundant, but it is not generally diffused.

To these birds observed by myself, may be added those seen by other persons.

94. *Falco peregrinus,* the *Peregrine Falcon.*

95. *Sterna arctica,* the *Arctic Tern.*

These species were observed by my brother, Mr. Donald Macgillivray.

96. *Anas Crecca,* the *Teal,* shot by the Rev. Mr. Alexander Simson in Lewis.

97. *Strix* ——, a species of *Owl,* I have been informed by Major Macdonald, occurs in South Uist.

98. *Alca impennis,* the *Great Auk, An Gearbhul,* An individual of this very rare species, I was informed by Mr. Adam, was sent to him in Lewis. The late Mr. M'Neill, who was long tacksman of St. Kilda, informed me that it occurred there at irregular intervals of two or three years; but I have not heard of its having been seen on the coast of the Outer Hebrides.

It is probable that several other species occur. In fact, I have myself seen one or two ducks, besides those mentioned, but was not fortunate enough to procure them, or even to get near enough to distinguish the species with accuracy. It is also probable that another species of goose is not uncommon in these islands; and I have an indistinct recollection of seeing the bernacle, *Anas Erythropus.* As to the brent-goose, I am certain of its occurrence, having myself shot four of it.

The permanent residents are, of these 98 species, as follows:—

1. Falco Æsalon.
2. F. Tinnunculus.
3. F. peregrinus?
4. F. fulvus.
5. F. Albicilla.
6. F. Milvus.
7. F. Cyaneus.
8. F. Nisus.
9. F. rufus?
10. Strix?
11. Corvus Corax.
12. C. Cornix.
13. Pyrrhocorax Graculus.
14. Sturnus vulgaris.
15. Turdus musicus.
16. Turdus Merula.
17. Cinclus aquaticus.
18. Sylvia Rubecula?
19. Sylvia Troglodytes.
20. Accentor modularis.
21. Anthus pratensis.
22. A. aquaticus.
23. Alauda arvensis.
24. Emberiza Miliaria.
25. E. Schœniculus.
26. Fringilla domestica.
27. F. Linaria.
28. Columba Livia.
29. Tetrao scoticus.
30. T. Lagopus.
31. Hæmatopus Ostralegus.
32. Charadrius pluvialis.
33. C. Hiaticula.
34. Vanellus cristatus.
35. Ardea cinerea.
36. Numenius Arquata.
37. Tringa variabilis.
38. Totanus Calidris.
39. T. Glottis.
40. Scolopax Gallinago.
41. S. Gallinula.
42. Rallus aquaticus.
43. Gallinula Chloropus.
44. Fulica atra.
45. Podiceps auritus?
46. P. minor.
47. Larus glaucus.
48. L. marinus.
49. L. argentatus.
50. L. fuscus.
51. L. canus.
52. Procellaria pelagica.
53. Anas segetum.
54. A. Boschas.
55. A. glacialis.
56. A. fusca.
57. Carbo Cormoranus.
58. C. Graculus.
59. C. cristatus.
60. Colymbus glacialis?
61. C. septentrionalis?
62. Uria Grylle?

The winter visitants are,

1. Turdus pilaris.
2. T. iliacus.
3. Emberiza nivalis.
4. Calidris arenaria.
5. Strepsilas collaris.
6. Tringa maritima.
7. Scolopax rusticola.
8. Anas Bernicla.
9. A. Cygnus.
10. A. Clangula.

The summer visitants are,

1. Cuculus canorus.
2. Saxicola Oenanthe.
3. S. Rubicola.
4. S. Rubetra.
5. Hirundo riparia.
6. Numenius Phæopus.
7. Totanus Hypoleucos.
8. Gallinula Crex.
9. Sterna Hirundo.
10. S. arctica.
11. Larus tridactylus.
12. L. ridibundus.
13. Lestris parasiticus.
14. Procellaria glacialis.
15. Anas Tadorna.
16. A. mollissima.
17. A. Crecca.
18. Mergus Merganser.

19. M. Serrator.
20. Sula alba.
21. Uria Irvile.
22. Alca Torda.
23. Mormon Fraterculus.

The occasional or irregular visitants are,

1. Corvus frugilegus.
2. Motacilla alba.
3. Alca impennis.

Why there should be so large a proportion of birds of prey, it is not easy to say. Most of the species, however, seem to have but few representatives. Perhaps the eagles are more numerous than any other species; at least one frequently sees more eagles in a day than hawks.

The *Omnivoræ,* although few in species, are pretty numerous in individuals.

The *Insectivoræ* bear a fair proportion to the others.

The *Granivoræ* are few; the *Zygodactylæ* and *Chelidones* are each reduced to one species.

The *Columbæ* and *Gallinæ* are very low in point of species; but the rock-pigeon is very abundant, and the red grouse exists in many parts in astonishing numbers.

The *Pinnatipedes* are not proportionally deficient. But the *Grallatores* and *Palmipedes* outnumber all the other orders together, as to species, and in respect to individuals are probably far above them.

In winter the heaths and lower grounds seem almost destitute of birds; but here and there large flocks of pigeons and starlings are seen, with occasionally vast numbers of plovers. At this season, however, the shores are swarming with *Grallæ,* and numerous gulls and other birds, ravens, crows, &c. are met with along them. In spring the country wears the same dull appearance; but, as the summer advances, myriads of aquatic birds are seen on the waters, and the land swarms with rails, wheatears, and whimbrels. The remote islands, such as Heisker, Gasker, the south isles of Barray, the Flannan Isles, and the Shiant Isles, become covered with sea-birds of different species, the numbers of which are truly astonishing. Some idea may be formed of these breeding-places, by reading the following extract from one of my note-books.

" *Vatersay,* 13*th June* 1818. On reaching Berneray we landed, and soon after betook ourselves to a hut, which we found cleared for our reception. Here we dined on roasted mutton, wild fowls' eggs, bread, butter, and whisky. The goodman of the house came home with a basketful of eggs from the rocks, and some birds which he had caught. We then rowed round the eastern extremity of the island, where we shot about forty guillemots and two or three gulls, with which we returned to our lodging after rowing round the island. On Friday morning some of our crew had gone to the rocks and returned with their hats full of eggs, and with some birds. The island of Berneray is upwards of a mile in length, and of half a mile in breadth, and of an elliptical form. It is to appearance a mass of rock much inclined, with the northern part dipping into the water, and the southern exhibiting an abrupt section, rising to the height of several hundred feet. On a sort of peninsula jutting out from the face of this frightful precipice, are the remains of a rude fortification, in the form of a wall laid across its isthmus. It is of considerable height, and, like others in the Long Island, has an empty space within the wall, probably used for the habitation of its owners, while their cattle occupied the space inclosed. The face of this vast mass of rock, viewed from the sea, exhibits a very interesting and grand spectacle. It affords almost all the variety of which such is capable: inclining, perpendicular, and projecting cliffs, smooth, largely cleft, or minutely fissured; in one place a huge protruded mass, in another a retiring cove, terminating above in a perpendicular fissure, below in a gloomy cavern. The whole face of these cliffs, over an extent of half a mile, was covered with birds, which assemble here for the purpose of breeding. Four species only are found: *Colymbus Troile, Alca Torda, Alca arctica,* and *Larus Rissa.* These inhabit the cliffs, not promiscuously, but with a degree of regularity and seclusion, which might bring to the mind of an observer the right of property among mankind. On the grassy summits, the *Alca arctica* breeds, burrowing like the rabbit. From thence to halfway down is the habitation of the *Alca Torda*; while in the remaining division are arranged the *Co'ymbus Troile* and *Larus Rissa,* the latter coming almost to high water mark. The auk and guillemot have each one egg, and this laid upon the bare rock. On a shelf of about two yards in length and as many feet in breadth, I have seen at least threescore birds, crammed together as closely as they could sit, and each upon its own egg. This occurred very frequently, the shelves being greater or smaller. But in general two, or three, or four, were seen together, and sometimes one was seen sitting solitary, if one may say so, when it was surrounded with others at no greater distance than three or four feet at farthest. The *gull,* on the other hand, has a regularly constructed nest, made of grass and sea-weeds, and fixed to the rock with clay or mud, in which there are generally three eggs. This, I believe, is the most numerous species. In many places the rock appeared white with them. In fact the numbers of all the species were astonishing. When a shot was fired, most of the birds left their nests and flew about, while some, in their hurry, fell into the sea, and on emerging raised with their wings an uninterrupted splutter for some hundred yards from the shore. Looking up, I could scarcely distinguish the white clouds from the blue sky, so thickly did the birds fly, and this over an extent of a quarter of a square mile at a time. In their flight they did not cross much, but flew generally in the same direction, wheeling in a large circle. This disposition probably arose from their number being so great that they could not conveniently pass each other. Their mingling screams produce one general noise, in which the cry of individuals cannot be distinguished. The noise and bustle reminded me of the crowded streets of a great city; and the prodigious numbers I could compare to nothing that I have seen, but swarms of bees, or the shoals of some species of fishes. Some were fishing out at sea, some flying from the rocks, some returning to them, some resting by the edge of the water upon shelves or projecting crags, while by far the greater number were sitting upon their eggs. This when they were not disturbed, and indeed they were not very apt to be startled, for unless after a shot none stirred from their places. It was not uncommon to see them ranged in a line extending several yards along a fissure, and this formed a very pretty spectatle, especially when their white breasts appeared; for, excepting the gulls, these birds stand almost erect. About ten we set out, passing from the eastern extremity of the island along the rocks westward. In this course about fifty birds were killed, principally guillemots, the reason of which was that the auk and puffin were out of reach, being in the higher parts, and the kittiwake, though nearest, was not in groups like the guillemot, and so was not fired at. A few of the puffins, however, and of the kittiwakes were in the number, the latter having been shot by chance, and the former having been obtained by our guide, who was sent ashore for them. When a shot was fired, the birds, as I have said, did not all leave their nests, and those which did soon returned. Two men were in the rocks gathering eggs. About twelve the wind began to come in gusts, and the sea was much agitated, particulary at the western extremity of the island, where the current ran with great rapidity. These circumstances prevented us from visiting some places equally interesting, particulary an islet covered with puffins, and induced us to return to our anchorage, through the sound of Minglay. Rain now began to fall, and the wind blowing pretty smartly from the south, we prepared for returning, and about two set sail. The voyage to Vatersay was performed in an hour and three quarters."

But the remote islets and rocks are not the only places where birds occur in great numbers during the breeding-season. In crossing the heaths, one sees numerous birds of different species, all indicating by their cries and motions their anxiety to decoy him from their nests. The golden plover, the dunlin, the snipe, and the red grouse, meet him at almost every step. As he approaches the marshes and pools, he sees the greenshank, the feaser, and the common sandpiper, hovering about, and filling the air with their shrieks, while several species of duck, the coot, the water-hen, the red-throated diver, and the merganser, are swimming about in a state of great perturbation. On the sandy shores he meets with the ring-plover and shoals of terns; and if he visits the caves and crevices of the maritime cliffs, he finds them occupied by shags, black guillemots, pigeons, and starlings.

From what has been said above, it will be seen that a sportsman residing in any of these islands, needs not lack employment. At all seasons of the year, objects on which to exercise his craft present themselves in abundance. The red deer, the swan, the goose, the brent, several species of ducks, mergansers, and divers, the plover, the pigeon, the snipe, and some others, offer abundant occupation. To these may be added the seal, the otter, and the numerous marine and fresh water fishes, which will be noticed in a subsequent section. The various economical purposes to which these animals are or might be applied, will also be treated of in a separate department.

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## ART. IV. *On the Mechanism of Respiration in certain Aquatic Animals.* By WILLIAM SHARPEY, M.D.*

IN the course of some investigations on the development of the tadpole in which I was lately engaged, I was accidentally led to observe, that the surface of that animal possessed the power of exciting currents in the water contiguous to it, in a constant and determinate direction. This fact, while it was a curious circumstance in the history of the animal in question, appearing to me at the same time of considerable importance in a general point of view, I was induced to inquire how far appearances of the same kind existed in the rest of the animal kingdom. I was aware that many infusory animalcules and zoophytes had been observed to produce currents in the water exterior to their surface, and that in the sponge, as was first satisfactorily shown by Dr. Grant, the water is carried in a uniform direction through certain canals in its interior; but in prosecuting the subject I have ascertained that phenomena more or less analogous are exhibited by extensive tribes of animals of a more perfect structure, in which, to the best of my knowledge, nothing similar has hitherto been observed. Although still occupied with the investigation, yet, as the facts I have already made out are, so far as I know, in a great measure new, and appear to me to lead to conclusions of importance, I think it right in the meantime to give some preliminary account of them; intending to resume the subject at greater length on a future occasion.

The larva of the frog, for some time after its exclusion from the egg, has certain small appendages on each side of the head, to which various uses have been assigned by naturalists, but which

* This paper of our excellent friend Dr. Sharpey has already appeared in the pages of the Edin. Med. and Surg. Journal. But as it is perhaps more connected with the objects of this Journal, and as, from its importance, it deserves every publicity, we do not hesitate in giving it a place amongst our original articles. For some remarks and a notice of the previous state of our knowledge on the subject, *vide* "Nat. Hist. Collections," *infra.*—ED.

are now known to be organs of respiration, and are called the external gills, to distinguish them from the internal gills, by which the animal respires at a later period. Of these appendages there are three on each side, the two anterior of which are larger than the posterior, and consist each of five or six branches diverging from a common trunk, which is attached to the body of the animal. The blood circulates through them in a single stream, which passes outwards to the extremities, where it is bent back, and returns in a contrary direction.

Being desirous of ascertaining the dimensions of the globules of the blood at this period, I happened to cut off one of the external gills as the readiest mode of attaining my object, and laid it on a glass micrometer with a drop of water. On viewing it then with a lens, my attention was attracted by a very singular and unlooked-for appearance; the globules of blood which had escaped from the cut part of the gill were moved rapidly along its surface towards the points of the branches in a constant and uniform manner. On further inspection I soon satisfied myself that the blood globules were entirely passive in this phenomenon, and that other light particles brought near to the surface of the gill were moved in a similar manner; their motion being manifestly owing to a current produced in the water along the surface of the gill, in a determinate direction. A conclusive proof of this was afforded by putting the gill which had been cut off, into a watch-glass with a little water. Here, when it happened to be fixed against any obstacle, small bodies in its vicinity were moved along it as before towards the extremity of the branches; but when unimpeded, the gill itself advanced through the water in a direction contrary to that in which the particles were moved, the trunk being turned forwards; the tendency to produce a current in one direction thus causing the gill, now no longer fixed, to move in an opposite one. The current commences at the root of the gill and runs along the branches, at the points of which it does not continue its primitive direction, but is turned off sideways and immediately ceases.

I soon found that the gill was not the only part of the animal which excited motions in the water. Nearly the whole surface of the body produced the same effect. A general current commenced on the fore part of the head, proceeded along the back and belly and the two sides, to the tail, along which it then continued to the extremity. It was not so strong as that on the gills, but agreed with it in other respects.

The power of giving rise to the currents, whatever may be its nature, is confined entirely to the external surface of the animal; portions of the skin being removed and put into water in which a powder was diffused, the particles of powder were moved along the external surface only. Parts detached from the animal continue to excite currents for several hours after their separation, and the smallest portion produces this effect. In these cases the current moves always in the same direction with respect to the surface of the detached parts, as it had done previously to their separation.

I continued for some time to observe this phenomenon in the larva of the frog, in order to find out whether it underwent any alteration in the progress of the development of that animal. It is known that after a time the external gills become covered by a fold of the skin, and inclosed in the same cavity with the internal gills, where they gradually shrink and ultimately disappear. When this change is effected, the animal respires by the internal gills, the water entering the branchial cavity at the nostrils, and escaping from it by an opening on the left side. On examining it while this change was taking place, and for some time after, I found that the power of exciting motions in the water underwent little or no alteration. The external gills, after their inclosure, still retained their peculiar property, and continued to do so as long as any trace of them was visible; the current on the body remained the same; on the tail it had acquired a twofold direction, diverging from its middle part, or the continuation of the vertebral column, obliquely upwards and downwards towards the upper and lower edge. As the animal advanced in growth, however, the currents gradually disappeared over the greater part of the surface, continuing longest at the posterior and lateral part of the body; at length, when the posterior extremities were so far advanced that the thigh and leg, and the division of the foot into toes, could be discerned with a magnifying-glass, which is the latest period I have made any observation, the current existed only at the commencement of the tail, and on a small part of the surface of the body adjacent to the hind leg.

The internal gills, though tried in various stages of development, never produced any current.

Whatever might be the cause which more immediately gave rise to these currents, it appeared to me that the purpose for which they were intended, was to effect a renewal of the water on the respiratory surfaces; respiration being performed in this animal not only by means of the gills, but very probably also by the general surface of the body. It was, therefore, not unreasonable to presume, that similar phenomena might be exhibited by the larvæ of other Batrachia, by the Proteus, Siren, &c. and perhaps other tribes of aquatic animals, particularly those in which the respiratory organ was unprovided with a muscular apparatus, capable of causing a renewal of the water on its surface. I have, accordingly, found currents in the larva of the newt, in the Mollusca and other invertebrate animals, and to a greater extent, indeed, than I at first anticipated.

I first examined the larva of the newt or water salamander, a few days after its exclusion from the egg. The external gills at that time consist of three appendages on each side, the posterior and middle of which have each two short lateral processes, the commencement of branches. The anterior extremities appear as a simple protuberance on each side of the spine, a little behind the gills. The heart can be distinctly seen pulsating on the under surface, and the blood in it is of a red colour. The circulation of the blood can be perceived in the gills, the tail, and on the abdomen, on the under surface of which a large vessel collects many collateral streams and returns towards the heart.

At this period, the surface of the animal produces currents agreeing in almost every respect with those which take place in the larva of the frog at a corresponding stage of its development. Particles of powder diffused in the water are carried along the surface of the body from its anterior to its posterior extremity; on the gills they are conveyed along each of the trunks, from the root to the extremity, and apparently with greatest force along the upper and lower surface. The gills also exhibit when cut off the same phenomena as in the larva of the frog, advancing through the water with the cut extremity forwards, in a direction contrary to the currents.

The eggs of the newt being easily procured in every degree of advancement, I next proceeded to inquire at how early a period in the development of the animal the currents are to be perceived. The egg is of an oblong figure, and altogether transparent except the yelk, which is opaque and of a greenish yellow colour, and is surrounded with a quantity of clear liquid. The embryo is formed from the yelk, and is at first of the same colour; it afterwards becomes elongated, and is covered on the back with dark speckles, uniting at a later period into broad stripes.

At the period when I was first able satisfactorily to ascertain the existence of a current, the embryo was but little elongated; the commencement of the gills appeared as a small protuberance on each side, elevated but little above the adjacent surface; the tail did not exist, but its commencement was indicated by the prominence of the spine at its posterior extremity. The abdomen was yellow; the back of a grayish colour, the dark speckles not having yet appeared. When the egg is examined at this period with a lens of high magnifying power, minute bodies may occasionally be perceived floating in the liquid with which the embryo is surrounded. These are drawn towards its under surface, and immediately hurried onwards a short way in a direction towards the tail. The motion, which exists within the egg, may be much more distinctly perceived on taking out the embryo, which, however, requires some nicety, and viewing it in water containing a powdery substance, as in former cases. The current is directed backwards along the under surface of the head and body. It extends only a very short way, and is by no means strong, resembling a good deal what takes place at a more advanced period with parts that have been some time detached from the body of the animal, and, consequently, where the motion has become languid. As the embryo advances in growth, this current gradually becomes stronger, and extends farther back. A lateral current then appears, commencing on each side of the head, and running in the same direction, but not extending so far as the inferior one. At a period somewhat more advanced, but still some time before exclusion from the egg, the animal presents all these appearances in a considerably greater degree.

The next animals in which I have found the power of producing currents, are the Mollusca. Among these it prevails to such an extent, and exists in species differing so much in other respects, as almost to lead one to suspect that it may belong to at least all the animals of this class that respire by means of gills. Indeed I am at a loss to conceive why so general and obvious a phenomenon should have escaped the attention of naturalists, unless perhaps because such as have been engaged in studying these animals have in most cases made their examinations on dead specimens.

In the Mollusca, as in the larvæ of the Batrachia, the currents appear chiefly to serve the purpose of renewing the water on the surface of the respiratory organs; but, though agreeing in every other circumstance of importance, there is one peculiarity in the Mollusca, which, notwithstanding every endeavour, I have not been able to discover in the Batrachia. The peculiarity consists in this, that the surfaces along which the currents are excited are beset with innumerable cilia, visible only with a glass, which are in constant motion. In this they more or less resemble certain zoophytes and infusory animalcules, in which like cilia have been detected.

The remarkable circumstances attending the respiration of the testaceous acephala or bivalves, first led me to suspect that a property more or less resembling what I had met with in the Batrachia, might also exist in this class of animals. I accordingly began the examination with the common muscle, and, though I subsequently found the same property in others of the acephalous and gasteropodous Mollusca, yet, as I have observed the phenomena with most attention in the muscle, and, as it can be easily procured by any one who is desirous of inspecting the appearances in question, I shall confine my description in a great measure to that species alone.

When a live muscle (*Mytilus edulis*) is attentively examined in a vessel of sea water, it is soon observed to open its shell in a slight degree, and about the same time a commotion may be perceived in the water in its vicinity. This is occasioned by the water entering at the posterior or large extremity of the animal, into the cavity in which the gills are lodged, and coming out near the same place by a separate orifice,* in a continued stream. This current

* It will be recollected, that the respiratory organs or gills of the bivalve Mollusca are in the form of leaves, of which there are two on each side, inclosed between the lobes of the mantle. Between them are interposed what is called the foot and the prominent part of the abdomen, which separate the two of the right

is obviously intended for the purpose of renewing the water required for the respiration and nutrition of the animal; but though it is now a well established fact in the history of the mussel, the mechanism by which it is produced has not, so far as I know, been satisfactorily. Some have contented themselves with ascribing it to an alternate opening and shutting of the shell, but as no such motion takes place in the shell except at distant and irregular intervals, it is evident that the constant passage of the water cannot be explained in this way. Others, who saw the insufficiency of this explanation, have endeavoured to account for it by assuming peculiar contractions and dilatations of the mantle in virtue of its muscular power, or like M. de Blainville,* have supposed that the triangular labial appendages placed round the mouth excited the current by their constant motion. After meeting with the currents in the tadpole, it struck me that the entrance and exit of the water in the bivalve mollusca might not improbably be owing to a similar cause; and that the surface of the respiratory organs, and other parts over which the water passed, might have the power of exciting currents in it, the combined effect of which would give rise to the entering and returning stream.

This conjecture proved on actual examination to be right. Having cut off a portion of the gill, I found that a current was excited along its surface in a determinate direction, and that it moved itself through the water in an opposite one, exactly as in the case of the tadpole. The whole surface of the gills and labial appendages or accessory gills, the inner surface of the cloak, and some other parts, produced this effect. The currents on the gills are of two kinds. When finely powdered charcoal is put on any part of their surface a great portion of it soon disappears, having penetrated through the interstices of the vessels into the space between the two layers of the gill. On arriving here a part is forced out again at the base of the gill from under the border of the unattached layer, but most of it is conveyed rapidly backwards in the interior of the gill between the two layers, and almost immediately escapes at the excretory orifice, or that from which the general current already mentioned is observed to come out. That portion of the

side from those of the left. Each consists of two layers, which are made up of vessels set very close to one another like the teeth of a comb, across the direction of the gill, and perpendicular also to the great vascular trunks with which they communicate, which run along the base. In the common mussel, the two layers, of which each gill is composed, are connected together at its margin, and by a few points of their contiguous surfaces; but, at the base, only one of them is fixed, the other terminating at this part by a round unattached border, (fig. 4. *e*, *e*,) under which a probe can be passed into the interior space between the two layers. Besides the gills, the same animals are furnished with four triangular laminæ, placed round the mouth, which have been called labial appendages, tentacula, or accessory gills, and which probably serve more or less for respiration.

* Manuel de Malacologie, &c. Paris, 1825. p. 157.

powder which remains outside the gill is carried along its surface in straight lines from the base to the margin, along which it then advances onwards towards the fore part of the animal. As the spaces between the layers of all the gills terminate directly or indirectly at the excretory orifice, it is easily conceivable that the water, penetrating by the entire surface of these organs, may, by their concentrated effect, give rise to the powerful current which is observed to come out from the animal.

On examining a portion of the gills with a powerful lens, I perceived that it was beset with minute cilia, which are evidently instrumental in producing the different currents. Most of them are ranged along the anterior and posterior margin of each of the vessels composing the gills, in two sets, one nearer the surface, consisting of longer and more opaque cilia; the other close to the first, but a little deeper, in which they are shorter and nearly transparent. Both sets are in constant motion, but of this it is difficult to convey a correct idea by description. The more opaque cilia, or those of the exterior range, appear and disappear by turns, as if they either were alternately pushed out and retracted, or were continually changing from a horizontal to a vertical direction. The motion of the other set appears to consist in a succession of undulations, which proceed in a uniform manner along the margin of the vessel from one end to the other. It resembles a good deal the apparent progression of the turns of a spiral when it revolves on its axis, and might very easily be mistaken for the circulation of a fluid in the interior of a canal, more particularly as the course of the undulations is different on the two edges of the vessel, being directed on the one towards the margin of the gill, and on the other towards the base. But besides that the undulations continue to go on for some time in small pieces cut off from the gill, which is inconsistent with the progression of a fluid in a canal, the cilia are easily distinguished when the undulatory motion has become languid. When it has entirely stopped they remain in contact with each other, so as to present the appearance of a membrane attached to the edge of the vessel.

It is very remarkable, that when the gill is immersed in fresh water, both the currents and the motion of the cilia are almost instantaneously stopped.

Such, nearly, are the appearances I have observed in the mussel. There are, indeed, other particulars which could not well be made intelligible in a short description, and which I purposely avoid mentioning here, the object of this paper being merely to give a statement of the phenomena in general, and not to detail the peculiarities of individual cases, which I shall be able to do with more advantage on a future occasion. For this reason, also, I shall content myself with a simple mention of the other animals belonging to this class, in which I have observed the currents. Of the Bivalves, I have examined the fresh water mussel, the oyster, and another species. In the first of these the motion of the two sets of cilia is the same, but as the gills in that animal differ in some points from those of the salt water mussel, I have not yet been able to satisfy myself as to the mode in which the water is conveyed to the excretory orifice. The current on the surface of the gills resembles that of the salt water mussel, except that on the outside of the external gill it is directed from the margin to the base. It is obvious that, in the bivalve mollusca, the property of exciting motions in the water may serve other important purposes besides respiration, and it is probably in this way that their nutriment is carried to the mouth, and that the ova are excreted, or conveyed from one part of the body to another.

Of the Gasteropodous Mollusca, I have examined species belonging to three of the great divisions in which Cuvier has arranged them, according to their respiratory organs. The *Doris* and *Eolis* of the *Nudibranchiata,* the *Buccinum undatum* and other species of the *Pectinibranchiata,* and the *Patella* and *Oscabrion,* (*Chiton, L.*) which form the two genera of the *Cyclobranchiata.* In all these, I have found like currents along the surface of the gills and other parts of the body, directed in general in such a way as to expose the respiratory surface as completely as possible to the influence of the water.

The only animal among the Mollusca in which I have not been able to perceive a current, is the *Ascidia,* but the observation may perhaps be inconclusive, as the specimens had been some time out of the water. I have not yet been able to procure live specimens of the *Cephalopoda.*

I also found this phenomenon in the *Annelides;* the animal examined was a species of *Amphitrite,* which has the gills in the shape of tapering filaments, placed in two rows along the back. Here the current runs forwards on the back between the two rows of gills, then along the surface of the latter, which are beset with tufts of cilia. In the class of radiated animals, similar appearances are presented by the *Actinia.*

I have not as yet been able to discover any thing analogous in fishes. It seems to me, however, not improbable, that the external gills which belong to the fœtus of some cartilaginous fishes, and which have been compared to those of the tadpole, may resemble them also in this particular.

I have not yet extended the inquiry to warm-blooded animals. It is true I have made one or two observations on the chick during incubation, in order to ascertain whether its respiratory process is accompanied at an early period with phenomena like those I have been describing. These trials have hitherto afforded no decisive result. But there are other processes in the animal economy, in which a similar agency may possibly be in operation. Of these perhaps the most striking is the motion of fluids through canals, under circumstances in which it cannot well be ascribed to a contractile power in their coats; but it would be premature to reason further on this subject at present.

The foregoing are the principal facts I have as yet made out. Of the cause which more immediately gives rise to the phenomena, I am not prepared to offer any satisfactory explanation. It might be supposed that, in most of the invertebrate animals, the motion in the fluid is produced by the mere agitation of the cilia. The operation of these, however, is probably not entirely mechanical, because, though I have closely examined the gills of the tadpole with a lens of less than the twentieth of an inch focal distance, I have never been able to detect cilia on any part of their surface. The currents, moreover, take place in the embryo of the Batrachia at a period when the extreme simplicity of its structure renders the existence of cilia highly improbable, and it is not likely that phenomena, agreeing so much in other respects, are owing to different causes; but whether they are to be referred to any of the known properties of living bodies, or to a peculiar power residing in the parts, is a question which in the meantime I would merely submit to the consideration of physiologists, without venturing to give any decided opinion.

In conclusion, I may mention that most of these observations have been several times repeated. The phenomena observed, are for the most part sufficiently obvious, some being visible with the naked eye, and almost all with a lens of moderate power. I have shown them to several of my friends, among whom I may mention Dr. Thomson, Mr. Syme, and Mr. Allen Thomson, to the last of whom I feel much indebted for his obliging assistance in various ways, in the course of these inquiries.

## EXPLANATION OF THE PLATE.

Fig. 1. The larva of the frog a few days after coming out of the egg.

Fig. 2. Magnified view of the same.

Fig. 3. Plan showing the direction of the currents on a portion of the gill.

Fig. 4. The common mussel viewed from the right side; the right half of the shell having been removed, and the mantle turned down to show the parts within.

*a, a, a', a''*, The circumference of the mantle or cloak; between *a'* and *a''* it is fringed with tentacula or cirri, and it is nearly in this space that the water enters, the borders being usually contiguous in other parts.

*b*. The posterior muscle which closes the shell, partly concealed by the reflected edge of the cloak. Between *a'* and *b* is seen the opening by which the water issues.

*c, c'*. The two gills of the right side; *d*, one of those of the left. The dotted arrows mark the course of the water that has been forced through the insterstices of the vessels into the interior of the gill. The dark arrows indicate the direction of the external current, which perhaps serves also to clear the surface of the gill from foreign matters, and convey nourishment to the mouth.

*e, e*. The free edge of the unattached layer; under it is seen the opening where the water sometimes escapes from the interior of the gill, and through which a probe can be passed between the two layers.

*f*. The extremity of the foot, or the tongue as it is sometimes called.

*m, m*. The two labial appendages or accessory gills of the right side; *n*, one of those of the left. Between them and before the foot is the opening of the mouth, which cannot be seen in the figure.

For references to Fig. 5. and 6. *vide* "Natural-Historical Collections."

# SCIENTIFIC REVIEWS.

*An Account of the Great Floods of August* 1829, *in the Province of Moray and adjoining Districts.* By Sir Thomas Dick Lauder, Bart. F.R.S.E. 1 Vol. 8vo. Pp. 431. 64 Plates. Black, Edinburgh, 1830.

We have heard it often surmized, and have further seen the inquiries of critics, whether the subject of the work before us were of sufficient importance to warrant the labour of a detailed account. We have to answer to this, in the first place, that, exaggerated on the one hand, too much neglected and undervalued on the other, the effects of water, of streams, and rivulets, in modifying the configuration of the soil, and producing changes in the nature of its mineral beds, are of the highest importance to philosophical theories of the earth. The action of these waters, increased in time of sudden rise and flood, is then capable of producing effects which the calm contemplator of a stream, murmuring in sadness along its green banks, or rippling through its rocky bed, may sometimes conceive by the strength of his imagination, though he has not boldness enough to avow his belief. If all the floods and storms, from that which in its fury bore away the mountain and the hamlet, and left villages so many sightless ruins,—to the Deluge, which swept a nation from the surface of the earth,—had been chronicled with the same minute fidelity as the flood of Morayshire, what valuable data should we have for calculating the action of the elements on the terrestrial globe, and the slow but steady progress of the most important changes!

In the second place, Science, which is only the application of one fact to the knowledge and appropriation of another, claims these gleanings as her own on other grounds; for she is aware that they may be used in the great cause of humanity. From accurate details of the origin and nature of former accidents, we learn to provide against the occurrence of others. The inhabitant of an hydrographical basin, like that of Morayshire, must be as well prepared for the sudden rise of the waters of its numerous and divided streams, as the Swiss peasant for the rush of the Lauwine, or the *chalets* of the Don for the descent of the tottering chalk-cliffs of the dark and lofty glens which lie between that river and the Wolga. Meteorological observations are here of the highest importance, and may be brought to bear upon phenomena which have been already the subject of observation; while the immediate causes of the peculiarities presented by these phenomena, can only be explained by men versed in physical geography, or well acquainted both with the mineralogical structure of the globe, and with the important science of hydrography.

Rivers and rivulets which may be considered as tending to unite with, or flow into a supposed prolongation of a main stream, are to be viewed as belonging to the same basin; as also, all streams flowing into a firth, (*fleuve,*) belong to the same great hydrographical basin. From these general principles we can understand, then, the relation of the Nairn and Findhorn rivers with the basin of the Ness; and the connection of these three rivers, together with the Lossie, Spey, Cullen, and Deveron, with the great basin of the Moray Firth. The fine streams of the Don, the Dee, and the Esk rivers, form an equally well characterized basin to the east.

The chain of the Grampians does not consist of a main geographical chain, preserving the same direction, and accompanied by a number of parallel or longitudinal chains, but is composed of chains which, parallel to one another, are nevertheless at angles more or less inclined to the general geographical direction, or extent of the country of mountains. These chains again have their transverse ridges supported by buttresses, (*contreforts,*) like a rampart; and from this simple arrangement, results a kind of independent grouping of each particular chain.

Two of these mountain groups, the Monadhleadh and the Cairngorm, domineer over the plains of Nairn, Moray, and Banff, and the upland districts of Aberdeenshire. It was on these mountains that the deluge of rain which produced the flood of the 3d and 4th of August 1829, principally fell. The heat during the months of May, June, and July, of that year, was unusually great, and as the season advanced, the learned author of the volume before us observes, the fluctuations of the barometer became very remarkable; meaning, we suppose, that there occurred the irregular oscillations which present phenomena directly opposite to the amount of the diurnal or annual movements. These oscillations were not followed by the usual alternations of weather. "The aurora borealis appeared with uncommon brilliancy about the beginning of July, and was frequently seen afterwards, being generally accompanied by windy and unsteady weather, the continued drought having been already interrupted during the previous month by sudden falls of rain, partaking of the character of water-spouts." (Some remarkable instances of these water-spouts are mentioned.) The rivers Nairn, Findhorn, and Lossie, were all more or less affected by the flood, exactly in proportion as they were more or less connected with the mountain in question. The mouth of the latter river was perhaps the most important scene of action.

The Spey from below Kingussie, and its tributaries, were elevated to an unexampled height; and the Deveron, the Don, the Dee, and the two Esks, were each of them operated upon in a similar degree. Mr. Murdoch, gardener to his grace the Duke of Gordon at Huntly Lodge, informed the author that 3¾ inches of rain fell between 5 A.M. of the 3d, and 5 A.M. of the 4th of August, which appears to be, taking the average of the years from 1821 to 1828 inclusive, about one-sixth part of the usual annual fall.

There was another flood on the 27th of August, also very disastrous in its effects, and which, connected principally with the Monadhleadh mountains, influenced principally the Nairn, the valley of the Garve, and the burn of Moniack.

No legends tell of any of these rivers having before worked such universal ruin, or produced such extensive misery; and we think that, on this subject, Sir T. D. Lauder's philosophy is good. Rain drops were formerly evaporated on the hill-side, or sucked up by an arid or a spongy soil. These are now dry hill-pastures; bogs have been reclaimed; and the plains are now fertile tracts. The systematic agriculturist must therefore make provision for greater floods than were produced before the country became so highly improved.

We have ourselves often traversed this country, so lately the theatre of a desolating flood; and the picturesque scenery of its streams and mountains, and the smiling aspect of its wide valleys, cultivated plains, and birch-fringed hills, are deeply impressed upon our memory. How great must have been the change, when these plains, belted with wood and shrubbery, mid which rose the lonely cairn and rudely sculptured obelisk, and the fertile and cultivated tracts, smiling with their rich products, and interspersed with the lively habitations of men, were overwhelmed in the vast flood of impetuous waters. Now the tufted trees could barely raise their heads above the torrent which hastened to the ocean, covered with the floating wrecks of nature and of human industry. The house, formerly on the plain, now perched on the verge of some precipice, or mingled its ruins with those of the mountain and the forest.

Nor was the change less in the upland districts. The tracts winding along the mountain side were obliterated,—the high and steep acclivity of the mountain faces, seared with tributary ravines, were sheeted with cataracts,—castellated rocks, with the rugged forms of aged pines, rose above the waters,—and the bold and lofty arches of the Highland bridges, spanning the yawning chasm, were swept ruthlessly away.

The secluded haunts and shaggy coverts of Easter-Tchirfogrein, "the place hid from the sun," were shorn of their beauteous proportions. But it was the case with all these fair glens and lovely vales. Mrs. Cumming Bruce, in a letter to the author, expresses herself with the feeling and sensibility of a lady, on the devastation of Dunphail, "I daresay," she says, "we were all too proud of the beauty of our valley,—a beauty which we had not given, and which we could not take away, but which has vanished in an instant before His sweeping arm."

The bridges and houses that were destroyed are innumerable, and the loss of lives considerable. The author remarks, that the bridges of the old military school of architecture resist the flood with success, though not capable of doing so when modernized.

"Some of them," he says, "standing in positions where both banks are low, are formed with steep ascents from either end towards the centre. In both these cases the bridges are quite secure in floods from the superabundant water being allowed to escape over the low end or ends. But let the approach or approaches to the bridge be modernized, by raising the wing-walls and banking up the road-way, as has unfortunately been done in some instances, and the result must be destruction; for the flood-water being compelled to pass through an arch which the builders never intended should contain it, the bridge or its approaches must give way before its pressure."

Not only the flood, but water-spouts, covered the land with stones and heaps of gravel. Portions of rock, of many scores of tons weight were borne down by the streams. But to gain any correct notion of the effects of the flood on the country, the inquirer must peruse the work itself of our talented author.

On the whole, this is a production of considerable character, with which, though we have some faults to find, we have no real subject of complaint. It is illustrated by a very great number of engravings, some of which, like many pages of the work, do not strictly appertain to the subject. Others, however, illustrate, in a excellent manner, the tremendous effects of the rushing of a mighty stream, which our author, rather irreverently, compares to the force of an eagle sweeping to its prey, (p. 70.) The passage of the Dorbach is interesting, in this point of view, from the narrow cleft opened in Plate XVI., to the wide expansive channel in Plate XVII., on which the worthy Baronet appears to be gazing with his arms a-kimbo; and the plates exhibit a transition worthy of the attention of him who denies the influence of water, more especially when assisted by the presence of pebbles and of gravel. There are also interspersed through the book many gloomy Highland tales of fearlessness and courage, of murder in caves, and of that bloody revenge which was characteristic of those countries in olden time. The work thus becomes more readable to those whose curiosity would not be sufficiently awakened by the trying scenes of nature which Sir Thomas Lauder has so well pourtrayed.

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*The Genera and Species of Orchideous Plants.* Part I. *Malaxideæ.* By JOHN LINDLEY, F.R.S. Treuttel and Co., London, 1830.

THE work before us, by the *soi-disant* professor of botany in the London seminary for the education of youth, is of a very different character from that which we had very lately occasion to notice, (p. 181.) That was a wretched production, made up of borrowed plumage;—this, belonging to a branch of botany perhaps one of the most intricate, and certainly, we believe, the most difficult to be studied from dried specimens; nevertheless, Mr. Lindley has by his assiduity put forth a work that, were he not already known, would have stamped him, after Brown and Hooker, the most promising British botanist of the day.

In the second edition of his "Species Plantarum," in 1763, Linnæus reduced all the known Orchideæ to eight genera; in 1789, Jussieu extended them to thirteen; in Willdenow's "Species Plantarum" there are twenty-seven; and Richard, in Persoon's "Synopsis," increased them soon afterwards to thirty-four. The organization of these plants was, however, far from being understood. Swartz, in a separate treatise on the genera and species of this family, and in his Flora of the West Indies, first attempted new characters for them; but it was reserved for Mr. Brown, the first botanist of this or of any former age, to point out the real structure of these curious plants, and to show that the grounds on which their genera ought to be founded, consist in the different modifications presented by the anther. Many new orchideous genera were instituted by that distinguished naturalist in his "Prod. Floræ Nov. Holl," and in the 2d edit. of the "Hortus Kewensis;" and shortly afterwards Richard applied an extension of the same principles to the species found in Europe, in the investigation of which he altered some of Brown's genera. Since that time, many genera have been added by different botanists, by Kunth, by Hooker, by Lindley, Thouars, Achille Richard, Blume, and others. In the "Sceletos Orchidearum," a mere arranged catalogue of generic names, published by Mr. Lindley in 1826, 157 genera are introduced; but it is almost impossible to say to what extent they are to be multiplied in his present work. The *Malaxideæ*[*] have alone appeared, and there we have 47 genera; in the "Sceletos" the same tribe consisted of 21 genera, so that if the whole Orchideæ are to be subdivided in the same proportion, we shall have about 350 genera up to the present day.

We can by no means give our support to this minute subdivision of genera, and we differ *in toto* from an opinion lately expressed by M. Don, that, by so dividing genera and families, "the individuals composing them become better understood, and their characters more accurately investigated." We know that by those who are not professed botanists, this continual change among the genera is exceedingly disliked, and a practical botanist does not require this subdivision to make him open his eyes. If this system were to be carried on much longer we should have the generic become the ultimate positive characters, and attribute to the groups in a natural family the same ideas we formerly applied to genera. Achille

[*] We have some hesitation in thinking that the termination of this word, as the name of a group in a great natural order, is selected according to the rules so well laid down by De Candolle.

Richard, in his "Nouveaux Elemens de Botanique," has some observations on this subject too much lost sight of. They will be found at large in his preface; but we have only room for a few lines: "Dans l'état actuel de la science, nous pensons qu'il y a peut-être plus de réductions à faire dans le nombre des genres et des familles, qu'il n'y a lieu à multiplier ce nombre."—"Dans ce nouvel état de choses, en voit tous les jours disparaître les caractères tranchés qu'on avait cru d'abord exister, soit entre les espèces qui composent les genres, soit entre les genres réunis en famille. Il en résulte nécessairement que comme les différences disparaissent, on doit anéantir les coupes ou divisions qui avaient été fondées sur elles. Aussi, nous le répétons, les progrès toujours croissans de la botanique nous paraissent devoir présenter pour resultat de diminuer de beaucoup, et le nombre des genres actuellement établis et celui des groupes ou familles que l'on a formées par leur rapprochement."*

Perhaps, however, Richard goes too far into the opposite extreme; and we would recommend to botanists Sol's advice to Phaeton,

"Inter utrumque tene: medio tutissimus ibis."

Notwithstanding the great array of genera, we highly commend Mr. Lindley's *brochure*, so far as he is concerned; but, with regard to the publishers, we really think that 7s. for 96 pages *octavo* without plates is exorbitant, and will deter many from becoming purchasers. There is, however, no originality of conception in the work, but the material is good. The mode occasionally adopted to mark the position of the pollen masses is somewhat new, and both simple and useful, and is only to be equalled by the corresponding marks (which no doubt suggested the idea to Mr. Lindley,) used by De Candolle for denoting the relative position of the radicle and cotyledons of the Cruciferæ, Labiatæ and Polygoneæ.

Mr. Lindley pretends to give nothing more than a synopsis; but in that synopsis all Dr. Wallich's new orchideous plants are introduced, besides many from other parts of the globe, which make the work highly valuable.

Of the Malaxideæ we possess in Britain very few species. Indeed we have only *Malaxis paludosa* and *Liparis Lœselii.* All Europe boasts of but one in addition, *Microstylis monophyllos,* North America has two of these, *Micr. monophyllos* and *Lip. Lœselii;* with two other species, *Micr. ophioglossoides* and *Lip. liliifolia.* Northern Asia has *Micr. diphyllos* and *Dienia Gmelini.* So that in the whole northern hemisphere we find only seven species of the Malaxideæ.

* We would have extracted the above from Clinton's translation, were not that translation execrable, and executed by one who does not understand the subject. We wish to forget that such a book exists, so long as we can admire the beauty and elegance of the original.

A series of illustrations, we are told, will shortly appear; we do not know of what nature they are to be, but trust that the characters of the genera will be exhibited in a similar way to those given by A. Richard in his Orchideæ of the Mauritius. An error commonly exists at present of not illustrating those genera of a family which have been previously well described or figured; and this in order that the book may be got up at a smaller expense; but it would be much better to pay a higher price for a complete work than to purchase all the preceding ones. One may as erroneously omit in a botanical work the characters of those genera and species that were previously described by systematic writers.

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*Reflections on the Decline of Science in England, and on some of its Causes.* By CHARLES BABBAGE, Esq. Lucasian Professor of Mathematics in the University of Cambridge, and Member of several Academies. Pp. 228. Fellowes, London, 1830.

WE turn from the perusal of the Memoirs of the Institute of France to examine a work which speaks of the science of our own country; and we are startled at observing the word "decline" inscribed on its very face. Ill are we prepared, after our reflections on the glory of that nation whose labours have so recently excited our admiration, to enter calmly upon the consideration of such a work. But the unprecedented nature of the volume, and the coincidences of our own experience, render us anxious to ascertain what character it deserves.

The objects of the work may be stated in the author's own words:

"It cannot," he says, "have escaped the attention of those, whose acquirements enable them to judge, and who have had opportunities of examining the state of science in other countries, that in England, particularly with respect to the more difficult and abstract sciences, we are much below other nations, not merely of equal rank, but below several even of inferior power. That a country, eminently distinguished for its mechanical and manufacturing ingenuity, should be indifferent to the progress of inquiries which form the highest departments of that knowledge on whose more elementary truths its wealth and rank depend, is a fact which is well deserving the attention of those who shall inquire into the causes that influence the progress of nations.

"To trace the gradual decline of mathematical, and with it of the highest departments of physical science, from the days of Newton to the present, must be left to the historian. It is not within the province of one who, having mixed sufficiently with scientific society in England to see and regret the weakness of some of its greatest ornaments, and to see through and deplore the conduct of its pretended friends, offers these remarks, with the hope that they may excite discussion,—with the conviction that discussion is the firmest ally of truth,—and with the confidence that nothing but the full expression of public opinion can remove the evils that chill the enthusiasm, and cramp the energies of the science of England.

"The causes which have produced, and some of the effects which have resulted from, the present state of science in England, are so mixed, that it is difficult to distinguish accurately between them. I shall, therefore, in this volume, not attempt any minute discrimination, but rather present the result of my reflections on the concomitant circumstances which have attended the decay, and at the conclusion of it, shall examine some of the suggestions which have been offered for the advancement of British science."—P. 2.

The emanation of such a work from an English university indubitably marks the progress of a new era in the history of this country's mind. And the characteristic feature of this age appears to be an unflinching determination amongst the people to battle with error, and to work out an emancipation from the thraldom of old established and injurious customs, which have long maintained their existence under the succour of a careless sufferance. Liberalism of opinion, compensating, in some measure, for the evil influence which it must always exercise over a state, when it riots with religious creeds, has done a service to man, if it be only by exposing to his view the old leaven of corruption, and by exhibiting undisguised the real enemy to his good. And man has taken advantage of his newly acquired knowledge. The political steps which our government has recently been "compelled" to take,—the toleration which is gradually extending to almost all opinions,—the revolutions which have taken place in several of our institutions,—all assert the fact, that error, to be vanquished, "needs but to be seen." Civil discord is, moreover, now in the enemy's strong-holds. Bigotry is at war with his ancient ally; and religion, in all the loveliness of pure intentions, has courted science to her aid, and joined herself to the cause of truth.

In the brief notice to which we must now restrict ourselves, we shall not be able to give more than a partial analysis of the work, which leads us to these considerations; but we shall return to the subject on a future occasion.

In the first place, however, it may be well to inquire what degree of credit a volume with such a title-page deserves; for we are well enough aware that mere captious and petulant individuals may at any time be found to abuse "men and things in the Capital."

The matter stands thus: a Professor of Mathematics in the University of Cambridge, has published, with his name, a work professing to depict the "decline of science in England," and to indicate "some of its causes." And he therein exposes such a tissue of ill doings connected with institutions and individuals whom we have been accustomed to respect, as must afflict every man who bears a spark of patriotism in his breast. That the statements contained in this volume are not unfounded, we might assume from the responsibility of the author's situation, and that they are entitled to investigation, we argue from his rank. And it further appears to us to be a great evidence of the truth of his allegations, that the accused do not attempt to repel the charges which he has made; for, with individual exceptions, where personal character was deeply involved,* his taunts and accusations remain unanswered. It is true that the author may be suspected of being led on by private considerations, and of being warped by personal motives; and such a charge is generally darkened with a criminal aspect. But even if such were the impulse, we consider it fortunate for his country that it existed; for we hold it to be of little consequence to the public, by what private causes a national good is engendered, if the character of the nation be not thereby affected. We are disposed to admit that there is every probability that Mr. Babbage is actuated by concealed motives; for in the first place, he has thought it necessary, in his preface, to disclaim what would perhaps not have been otherwise imputed to him; secondly, he betrays the reason why he passes so cursorily over the state of the Universities, when he tells us that "the ties which connect him with Cambridge are of no ordinary kind;" and, in the third place, he singles out for the main object of censure the Royal Society of London, and certain individuals in particular, when there is so much "rottenness" in the whole of "Denmark." The science of Britain is not disjointed: England is, generally speaking, no worse than her fellow provinces. Why did Mr. Babbage not travel north? He might suppose that *we* were sufficient for the Augean stable; and we believe we have shown no relaxation in the labour †. But if the author had been entirely impartial in his investigation, he would have observed the mutual influence which the science of each of the three United Kingdoms exerts over the others; and would not have limited his views to one portion alone of the empire.

Nevertheless, in spite of all allowances, we hold the author's testimony to be not a whit the less valuable, where facts alone are to be considered; although in matters of opinion it may perhaps be requisite to keep in recollection the situation and circumstances in which he is placed. The author himself, speaking of anonymous publication, makes a just observation, which is also applicable in the present case. "A matter of opinion," he remarks, "derives weight from the name which is attached to it; but a chain of reasoning is equally conclusive whoever may be its author."

* Dr. Roget, the secretary of the Royal Society, and Captain Sabine, have attempted to defend themselves, in the Annals of Philosophy, which seems indeed to have become a "refuge" for all "destitute" authors. The editors of that miscellany, till lately so respectable, appear to have forgotten that one "cannot touch pitch without being defiled." They are now publishing a personal attack on Dr. Fleming the dichotomist, from the pen of Mr. Macleay the quinarian, which, in point of low and ungentlemanly ribaldry, has no parallel even in Cobbett's worst lampoons, or in the slander of the Lancet. We wonder whether the people converse in such language at the Havannah!

† Our exertions have, however, as yet, been confined to rather a limited district. When we publish our extended researches, we imagine that we shall astonish even Mr. Babbage.

It might be more reasonable to question the *capability* of an individual for the execution of such a task as the author has imposed upon himself. But in this case we hold Mr. Babbage to be equally secure. Every one who is acquainted with his writings will place implicit reliance upon his testimony; but for the assurance of those who may not be conversant with his labours, we cannot do better than quote the words of the Quarterly Review.

" Mr. Babbage ranks among the first mathematicians of the age; and he is not merely an abstract calculator, spending his time in solving problems of transcendental geometry, constructing algebraic formulæ, or raising infinite series to the $n^{th}$ power, but a man of general science, of varied talent; and one who, to his other acquirements, adds that of being a good practical mechanist. We need no further proof of this last point, than the machine which he has actually constructed for the computation of logarithmic and other tables, and which alone would entitle him to rank with such men as Herschel and Brunel."—(Vol. XXXV. p. 2.)

As to his strictures on the Royal Society, which occupy more than half of his book, in 1827 he had already been two years in the Council, and has probably been a member of it since; and hence was amply qualified to understand how that Institution was regulated. And, moreover, "living," as he states, "in terms of intercourse with almost all, and of intimacy with several of those from whom he most widely differs," he was in every respect placed in a situation to be acquainted with, if not to judge accurately of, the facts which he relates.

We shall not now enter upon a discussion of the *causes* of the decline of science in England, though we differ materially from Mr. Babbage on this subject. We shall only observe, that we are impressed with the idea that, sitting comfortably at the root of evil, and shaded by the luxuriant groves of "his own" Academe, and moreover, led, when in the world, into personal contact with the secondary effects of a disease which lies deeper in the system, he is unable to detect the true seat of the malady which he observes, and laments, and desires to remedy; nevertheless, the symptoms which he has discovered must, no doubt, have a reciprocal influence on the deep-seated evils, but they can only be removed by eradicating the corruption which rankles within. It is our opinion that if a man be not educated to science he can never adorn a scientific society, and herein would lie the fundamental error; but we agree with the author, that whilst government does not encourage and reward the devotion of individuals to the profession of the abstract sciences, few will be led to sacrifice themselves to such a hopeless pursuit. The developement of our views must however be delayed to a future opportunity. We now attend to Mr. Babbage's book; and, for the sake of brevity, we shall let the author principally speak for himself.

Mr. Babbage first adverts very briefly to the system of *educa-*

*tion* in the Universities, as one of the causes of the decline of science; and on this subject he remarks,—

"It is in some measure to be attributed to the defects of our system of education, that scientific knowledge scarcely exists amongst the higher classes of society. The discussions in the Houses of Lords or of Commons, which arise on the occurrence of any subjects connected with science, sufficiently prove this fact, which, if I had consulted the extremely limited nature of my personal experience, I should, perhaps, have doubted."—P. 8.

He next speaks at greater length of the want of professional impulses, as a cause of the retardation of science.

"The pursuit of science," he remarks, "does not, in England, constitute a distinct profession, as it does in many other countries. It is therefore, on that ground alone, deprived of many of the advantages which attach to professions. One of its greatest misfortunes arises from this circumstance; for the subjects on which it is conversant are so difficult, and require such unremitted devotion of time, that few who have not spent years in their study can judge of the relative knowledge of those who pursue them. It follows, therefore, that the public, and even that men of sound sense and discernment, can scarcely find means to distinguish between the possessors of knowledge, in the present day, merely elementary, and those whose acquirements are of the highest order. This remark applies with peculiar force to all the more difficult applications of mathematics; and the fact is calculated to check the energies of those who only look to reputation in England."—P. 10.

But this is only one of the several causes which deter men, *who are eager for the pursuit of science,* from entering upon it with ardour and devotion.

"Let us look," says our author, "at the prospects of a young man at his entrance into life, who, impelled by an almost irresistible desire to devote himself to the abstruser sciences, or who, confident in the energy of youthful power, feels that the career of science is that in which his mental faculties are most fitted to achieve the reputation for which he pants. What are his prospects? Can even the glowing pencil of enthusiasm add colour to the blank before him? There are no situations in the state; there is no position in society to which hope can point, to cheer him in his laborious path. If, indeed, he belong to one of our universities, there are some few chairs in his *own* Alma Mater to which he may at some distant day pretend; but these are not numerous; and whilst the salaries attached are seldom sufficient for the sole support of the individual, they are very rarely enough for that of a family. What then can he reply to the entreaties of his friends, to betake himself to some business in which perhaps they have power to assist him, or to choose some profession in which his talents may produce for him their fair reward? If he have no fortune, the choice is taken away: he *must* give up that line of life in which his habits of thought and his ambition qualify him to succeed eminently, and he *must* choose the bar, or some other profession, in which, amongst so many competitors, in spite of his great talents, he can be but moderately successful. The loss to him is great, but to the country it is greater. We thus, by a destructive misapplication of talent which our institutions create, exchange a profound philosopher for but a tolerable lawyer.

If, on the other hand, he possess some moderate fortune of his own; and, intent on the glory of an immortal name, yet not blindly ignorant of the state of science in this country, he resolve to make for that aspiration a sacrifice the greater, because he is fully aware of its extent;—if, so circumstanced, he give up a business or a profession on which he might have entered with advantage, with the hope that, when he shall have won a station high in the ranks of European science, he may a little augment his resources by some of those few employments to which science leads;—if he hope to obtain some situation, (at the Board of Longitude *, for example,) where he may be permitted to exercise the talents of a philosopher for the paltry remuneration of a clerk, he will find that other qualifications than knowledge and a love of science are necessary for its attainment. He will also find that the high and independent spirit, which usually dwells in the breast of those who are deeply versed in these pursuits, is ill adapted for such appointments; and that even if successful, he must hear many things he disapproves, and raise no voice *against* them."—P. 36.

But Government itself also retards science, by not rewarding the discovery of "abstract truth," whilst the patronage of the public extends only to practical inventions.

"Long intervals," Mr. Babbage observes, "frequently elapse between the discovery of new principles in science and their practical application: nor ought this at all to surprise us. Those intellectual qualifications, which give birth to new principles or to new methods, are of quite a different order from those which are necessary for their practical application."—P. 17. * * * *

"For one person who is blessed with the power of invention, many will always be found who have the capacity of applying principles; and much of the merit ascribed to these applications will always depend on the care and labour bestowed in the practical detail.

"If, therefore, it is important to the country that abstract principles should be applied to practical use, it is clear that it is also important that encouragement should be held out to the few who are capable of adding to the number of those truths on which such applications are founded. Unless there exist peculiar institutions for the support of such inquirers, or unless the government directly interfere, the contriver of a thaumatrope may derive profit from his ingenuity, whilst he who unravels the laws of light and vision, on which multitudes of phenomena depend, shall descend unrewarded to the tomb.

"Perhaps it may be urged, that sufficient encouragement is already afforded to abstract science in our different universities, by the professorships established at them. It is not however in the power of such institutions to create; they may foster and aid the development of genius; and, when rightly applied, such stations ought to be its fair and honourable rewards. In many instances their emolument is small; and when otherwise, the lectures which are required from the professor are not perhaps in all cases the best mode of employing the energies of those who are capable of inventing."—P. 18. * * * *

"Surely, if knowledge is valuable, it can never be good policy in a country far wealthier than Tuscany, to allow a genius like Mr. Dalton's, to be employed in the drudgery of elementary instruction.† Where would have been the military renown of England, if, with an equally improvident waste of mental power, its institutions had forced the Duke of Wellington to employ his life in drilling recruits, instead of planning campaigns?"—P. 20.

* This body is now dissolved.

† "I utter these sentiments from no feelings of private friendship to that estimable philosopher, to whom it is my regret to be almost unknown, and whose modest and retiring merit, I may, perhaps, have the misfortune to offend by these remarks. But Mr. Dalton was of no party; had he ever moved in that vortex which has brought discredit, and almost ruin, on the Royal Society of England;—had he taken part with those who vote to each other medals, and affecting to be tired of the fatigues of office, make to each other requisitions to retain places they would be most reluctant to quit; his great

*Other nations* have other modes of rewarding and encouraging science.

"In other countries it has been found, and is admitted, that a knowledge of science is a recommendation to public appointments, and that a man does not make a worse ambassador because he has directed an observatory, or has added by his discoveries to the extent of our knowledge of animated nature. Instances even are not wanting of ministers who have begun their career in the inquiries of pure analysis;" and the author mentions the names of Laplace, Carnot, Chaptal, Cuvier, the two Humboldts, Rangoni, Fossombroni, and Lindenau, as "a few of those men of science who have formerly held, or who now hold, high official stations in the governments of their respective countries."—p. 26.

But the state of the learned societies, and of the Royal Society in particular, form, with Mr. Babbage, the main cause of the retardation of science in this country, and on this point he dilates to a great extent. This subject will, however, afford us a topic for another article.*

To give an instance of the condition of some of our societies, and at the same time a specimen of the tone which Mr. Babbage has employed in his volume, we extract the following remarks on the Medico-Botanical Society:—

"The Medico-Botanical Society suddenly claimed the attention of the public; its pretensions were great—its assurance unbounded. It speedily became distinguished, not by its publications or discoveries, but by the number of princes it enrolled in its list. It is needless now to expose the extent of its short-lived quackery; but the evil deeds of that institution will long remain in the impression they have contributed to confirm throughout Europe, of the character of our scientific establishments. It would be at once a judicious and a dignified course, if those lovers of science, who have been so grievously deceived in this society, were to enrol upon the latest page of its history its highest claim to public approbation, and by signing its dissolution, offer the only atonement in their power to the insulted science of their country. As with a singular inversion

and splendid discovery would long since have been represented to government. Expectant mediocrity would have urged on his claims to remuneration, and those who covered their selfish purposes with the cloak of science, would have hastened to shelter themselves in the mantle of his glory.—But the philosopher may find consolation for the tardy approbation of that society, in the applause of Europe. If he was insulted by their medal, he escaped the pain of seeing his name connected with their proceedings."

* We are induced to defer noticing the state of the Royal Society till we have had an opportunity of seeing a work by Mr. South, one of the members of the Council of the Society, which is now in preparation, as we learn from the following paragraph, extracted from a letter from that gentleman, to the editor of the *Times* newspaper:—"Being engaged on a work rendered necessary by the appearance of Mr. Babbage's recent pamphlet *On the Decline of Science in England*, I had occasion to refer to the 'glass-making proceedings' of the Royal Society. On application, however, for the minutes of the sub-committee, to whose superintendence the affair had been intrusted, I found, to my astonishment, that they are not in the Society's possession. As these experiments, during the last six years, have been attended with considerable expense to the nation, and as this is not the only instance in which public documents when asked for could not be produced, may I, Mr. Editor, be permitted, through you, to request the president and council will restore them to their proper place in the Society's apartments, where they may be accessible to every member who wishes to consult them; and from which they ought never to have been removed?"

of principle, the society contrived to render *expulsion** the highest *honour* it could confer; so it remains for it to exemplify, in *suicide*, the sublimest *virtue* of which it is capable."—p. 48.

The mal-administration of funds devoted to scientific purposes is another source of evil noticed by Mr. Babbage, and is exemplified in the following anecdote of the "*conversion of the Greenwich observations into pasteboard*," which forms a fine subject for an article from Mr. Pond:—

"Some years since, a member of the Royal Society accidentally learned, that there was, at an old store-shop in Thames Street, a large quantity of the volumes of the Greenwich Observations on sale as waste paper. On making inquiry, he ascertained that there were two tons and a half to be disposed of, and that an equal quantity had already been sold, for the purpose of converting it into pasteboard. The vender said he could get fourpence a pound for the whole, and that it made *capital* Bristol board. The fact was mentioned by a member of the Council of the Royal Society, and they thought it necessary to inquire into the circumstances.

"Now, the Observations made at the Royal Observatory are printed with every regard to typographical luxury, with large margins, on thick paper, hot-pressed, and with no sort of regard to economy. This magnificence is advocated by some who maintain, that the volumes ought to be worthy of a great nation; whilst others, seeing how little that nation spends on science, regret that the sums allotted to it should not be applied with the strictest economy. If the Astronomer Royal really has a right to these volumes, printed by the government at a large expense, it is, perhaps, the most extravagant mode which was ever yet invented of paying a public servant. When that right was given to him,—let us suppose somebody had suggested the impolicy of it, lest he should sell the costly volumes for waste paper,—who would have listened for one moment to such a supposition? He would have been told that it was impossible to suppose a person in that high and responsible situation, could be so indifferent to his own reputation. P. 108.

"It is, however, but justice to observe, that the injury already done to science, by the conversion of these Observations into pasteboard, is not so great as the public might have feared. Mr. Pond, than whom no one can be supposed better acquainted with their value, and whose right to judge no man can question, has shown his own opinion to be, that his reputation will be best consulted by diminishing the extent of their circulation." P. 114.

The rest of the volume is occupied by remarks on "Observations" and the "Frauds of Observers;" "Suggestions for the Advancement of Science;" and a well-drawn "Comparison between Wollaston and Davy," from which we extract the following:

"In a work on the Decline of Science, at a period when England has so recently lost two of its brightest ornaments, I should hardly be excused if I omitted to devote a few words to the names of Wollaston and of Davy. Until the warm feelings of surviving kindred and admiring friends shall be cold as the grave from which remembrance vainly recalls their cherished forms, invested with all the life and energy of recent existence, the volumes of their biography must be sealed. Their contemporaries can expect only to read their éloge." * * * *

* "They expelled from amongst them a gentleman, of whom it is but slight praise to say, that he is the first and most philosophical botanist of our own country, and who is admired abroad as he is respected at home. The circumstance which surprized the world was not his exit from, but his previous entrance into that Society."

"Caution and precision were the predominant features of the character of Wollaston, and those who are disposed to reduce the number of principles, would perhaps justly trace the precision which adorned his philosophical, to the extreme caution which pervaded his moral character. It may indeed be questioned whether the latter quality will not in all persons of great abilities produce the former.

"Ambition constituted a far larger ingredient in the character of Davy, and with the daring hand of genius he grasped even the remotest conclusions to which a theory led him. He seemed to think invention a more common attribute than it really is, and hastened, as soon as he was in possession of a new fact or a new principle, to communicate it to the world, doubtful perhaps lest he might be anticipated; but, confident in his own powers, he was content to give to others a chance of reaping some part of that harvest, the largest portion of which he knew must still fall to his own share.

"Dr. Wollaston, on the other hand, appreciated more truly the rarity of the inventive faculty; and, undeterred by the fear of being anticipated, when he had contrived a new instrument, or detected a new principle, he brought all the information that he could collect from others, or which arose from his own reflection, to bear upon it for years, before he delivered it to the world.

"The most singular characteristic of Wollaston's mind was the plain and distinct line which separated what he knew from what he did not know; and this again, arising from his precision, might be traced to caution." * * * *

"In associating with Wollaston, you perceived that the predominant principle was to avoid error; in the society of Davy, you saw that it was the desire to see and make known truth. Wollaston never could have been a poet; Davy might have been a great one."—p. 203 *et seqq.*

Such, in imperfect outline, is the work of Mr. Babbage,—a work which even the prejudices of society cannot hinder from having its effect. It may be sought to smother by silence the brand which has burst into flame within the very walls of the incubus which broods over the science of Britain, but the increasing expression of public detestation will fan the torch into such a brilliant glow, as shall, we trust, serve to light us out of the region of darkness. In the interim, let every father of children, on perusing this volume, reflect where the men who figure on its page received their education, and let him be cautious where he sends his sons till the change come. He sees, in the "decline of science," what has sprung, in a great measure, from the condition of the English universities, which, tottering under the weight of years and the lumber of extraneous learning, have been unable to keep pace with the rapid progress of the old branches of knowledge, and, (until very lately, and yet imperfectly,) to seize upon the new sciences as they have flitted along. This may, however, be changed, though the corrupt state of man's heart be unalterable.

It is now several months since the work before us has been circulated in this country, and no national vindication has been attempted against the changes therein contained. Government has not come forward to disclaim the imputations which are cast upon her. Parliament has preserved an idiotic indifference, whilst the finger of scorn is pointed at the mental impotency of her people. We see England sitting tamely under the curse of inferiority,—we see the victim hug his chain,—and we shudder to think of our country's degradation.

## Wernerian Natural History Society.

In our last Number, p. 272, an inaccurate statement was made, the correction of which we repeat from a fly-slip appended to that number. It was asserted that "Mr. Arnott did not sign" the letter which was addressed by Mr. Falconar and Dr. Gillies to the President of the Wernerian Society, on the subject of the library, &c. We have since, however, ascertained that Mr. Arnott's name is appended to the letter, and we have received that gentleman's assurance that his signature was made before the letter was delivered to the chair.

We regret that we should have been led into error upon this matter, and that we should have expressed our contradiction in such strong language, especially as Mr. Neill, whose name was attached to the circular upon which we have animadverted, has declared himself to be solely responsible for that document, and has been irritated by the light in which we found ourselves necessitated to view it. So highly do we estimate this gentleman's public and private worth, that we do not for one moment hesitate to declare, that the remarks we made were never intended to attach to him, and that we are concerned at having occasioned him the slightest uneasiness.

With respect to the fact, which is itself independent of personal considerations, we consider it but justice to ourselves to mention, by what circumstances we were induced to make a statement which now proves to be untrue.

On the 17th April last, when the letter in question was delivered to the president of the meeting, Mr. Arnott was in the chair. The letter was twice read to the Society, and no mention of Mr. Arnott's name, as affixed, was at either time made. Mr. Arnott has since informed us that, after having read the other two signatures, he said "*et cetera*;" but no one could have gathered from this expression that Mr. Arnott's name was intended to be implied; and besides, this addition does not appear to have been heard by the members of the Society, as far as we have been able to learn. Moreover, we have the authority of Mr. Falconar and Dr. Gillies to state, that it was their full impression that the letter was only signed by themselves when delivered by Mr. Falconar to the chair; and that, from Mr. Arnott's name not having been read to the Society, they believed, until the time of our discovering the error, that their signatures alone were attached. Thus, it will be evident that the fact of Mr. Arnott's name being also signed, could only be known to himself and to the secretary, in whose possession the letter was deposited. To these gentlemen, it has been said, we might have applied for information; but had there even appeared to us to be any room for doubt, Mr. Arnott was at the time absent from Scotland, and delicacy restrained us from interrogating Mr. Neill, whose connection with the circular was of rather a dubious nature. Public opinion, then, could alone be our guide; and to this we confidently trusted. We did not wantonly make an assertion which we knew to be false, but reported an opinion which was entertained by numbers of the Society, as well as several visitors who were present at the meeting.

We have received a full communication from our friend Mr. Arnott upon the subject of our article; but as we should be obliged to dissent from several things which he has taken for granted,—and further, as our other statements have not been impugned by the gentlemen more immediately concerned, we consider it would be the more conciliatory plan to suspend the publication of his letter, unless further circumstances should immediately require it.

For the purpose of all possible exactness, we take this opportunity of correcting another mistake, into which we were led by the circular of which we have spoken. It is mentioned in that document that prior to 1828, "Mr. Macgillivray had assisted in arranging and keeping the books, *without holding any office* in the Society," and we were at the time amazed at such an admission. But we have since ascertained that Mr. Macgillivray was requested by the Society to act as assistant librarian so far back as December 1823, for the *nominal* conveniency of Mr. Wilson, keeper of the Museum, and librarian to the Society.

# GEOGRAPHICAL COLLECTIONS.

*On the Asiatic and Japanese Origin of the People of the Upland of Bogota.*— The Baron de Humboldt had already, with his ordinary sagacity, observed that the half civilized people met with in 1537, by the conqueror Queseda, on the fertile and elevated land of Bogota, have the most intimate relations with the people of Japan. Like the latter they were clothed in cotton garments, and they cultivated the shrub which furnishes the material; like them they were united into tribes, and reaped rich harvests of corn; they were also submitted to two sovereigns at once —the one, supreme pontiff, reminding us of the *dairi* of Japan; the other, a secular king, analogous to the *djogoun* or king of Japan. And, like the Japanese, these people of New Grenada employed in their hieroglyphical calendar of a complicated structure, cycles, or a series of days and of numbers combined two and two; and more especially they had a period of sixty years, which alone would suffice to denote an Asiatic origin; lastly, in the language *Chi-bcha* spoken by these people of Bogota, the sound of the letter *l* was wanting, as it is also wanting in the language of Japan.

Such had been the first relations discovered by the Baron de Humboldt, and exposed in his splendid work *Vues des Cordillieres;* and Mr. de Paravey, in a work published in 1826, on the *Origine unique des chiffres et des lettres de tous les Peuples,* had shown some further no less striking affinities. In comparing the cycle of days of the Muyscas with that of the Japanese, M. de Paravey found the same significations in each (evidently astronomical) for the same numbers. Thus, at Japan, as a New Grenada among the Muyscas, the fifth day was expressed by the very complex idea of an hieroglyphic of the conjunction of the sun and moon.

The fourth day offered on both sides the idea of gates, which is precisely the signification of *Daleth* of the Hebrews, constantly used for the number four, of which it had even the figure. The second day gave an idea of enclosures or boundaries, as is presented also in the *Beth* of the Hebrews, and the symbol of the second character of the cycle of Japan; lastly, the number one at New Grenada, as at Japan, offered equally ideas of water and of the tadpole of a frog, or of son, child, which, among the ancient Egyptians, Horapollon informs us, was also expressed by a young frog.

Without pushing any further this comparison of numbers of a similar value made between people separated by such very great distances, it becomes evident that the cycle of the Muyscas, exposed by De Humboldt from a learned memoir of the Canon Duquesne of Santa-Fé de Bogota, who was a long time minister among these half civilized people, and who discovered it upon a stone calendar, of which De Humboldt has given a drawing, had been imported into America from Japan itself, or from China, and probably, as De Humboldt suspects, by the north-east of Asia, where winds are met with which conduct easily into America; whilst all the tribes of Spanish America avow having come from the north at not a very remote period, following the elevated chains of the Andes and of the Cordilleras, which, as is well known, extend the whole length of the new continent.

In 1826, M. de Paravey compared the names *Ata, Bosca, Mica, Hisca, Cuhubqa, Ubchchica,* of the numbers 1, 2, 3, 5, 7, and 10, of the cycle of the Muyscas, to the sounds A, B, C, E, and Z or G, and J or Y, which answer to the same numbers in the Phenician or Hebrew alphabet. He farther found, as we have already mentioned, the same hieroglyphical meaning attached to several of them; but he did not at that time think of comparing these same numbers of the Muyscas to the names of the cycle of ten days of the Japanese; and this is what M. de Siebold, who walks in the steps of De Humboldt, has just done at Japan itself and at Nangasachi.

M. de Siebold was sent into these parts by the Baron Van der Capellan, when governor of Batavia, and, besides rich remittances of seeds to the Garden of Plants of Paris, he had, previous to the misfortunes of which we have already given an account in this Journal, sent to the Asiatic Society of France a learned memoir on the language and history of the Japanese, in which he discusses their origin, and which it would be desirable to see translated either into the French or English language; for the history of man is a great problem, which, in the present day, is discussed in every part of the world, and new discoveries come every month to give confirmation to the Mosaic records.

M. Siebold remarked that, excepting the first, the names of the Japanese days terminated all in *ka*, as is also the case in seven out of ten of the Muysca numbers. In the Caucasus the languages of the Awares and Lesghi have also the names of their numbers terminating in *ko*, or *ico*. He further remarked that *fito*, which signifies one in Japanese, approximates closely to *atar*, number one in Muyscayan; *ada* also, among the Abazes of Caucasus, signifies frog, which is the hieroglyphic of the number one, as we previously remarked in Muysca and Japan, and *adi* in Nepaul and in Asia, and the primitive *atha* in Sanscrit, signify the first, like the term *atha* in Muyscayan. M. Siebold also remarked, that *foutsca* or *boutsca*, signifying two in Japanese, is evidently *bosca* or *bousca*, equal to two among the Muscayans; that, in each, *mica* signifies three; and that *itsca* and *hisca*, for five, were evidently the same words; whilst *aca*, nine in Muyscayan, is the simple abbreviation of *conoca*; that is to say, nine days in Japanese. And he concluded from these and similar affinities that the two people had the same origin.

M. Klaproth, in analyzing, in the name of a commission, the memoir of M. Siebold, has wished to contest this opinion; and to compensate for the strength of proof furnished by this simple analogy of numbers, Mr. Klaproth presented a list of twenty-three Muyscayan words that were very different from the Japanese words that were compared with them. But Mr. Klaproth, who often, from the similarity of a few words alone, has identified people who had no other relation, has certainly been unfortunate in the choice of his Japanese words; for M. de Paravey found in that language more than twenty words quoted by Mr. Klaproth, and among others very complicated words of four syllables; for example, *tomagata* is the name of a bad genius, or a comet or burning star, which in Muyscayan signifies melted or burning mass, whilst in Japanese *Fi macouts* expresses the same idea.

We might mention all the Muyscayan words found in the Japanese itself by M. de Paravey, but we would rather refer to the curious discoveries lately made in Guatemala, and in the rich and ancient town of Palenque, for so long a time unknown, and which might be called the Thebes of America.

It will suffice to add here, that even the name of the language of the Muyscas, which is called *Chibcha*, or the language of the *Chib* men, or *sibcha* in Muyscayan, signifying man, (which is the *sa* of the Japanese, also signifying man,) is the same as that of the Japanese language, which in the present day at Japan is actually called *sewa* or *siwa*, from whence might easily have been derived the name *chib* of the Chibcha language, which has further come to us, and is preserved here, in the French pronunciation. M. de Humboldt, when visiting the upland of Bogota, not far from the fine cascade of Tequendama, which has been the subject of his descriptions, found, beside a hill at this day called Chiper, an ancient Indian village also called Subé, a name that closely approximates to Sewa, Saba; and he saw in the vicinity of this village the remains of an ancient and flourishing agriculture.

This name, then, alone would lead us to Japan, the country of the language of *Sewa*; and might we not even find some traces of the Sabeans? since the Muyscayans, as well as the Japanese and the ancient Sabeans or Phenicians, adored the sun and the moon, and, with others of the old American nations, approximated themselves to those of the east by the sacrifice of human victims.

The historical traditions of the Muyscayans also conduct us to Japan or to Asia; for their first pontiff, the mysterious Bochica, whose name *Sue*, is that of the sun, and who laid the upland of Bogota dry, after a fatal inundation, by a cleft in the rocks, reminds us of Yao, whose name applies to the rising sun, a king as celebrated at Japan as he is in China, and under whom the fatal deluge took place; and he also laid dry his empire by a cleft in the mountains, as Bochica did when he produced the beautiful cataract so elegantly described by De Humboldt.

We may still trace some relation with the Japanese traditions, when we hear that Bochica elected for first king of the dried country the wise and illustrious Huncahua; while the Muyscayans state that the king Yao had for successor the prince Chun, not less celebrated for his virtues than the first *Zaque* or king of Bogota, Huncahua. The names have even the same pronunciation Chun or Hun.

Perhaps we may consider nothing better proved in philosophy than the purely Japanese origin of the most civilized tribes of New Grenada and of the upland of Bogota; and indeed all the travellers that have penetrated either into Mexico or Brazil, or to Bogota, have been struck with the analogy of features and figure which exists between the more or less copper-coloured races of America and the yellowish race of Mogul and the tribes of the north-east of Asia; the want of beard, the black and thick hair being characters equally common to these people, who almost come in contact in the north at Behring's Straits.

Having sufficiently dilated upon the relations which exist even in the writings of the two people, (for the figures of the Muyscayan numbers given by De Humboldt are only a running hand of the Japanese,) let us only draw the philosophical and Christian conclusion, that these results tend still further to corroborate that evidence which supposes that America, as well as Africa and Europe itself, so long covered with dark forests, has received its population, as well as its language, its writing, its religion, its traditions, and its sciences from ancient Asia, where Genesis shows us the first men escaping from the last cataclysm which ravaged the earth and destroyed the Atlantis.

Very soon this complete harmony of the traditions of all people, and their admirable agreement with the best observations of geologists, will exhibit themselves with an irresistible force to all minds divested of prejudice. Instead of endeavouring to extinguish a wish to investigate these subjects, such a desire should be encouraged; for those who, in the midst of so many different interests, have industry to watch the general progress of discovery, will see every thing tend to the same important result, that which more and more establishes the unity of the human species, and the truth of the grave and antique traditions contained in the sacred book of Moses, and found under a form that is often very little disfigured among all tribes, even among those whom isolation and the most pressing physical wants have rendered half stupid.

We might recal here all the traces of Genesis recognised by De Humboldt among the different tribes of America. It is true that the learned traveller has appeared to consider these striking memorials as a kind of mythology; but the labours which are at this moment carried on both in ancient Europe and in the elevated parts of Asia, will, we have no doubt, assist materially in uniting and explaining these scattered traditions; and we are not far from that time when they will only be illiterate persons who boast of their incredulity.

*Extract from a Letter of Dr. Siebold to the Lieut. Governor-General of the Dutch possessions in India, at Batavia.—Dezima, 15th Feb.* 1829.—During my residence at Sedo the imperial astronomer and librarian, Frakahasi-Sakusaimon, promised to procure me a copy of the maps of the empire of Japan, constructed during the last ten years by order of the emperor, according to the European method. I received them towards the end of the year 1826, and in the spring of 1827, accompanied by some other works of interest concerning Krafto Tartary and the Archipelago of Linkin, and at the same time I kept up a constant correspondence with this friend of European science, and hence the origin of the failure of all my efforts and my hopes to enrich Europe with new information on Japan.

A personal quarrel which took place between the astronomer and one of the draughtsmen employed in making copies of the maps which he was to deliver to me, and a serious offence received from the astronomer, led the draughtsman to revenge himself on his chief, by accusing him of delivering to a stranger, copies of the imperial maps, a thing absolutely forbidden by the Japanese laws. Government received this accusation; and the consequences were equally vexatious to the astronomer, to all who had been useful on the occasion, as well as to myself. The astronomer, his servants, the interpreters, many of my pupils, and other Japanese, however slightly they had been implicated in this business, were put into prison, and government instituted a severe inquiry into the affair.

The 19th of December 1828, notice was given to me to remit to government the geographical maps which I had obtained; and as I hesitated to follow these directions, they proceeded to visit my house, which this time had less unfortunate results for myself than for those who had been employed upon this service.

Having been charged, by the government of the Dutch Indian possessions, by virtue of an order, dated 19th April 1825, No. 20, to make all possible researches into the religion, geography, government, &c. &c. of the Japanese empire, I had employed, during a residence of five years, my private fortune in acquiring all the objects necessary for this knowledge, so that, previous to this unfortunate event, I had in my possession a complete collection of Japanese writings, which were valued at 20,000 florins, and which were destined for the museum of his majesty, to whom I hoped to have the honour of presenting them myself. I had also obtained a great number of literary and scientific works. During four months I had eluded the demands of the Japanese government, and, while endeavouring not openly to displease it, I had found means to preserve the most interesting part of my collections, always having some hopes of keeping them from their inquisitorial vigilance, when, on the 20th of last January, these hopes were entirely frustrated—the head of the Dutch factories having received formal orders not to allow of my departure previous to the termination of these inquiries.

The Japanese government put every thing in action, from the very commencement of this affair, in order to discover the political aim of this acquisition of geographical maps. I received orders to be under strict arrest the 19th of last December, whilst the interpreter whom I had employed, my pupils, my painter, my servants, in one word, all who had had the least relation with me, were placed in more or less rigorous confinement.

I was called, as well as my assistants, several times to appear before the governor and judges in this affair. I was ordered to name all who had entered into the plot with me; and it was with so much more rigour that they insisted on this fact, as the papers containing my correspondence with the astronomer had been seized, and government fancied that it perceived a new source of suspicion.

As the consequences of this business were not only of a nature to make me lose the fruit of my labours, but also to threaten the life of several individuals, I resolved to acknowledge the truth concerning the maps and other collections, protesting that my sole intention was to extend my scientific knowledge, to collect all interesting objects into a museum, and to return all that it would have been impossible for me to preserve. I thus hoped to drown suspicion, and to keep some precious documents which we were hitherto unacquainted with, and which would have compromised others not yet suspected.

I shall avoid making our government appear interested in my scientific mission; my intentions were to make the Japanese feel that my researches in natural history, medicine, and the physical sciences, might be as useful to them as to us.

As it was impossible to foresee all that has happened, I flatter myself that your

Excellency will approve of my conduct, and acquaint the head of our factory with the most advantageous manner of terminating this unfortunate affair, so that my mission may not be entirely without results for science.

*Geographical Society of Paris.*—In the report for the prizes given for 1830, the medal for the most important geographical discovery was announced as having been given to René Caillie for having reached Timbuctoo, in Central Africa; and a similar gold medal was voted to the widow of the unfortunate Major Laing. Among the journies and voyages which received an honourable mention, were those of M. Segoaran de Tromelin, and of M. de Haut Cilly in the Pacific; the American expedition to New Shetland; and more especially the voyage of Captain Dumont d'Urville to Vanikoro, and round the world, which would have gained a prize had it not been preceded in the discovery of the remains of La Perouse by Captain Dillon. Among the discoveries were ranked the great circumnavigation of the coasts of Africa, by Captain Owen, from the Indian seas to Sierra Leone; the surveys of Admiral Roussin and M. le Predour, on the coasts of Western Africa; of Captain Steenhoom on those of New Guinea; and of Mr. Beechey in the Polar Seas. General Ashley's journey to Lake Timpanogos; M. Muller's in the interior of Borneo; M. Gerardin's in Senegal; M. Duranton's in Bambouk; M. Fontanier's, M. Ch. Belanger's, and Bishop Heber's in Asia; Dr. Siebold's labours; Mr. Hodgson's observations in Nepaul; M. Ruppel's and M. Ehrenberg's researches in Africa, were mentioned with honour; as were also Capt. King's and M. d'Orbigny's excursions in Patagonia; the establishment of a colony at Swan River; Mr. Maw's descent of the Amazon; Mr. Hardy's travels in Mexico; and Capt. Basil Hall's in North America.

The prize for a journey into ancient Babylonia and Chaldea had no successful candidate.

Honourable mention was made of M. Baradere's researches; but the prize for a description of the monuments of Palenqua and the peninsula of Yucatan was postponed to 1832.

The prizes offered this year are a gold medal of the value of 1000 francs (L.50.) for the most important discovery in geography; if a stranger, the candidate will further receive the title of Perpetual Correspondent; or that of Member, if a Frenchman. In the absence of information of this kind, a gold medal, value 500 francs, will be awarded to the author of observations or communications that shall be considered as most novel or useful to the progress of the science.

A gold medal, value 500 francs, will be given to the traveller who shall have first penetrated to the banks of the Misselad, taking his departure from Darfour. He must further determine the source and mouth of that river; and describe, with exactness, the mountains which occur in the interval.

A similar prize is offered to the person who, taking his departure from the banks of the Misselad, or from the town of Ouaro, the residence of the Sultan of Bargow,—shall have arrived as far as lake Tchad,—and shall have recognized the principal rivers that flow in that space, and procured information on the origin, course, importance, and general direction of these rivers, as the Bahr-Koulla (or Goulla,) Bahr-Dago, Bahr-el-Ghazal, the presumed branches or affluents of the Schary.

The sum of 2500 francs will be given to the first traveller who shall reach the place marked on the map of Africa by the name of Marawi, which is supposed to be situated about the 32d degree of east longitude from Paris, and about 10° south latitude. He must endeavour to ascertain what part of the course of the river Loffih flows towards this parallel, and descends in a south-easterly direction on the opposite slopes of the great transverse chain from whence originates the White River. He must seek for any communication that may exist between the Loffih and the running or stagnant waters of the Marawi. Travellers are expected to make other correlative remarks.

A gold medal, of the value of 2400 francs, is offered for a journey into the southern part of Caramania, in Asia Minor. The society understands by the southern part of Caramania, the countries to the south of Mount Taurus, formerly known by the name of Lycia, Pamphylia, and Cilicia. The society demands a manuscript and detailed relation made by the author from personal observations, and accompanied by a geographical map, upon which his road shall be traced. A description of the country neighbouring the transverse ranges (*contre-forts*) of the Taurus. The height of these must be barometrically measured; and it must be ascertained if the chain consists of a series of elevated plateaux. The culminating points of the chain must be measured; and it must be observed if the rivers have deposited much debris at their mouth. The author will further present notions of the physical aspect of the country, its climate, soil, productions, cultivation, industry, commerce, and population, whose manners and customs he will describe. He will give, as far as possible, the plan of the ancient towns; he will draw the monuments; copy the Greek, Roman, Armenian, or even Mussulman inscriptions which he may meet with; he will mention the ancient coins that may be offered to him, taking care to indicate the places where they may be found. He will push his observations beyond Mount Taurus, so as to connect his itineraries with known cities, as Erekli, Konieh, Ak-sheer, Kara-Hissar, &c.; and he will endeavour even to penetrate as far as the Euphrates. He will make observations on the latitude in several places; and will determine the longitude either astronomically or by means of the marine watch. The transcription of the names of places in the language and in the characters of the country, and the different names given to the same place by different tribes is particularly recommended. The narrative must be remitted to the Society previous to the 31st December 1830.

A gold medal, of the value of 7000 francs, will be awarded for a journey of discovery into the interior of Guyana. The object must be to recognize the unknown parts of French Guyana; to determine the position of the sources of the Maroni, and extend these researches as far as possible to the west, in the direction of the 2d degree of north latitude, following the line which divides the streams of Guyana from those of Brazil.

The traveller will fix the geographical positions, and the level of the principal points, according to the adopted methods, and will bring back the elements of a new and correct map.

The Society further desires that he may collect the vocabularies of the different tribes.

A gold medal, of the value of 2400 francs, is offered as a prize for discoveries in Mexican antiquities. The Society demands a more complete and exact description than is yet possessed of the ruins of the ancient city of Palenque, situated to the north-west of the village of Santo Domingo, (Palenque is near the river of Micol, in the state of Chiapa;) of the ancient kingdom of Guatemala, designated by the name of Casas de Piedras in the report of Captain Antonio del Rio, addressed to the King of Spain in 1787. The author will give picturesque views of the monuments, with plans and cuts, with the principal details of the sculptures.

The relations which appear to exist between these monuments and several others of Guatemala and of the Yucatan, make it desirable that the author should, if it be possible, examine the ancient Utatlan, near Santa Cruz del Quiché, province of Solola, the ancient fortress of Mixco, and several other similar ones; the ruins of Copan, in the state of Honduras; those of the island of Peten, in the laguna of Itza; the limits of the Chiapa, Yucatan, and Verapaz; the ancient buildings placed in Yucatan, and 20 leagues to the south of Merida, between Mora-y-Ticul and the town of Nocacab; lastly, the edifices in the neighbourhood of the town of Main, near the river Lagartos.

The bas reliefs representing the adoration of the cross, like that represented in the work of Rio, should be sought after.

It would be of importance to recognize the analogies which exist between these different edifices, considered as the work of the same art and of the same people.

In the geographical relations, the Society demands more especially particular maps of the cantons in which these ruins are situated, accompanied by topographical plans, the maps should be constructed according to the exact methods. They further demand the absolute height of the principal points above the level of the sea; and remarks on the physical state and productions of the country.

The Society also asks for researches on the traditions relating to the ancient people to whom the construction of these monuments is attributed; with observations on the manners and customs of the natives, and vocabularies of the ancient idioms. What the traditions relate as to the age of these edifices must be more particularly inquired into, as well as whether it is well proved that the figures drawn with a certain degree of correctness were anterior to the conquest.

Lastly, the author will collect all that is known on the Votan or Wodan of the Chiapanais,—a personage compared by De Humboldt to Odin and to Boudha.

A gold medal of the value of 1000 francs, will be given for the best memoir on the origin of the Asiatic negroes. According to the Chinese historians, negro races have inhabited the mountains of Kuenlun to the north of Thibet. There exist some traces of the same race in the mountains which separate the Annam from Cambodia. The nation of the Sameng, in the mountains of the peninsula of Malacca, is also the remains of a negro race. They speak a particular language, which is mingled with the Malay. This latter language is met with amongst the negroes of Oceanica; and, in general, we find that their exists some relation between these tribes of the Malay race—a race which, as is well known, extends itself from the Island of Formosa as far as Madagascar, and from New Holland to the Sandwich Islands.

A memoir of researches on the question relative to the origin of these negro tribes is demanded.

It is also desirable that the author should make us acquainted with, and should compare together, the different negro races which have inhabited the different countries of oriental Asia, and that he should expose the relations which may have taken place between them and the Malay race. It is to be desired that the author shall found his researches on the Chinese historians.

The Society offers a medal, value 800 francs, and another of 400, for essays on the geography of France. It demands a physical description of any part of the French territory that constitutes a natural region.

The physical and moral relations of man, when they give origin to new observations, should be connected with the description of a region.

The memoir should be accompanied by a map indicating the trigonometrical and barometrical elevations of the principal points, as well as the slope and rapidity of the rivers, and the limits of the different vegetations.

The society furthers offers a gold medal to every one who shall have procured the geometric levelling of a suitable part of the course of the firths and principal rivers of France.

Three medals granted by M. Perrot of the Society, are offered to the authors of the most extended and exact barometrical levellings made on the line of division of the waters of the great basins of France.

The society desires that the memoirs be written in French or in Latin; but the works may be published in English, Italian, Spanish, or in Portuguese. All memoirs should be legibly written; the author must not name himself either in the title or the body of the work. All memoirs must be accompanied by a motto, which must be contained in a sealed paper, with the name and address of the author. All memoirs, letters, &c. must be addressed, post paid, to the President of the Society at Paris, Rue et Passage Dauphine, No. 36.

*Geographical Society of London.*—We have already expressed the high sense of gratification which we felt at the first dawn of this institution, destined we hope to be national; and we now feel an increased pleasure in the confidence of its having based itself on a firm foundation. A change has we perceive taken place in the more active members concerned in its inauguration, and the gentlemen who first met privately with a view to the formation of a society of this description, and by whom we were first made acquainted with the proposed undertaking, have, as we learn from the Literary Gazette, amalgamated themselves with the members of the Raleigh Traveller's Club, and a body of gentlemen famed for their literary and scientific attainments, and their extensive acquaintance with the objects of the new institution. The power gained by this union in a common cause, is attested by the names attached to the provisional committee: indeed to fulfil with success the duties connected with the varied and complex questions of geographical inquiry, demands no ordinary combination of talent and information. One thing is most certain, that prejudice of every kind must be done away with, before success can be ensured with honour. Every country has its prejudices, but abroad we have met with none more prejudiced to their tastes, customs, and manners, than our own countrymen, and we do not hesitate to say, that for the high rank which we hold in civilization, we have yet many lamentable errors to correct.

The national temperament and the genius of the people may be considered as the same thing; but a nation, like an individual, should learn to know itself, its virtues and its vices, its power and its weakness; and then the temperament, like an unclean atmosphere, may be purified, and the genius which, strictly speaking, a tribe or people may possess, will gleam forth in truly unobstructed splendour. The power given by invention or by knowledge will be consolidated, and the sceptre of the natural and lawful sway of an intellectual and courageous nation, will be wielded with greater weight over less civilized and less fortunate tribes.

It will be felt by these remarks that we place much value on the institution of this society, and that we consider that the results will be important in proportion to the energy employed in forwarding its intentions, and putting what ought to be the plan of all institutions of that character into execution. The development which in proper hands these may assume, strike the mind so instantaneously, that it is needless here to give too high a colouring to such ordinary pictures; but the imagination of our readers, which we indulge by our silence, is not in fault, as it generally provokes a desire for perfection, and one of the most pleasing, the most instructive, and in its whole tendency one of the most useful tasks which we can perform, will be, while marking the progress of our favourite science, to point out the new impulses given by a society that shall be instituted to further its views, and to claim the privilege of rewarding its successful proselytes. As the advantages of novel inventions lie only in their application, so there is nothing in a geographical discovery more glorious than its affording a clue to others; and hence the wide field of observation and research that opens before us, by which we may become acquainted with the primitive history of the human race,—their dispersion,—the origin and distribution of animals and plants,—the progress of civilization,—the solution of problems in the physical sciences,—new qualities of natural objects, and a consequent increase of enjoyments, from new luxuries and new conveniences; and it comes in our power to disseminate the benign influence of Christianity and of civilization among neglected outcast races of men.

We observe that the society intends preparing instructions for such as are setting out on their travels. Now this is one of the most difficult tasks which they could prescribe to themselves, one which the Geographical Society of Paris has very imperfectly fulfilled. Indeed, the directions given even by governments and learned societies at remote periods, now only remain as monuments to attest the ignorance of the times,—witness the instructions given to La Perouse, or compare the instructions given by the East India Company to Dr. Buchanan, to Syme, and very lately to Captain Dillon, with the splendid results of the journies of Humboldt, Franklin, Parry, and D'Urville. A gentleman, otherwise well qualified as a traveller, Captain Basil Hall, failed entirely in drawing up a compendium of objects for a traveller's inquiry,—in fact, the objects of inquiry in each particular science, should be drawn up by one especially conversant with that branch. Leonhard's *Agenda Geognostica* is an example in one science; the same should be done for every branch of natural history, for archæology, &c. &c. This ground-work being completed, the Society should, upon all occasions, appoint committees out of its own body, to prepare instructions for particular countries or districts, which always present some facts for investigation that do not occur in others, and which may be made the subject of observations, independent of the general objects.

With the extensive patronage it is receiving, we hope the society will not only be generous, but munificent in its rewards; and we strenuously recommend that not only pecuniary assistance should be afforded to such travellers as may require it, but that travellers should, if the funds of the society permit it, be sent out to countries which it may be thought desirable and advantageous to explore. We must content ourselves, however, for the present, with curtailing our own remarks on the objects of this institution, and lay before our readers the printed results of their first meeting.

" At a numerous meeting of the members of the Raleigh Traveller's Club, and several other Gentlemen, held at the Thatched House, on Monday, the 24th of May, John Barrow, Esq. in the Chair, it was submitted, that among the numerous literary and scientific societies established in the British metropolis, one was still wanting to complete the circle of scientific institutions, whose sole object should be the promotion and diffusion of that most important, useful, and entertaining branch of knowledge, GEOGRAPHY.

That a new Society might therefore be formed, under the name of the " Geographical Society of London."

That the interest excited by this department of science is universally felt; that its advantages are of the first importance to mankind in general, and paramount to the welfare of a maritime nation, like Great Britain, with its numerous and extensive foreign possessions.

That its decided utility in conferring just and distinct notions of the physical and political relations of our globe must be obvious to every one; and is the more enhanced by this species of knowledge being attainable without much difficulty, while at the same time it affords a copious source of rational amusement.

That although there is a vast store of geographical information existing, yet it is so scattered and dispersed, either in large books that are not generally accessible, or in the bureaus of the public departments, or in the possession of private individuals, as to be nearly unavailable to the public.

The objects then of such a Society as is now suggested would be,

1. To collect, register, and digest, and to print for the use of the Members, and the public at large, in a cheap form and at certain intervals, such new, interesting, and useful facts and discoveries, as the Society may have in its possession, and may, from time to time, acquire.

2. To accumulate gradually a library of the best books on Geography—a selection of the best Voyages and Travels—a complete collection of Maps and Charts, from the earliest period of rude geographical delineations, to the most improved of the present time; as well as all such documents and materials as may convey the best information to persons intending to visit foreign countries; it being of the greatest utility to a traveller to be aware, previously to his setting out, of what has been already done, and what is still wanting, in the countries he may intend to visit.

3. To procure specimens of such instruments as experience has shown to be

most useful, and best adapted to the compendious stock of a traveller, by consulting which, he may make himself familiar with their use.

4. To prepare brief instructions for such as are setting out on their travels; pointing out the parts most desirable to be visited; the best and most practicable means of proceeding thither; the researches most essential to make; phenomena to be observed; the subjects of natural history most desirable to be procured; and to obtain all such information as may tend to the extension of our geographical knowledge. And it is hoped that the Society may ultimately be enabled, from its funds, to render pecuniary assistance to such travellers as may require it, in order to facilitate the attainment of some particular object of research.

5. To correspond with similar societies that may be established in different parts of the world; with foreign individuals engaged in geographical pursuits, and with the most intelligent British residents in the various remote settlements of the Empire.

6. To open a communication with all those philosophical and literary societies with which Geography is connected; for as all are fellow-labourers in the different departments of the same vineyard, their united efforts cannot fail mutually to assist each other.

7. And lastly. In order to induce men of eminence and ability in every branch of Science, Literature, and the Arts, and in particular those who have travelled by sea and by land, and all such as are skilled in Geographical Knowledge, and likely to become useful and efficient Members, it was suggested that the admission fee and annual contribution should be on as moderate a scale as, with the number of subscribers calculated upon, would be sufficient to enable the Society to fulfil the important objects herein alluded to.

The Meeting then proceeded to nominate the following gentlemen as a *Provisional Committee,* to draw up certain leading principles, as the groundwork on which such a Society may be established.

The Hon. Mountstuart Elphinstone.
Lieut.-Gen. Sir Thomas Macdougall Brisbane, K.C.B.
Sir Arthur De Capell Brooke, Bart.
John Cam Hobhouse, Esq. M.P.
Robert William Hay, Esq.
Colonel Leake.
Robert Brown, Esq.
Captain Beaufort, R.N.
Captain Basil Hall, R.N.
Major the Hon. George Keppell.
Henry Ward, Esq.
Lieut.-Col. Colby, R.E.
Thomas Murdoch, Esq.
Commander Mangles, R.N.
Roderick Impey Murchison, Esq.
Captain Sir John Franklin, R.N.
Captain Smith, R.N.
John Barrow, Esq.
George Ballas Greenough, Esq.
Commander M'Konochie, *Provisional Secretary.*

At a Meeting of the above-mentioned Committee, held on the 26th May, the following Resolutions were agreed to.

1. That the Society be called THE GEOGRAPHICAL SOCIETY OF LONDON.

2. That the number of Ordinary Members be not limited; but the number of honorary foreign Members to be limited as hereafter shall be determined.

3. That as soon as the number of Subscribers shall amount to three hundred, a general meeting be called, to appoint a President, two Vice-Presidents, a Treasurer, Secretaries, and a Council, to conduct the affairs of the Society; and for approving, altering, and, if necessary, establishing such other regulations, in addition to those herein recommended, as may appear to be necessary for the well-being of the Society.

4. That the election of the Council and Officers of the Society be annual.

5. That the office of President be not held by the same individual for a longer period than two consecutive years; but that he be eligible for re-election after the lapse of one year.

6. That the two Vice-Presidents be subject to the same regulation as regards the President; but the Treasurer and the Secretaries may be re-elected.
7. That the officers above mentioned, with fifteen other Members, constitute the Council, and that five of the fifteen are to go out annually at the period of the general election of the officers of the Society.
8. That the admission fee of Members be L. 3, and the annual subscription L. 2; or, both may be compounded for on the payment of L. 20.
9. That all admission fees and compositions be placed in the public securities, to be hereafter applied as the Society may direct.
10. That the funds and property of the Society be vested in the names of three Trustees.
11. That these three Trustees be supernumerary Members of the Council.
12. That so soon as five hundred Members shall be entered on the list, a second General Meeting will be called to decide upon such further regulations and bye-laws as shall appear beneficial and useful for the management of the Society.
13. That Commander M'Konochie, R.N. be appointed *Provisional* Secretary to the Society.

ARTHUR DE CAPELL BROOKE. *Chairman.*

Those who may be desirous of becoming Members of "The Geographical Society of London," are requested to send their names to any of the gentlemen of the Provisional Committee, or the Secretary, 99. Quadrant, Regent Street."

At the beginning of last month, upwards of 400 gentlemen had joined the new Institution, and a general meeting was consequently called. We hope to give the detail of their proceedings, and a list of the members, in our next number.

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*Miscellaneous Intelligence.*

*Swan River.*—The news from Swan River continues to be favourable; the number of colonists does not, however, according to the latest accounts, amount to more than 400; ships had arrived from Europe, from New South Wales, and from Batavia. According to some statements the good land is not estimated at more than 3000 acres.

M. Botta is about to depart for Arabia and Egypt.

M. Michaud, of the French Academy, is about to be sent by government into Palestine to carry on researches on the itinerary of the crusaders, and to recognize the places where different memorable events took place. He is to be accompanied by several engineers, geographers, and artists.

*Origin of the Bushmen.*—In a paper, read at a meeting of the South African Institution at the Cape of Good Hope, on the origin and history of the Bushmen, Dr. Smith, whose activity in elucidating the geography and natural history of those countries has already called forth our encomiums, alleges reasons in favour of the supposition that the Bushmen existed in Africa long previous to the appearance of the Europeans, and that they were probably cotemporaneous with the Hottentots themselves. He added, that communities or families, similar to what we understand by the term Bushmen, inhabit all the uncultivated deserts known by the name of Great Kamagualand, and conduct themselves towards the Hottentots and the Damaras of their neighbourhood exactly as the former do with regard to the colonists on our frontiers. Dr. Smith thinks that they are originally Hottentots.
The South African Institution has offered a prize for the best essay on the character, history, and geographical distribution of the Hottentots.

*Exploration of California.*—Dr. Coulter, a distinguished British naturalist now resident in Mexico, intends exploring the interesting and unknown districts of California. He is stated to be a good astronomer, and to be furnished with instruments; he is to spare neither time nor money in his expedition. He intends embarking at San Blas, travelling by sea to Monterez, which he will make the centre of his excursions into New California. He will first reconnoitre Lake Timpanogos and the Salt Lake; he will ascertain whether the river San Francisco or Buenaventure does not take its origin from this first lake; he will afterwards return to Monterez, and descend by land towards Port Deigo, from whence he will go to the mouth of the western Rio Colorado and ascend to its source. He will thus ascertain if Lake Timpanogos does not pour its waters into the Gulf of California by the Rio Colorado, or whether it flows into the Pacific Ocean by the San Francisco, as some geographers suppose. After having examined the source of the Rio Colorado, Dr. Coulter will pass the Rocky Mountains as much to the south as possible, will descend the Rio Bravo del Norte as far as the parallel of New Mexico, and thence he will go and seek the source of the Red River, or Rio Roxe, whose course he will follow to the Mississippi.

*De Humboldt's Travels in the Ural.*—The French say that the English newspapers have spoken of the late journey of De Humboldt to the Ural Mountains with a puerile jealousy which characterizes every line. They should be aware that in matters connected with science these organs of public opinion, in almost every country, are mostly plagiarists, and what has appeared in one paper will often run the circuit of a periodical press. We do not ourselves profess to have seen the remarks, which have been attributed to an eminent geologist, once united by the ties of friendship to De Humboldt, or we should have corrected the erroneous impressions; but though we have often expressed our opinion of the extreme mineralogical riches of the Ural Mountains, we cannot see, in the first place, that Russia can benefit by them so exceedingly and so suddenly as to excite our jealousy; nor can we see, in the second, why we should be more susceptible of those feelings than our continental neighbours. We are, further, as far from thinking, both from the geological age of the chain, from the *manière d'etre* of the metals and precious stones, from the mineralogical character of the products, and, without putting too much stress on such an argument, from analogy with more distant countries, and lastly, from the neglect that has attended these mountains where "*l'argent ne se montre que mêlé à l'or,*" that their products will in future supply the ancient continent, or that the mines of America, worked by the fire worshippers of Peru and Mexico, "have already passed through the crucibles of the Europeans!"

The French journals like to harp upon the quantity of meat devoured by our countrymen. The population of London is 1,225,000 individuals, who consume 189,710,000 lbs. of meat, or 155 lbs. each. The population of Paris, valued at 715,000 inhabitants, consumes 61,927, 444 French lbs. of meat, or 36 French lbs. each. Brussels, with a population of 100,000, consumes 8,888,024 French lbs. of meat, or about 89 lbs. each, and consequently, most certainly not 3 lbs. more than an inhabitant of Paris, as stated in the *Correspondence Mathematique et Physique,* 1r. liv. T. VI.

The utility of balloons for geographical purposes has been again discussed in the *Annales Maritimes et Coloniales.* We have but one opinion as to their utility not only to geography, but in time of war to stratagem, and in time of peace to rapidity of communication; we only wait for their practical application, the discoverer of which will confer a benefit on mankind.

The sensation of an earthquake at Smyrna has been communicated to the

Geographical Society of Paris. It occurred on the 28th of December 1829, at 17 minutes past 4 o'clock in the afternoon, and lasted a little more than a second; its direction was from north to south.

*Steenhoom's Expedition to New Guinea.*—We alluded, in our account of the Geog. Soc. of Paris, to Capt. Steenhoom's exploration of the coasts of New Guinea having been honourably mentioned. It is not generally known that a Netherland expedition, commanded by this officer, composed of the Triton and brig Isis, went to explore and take possession of the northern coast of that country. Many officers and naturalists were joined to the expedition. They discovered, in 3° 42′ S. latitude, and 153° 57′ E. longitude of Greenwich, a bay which they called Triton Bay, and in which they constructed a fort. This fort received the name of Bas. The expedition has made a rich harvest in natural history, and many improvements in geography and nautical science. The establishment of a European colony in that country will also be the source of many important discoveries.

Attempts have been made, with some success, to naturalize the cochineal and breed silk worms in Java. The cultivation of tea in the same country promises to be successful.

The two naturalists, Messrs. Meyer and Menetrier, sent by the Imperial Academy of Sciences of St. Petersburg to explore the chain of the Caucasus, have arrived at Bakou, where they were to stay during last winter, and to recommence in spring their excursions in the environs and on the banks of the Caspian.

*Numerical relation of Births and Deaths.*—M. Labatto has lately published the results of 10 years' observations on the law of the proportion of births and deaths in the Low Countries, of which the following is a tabular view:—

| | *Births.* | *Deaths.* | | *Births.* | *Deaths.* |
|---|---|---|---|---|---|
| January, . | 1091 | 1196 | July, . | 851 | 833 |
| February, . | 1171 | 1177 | August, . | 915 | 826 |
| March, . | 1117 | 1171 | Septemper, | 993 | 890 |
| April, . | 1017 | 1098 | October, | 1003 | 937 |
| May, . | 934 | 978 | November, | 1011 | 952 |
| June, . | 876 | 897 | December, | 1021 | 1043 |

These documents confirm the law of births and deaths, deduced by M. Villermé from more than twelve millions of observations collected from different parts of the globe, and verified for Brussels by the editors of the *Correspondence Mathematique et Physique*; and it appears well established that more births and deaths occur in the winter months, and fewer in the summer. It may also be remarked, that there is a preponderance of the second column over the first in the general average; and the results given by the tables of the variations of the populations of Paris, Brussels, &c. correspond with this proportion, which is still further increased when we compare the births of boys and girls with the deaths of men and women. On the contrary, a comparison of the births of boys and girls with the number of deaths of boys and girls, as has been made in the tables given of the movement of population in Liege, (*Courier Universel de Liege*, 7th Jan. 1830,) may lead to erroneous estimates. These results are of importance in considerations connected with the comparative population of ancient and modern periods, which both Hume and Montesquieu supposed to have considerably diminished with the progress of time, and which assume their greatest latitude when we apply them to the inhabitants of a particular spot, and not to the population of continents concentrated in agricultural or commercial districts, at the expense of the remainder.

*Estimates for draining the Lake of Haarlem.*—The Lake of Haarlem, properly so called, has only existed since the 16th century; before that time, a great marsh, known in the country by the name of *Harlemmer-meer,* occupied nearly the centre of the present lake. It is also well established that the village of Vijfhuizen, and all the lands that separate the Spirnigs-meer, the Harlemmermeer, the Ouder-meer, and the Leidsche-meer, were swallowed up, so that the four lakes formed from that time only one sheet of water, which now bears the name of the Lake of Haarlem. The Dutch government appeared disposed a few years ago to order the draining of this great lake, and the question excited a lively discussion. M. de Stappers has just published a pamphlet in 8vo. on the means to be employed in the drainage, and on the probable expense of such an undertaking. The author conceives that the dykes alone would cost annually 30,000 florins. Several projects of drainage have been made.

| | *Florins.* |
|---|---|
| In 1640, Engineer Leeghwater valued this enterprize at | 3,600,000 |
| 1769, Goudrian and Glenkenberg, at | 9,000,000 |
| 1808, Blanken Jantz, at | 8,000,000 |
| 1820, Baron Van Lynden, at | 7,000,000 |
| And, lastly, M. de Stappers not only proposes to drain the lake and some neighbouring marshes, but to construct conducting canals, for | 6,000,000 |

*Correction of the Longitude of Orchilla, one of the Little Antilles, or Leeward Islands.* By J. A. Macwhirter, Esq.—We have been favoured with the following extract from a MS. " Voyage to Curaçao," by our friend Mr. Macwhirter, which we trust will in future afford much interesting information to our readers:—

" I am not aware that the small group of islands called in our maps the " Little Antilles," has ever been accurately described by any author. It consists of eight islands, viz. Margarita, Isla Blanca, Tortuga, Orchilla, Aves, Buen Ayre, Curaçao, and Aruba, extending in a line of about W. by N. from Margarita, from the longitude of about 64° 45′ to 71° west; and latitude of 10° 45′, to 12° 12′ N. The first of the group has lately been better known from its having been the rendezvous for the cruizers and privateers of the Independents of Venezuela, at the beginning of their contest with Spain; and much, which is unknown to me, may have been written about it, as well as the other members of the group, by those who entered into the Columbian service. But there is one fact, connected with the position of the Island of Orchilla, the fourth in the group, which appears to me to deserve every publicity.

" In some of the best charts, published prior to the year 1820, the position of Orchilla was stated to be 11° 51′ N. and 65° 5′ W., which was no less than 58′ of longitude *wrong;* and, in consequence of this error, when I passed the island early in that year, a large vessel, at least 400 tons, was lying a complete wreck. The latitude is sufficiently correct; but the *true* longitude, as ascertained by two sets of accurate lunar observations taken by myself, with two good chronometers of my own, and also by two sets of lunars by the captain of the vessel, is 66° 2′ 15″ W., making a difference in the position of the island of 57′ 15″ of longitude further to the eastward than it really is, and leading to the already-mentioned unfortunate result. On my return to Britain, the year afterwards, I communicated this information to Mr. Norie of London, as well as the Spanish chart I possessed of that coast and adjacent islands, and I hope the error has since been corrected. If it has not, your work will make it known."

# NATURAL-HISTORICAL COLLECTIONS.

## Baron Cuvier's *Lectures on the History of the Natural Sciences.*

Lecture IX.—Theophrastus.—Aristotle died, as we have said, in the year 322 before Christ, the same year with Demosthenes, who destroyed himself that he might not fall into the hands of Antipater. After this period, the Macedonian yoke weighed still more heavily on Greece than it had done even in the time of Alexander. Athens, though it retained its own laws and internal administration, was, in reality, subjugated. However, so long as the turbulence of the times allowed, the schools of this city flourished: the Portico, which was a separate branch of the Cynic sect; the Academy, where the doctrines of Plato, somewhat modified, were professed; and the Lyceum, where the labours of Aristotle were continued.

Among the philosophers of the Lyceum, the most famous was Theophrastus. He was born at Evesus, in the island of Lesbos, 370 years before Christ, and 22 before the death of Plato, whose pupil he is supposed to have been for some time before entering the school of Aristotle. His eloquence, from which he took the name of Theophrastus, (for he was at first called Tyrtamus,) drew around him a number of disciples, and he had, at one time, more than two hundred. It is said, that when Aristotle was about to leave Eubœa, his pupils insisted on his appointing one among them, who should succeed him in the school. The philosopher, without speaking openly, said enough to let them know the man of his choice, for, having produced some wine from Rhodes, and some from Lesbos, the first sort, he said, was stronger, but the other was more palatable, and appeared to him preferable; thus making an illusion to the two persons, between whom the choice might appear doubtful, namely, to Theophrastus, who, as we have already said, was born in the island of Lesbos, and to Menedemus, who was born in that of Rhodes.

Theophrastus, like his master, was subject to some persecutions. Attacked by Sophocles, he, along with other philosophers, was driven into exile, about 306 years before Christ; but he was soon recalled, and the person who had accused him, was himself banished. Ptolemy Lagus endeavoured to attract him to Alexandria, but he preferred remaining at Athens. Eloquent, mild, beneficent, upright in his conduct, and neat in his external appearance, he gained the good will and respect of every body. He died at the age of 85 years, according to some, and of more than 100, according to others. The whole body of the people attended his funeral. His house, he bequeathed to his friends, on the conditions that they should not sell it, and that they should meet in it for the prosecution of the study of letters and philosophy. This is the first legacy which was left to the sciences by a private man. He left them also a garden, in which he had collected a great many native and foreign plants, such, at least, as would grow in the climate of Greece; for, as glass was not in use at that time, there were no hot-houses. Thus the descriptions which Theophrastus has given of the plants of warm countries, lie under a disadvantage, from this want of the means of observation. His botanic garden, however, notwithstanding this imperfection, was still a very useful institution to science: it was the first of the kind that had been established.

Theophrastus wrote on different subjects, on general philosophical questions, on manners, and on natural history. He left, it is said, more than two hundred treatises, some of the titles of which have been preserved by Diogenes Laertius. The most considerable of these, as well as some smaller ones, are still extant. In all these works, there is a good deal of spirit, much justness and elegance of expression, and great clearness of method.

The most important work of Theophrastus is his History of Plants, a work somewhat similar in design to Aristotle's History of Animals. Thus, according to this model, he begins by treating of the parts of plants, which, first of all, he divides into roots, stems, branches, and shoots. He remarks that there is not one of these parts which is common to all plants—a circumstance which is the more true, if truffles and mushrooms be included, as it is proper they should be. In every part, he distinguishes the bark, the wood, and the pith. He describes the exterior organs of vegetables, the leaves, the flower, the peduncle, the tendrils,—and, under this head, he speaks of *gall-nuts*. Then he treats of the interior parts, of the *flesh*, that is to say, of the parenchyma, veins, and juices.

After these preliminary observations, he arranges plants, and forms a sort of method, as Aristotle had done, in treating of animals. But his task was a more difficult one to accomplish, as the characters upon which it is necessary to establish a classification, are less easily observed in vegetables than in animated beings. Theophrastus contents himself, therefore, with dividing plants, according to their size and consistence, into trees, shrubs, plants, and herbs. This mode of division has been of very long continuance.

He speaks of the different qualities of wood and pith, and of the different forms assumed by the root, namely, the fusiform, the ramous, the tuberculous, or bulbous; and illustrates his definitions by examples. He says that the root goes no farther into the earth than the point to which the heat penetrates from the surface.

In treating of leaves, he makes the very just remark, that the inferior surface of these organs is more absorbent than the superior. He divides them according to their size, situation, and form. He speaks of the organs of fructification, and makes a distinction between the upper and lower flowers, and points out the different kinds of seeds. He proceeds to examine the modes of reproduction in vegetables, which are perpetuated not only by seeds, but also often by suckers, roots, and slips. He next considers wild and cultivated plants; says that the latter are not the produce of a degenerescence caused by cultivation; and that, therefore, it is false to say that barley can be transformed to oats. He speaks of the effects which the sun, climate, and various other circumstances have upon the fecundity of plants; and, on this subject, relates many curious facts. Thus, he speaks of caprification, an operation, by means of which the bulk of the fruit of the fig-tree is increased, and which consists in breeding upon it very small insects, which introduce themselves into the calyx of the flower. He describes also the way in which female date-trees were made to bear fruits, namely, by putting them near enough to receive the influence of the male dates. He does not, however, look upon this as a real fecundation. In this place, he speaks of the different palm-trees of warm countries; and, among others, of a palm-tree having a forked, or dichotomous stem, which belongs to Upper Egypt. He tells by what means forest-trees are propagated to a distance, namely, by the aid of winds, inundations, &c. He next considers trees as they inhabit the plain or the mountain, as they remain always green, or are divested of foliage; and, in this last division, he points out in many species the period of the fall of the leaf. He speaks also of the time of the rising of the sap, and of the period of fructification. Finally, he considers the slowness or the rapidity with which plants grow.

Theophrastus, in speaking of trees, often distinguishes them as male and female; but these terms, as used by him, do not convey the idea of sexes. He describes different species: in speaking of the trees of warm climates, he describes the true acacia, which is a mimosa, a sensitive plant, different from that small species which is cultivated in our greenhouses; the lemon-tree (the thorny apple-tree of the Medes), the fruit of which was used at that time for perfuming clothes; the banana-tree, the large leaves of which resemble a plume of ostrich feathers; and the fig-tree of the Brahmins, the branches of which, descending to the earth, take root in it, and send forth new shoots. He speaks also of ebony and of the cotton-tree, a shrub which was known from the time of the expedition of Alexander, but which had not yet been transported into Greece.

Theophrastus speaks of plants which grow in water, such as the fucus and sponge. He remarks, that in the latter there is something approaching to animals. In treating of vegetables which grow in rivers, he describes the papyrus, an important plant during the time when parchment was undiscovered; and of the lotus, a sort of nymphæa, very common in every Egyptian canal.

He treats of the duration of the life of plants, and of their diseases,—among others, of those which attack the wood; also of the insects that destroy it. On this subject, he describes the *larvæ* of the horn-beetle. He shows the places in which forest-trees attain the greatest height, and mentions Corsica in particular.

These are nearly all the subjects treated of in the first five books. The sixth treats of shrubs, bushes, and garden flowers; the seventh, of culinary vegetables, and also of some field plants; the eighth, of grains, and of some leguminous plants; and, in the ninth and last book, he treats of the juices which are extracted from plants, namely, pitch, tar, resin, frankincense, and myrrh. In this book, he speaks also of certain aromatics, particularly of cinnamon, and of several medicinal plants, of hellebore, for instance, which was much more in use among the ancients than it is among the moderns.

From what has been said, it is obvious, that the history of plants is a sort of counterpart to the history of animals. But Theophrastus, though he had a good deal of talent and information, was far from having the genius of Aristotle. Nor do we find in his works those enlarged views, and that abundance of general rules, which we admire in the other.

Theophrastus noticed in his work about 360 plants. There are mentioned in it a good many forest-trees, and fruit-trees, most of the culinary vegetables, grains, and, lastly, a great many Indian plants, which have been discovered again only since the fifteenth or sixteenth centuries.

Theophrastus wrote another work relating to botany,—a treatise on the *Causes of Plants*. In it he treats of some questions in vegetable physiology, but principally on the influence of external circumstances on plants. He proposes a certain number of questions, which it is not always easy to answer. He asks, for example, why the best fruit does not always contain the best seed?—why the fruit of wild trees has not so sweet a taste as that of cultivated trees? He puts also other physical questions. He would have it explained, for instance, why animals have not in general a pleasant odour, since many plants diffuse a very agreeable fragrance? It is, says he, because animals, being of a hot, dry constitution, and having a thin breath, throw off by evaporation the superfluous parts of their aliment. The physics of Theophrastus are worse than those of Aristotle.

Theophrastus, like his master, studied almost all the branches of natural history. He wrote some small treatises on different points in zoology. There is one of them which treats of fish that live without water, in which he gives proofs of extensive knowledge of the productions of India. He speaks of flying-fish; of those which the sea in ebbing leaves upon the rocks; of those which lie buried in the mud of lakes, as the loach, and comitis fossilis, which is sometimes found in slime when thickened and dried. He speaks of an Indian fish that comes out of the water. This fish, which was unknown to us till about twenty years ago, when we were made acquainted wtih it through the account of M. Hamilton Buchanan, is the ophicephalus. It lives in the Ganges; but it is found sometimes at so great a distance from every appearance of water, that the people believe it to have fallen from heaven. Theophrastus gives a pretty good description of it, and says that it resembles the mullet, in the round form of the head, in its colour, and in the disposition of its scales.

Theophrastus wrote also a small treatise on animals which change their colour. Here he speaks of the various colours assumed by the cameleon, and the change of tint which takes place in the hair of the reindeer,—a change which he considers as dependent upon the will of the animal, but which, in reality, is only an effect of the seasons. In another little work upon animals which appear suddenly, he seems little disposed to admit of spontaneous generation; and if he does not altogether reject it, at least he limits it a good deal more than his master did.

The most important of the works of Theophrastus, next to his two books upon botany, is his treatise on stones, a work valuable on account of the number of mineral species that are pointed out in it; but this treatise is lost. He considers metals as deriving their origin from water, and stones as produced by the earth. He makes a division among stones, distinguishing them as fusible and infusible; and these last, again, as calcinable stones, and stones which are unalterable by fire. He arranges them also according to their hardness and cohesion. He groups all the mineral substances which have a common property, as amber and the loadstone, both of which have a power of attraction. He shows the uses of the touchstone, speaks of the different kinds of petrifaction, and of petrifying waters.

From these general considerations, he goes to particular descriptions. He speaks of different marbles, of the Parian marble, pentelic marble, alabaster, and a good many others that are used by architects and sculptors. He treats of the stones which are reduced for extracting metals, of pit-coal and its different species. He compares amber with a variety of coal which is found in Liguria, and it is a very just comparison. He mentions also pumice-stones; he knew their volcanic origin, and gives to one of the species the name of Lipari-stone. He gives a description of the amianthus, which is indestructible by fire; and of another substance, like rotten wood, which, when soaked in oil, burns with a flame. Next come the stones fit for engraving; the carnelian, the jasper, &c. Mention is made of a sapphire, which has a blue ground, with veins of gold; it is therefore not the gem which is now designated sapphire, but the lapis-lazuli. Theophrastus speaks of emeralds, and, in doing so, relates, that an Egyptian king had received emeralds from a prince of Ethiopia, which were not less than four cubits in height, and that four of them would have served to erect an obelisk. The thing, though strange, is not altogether incredible; for it is known that, near Limoges, emeralds are found of very large dimensions, but without either brightness or transparency. Besides, the ancients confounded, under the name of emeralds, tourmalines and many other green stones. Theophrastus speaks also of the hyacinth; of the amethyst, which he calls the Heraclean-stone; of rock-crystal; of the onyx, which is found on breaking certain rocks; of the agate, which takes its name from the river Achates; of the jasper of Bactriana, which is met with among sand. He speaks of the magnetic stone; and by this name he designates, not what has since been understood by it, the loadstone, but a stone which has no attractive power, of a silvery lustre, and which was then used for making cups.

In treating of precious stones, Theophrastus speaks also of pearls, but without confounding them with mineral productions. He says that they are got from a shell-fish which is fished in the Indian seas. He speaks of the remains of organized bodies which are found in the earth, of petrified reeds, of fossil ivory, of Armenian blue, &c.

In treating of the use of mineral substances, he describes the process of the manufactory of glass. He mentions the different colours that painters obtain from minerals; natural ochre, burnt ochre, white lead, verdigris, vermillion, cinnabar, which the Phenicians brought from Spain; it was brought also from Colchis, and was found, it was said, on the top of certain steep rocks, from which it was separated by the shots of arrows. This was undoubtedly a story invented by the merchants, to warrant their raising its price. Finally, Theophrastus speaks of marl, and its uses; and of plaster, which, even in his time, was used as it is now, for moulding ornaments for the interior of houses.

*(To be continued.)*

*Note on Baron Cuvier's Lectures, by a Correspondent.*

We have been obliged by the following remarks on a portion of M. Cuvier's lectures, by a gentleman whose criticisms we shall always value :—

Having traced M. Cuvier's interesting progress of the Natural Sciences, in the Edin. Journ. of Nat. and Geog. Science, down to the improvements introduced by the Greeks, I trust it may not be deemed presumptuous to notice one or two singular omissions of the great physiologist of France, when he comes to grapple with history. After noticing the profound acquirements of Moses, compared with the leaders of the Ionian colonies, and fixing the age of the Egyptian greatness contemporary with the Judges, it seems strange that he should then trace back the origin of that country's civilization to a source so remote as India, merely because Thibet offered the first asylum to mankind after the deluge. The sacred historian tells us the whole race, journeying *from* the east, was assembled in the plain of Shinar; and as M. Cuvier's own discoveries on the strata of the earth, corroborate his account of a series of successive creations and catastrophes, (which last, Gentile tradition limits to four,*) why discredit his record as to the centre of dispersion? Is it not more probable that that infant form of society, the institution of *castes*, was carried across the Arabian Gulf, upon the upper waters of the Nile, than by the circuitous route of the Straits of Babelmandel? In Southern Persia, as well as in Egypt and India, a kindred system prevailed, and the expulsion of the Divs, or Indian gods, at the era of Zohawk or Assyrian conquest, is still remembered by the Guebres. What is singular, too, our present race of gypsies have been clearly traced to modern Chosestan. We should thus have light thrown on the part Abraham and his relative took in the dispute of the king of Elam with his tributaries in Syria, where the Sabian principles of idolatry, founded on astronomy, did not so universally prevail. They could not, however, survive the proclamation of the king of Babylon, not even when the sceptre of the Achæmenides was again established "in Shushan the palace." The Medes, the Yavana Divipa of Hindoo writ, had been taught in a purer school, that of Assyria. The gold, the silver, the brazen, and the iron ages of Hesiod, however fictitious their progressive deterioration, relate to certain successive epochs of our planet. M. Cuvier has shown the conjunction of the Hindoos† to be a suppositious one calculated back; yet he will not venture to deny the accuracy of their celebrated era, which extends some centuries anterior to the flood, according to the Hebrew version. The superior antiquity of that of Egypt, is preserved in the expression of the sun having twice risen where he set, and twice set where he rose, a course of 2920 years, if even a greater length may not be fairly presumed, the time before Herodotus, when the last cycle was taken, not being defined.‡ Though their system of intercalation was not perfected till the Alexandrian school, the principles of gravitation would seem to have been known by the builders of the Pyramids; and had not this been the result of actual observation, they would scarcely have been content with a simple duplication of the solar day, but, like other pretenders, would have soared into an ideal antiquity; and the records of the earth had not then been consulted to contradict them. The amplest relics of antediluvian learning might well be expected to be found in the city of the ark, at Thebes. We smile at the incredulity of the ancients, after exploding the fables of their priests, in not believing the circumnavigation of Africa; yet we ourselves, who have been as much inclined to swallow those of the Brahmins, would now restrict the dawn of science with a scepticism too unphilosophical.—Candidus.

* They are even particularized by the Mexicans, one as atmospherical, one as igneous, the effect we now witness of crystallization; and two others, the one attended by a great disruption of the earth's surface, the other, when the water subsided calmly, diluvial."

† The Arii of Herodotus.

‡ Still astronomy no more contradicts the Biblical annals than geology brings the works of God in opposition to his word.

*On the Respiratory Currents of certain Aquatic Animals.*—In a note to the important paper by Dr. Sharpey, "On the Mechanism of Respiration, &c." published in this Number, (p. 334.) it is mentioned that we would, in another place, exhibit the previous state of our knowledge on the subject. This we proceed to do, as well for the purpose of giving its proper estimation to a discovery by our friend Dr. Fleming, which appears to have been overlooked, as of bringing some corroborative evidence to show the extensive distribution of the structure observed by Dr. Sharpey.

It has been for a considerable time ascertained, that the currents observed in water in which zoophytes and infusoria are immersed, are owing to the rapid motion of *cilia* disposed around the mouth, or on the tentacula of the animal; and similar bodies have been observed and described by Dr. Grant in the *ova* of zoophytes, whence their spontaneous motions are sustained.

"The *cilia* on the surface of these ova," says Dr. Grant, "are minute filaments, which may be compared to the small hairs covering the human body; they do not add to the internal organization of the ovum, nor render it as complex as that of the adult animal which possesses highly organized polypi; they are organs which exist in the adult zoophyte, and in the simplest forms of animal matter, the motions of the simplest gelatinous animalcules being performed by them; and they are necessary to prevent the ova from falling by their own gravity like the seeds of plants, to be buried in the ever-moving sands."—*Ed. Phil. Journ.* I. 152.

Dr. Fleming, in a paper in the Wernerian Memoirs, Vol. IV. p. 488, was the first to describe and figure the *cilia* by which currents are produced along the tentacula of polypi, in the *Sertularia cuscuta* of Ellis, (*Valkeria cuscuta*, Flem.;) and to render the subject more clear to those who are less acquainted with the nature of zoophytes, we have added Fig. 5. and 6. to the plate accompanying Dr. Sharpey's paper, from the illustrations of Dr. Fleming's observations.

"In some Sertulariæ which I have examined," says the author, "the arms seemed furnished on all sides with suckers, analogous to those of the cuttle-fish. On the arms of this species, however, I detected a very different arrangement, and one which I suspect has not hitherto been noticed. Each arm is furnished, laterally, with a row of short hairs or plates; for the highest magnifier which I could conveniently apply did not enlarge the object above a hundred diameters, and was incapable of enabling me to determine their true shape. The motions of these hairs, were, in consequence of the currents which they produced in the water, sufficiently obvious. The hairs, on one side of the arm, exercised a continued motion, so as to cause the water to flow from its base to the extremity; while those on the opposite side executed a motion the very reverse of this, causing the water to descend from the extremity of the arm towards its base. And again, if the hairs on the right side of one arm were fitted to cause the water to ascend, the hairs on the left side of the contiguous arm were found suited to produce a current in the opposite direction, as exhibited (not from nature, but to render the description intelligible) at Fig. 6. Plate VII. Analogous hairs exist on many species of Medusæ, Tritoniæ, &c. in which they are obviously unconnected with the digestive system as assisting prehensile organs, and may probably be considered as forming a part of the aerating organs. In this Sertularia, their occurrence on the arms, which are true prehensile organs, and belonging to the digestive system, may induce a belief that they are merely parts of that system, and destined by the currents which they produce, to bring the small animals, their prey, more easily within reach of seizure. The currents, however, which are produced by their motion, seem better calculated for bringing fresh portions of water in contact with the sides of the arms, than to bring animalculæ within the space which they surround. They may possibly be destined to act as organs of touch, though I am rather disposed to regard them as *branchiæ*, placed in the most favourable position for receiving the influence of the oxygen of the water."

Thus the existence of these little organs in zoophytes, and their probable use in the functions of respiration, seems to have been clearly understood; and they have been observed by Dr. Grant "in many species, particularly of the *Sertularia* and *Alcyonia*." But, except in the observation contained in the above extract, that "analogous hairs exist on many species of *Medusæ*, *Tritoniæ*, &c." which "may probably be considered as forming a part of the aerating organs,"— and in the fact mentioned in Dr. Fleming's Phil. of Zool. Vol. II. p. 470. that "the branchiæ in some species (of *Tritonia*) readily fall of, and, as if independent, are capable of swimming about for a short time in the water, by means of minute hairs with which their surface is covered, and which move rapidly, pushing forwards the distal extremity,"—we have met with no approximation to Dr. Sharpey's discovery of *cilia* in the higher invertebrata.

The process by which that gentlemen arrived at the discovery was original and extremely beautiful, and the observations of Dr. Fleming serve to corroborate what Dr. Sharpey has so widely extended.

We think that two interesting deductions may be drawn from these observations, which the authors seem indisposed to recognize.

In the 1st. place, we should be inclined to consider it as a fact resting on a sound analogy, that the tentacula of polypi are their respiratory organs, and that the process is effected by successive portions of water being moved along by the vibrations of the *cilia* on their surface.

And, 2dly, we do not see occasion for the question put by Dr. Sharpey, whether the currents "are to be referred to any of the known properties of living bodies, or *or to a peculiar power residing in the parts ?*" It is true that *cilia* have not been observed in the tadpole, nor in the ascidia; and Dr. Grant was unable to detect them in the sponge; but Ellis could not even see them on the ova of the *campanularia dichotoma*, probably, as Dr. Grant observes, from not having employed a sufficiently high magnifying power; and as the ascidia is the only one of the mollusca examined by Dr. Sharpey in which he has not observed these organs, we think the question should be, what magnifying power does it require to see the *cilia* in those species in which they have not yet been discovered ? and not whether there be a "peculiar power residing in the parts ?" Sir E. Home was not even able to see *the currents* along the gills of the tadpole, though he (or Mr. Bauer) had described this larva from its formation in the ovum through the whole period of the existence of the external gills. But the fact is now placed beyond doubt by Dr. Sharpey's observations.

Dr. Grant, however, seems to have taken every means to discover cilia in the sponge, in which he was led by analogy to expect them,—but without success. He says, "The highest orders of aquatic animals produce currents in the water, by the contraction and relaxation of various muscular parts of their bodies; and the most perfect inhabitants of the dry land produce similar currents in the air to oxidate their blood. We are not yet acquainted with any zoophyte capable of producing these currents, by contracting and dilating its axis; and I have shown, that the currents of the sponge are not produced by any contraction or dilatation of the mass of its body, or of the pores, canals, or orifices. No naturalist has ever discovered polypi in the sponge; and, as I have used every effort in vain to detect them with a microscope, magnifying nearly a hundred times, it is very probable that no such organs exist. If they be present and indistinguishable by such aid, they must be at least a hundred times finer than a filament of silk, and the cilia of the tentacula of such polypi would bear no proportion to the velocity and volume of the currents described. I have stated above, that the currents can be distinguished by the naked eye passing into the open pores of the *Spongia panicea*, and they are readily seen through the microscope passing into the pores in most of the other species. I was therefore led to suspect that the currents are not caused by polypi on the surface, but by cilia, or some similar apparatus, placed around the entrance of the pores, or on the margins of the gelatinous net-works, or on the whole surface of the internal canals. I first placed a thin layer from the surface of the *S. papillaris*, in a watch-glass with sea water under the microscope, and, on looking through its pores, I perceived the floating particles driven with impetuosity through these openings; they floated with a gentle motion to the margin of the pores, rushed through with a greatly increased velocity, often striking on the gelatinous net-works, and again relented their course when they had passed through the openings. The motions were exactly such as we would expect to be produced by cilia, disposed round the inside of the pores; but the most intense observation, with high magnifying powers, did not render cilia visible on this or any other species which I examined. I now took deeper sections from the substance of a great variety of living sponges, after removing their surface, and on examining them in the same manner, under a powerful microscope, I found that, wherever a portion of an internal canal presented itself, there was a distinct and rapid current through it, but the moving organs were as little distinguishable on these, as on the margins or net-works of the pores. On looking with the microscope through the pores of a detached portion of the *S. compressa*, I have sometimes observed a confused motion among the granular bodies lining their sides, and have even seen these monade-like bodies in groups staggering to and fro, when they had fallen separate to the bottom of the watch glass. But, although every known analogy would lead us to believe that these motions and the currents are produced by cilia, I have never been able, by any artifice, or by the highest magnifying powers, to bring them distinctly into view in any species of sponge."—*Edin. New Phil. Journ.* **II. 126.**

We are inclined to believe, however, from the numerous analogies, that the ciliated structure will, by deeper investigation, be found to be pretty universal amongst aquatic invertebrata, and that it will probably also come to be classed amongst those transient structures through which several reptiles and fishes pass at an early period of their life.

Upon the whole, it appears that the use of the cilia in producing currents in the zoophytes, and in a few species of acalepha and gasteropodous mollusca, has been already pretty clearly made out; but the discovery of this wonderful process, as a general property of the bivalve and gasteropodous mollusca, the annelida, radiata, and, still more remarkably, of the tadpole and water salamander, will stamp Dr. Sharpey as an highly ingenious and talented observer. And we trust that he will pursue the investigation to its utmost limits.

*Additional references to Plate VII.*

Fig. 5. The *Sertularia cuscuta* of Ellis.

*a, a.* The polypi, with their eight tentacula expanding beyond the denticle.

Fig. 6. Magnified representation of two of the tentacula, not from nature, but for the purpose of showing the direction of the currents.

*On Calceolariæ Hybridæ; by* Dr. Graham, *Professor of Botany in the University of Edinburgh.*—It is with no slight feelings of disappointment that have lately seen sent to the Botanic Garden some very fine hybrid varieties of *Calceolariæ.* The species lately introduced into cultivation in this country seemed so well marked, and so entirely agreed with native specimens which have accompanied the seeds, that I did not fear a confusion of species in this genus; a confusion which in other genera seems to have rendered a distinction of species impossible, and has given colour to the opinion that natural genera form the ultimate divisions of plants with permanent characters.

Mr. Morrison, gardener to Lord President Hope at Granton, being aware that several of the finest species of *Calceolaria* were shy in producing seed, suspected that this defect might be corrected, by applying the pollen of certain kinds to the stigmata of others; and he first has had the merit of presenting to the florist, hybrids thus produced, which equal, if they do not surpass, in beauty, any of the species of this handsome genus. Mr. Morrison's experiments have been confined to four species, all herbaceous, viz. *C. corymbosa, C. arachnoidea, C. plantaginea, C. Fothergillii.* He has succeeded in crossing the whole of these. *C. plantaginea* he finds most apt to produce seeds of itself, and most readily to fertilize others. The hybrids which Mr. Morrison has sent to the Botanic Garden are the following:

1. *C. plantaginea-corymbosa*, raised from seed of *C. corymbosa*; produced by the pollen of *C. plantaginea*.

This is an exceedingly handsome plant, with the foliage of *C. plantaginea*, and the outline of its flowers, but they are larger than these, and with fewer spots externally; the mouth is open, as in *C. corymbosa*, but smaller, and the dark marks on the inside of the throat are round, not in streaks; in its flowering stem there is the mode of branching of *C. corymbosa*. Looking at it only with a florist's eye, it is really a splendid plant. A specimen of this hybrid having been sent by Mr. Morrison to the meeting of the Caledonian Horticultural Society on 3d June 1830, the Society's Silver Medal was voted for it.

2. *C. plantaginea-arachnoidea*; raised from seed of *C. arachnoidea*, produced by the pollen of *C. plantaginea*.

This is a large healthy plant, having acquired little from *C. arachnoidea*, except a dirty brown colour in the corolla, the mode of branching in the flower-stalk, and the number of its flowers. There is very little woolliness upon the plant, but there is none of the polished surface of *C. plantaginea*, and the leaves are much smaller, and very much resemble those of *C. purpurea*.

3. *C. arachnoidea-plantaginea*; raised from seed of *C. plantaginea*, produced by the pollen of *C. arachnoidea*.

This plant is almost identical in appearance with the last, the parents being only transposed. The flower is rather smaller, its colours darker, more decided, more speckled, and, on the whole certainly handsomer.

4. *C. corymbosa-Fothergillii*; raised from seed of *C. Fothergillii*, produced by the pollen of *C. corymbosa*.

This plant being produced by a cross between species much more dissimilar, is quite unlike any of the others, has little of the family features of either of its parents, and apparently the delicate health of a badly organized mule. The leaves are like those of *C. Fothergillii*, but they are more numerous, and extend farther, upon a more robust stem. The form of the flowers considerably resembles those of *C. Fothergillii*, but they are larger, and yellow. Its habit is such that I thought it was probably a mule between *C. Fothergillii* and *C. integrifolia*, before I was informed by Mr. Morrison of its origin.—*Ed. New Phil. Journ.* July 1830.

*Division of the Organs of Motion.*—M. Carus, in his synoptical Tables of comparative anatomy, commences with the causes and phenomena of motion. He establishes the following table:—

*Attraction.* *Repulsion.*
(Phenomena of general motion in space.)
*Contraction.* *Expansion.*
(Phenomena of motion in the living individual.)
*Circular line.* *Straight line.*
(Expressing the relation of two points in attraction and repulsion.)
*Circular fibre.* *Longitudinal fibre.*

*Contraction, expansion.* *Contraction, expansion.*

Cylinder.
(Result of the combination of the longitudinal and the circular fibre.)
(*a.* In motion.)

Systole. Diastole.

(*b.* In development.)

Retrograde. Progressive.

He recognizes three principal forms in the organs of motion.

1. Muscular substance, indistinct and confounded with the cutaneous system; contractile.

2. Longitudinal and circular muscular fibres, not in a solid piece; articulated.

3. Muscular fibres principally developed in a longitudinal direction, connected with an internal or external skeleton, which is accompanied by a nervous system.—*Erlæuterungstafelnzur vergleichenden, Anat. A. G. Carus.*

*On the Rudiment of a Pelvis in the River Trout,* (Salmo fario.)—In the 2d Vol. p. 301, of the Zeitschrift für Physiologie, M. Otto describes a little bone, which he calls the pelvis, in the river trout, one of the Salmonides. Its form is that of the letter S; it is eight lines in length. It is situated about three lines from the inferior extremity of the fourteenth rib, which receives it in an articular cavity, whose circumference is surrounded by a capsular ligament. Its articular extremity has the form of a head; the other end is pointed. From this point point arises a tendinous filament which terminates in the ventral fin of the same side. M. Otto, who considers this bone to be the rudiment of a pelvis, remarks, that this separation of the bones of the pelvis from each other, and their articulation with the ribs, in fishes, is explained by the presence of the latter bones during the whole length of the vertebral column.

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*Extracts from the analysis of the labours of the Academy of Sciences during the year* 1826; *by* BARON CUVIER.* Paris, 1830.

ZOOLOGY—*Cuvier on the genus* Amphiuma.—M. Cuvier has made some observations upon a genus of reptiles discovered by Garden, and named *Amphiuma*, but for a long time neglected by zoologists. Its body is elongated, naked, supported on two pairs of very small feet, without nails; its mouth is furnished with teeth on the jaws and the palate; it respires by lungs similar to those of the salamander; no gills have yet been discovered at any period of its life, although there is an opening on each side of the neck through which the water taken in by the mouth may escape without entering the œsophagus. Besides the species formerly known, (*A. means*,) which has only two toes on each foot, and which has recently been re-discovered by Messrs. Mitchill and Harlan, the author described a new species, all of whose feet have three toes, and which he accordingly named *A. tridactylum.* Both species are found in the marshes of Louisiana, where they pass the winter buried in sand. It has been supposed that they might be the adults of the sirens, other reptiles which have only fore-feet, and carry at the sides of the neck tufted gills like the young salamander. But there are sirens as large and larger than the amphiuma; their feet have four toes; their nostrils and their teeth are differently disposed; in short, it is now certain that they are two distinct genera of animals.

*Geof. St. Hilaire on the ancient Crocodile of Egypt.*—M. G. St. Hilaire has returned to a subject on which we reported in our analysis for the last year; that is to say, to the crocodiles which were reared by the priests of ancient Egypt, and which, according to his opinion, form a particular species, to which he proposes to apply the ancient name of *suchus*. He has returned to this labour on the occasion of a present made by M. Calliaud to the Museum of Natural History, of a crocodile seven feet long, brought from the catacombs of Thebes, where it had been carefully embalmed, and was found in the most perfect state of preser-

* Though we have already presented our readers with M. Cuvier's analysis for a later period than that with which we are now occupied, we consider the present reports too valuable to be neglected, merely because they are late in coming to our hands. ED.

vation. The views of M. Geoffroy will probably be modified by the arrival of another crocodile, also embalmed, larger, and in some respects very different from the specimen given to the *Jardin du Roi* by M. Calliaud.

*Robineau des Voidy on the Genus Musca.*—Nothing proves more clearly the immense progress of which natural history is always susceptible in many of its branches, than the memoir presented to the Academy by M. Robineau des Voidy, on the insects which compose the genus *Musca* of Fabricius.

The genera of known dipterous insects amounted only to ten in the 12th edition of the *Systema Naturæ;* but in sixty years the successive researches of Fabricius, Latreille, and other entomologists, have produced a rapid increase in their numbers. Fabricius brought them up to 23, Latreille to 117, and Meigen to nearly 400.

M. Robineau has occupied himself with a single genus only of Fabricius, to which the entomologist of Kiel had appropriated the name of *Musca;* and he has observed and collected nearly 1800 species, of which more than 1400 are new. But what is most remarkable, and may give us a more exalted idea than we ever possessed of the prodigious riches of nature, is, that most of these species have been collected in a very limited canton of a single department, that of the Yonne. The points of view under which he has considered the delicate peculiarities of organization, which he has observed in every part, especially in the mouth, in the forms of the head, and in the structure of the antennæ, in the nerves of the wings, and in the disposition of the little scales placed under the base of the wings, &c. have led him to establish divisions and subdivisions of many degrees, to which he gives the titles of families, sections, tribes, and genera; and he has endeavoured to trace his subdivisions so as to embrace the species which are related not only by form, but also by habits, by the substances on which they feed, and the places where they deposit their larvæ. The genera which he establishes, in the single genus *Musca* of Fabricius, which is itself only a dismemberment of the *Musca* of Linnæus, amount to the astonishing number of nearly 600; that is to say, to nearly seven times as many as Linnæus had established for the whole class of insects; he gives only 86 in his last edition. After this remark, it will be conceived how impossible it would be for us, without much exceeding the customary extent of our analyses, to give any idea of such a complicated work.

*Dejean on the* Carabi *and* Cicindelæ.—A similar multiplication of species has taken place with the insects known under the names of *Carabi* and *Cicindelæ,* in the great work of M. Dejean. These names were given by Linnæus to coleoptera whose motions are rapid, whose jaws are prominent, sharp, dentated, and furnished with palpi, and whose habits are cruel and carnivorous. They constituted two of the 86 genera of his class of insects, and in his last edition both of them contained only 57 species. This number has been successively increased by the labours of entomologists, and especially of M. Bonnelli; and M. Latreille in his last work, "*Les Familles du Règne Animal,*" had already discovered sufficient characters to divide them into 97 genera. At present, the collection of M. Dejean alone, certainly one of the richest in coleopterous insects, contains nearly 2000 species, and the detailed characters which this learned entomologist has recognized in these immense numbers, have led him to distribute them into 8 tribes, subdivided into many genera. The first four tribes alone, described in the two first volumes of the work, contain 70 genera. This work does not only offer a classification as exact as the state of science will admit; but also contains descriptions of all the species, sufficiently detailed to induce the hope that the nomenclature is fixed as surely as it is possible without figures: figures even would not suffice, if they were not performed by the best artists, and if they did not represent the object under every aspect.

*Mongez on the original habitat of the Mulberry Tree.*—Every one knows that the silk, which is the source of so much industry, and the means of so many agreeable and useful employments, did not originally come from the country which it now enriches, and that it was in the reign of Justinian, in the year 557, that two monks brought from Tartary the eggs of the insect which produces it; but it is a question whence the mulberry-tree has been obtained, upon whose leaves alone this insect ever lives. It would have been too slow a process to have brought over the seeds or plants at the same time with the eggs: it was necessary that the caterpillar, on coming out from its egg, should have a tree ready to receive it.

M. Mongez has sought to answer this question. He remarks in the first place, that the Greeks were not ignorant of the fact, that silk is the product of an insect, and that this insect lives upon a tree. He refers to a passage in Pliny, whence it results that they collected, in the Isle of Cos, silk produced by the caterpillars of the turpentine tree, the cypress, the ash, and the oak,—silk which the abundance and superior quality of that from the mulberry tree have probably caused to be forgotten. He reminds us that, according to the tale of Pyramus and Thisbe, the white mulberry tree seems not to have been unknown to the ancients, since it was the blood of Pyramus which turned the white mulberry tree into the purple.

> " ——— Arbor ibi, *niveis* uberrima pomis,
> Ardua *morus* erat."—

And again,

> " Arborei fetus aspergine cædis in atram
> Vertuntur faciem, madefactaque sanguine radix
> Puniceo tingit pendentia mora colore."

This conjecture has more verisimilitude, as the scene of this metamorphosis lay near the walls of Babylon, and as, from a word in Pliny, we learn that Assyria furnished a precious silk, used by the females.*

We find also in the Geoponics, a passage of Diophanes, contemporary with Julius Cæsar, where it is said, that if a mulberry tree be grafted on a white poplar, the berries become white; and although there is no probability in the assertion, we may at least conclude that white mulberries existed in the time of Diophanes, that is to say, before the Christian era, and in his country, which was Bithynia. The tree might easily be multiplied in the neighbourhood of Constantinople, where its important properties were known; but it appears to have been very tardy in dispersing itself. It only became common in the Peloponnesus, as also the silk-worm, about the period of the crusades. Roger, king of Sicily, having become master of a portion of this peninsula, enriched his possessions with these precious productions, and it was from Sicily that the more western countries obtained them by degrees. About this time the Peloponnesus began to receive the name of Morea, and this name M. Mongez thinks was rather owing to the numerous plantations of white mulberry trees which grew there, than to its form, similar certainly to the leaf of this tree, but which would have entitled it to the name of Morea long before that period. Others think that Moræa is merely a corruption of Romœa.

(*To be continued.*)

* *Assyria tamen bombyce adhuc feminis cedimus,* Plin. lib. xi. c. 23. Brothier and others think that they have also found, in the 22d chap. a description of the bombyx which produced the Assyrian silk; but they are in error. This article, taken from Aristotle, lib. v. c. 19. relates only to the bombyx of the Isle of Cos; it could only be supposed to relate to the Assyrian insect, because Pliny, in the commencement of this chapter, speaks of the wasps of Assyria, which make their nests in the ground, and are nothing else than our mason-bees.

# NATURAL-PHILOSOPHICAL COLLECTIONS.

## *Facts relative to the History of Cobalt; by* M. Lampadius.

### 1. *Preparation of pure cobalt.*

A. To obtain the oxide in a state of purity, recourse has hitherto been had to the rather complicated method of M. Laugier.

B. A less complicated preparation of pure peroxide was the following: The hydrated oxide of commerce was dissolved in sulphuric acid. There remained a little iron. The solution was then treated with sulphuretted hydrogen, filtered and treated by carbonate of soda. The precipitate which resulted was dried and brought to a red heat. After this the peroxide was redissolved in concentrated acetic acid, precipitated again by carbonate of potass, and lastly dried and heated.

C. A part of the oxide of commerce was triturated with water and treated by chlorine gas, by which there was obtained a black precipitate of pure peroxide.

During all these experiments, no oxide of nickel could be discovered in the oxide of cobalt of commerce; but there was found a little oxide of iron, oxide of copper and bismuth, and arsenic acid.

Each of the peroxides, obtained according to the methods A, B, and C, was put in the form of a paste with oil in a crucible, and covered with a thin layer of a flux, which had been prepared with three parts of calcined borax, one part of lime, one part of silica, and one part of alumina. Then each of the three crucibles was exposed for three hours to a heat which was sufficient to melt crude iron, steel, and nickel. Notwithstanding, there were only obtained some metallic grains of the size of a pin's head. All the rest of the reduced metal was in the form of a black powder, which was readily attracted by the magnet. The experiment was repeated, and the same products were again exposed for three hours to a heat quite as intense; but the result was the same. It was therefore found necessary to collect the metallic powder by means of the magnet, to put it in small paper capsules, about four grains in each, (that it might not be blown away by the blast,) and to melt it gradually on charcoal by means of oxygenated gas. In this manner, there were obtained grains of the size of a lentil, and whose exterior was covered by a small layer of oxide which could be removed. More than 200 grains of pure cobalt were thus obtained.

### 2. *Properties of Pure Cobalt.*

Colour greyish-white, intermediate between that of silver and steel.

Specific gravity, 8.710.

Lustre bright, strongly reflecting light, and remaining unaltered by exposure to the air.

Hardness moderate, not offering more resistance to the file than copper.

Extensibility equally moderate, bearing some blows of the hammer, and afterwards separating in the form of lacerated lamellæ; the same when the metal is heated; fracture fine and granular.

Fusibility between nickel and platina, about 145° of Wedgwood's pyrometer.

The magnetic force being taken as one, the magnetism of cobalt is 0.701.

### 3. *Oxides of Cobalt.*

The oxide, which is obtained on burning the metal with oxygen, is the first of these oxides. It is pure, and when melted, appears under the form of an opaque black glass. It dissolves in hydrochloric acid without disengagement of gas, and with an indigo-blue colour. In powder, and slowly submitted to a red heat, it passes into the state of peroxide. The vitrified peroxide is still attracted by the magnet with a force equal to 0.302.

4. *Action of Cobalt on some other Metals.*

Cobalt and gold readily melt together, and furnish a very hard but extensible alloy. The gold colour disappears, and the alloy has the colour of cobalt itself. The magnetic force of this mixture was 0.507 *.

Cobalt and platina readily united by fusion. The alloy, which was rather soft, possessed a moderate extensibility, and, after some blows of the hammer, broke. The colour approached that of silver. Magnetism = 0·509.

Cobalt and silver readily united in fluxion. The alloy broke under the first blows of the hammer. The colour was intermediate between that of iron and silver. Magnetism = 0.508.

Cobalt and copper combined, and in so doing intumesced and enlarged in volume. The mixture, which was softer than copper, had a considerable degree of extensibility, and a magnetic force = 0.509.

Cobalt and iron melted together, but a considerable portion of the iron burnt in this case, and the mixture was enveloped with a crust of oxide of iron. The mixture was of a grayish-white colour, pretty hard, and slightly malleable. Magnetism = 0.780.

Cobalt combines with sulphur and phosphorus. When combined with the latter substance it does not act on the magnet.

Nitric acid, of the specific gravity of 1.30, immediately attacks the metal in the cold state. There is disengagement of nitrous gas, and the solution has a fine deep rose colour.

Hydrochloric acid has little action in the cold state, but acquires a blue tint, and some bubbles of hydrogen are disengaged. With the aid of heat, the action becomes energetic, and the solution assumes a deep indigo colour.

Sulphuric acid of the specific gravity of 1.700, has no action in the cold state, and only attacks the metal feebly by means of heat. The solution at first assumes a purple colour, and when the ebullition is continued, the whole of the cobalt dissolves. The solution evaporated yields a rose-coloured salt.—*Bullet. des Sciences Chimiques.*

*Decrepitating Common Salt—Condensation of Gas in it.*—M. Dumas has examined and described a very curious effect which occurred when some rock-salt, obtained from the mine of Wieliczka, in Poland, and given to him by M. Boué, was put into water. It decrepitated as it dissolved in water, and gradually evolved a sensible portion of gas. The bubbles of gas were sensibly larger when the decrepitations were stronger, and the latter frequently made the glass tremble. This salt owes its property of decrepitating to a gas, which it contains in a strongly-compressed state, although no cavities are sensible to the eye. When the experiment was made in perfect darkness no light was disengaged. The gas disengaged is hydrogen slightly carbonated; when mixed with air it burns by the approach of a light.

This disengagement of gas will assist in explaining the numerous accidents which have happened from fire-damp in salt mines. Several portions of the salt were nebulous, others were transparent. The nebulosities indicated the existence of numerous minute cavities, probably filled with condensed gas, and, in fact, a nebulous fragment, dissolved in water gave more gas than an equal-sized fragment of the transparent salt.

* The author made two compound alloys, one of 10 cobalt and 90 gold, the other of 5 cobalt and 95 gold. Each of these alloys was still remarkably hard, so as to render it difficult to bend a piece of the form of a ducat. The two mixtures had a fine gold colour, were perfectly malleable, susceptible of a fine polish, and insensible to the action of the magnet. There would result from this that cobalt might be employed in alloy with gold.

This new fact, described by M. Dumas, shows how frequent, in the course of geological accidents, are the phenomena which give rise to the accumulation of gas in the cavities of mineral substances, and how varied are the substances upon which these phenomena have been exerted. M. Dumas has endeavoured to reproduce salt having the power of decrepitating in water like that described.—*Revue Encyc.* xlvi. 245.

*On a new Acid contained in the Urine of Herbivorous Animals; by* M. Liebeg.—The following abstract is made from M. Liebeg's paper, published at length in the Annales de Chimie, xliii. 188. Fourcroy and Vauquelin discovered a particular acid in the urine of certain animals, which they took for benzoic acid, and which appears to be the same as the one to be described. When the urine of the horse is mixed with excess of muriatic acid, a yellow-brown crystalline precipitate is gradually formed, having an unpleasant odour, which cannot be removed by simple washing with water. It is to be boiled with quicklime and water, the liquor filtered, a solution of chloride of lime added, until all urinous odour ceases, and then animal charcoal added, until the liquid which passes the filter is colourless. This liquid, whilst hot, is to be mixed with great excess of muriatic acid, and left to cool. There separate prismatic crystals two or three inches long, of a shining white colour, translucent, and which differ from benzoic acid, not only in the forms of its crystals, but by its smaller degree of insolubility in water, by the difference of its salts from the benzoates, and by its composition including azote. It fuses by heat, then is decomposed and becomes black, a crystalline sublimate rises, an odour of bitter almonds is perceived, and much charcoal is left. Being mixed with four times its weight of hydrate of lime and heated, much ammonia is disengaged.

Being obtained from the urine of the horse principally, it has been distinguished by the term *hippuric acid.* Sulphuric acid heated to 248° F. dissolves it without change, water precipitates it; a higher heat enables the acid to decompose it, and ultimately white crystals sublime. It dissolves also in nitric acid, and by heat is then decomposed. It is soluble in hot muriatic acid, but crystallizes out upon cooling. Aqueous solution of chlorine does not act upon it, but boiling with much chloride of lime decomposes it entirely.

When burnt very carefully by means of oxide of copper, it gave a mixture of carbonic acid and azote in the proportions of 100 to 5. This result appearing important, was confirmed by another mode of investigation, namely, by burning, not the acid, but its ammoniacal salt, by means of peroxide of copper, and observing the relation of the azote to the carbonic acid. The oxalate of ammonia burnt in this way yields 1 volume of azote and 2 of carbonic acid, the latter indicating so many volumes, *i. e.* 2 of carbon. The acid hippurate of ammonia so burnt gave 2 of azote and 27 of carbonic acid, confirming the result above. By other analytical processes the quantity of water given by 0.300 parts of the acid when burnt, was found to be 0.180, and from these and other data the following composition was made out:

| | | | |
|---|---|---|---|
| Azote . . . | .046 | or theoretically, 14 | 1 atom. |
| Carbon . . . . | .393 | . . 120 | 20 atoms. |
| Hydrogen . . . | .031 | . . 10 | 10 |
| Oxygen . . . . | .155 | . . 48 | 6 |
| | .625 | 192 | |

The mean result of experiments on its atomic weight was 197. In the hippurate of lead, 100 parts of the acid combine with 55.31 oxide of lead, and the crystallized salt contains besides 25.64 of water. The hippuric acid, when crystallized, is anhydrous and requires 600 parts of water at 32° for its solution.

Hippuric acid easily dissolves most of the metallic oxides. The soluble compounds precipitate solutions of iron of a rusty colour, and the nitrates of silver and protoxide of mercury, in a white flocculent state. The neutral ammoniacal salt crystallizes with difficulty, the acid salt easily. These, when heated, evolve ammonia, and leave principally hippuric acid. The hippurates of potassa, soda, and magnesia, are very soluble and difficultly crystallizable. The hippurates of baryta and strontia are soluble and crystallizable. The sub-salt of baryta has peculiar properties. The salt of lime crystallizes in rhomboidal prisms, &c., which are anhydrous: they dissolve in 18 parts cold water, and 6 parts of boiling water; it consists of 87.28 acid, and 12.72 lime. A neutral, and a sub-salt of lead may be formed; the former, by mixing a hot solution of a salt of lead with a hippurate, will be obtained, as the mixture cools, in nacreous plates; these are anhydrous, and consist of 64.38 acid, 35.62 oxide. Other salts have been formed with other bases.

When the dry hippuric acid is decomposed by heat, there is found, as already stated, a crystalline sublimate, which condenses in the neck of the retort, and has a yellow or rosy colour; if much hippuric acid has been used, this substance ultimately obstructs the neck of the retort. This substance dissolves in hot water easily, and contains ammonia; when combined with lime, filtered, and separated again by muriatic acid, it has all the properties of benzoic acid; it forms salts like the benzoates, and, in fact, it is benzoic acid. Hence Fourcroy and Vauquelin were right when they said they had obtained benzoic acid from the urine of horses; but it had not existed there ready formed.

If the hippuric acid be mixed with four times its weight of quick lime and distilled, it is entirely transformed into a yellow oily liquid, with an agreeable odour, containing ammonia, and resembling the fixed oils. If the hippuric acid be mixed with sulphuric acid, and heated only until sulphurous vapours begin to appear, if then the black mass be mixed with water, boiled with lime and then muriatic acid used, benzoic acid may be separated, being formed in this way as well as by heat alone. When the hippuric acid is boiled with nitric acid, a little nitrous acid is evolved, and then water precipitates pure benzoic acid.

M. Liebeg remarks, that he has not been able to extract the smallest trace of benzoic acid from the food of horses of which he has examined the urine; the crystalline form makes him doubt whether the substance which M. Vogel found in the anthoxanthum odoratum, and holcus odoratus, is really benzoic acid, as announced.—*Brande's Journ.* June 1830.

*Note on "Active Molecules;" by* M. Raspail.—It was thought that the subject of the alleged motions of granules had been exhausted, and that people had finally resolved to speak no more about it; but we do not so cheaply get rid of the learned societies, when some of their members or protegés run astray. Mr. Robert Brown has returned to the charge after a year's silence; and, in July 1829, came to Paris, to distribute, in the Academy of Sciences, a pamphlet of seven pages, entitled *Additional Remarks on Active Molecules,* printed in London.

As, in the number of the *Annales des Sciences Naturelles,* for October 1828, M. Brongniart took great pains to pass over the objections urged against him, to suppress whatever was most hostile to his opinions, to adduce testimonies whose authenticity we should be induced to deny, as we have testimonies of quite a contrary nature, and, lastly, to draw up his opinion retrospectively, and shape it, so to speak, upon the model of the refutation; so, Mr. Brown, after taking due precautions to cover in one way or other the concessions which he makes, in reality overthrows the whole of his first performance, and makes out of it a patchwork apparently intended to confirm the first.

The author had announced, in his first memoir, that all molecules, whether organic or inorganic, are *possessed of motion.* He had assimilated them to the alleged spermatic animalcules of vegetables, which M. Brongniart and M. de Cassini considered as possessed *of a spontaneous motion.* At present Mr. Brown as well as M. Brongniart complain that this opinion has been laid to their charge. The latter considers motion as inherent in these molecules; and Mr. Brown declares, that the extremely divided particles of a solid body, when they are suspended in pure water, or in any other aqueous fluid, show motions for which, he says, he cannot account, and which, from their irregularity and apparent independence, resemble, in a remarkable degree, the less rapid motions of some of the most simple of the inferior animals. Mr. Brown had, in his first paper, stated that the granules in motion were spherical, of an uniform diameter, although he had seen them varying from 1-15 thousandth to 1-20 thousandth of an English inch, according to the different substances submitted to examination. Now he says that these molecules, which he calls active, appear to be spherical or nearly so, and have a diameter of from 1-20 thousandth to 1-30 thousandth of an English inch, and that other particles of a considerably larger and diversified volume, and of a form either similar or very different, also present similar motions in the same circumstances. The author could not make broader concessions for our refutation. On the subject of forms and volumes it is precisely what we opposed to the first opinion of the learned members of the two French and English academies.

The causes to which we have attributed the different motions described by these gentlemen, have no doubt appeared so clearly established to Mr. Brown, that, so far from seeking in the least to refute our opinion, he has laid aside all his first experiments, and has had recourse to a new one, which, according to the author, is of itself sufficient to prove the reality of these motions, which are no longer spontaneous.

Mr. Brown, wishing to set aside the external causes to which these motions were attributed by those *who do not admit this property as inherent in matter*, has devised a precaution which M. Ad. de Jussieu has forthwith found to be *simple* and *ingenious*. This precaution consists in immersing the droplet of water which contains the particles under observation in a drop of a fluid specifically lighter, with which it cannot mingle, and whose evaporation is extremely slow, almond oil for example. The two fluids are agitated together. The drop of water divides into several others of unequal size, which are, as it were, imprisoned in the oil. Evaporation is thus suspended, and the formation of currents which result from it is suspended, as well as the disengagement of gas; yet the motion of the particles continues with the same activity. There may thus be obtained droplets which contain only a single particle, and its motion, which continues to take place, cannot then be attributed to a reciprocal action. So says Mr. Brown; and thus all the other experiments are good for nothing. All the motions of which they give evidence may be then attributed to external influences. Mr. Brown had therefore blundered at first; and if such motions exist, it is now only that he proves their existence. But yet, at the risk of being accused by the editors of the *Annales des Sciences Naturelles*, of professing a *snappish incredulity*, we declare explicitly that of all the experiments of Messrs. Brongniart and Brown, this is the most defective and most unpardonable; and for these reasons, which no doubt Mr. Brown will at the same period of next year do us the honour of refuting: 1st, The agitation impressed upon these different droplets does not cease promptly, and the motion still continues after the fugitive moment of a microscopic examination; 2dly, The aqueous droplets suspended in the oil are not withdrawn from the laws of attraction or capillarity, but are seen coming together and rapidly uniting; 3dly, The drops of water, being heavier than the oil, tend to fall towards the bottom of the capsule; 4thly, By the very fact of their suspension in fluid, they must be subject to the motions impressed upon this fluid mass by the agitation of the air, the more or less sensible shaking of the place, and the breath of the observer. All these indisputable causes of motion, although Mr. Brown has not foreseen them, cannot take place without the single molecule which the droplet of water contains, changing its position with relation to the eye of the observer, and without its seeming to direct itself downwards, or horizontally, or upon an inclined plane.

We therefore still assert, that all these motions described by Mr. Brown are not inherent in the molecules by a new and unknown law; that the author has seen nothing but common motions, a thousand times appreciated even by persons unacquainted with science; and, lastly, that it is time to give up a subject which can only tend more and more to compromise the renown of so illustrious a botanist. —*Annales des Sciences d'Observation*, Jan. 1830.

*Construction of a Map of the Heavens, proposed by the Academy of Sciences of Berlin, and executed at Florence; by* PROFESSOR INGHERAMI.—Numerous attempts have been made to construct maps of the heavens, but without success, for want of proper directions and means of execution. It was afterwards thought that to obtain complete maps of this kind, it would be necessary first to determine by meridian observations the greatest possible number of stars, in order to refer the positions of all the other stars to them.

But these observations, although often repeated, cannot give assurance that the position of all the stars which are to be comprehended in the sphere of action of the instruments of artificial vision, are perfectly determined. The history of the heavens contains too small a number of stars to serve as a basis to maps, which could be offered as complete, even were we to consider only the means of exploration which we at present possess. The necessity of a new and more numerous series of meridian observations has therefore been felt. They have recently been undertaken at the Observatory of Konigsberg, upon a zone which extends from 15° to + 15° of declination, and have already served to determine the position of 32,000 stars.

With these materials, the Berlin Academy, on the 1st November 1825, proposed to all the astronomers to contribute to the completion of a celestial atlas, which should be divided into 24 sheets, and should have for its basis the zone of 30° in declination, of which mention was made above. Each sheet was to comprehend an hour of right ascension, with four anterior and 4 posterior minutes additional, and this for the purpose of more effectually connecting the various parts.

The object of the Berlin Academy was to obtain as perfect a knowledge of the heavens as the present state of our instruments of observation may permit. While Flamstead was forced to confine himself to maps, which presented only stars of the 5th and 6th magnitudes, we may now include stars of the 9th and even the 10th, especially when they are not too near others of larger size.

As maps of this kind would furnish the means of seeing at once whether in a given region of the sky, there exists a star which has not yet been observed, there is ground for hoping that comets and new planets will more frequently be discovered, should any such remain unknown in our solar system; and, moreover, the position of all the visible stars being better determined by telescopes, it would be more easy to find in future the place of a comet, which might show itself in the part of the heavens which might be subjected to so exact a scrutiny. This important work was to be accomplished by the 1st January 1829.

The celebrated astronomer Ingherami, known to the scientific world by many useful investigations, was invited to contribute to the formation of the atlas proposed by the Academy. To render homage to his talents, the Academy assigned to him the 18th hour. This was the most difficult, for it contains the greater part of the Milky Way comprised between the zone of + 15° and — 15° of declination. The clearness of the Italian sky, and the excellence of the instruments employed by M. Ingherami, were favourable to observation, and he has finished his task before his fellow-labourers. We are sorry that we are unable to give an account of the method which has so expeditiously led him to the most brilliant success. We shall only say, that the map sent from Florence contains about 7500 stars, of which only 1500 are found in the catalogues of Bradleg, Piazzi, Lalande and Bessel. All the rest belong to M. Ingherami, who has discovered them by regular means of observation. We also know that he has rectified the position of a considerable number of stars, which are incorrectly indicated in the above-mentioned catalogues.

Immediately after M. Ingherami comes M. Harding, to whom the Academy has entrusted the 15th hour. But his map contains only 3000 stars. This is surprising, as M. Harding, who has already published an atlas, must have had more experience than M. Ingherami.

We are as yet ignorant of the number of stars which the astronomers who have undertaken the other 22 hours, have observed. But the comparison which we have established between the two maps which contain the 15th and the 18th hours, leads us to hope that the astronomer of Florence will be as much admired for the importance of his investigation, as for the expedition with which he has performed it.—*Bulletin des Sciences Math.*

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# CATALOGUE RAISONNÉ.

Botanical Commentaries. By JONATHAN STOKES, M.D. Vol. I. 8vo. London. Simpkin & Marshall.

This is a very singular production; for though we have a "preface," "an explanation of botanical terms," "abbreviations explained, names of gardens, and persons, and titles of books," and "a translation of the German preface to the Supplement to Willdenow's Enumeratio," altogether occupying 160 pages of introductory matter, we have not a single word about the nature or object of the work, nor whether it will extend to two or to twenty volumes. There is also a coxcombical affectation in the orthography, which is not likely to conciliate public favour, and can only be compared with the ridiculous innovations attempted to be introduced by Mitford in his History of Greece. Dr. Stokes has a vehement antipathy to elision, and writes "markd," "examind," "elapsd," "Bankss library," &c. We also observe such words as the following: activ, productiv, maritim, opposit, temperat, skil, envellop, &c. But the doctor is not consistent; for we find "climat" and "climate" in the same page, and "solved" and "solvd" within a few lines of each other. We might, however, bring ourselves to forgive the author for his violation of the proprieties of composition, if we could discover a redeeming quality in the matter of his book; but, as we observed before, we cannot find out what it is about. The bulk of the work consists of minute descriptions of plants, arranged according to the Linnæan method, with an extended, and, in our opinion, often very useless synonymy. We are not made acquainted with the principle by which the author has been guided in his selection,—why one plant has been admitted, another rejected. The work is therefore, as to its application, next to useless. The preface is a sort of *olla podrida*, and ought to have been called a fragment: it has a first sentence, but, logically speaking, no beginning. Here it is: "'The sciences thus extended exceed,' says a celebrated mathematician, 'the faculties of an individual.'" The author laments that we have not yet been informed how lichens, sertulariæ, and corals grow,—suggests experiments for ascertaining the nature of species and varieties,—gives directions for the drying of botanical specimens,—and for rendering cloth water-proof. Then we are exhorted to sleep between the blankets when the sheets are damp, and not to travel in the dark when precipices endanger our necks. As collections of art and natural history are in danger of destruction by fire, he "cannot help expressing a wish that the proprietors of solitary houses containing collections of books, coins, statues, or paintings, should be compelled by act of parliament to hold in readiness the means of extinguishing fires." Some philanthropist would next procure an act of parliament to "compel" men and women to make periodical affidavits of the state of their health to the proper authorities, or to "compel" them to wear flannel for the benefit of their constitution, and the great joy of all patriotic Welshmen.

A systematic arrangement of British Plants; by W. Withering, M.D. Corrected and condensed: preceded by an Introduction to the Study of Botany, accompanied with Figures. by W. Macgillivray, A.M. &c. 12mo. Pp. 391. With 10 Plates. Dove, London, 1830. Price 10s.

We are again prevented, by press of matter, from giving such a lengthened review of the merits of Mr. Macgillivray's little volume as we could have wished, and as any production from that gentleman deserves. Rather, however, than permit any longer delay in recommending it to the notice of our readers, we give it a place in our Catalogue Raisonné; for it is already sufficiently unfortunate in being put forth at so late a period of the botanical season.

This little manual is avowedly an abridgment of Withering's large work, deprived, however, of that which made the original so popular,—its interesting notices of the properties and uses of plants. Mr. M'Gillivray's abstract comes, then, more truly under the idea of a systematic work, and accordingly claims for itself a place beside the manuals of Smith, Hooker, and Galpine. From the "British Flora" of Hooker, very recently published, we observe that Mr. Macgillivray has selected several of its novelties, though there does not appear to be sufficient reason for his neglecting at least one of the most important. The *Equisetum Drummondii* is a species first published in the "British Flora," and ought to have been added to Mr. Macgillivray's work on "British Plants," when he quoted from Hooker the *Hymenophyllum Wilsoni*, another new species.

The principal excellence of this new Flora, seems to be its cheapness and its aptitude for teaching the rudiments of the science,—containing good plates of the forms of roots, stems, leaves, and flowers, with a glossary of terms, and directions for examining plants and preparing herbaria.

Characters of Genera, extracted from the British Flora of W. J. Hooker, LL.D. &c. Carfrae, Edinburgh, 1830.

Dr. Graham, perceiving the actual necessity of a synopsis of generic characters to a botanical work which was to be made the text-book of students, has published this little pamphlet, which will be indispensibly requisite to all who possess the "British Flora."

On the Systems of Numerical Signs used by different Nations, and on the Origin of the Expression of Value by Position in the Indian Numbers. By Alexander von Humboldt.—*Quarterly Journ. of Science, June* 1830.

In this learned and interesting essay, which was read in a class session of the Royal Academy of Sciences in Berlin, we find the following additional information on the numerical signs of the Muyscas, to which we have alluded in a notice on the Asiatic origin of the tribes inhabiting the uplands of Bogota:—

"In the Chibcha language of the Muyscas, (who, like the inhabitants of Japan and of Thibet, had an ecclesiastical and a laical chief; and whose method of intercalating the 37th month, like the inhabitants of North India, has been published and explained by me,) 11, 12, 13, are called foot one (quihieha ata,) foot two (quihieha bosa,) foot three (quihieha mica,) from quihieha or quhieha (foot,) and the first three unities, *ata*, *bozha* or *bosa*, and *mica*. The arithmetical signification of *foot* is ten, because the foot begins to be taken into account, when both hands are passed through. To express twenty, the Muyscas use in their arithmetical language the expression *foot ten*, or *the small house* (gueta,) perhaps because they used, in counting, grains of maize, and such a heap of maize reminded them of the barn, where maize was laid up. By means of the expression *small house* (or barn,) and twenty (both feet and hands) they formed the expressions for 30, 40, 80, by joining them together, as, twenty plus ten; twice twenty; four times twenty. Quite similar are the Celtic expressions which have passed into the languages of Roman origin, as, quatre vingt, and quinze vingt, or those more rarely met with, as six vingt, sept vingt, huit vingt. Deux vingt and trois vingt are not used in French; but in the Gaelic or Celtic dialect of West Britany, through which I passed a few years ago, twenty is called *ugent*, forty *daou-ugent*, or two twenty; sixty *tri-ugent*, or three twenty. It is even said *deh ha nao ugent*, or ten over nine twenty = 190."

Remarks on Snake Poisons and their Remedies. By Dr. J. Hancock, Corr. Memb. Zool. Soc. &c. &c.—*Ibid.*

The author mentions how often things have been cried up as remedies or antidotes against snake poisons, which are of no real utility; and, on the other hand, how often snakes have been erroneously reputed to be venomous. Dr. Hancock, as a summary of his experience, recommends the wound to be sucked as soon as possible, to be afterwards freely opened by cross cuts, and the skin to be pinched. The wound must be filled with common salt or with nitre, and the juice of any of the aristolochias, or any other stimulant substance at hand, must be applied. The suction should be continued for a considerable time, and a ligature should be applied above the wound. Of the virtues of the guaco, so much lauded by Mutis, the author is very sceptical.

Rattlesnakes are actually becoming an article of commerce with America, and, from an anecdote related by the author, it appears not improbable that we may soon enjoy the advantage of their naturalization in our groves and meadows.

## MISCELLANEOUS INTELLIGENCE.

*Meeting of Scottish Naturalists.*—We observe in the Lancet for 26th June last, a mangled *traduction* of our notice respecting the proposed meeting of *Scottish* Naturalists. The southern worthy, with his usual facility, has manufactured a long story out of our little paragraph; but in future, when he is about to distort any of our statements, we shall be obliged to him to refer his readers to his authority, that they may know where to find the exact facts. If the *Lancet* does not attend to this little point of etiquette, we shall give him a gentle administration of the *Actual Cautery*.

The Lancet "admits that the scheme is highly feasible and praiseworthy, and deserves the co-operation of every scientific individual in the empire;" but, like a good hypochondriac, who, even with admiration of the viands before him, will not eat, lest he choke, he is mightily afraid that it would not succeed. We may inform the editor of the Lancet, that "the cultivators of science," *in Scotland, do not* "follow it as a trade;" and, therefore, may have both "inclination and leisure" to visit such a meeting as is proposed. For, the proposal was, that this year "a meeting of *Scottish* Naturalists" should be held, to organize a more general meeting on future years, when all Britain may partake of the pleasures and advantages it may afford: and a private meeting for this purpose will take place.

We agree with the Lancet, that "the meetings should not be exclusively confined to Edinburgh, but held annually in succession in the three great capitals of the empire;" this, however, would be a matter for after arrangement. But does the Lancet think, that THIS would succeed with his mercantile men of science?

*School of Arts at Brussels.*—The King of the Netherlands, with a view to improve the manufactures of the country, and create a desire to establish manufactories in Holland, has just founded a Royal School of Arts and Trade at Brussels. This monarch is a great promoter of manufactures, and is proprietor of several manufactories, which must have fallen but for his aid. It is customary with him to advance money to distressed manufacturers, taking an assignment of their property until they are able to repay the sums borrowed, and then to restore the property with a handsome present from his own purse.

*College in New South Wales.*—A college has been founded at Sidney, in New South Wales. The first stone was laid on the 26th of January last. The following inscription (in Latin,) engraved on a brass plate, was inserted in it: " This foundation-stone of Sydney College—an institution founded for the vigorous and pious promotion of polite literature and the liberal arts among the youth of Australia—was laid by Francis Forbes, chief justice of New South Wales, on an auspicious day. viz. the 26th January, in the year of our Lord 1830, in the happy reign of George IV.; Lieutenant-General Ralph Darling being Governor of New south Wales."—*Lit. Gazette.*

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## LITERARY NOTICES.

The Managers of the Royal Institution having determined to publish a Quarterly Scientific Journal, more immediately under their own direction and superintendence, Mr. Brande's labours and responsibility terminated with the June No. of the Quarterly Journal of Science, &c.

On the 1st of November 1830, will be published, the First Number of a Series of Lithographed Illustrations of the Family of Psittacidæ or Parrots. By E. Lear. A number will be issued on the first day of every second month, containing four plates, and on every alternate month, containing three: the price of each number will be ten shillings.

### *List of New Books.*

*American Works.*—Wilson's American Ornithology, 3d and concluding vol. with folio plates. New York...Encyclopædia Americana, vol. 2...Ray's Conversations on the Animal Economy, 12mo. Portland, America...The Natural, Statistical, and Civil History of New York; by James Macauley. New York...Practical Instructions for the Culture of Silk and the Mulberry Tree; by Felix Pascalis, 2 vols. 8vo. New York...Familiar Lectures on Botany; by Mrs. Lincoln.

Lyell's Principles of Geology, in 2 vols. Vol. 1st. Pp. 511...Sir T. D. Lauder's Account of the Floods in Morayshire....The last Vol. (the 60th) of the Dictionnaire des Sciences Naturelles is just published, and principally consists of Blainville's article on Zoophytes.

Third Edition of Captain Basil Hall's Travels in North America, in 3 vols. L.1, 11s. 6d...Francœur's Hydrostatics Translated, 8vo, 5s. 6d...Maycock's Flora Barbadensis, 8vo. 18s...Astronomie Pratique par L. B. Francœur, 1830. 8vo. 7 fr...Journal de Voyage Pittoresque autour du Monde; par Lesson, Tom. I. Liv. I. 3 fr. 50 c.

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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.

THE

# EDINBURGH JOURNAL

OF

# NATURAL AND GEOGRAPHICAL SCIENCE.

SEPTEMBER 1830.

## ORIGINAL COMMUNICATIONS.

ART. I. *An Examination of the Opinions of Bremser and Others on the Equivocal Production of Animals.* By WILLIAM RHIND, Esq. Surgeon, Member of the Royal Medical and Royal Physical Societies of Edinburgh.

In the early stages of science, when as yet but few facts and observations were accumulated, and the minds of men were more disposed to launch into vague speculations, than to search after truth by patient induction, the doctrine of spontaneous generation, both in the animal and vegetable kingdom, was readily adopted, and long entertained as a plausible theory.

Aristotle observing a dead carcass in a few days become a living mass of worms, immediately accounted for their formation by supposing them to be the result of a putrefactive process in the animal matter. We have also the histories of the raining of frogs, and the more poetical account of the impregnation of mares by the wind. Such opinions passed unchallenged from one philosopher to another for many ages, till the acute and laborious Redi* directing his attention to the subject, traced the maggots in the dead carcass to eggs, and these eggs to the parent fly which had deposited them, and thus by observation and analogy throughout other minute species of animal life, established the proposition that all animals derive their origin from other similar animals. In this opinion, Redi has been followed by many of the most distinguished naturalists down to the present time. Yet there are not a few,

* Experimenta circa generationem Insectorum. Amstel. 1708.

who, after having devoted much patient investigation to the subject, adhere to the opposite opinion of the spontaneous formation of animal life.* As the arguments of Dr. Bremser are those generally adopted by the advocates of this latter opinion, we shall state them briefly here.

The certainty, says he, of spontaneous generation is established,

1*st*, By the negative proof that the eggs of intestinal worms cannot come from without.

2*d*, From the analogy of the infusoria.

3*d*, From induction drawn from the primitive formation of the animal kingdom.

Thus the first and principal proof of a spontaneous formation is the assumption of the impossibility of the eggs of intestinal worms being conveyed into the body from without.—Worms are found to exist in the internal cavities of the body. Their eggs cannot be distinctly traced entering these cavities; therefore these worms must have sprung, by a spontaneous creation, from the parts by which they are surrounded. Now, there are many of the minute operations of nature which we cannot distinctly trace,—many evident effects which must be the result of causes however obscure. We cannot explain how the yelk of the hen, after it has burst its calyx, is taken up by the fimbriated mouth of the infundibulum; yet we are certain, from daily results, that such a process takes place. The oviducts of the common frog terminate in two open mouths at the sides of the heart,—the ovaria of the same animal lie under the liver. Now here is a difficulty to understand how they should communicate. We cannot even tell by what process an ovum in the human species enters the Fallopian tube, to be hence conveyed to the uterus, and yet that it does so, by some means or other, there can be no doubt. And are not these cases of as apparent difficulty as the transmission of the minute egg of the *Distoma hepaticum* to the liver, or that of the *Hydatid* to the brain, and certainly much more so than the conveyance of the eggs of the common worms of the intestines?

The blight in wheat,† says Sir E. Home, is produced by a worm which is met with in all the stages of its growth. When full grown this worm is scarcely visible to the naked eye, but in the field of the microscope all its parts are readily distinguished: eggs are also seen in the belly, and detected passing out. The worms, when placed in a drop of water on the field of the microscope, are seen to move briskly about; but if the water is allowed to evaporate, a stain is left on the glass scarcely perceptible,—when water again is added, they revive and move. This experiment has been made at intervals of months during a period of six years, and

* Among these may be enumerated Blumenbach, Darwin, Cuvier, Bory de St. Vincent, Rudolphi, and Bremser.

† Purples, ear-cockle, smut.

whenever it is made, in a few hours the worms become as lively as when first taken from the corn. When seed-corn has this ear-cockle applied to it, and is sown, it becomes inoculated, and the worm grows in its substance, and passes along the inside of the stalk in the sap, so as to be found in the seed produced.*

Sharp needles frequently make their way through the fleshy parts of the body, in a very singular manner, and may not the infinitely more minute, and needle-shaped eggs of *Entozoa,* make a similar progress? The power of retaining life in some of the more minute animals and their eggs, is also highly favourable to the idea of their transmission and long preservation. Lewenhoek kept a cheese maggot glued to the point of a pin for many weeks, and it still retained life. The *Rotatoria,* or wheel animal, can be revived by a drop of water, after having lain in the dry state for a year apparently dead; and the eggs of various insects deposited in fleshy substances, resist washing, boiling, and other various modes of cookery, without their powers of life being destroyed.†

Among other probable means of the transmission of the minute eggs of *Entozoa,* or even the young of the viviparous species, may be enumerated:

1. Transmission by the food. This may occur accidentally in any kind of diet; or when we reflect that many species of worms are common to man and other animals, whose flesh and entrails are daily used in diet,‡ the probability of the transmission is rendered even greater.

2. By water and drinks, and even by inhalation and absorption of the minute ova.

3. By direct transmission, as in the case of *Oxyures,* while at stool in water-closets, &c.; these worms having the power of leaping, and of very quick and active motion.

On the whole, therefore, the first proposition of Bremser, that the eggs of intestinal worms cannot come from without, seeing we cannot distinctly trace their progress, is untenable, because it is an assertion without proof, and because there appears to be no physical impossibility to such transmission; but, on the contrary, many probable means by which it may be accomplished. The second argument of Bremser is drawn from the analogy of the infusory animals. Those minute animalcula found in vinegar, in paste, and some other substances, he supposes derive their origin from the process of fermentation. This, too, is but an assumption. The extreme minuteness of these animals, which are only rendered visible by the aid of the microscope, preclude us from investigating

* Comparative Anat. Vol. I. p. 358.

† Spallanzani found a live worm in the body of a fish which had been boiled. (Tracts on the Nat. Hist. of Animals and Vegetables.)

‡ The *Ascaris lumbricoides* is common to the ox and sheep, as well as to man. The *Distoma hepaticum, Cysticercus,* and *Echinococcus,* are common to man and the sheep, &c.—Rudol. Entoz. System.

their habits with that precision and accuracy, so as to lead us to say they have a spontaneous origin. May not the fermentive process of the liquids in which they are found, be only so far favourable to their existence and maturity, as to develope these animals from the minute ova of other similar beings, and not the actual cause of their formation? Every analogy drawn from the wide range of animal existence and propagation, is in favour of this latter supposition.*

The third argument of Bremser is founded on induction drawn from the primitive formation of the animal kingdom. This formation is founded on the following theory. This earth was at first a mass of inorganized matter, in a fluid state, and endued with the spirit of life: first of all, by a process of fermentation, the least perfect animals sprung into existence, containing in their composition a much greater proportion of matter than of spirit. The more perfect animals followed by a successive fermentation, and last of all man was produced with a proportion of 50 parts of spirit to 50 of matter. We are not told how this creative process stopped among the larger and more perfect animals,—how cows, and elephants, and men, ceased to spring up out of the fermenting elements, but that it had a termination we take for granted. Not so with regard to the lower grades of being, especially the *entozoa* and *infusoria*, they, it seems, still obey the original impulse, and spring spontaneously from fermenting matter.

To apply this theory to the formation of intestinal worms, Dr. Bremser supposes that by a surplus of nutritive matter in the bowels,—by a sluggish and diseased state of the alimentary canal, or, in short, by a peculiar *verminous* diatheses of any cavity or structure of the body, the various species of worms may have a spontaneous origin, and maintains that as the egg is produced by an inherent function of the ovary of the hen, so are the *ascarides* and *cestoides* by an inherent function of the intestinal canal, and the *Distoma hepaticum* by a similar function of the liver.

To this it may be answered that the ovarium of the hen is a distinct gland or organ, whose peculiar office is to secrete the rudiments of the future chick after it has been duly stimulated by the semen of the male. In the intestines there are no such glands or

* We confess it has always appeared to us extremely doubtful, whether many of the infusory substances, so often described, be really distinct animals, and more particularly the seminal animalcula. There is nothing more fallacious than microscopical investigations of minute objects. Besides, those who have described them most minutely, have set themselves to the task in order to find means to confirm certain theories with which their fancies were completely preoccupied. Such was Fray, Needham, Daubenton, Spallanzani, Buffon. Indeed this latter, when he found that as distinct animals they would not suit his purpose, viewed them a second time, and found "that they were not animals, but *organic moving particles*,"—that they "moved only for a time in a certain direction, moved without intervals, and when once stationary moved not again."

organs for the secretion of worms. The liver is appropriated to the formation of bile, and it is a highly improbable supposition to imagine that it is also calculated to secrete living animals.

If worms were thus fortuitously produced, without any distinct or appropriate glands or organs, and consequently without any mould or matrix to give them a determinate form, how does it happen that no new species are ever seen, or indeed that there should be any regularity or resemblance in their forms at all? How does it happen that in the ileum, in the very same situation, at the same time, and under similar circumstances, two such distinct species should be formed as the *Tœnia* and the *Ascaris lumbricoides*? That in the rectum the *Oxyuris* and *Tricocephalus* should have a common origin, or that the *Distoma hepaticum* should be found only in the liver and gall ducts? On the supposition of a direct propagation from parent animals, the peculiar habitats of these different species, where they obtain the kind of food, and protection best suited to their natures, can be satisfactorily accounted for. But above all, on this supposition, how does it happen that there is both male and female worms produced? Why, if there is any sex at all, should not the female be sufficient? Or what laws in the fermentive process, or verminous diatheses, tend to regulate the distribution of the sexes? I know it has been observed by some writers on the subject,* that where the *Ascaris lumbricoides* prevail, the females greatly preponderate, and that males are often not to be found at all; yet I have never found *Ascarides* exist in considerable numbers, either in man or in other animals, without observing both males and females.

Here it may also be remarked, that a relaxed or diseased condition of the bowels, or a vitiated state of their nutritious contents, are the least likely preparatives or requisites for a creative or conceptive process; for generation implies a healthy and vigorous condition, and an active and increased excitement of parts.—not a morbid or deranged structure. The analogy of tumours and excresences growing from various parts of the body, will not serve to elucidate this subject. These are mere extensions or aberrations of the re-productive powers inherent in all animals; but surely very different from the formation of a new being, which is, after a time, capable of an independent existence.

Another argument against the theory of spontaneous production, is the fact that intestinal worms are furnished with organs of generation, and produce eggs, and even young, in the same manner as other species of the animal creation. In many species, as the *Ascaris lumbricoides*, there is a male and female worm; others again, as the *Cestoides*, are hermaphrodite, and some, as the *Trematodes*, are androgynous. When we examine the female *Ascaris lumbricoides*, and perceive how large a proportion of the whole

* Bremser, Cloquet.

body is occupied by a very curious and very perfect series of ovaries and oviducts, convoluted in many folds, and capable of producing an immense number of eggs, we cannot easily reconcile these appearances, and this expenditure of a generative apparatus, with the notion that this animal is produced spontaneously by a fermentative process in the intestines. Even in the *Distoma hepaticum,* one of the most simple of the *Entozoa,* which contains a stomach and mouth, but no anus, distinct traces of an ovary may be perceived. It is true in some of the more simple animals we find two modes of generation. In the *Nais proboscidea,* the last joint of the body gradually enlarges, and at length drops off a distinct animal, while there is in this species also an ovarium, capable of producing young after impregnation.* The common *Polypus* propagates as it were by slips from its body, each part becoming a living animal of the simplest construction; but, in order to preserve the species during the cold of winter, before the commencement of that season this same *Polypus* lays eggs for a future progeny.† Yet even here there is no analogy to the supposed spontaneous generation of *Entozoa.* In the case of the *Nais* and *Polypus* similar animals are produced from a parent stock; whereas in the *Entozoa* distinct species are supposed to be generated in the bodies of animals of a widely different order.

We cannot therefore, without more positive and direct proof, admit the theory of spontaneous generation to be a correct one. As far as the investigations of naturalists have extended into the wide range of animal existence, it appears to be an unerring law of nature, that each particular species of animal derives its origin from a parent of the same species, and, however various the means, uniformly by a conceptive process, where the influence of two sexes, either placed in separate animals, or conjoined in one, is necessary. Hence spontaneous production is contrary to all known analogy; and if uniformly among the thousands of distinct species, from the highest to the lowest which form the great bulk of the animal creation, we find one undeviating law established, something more than theory is necessary to lead us to the conclusion that this law is violated in a few particular instances.

We have no grounds for believing that there exists a creative property or impulse in matter, as in the supposed cases of infusory animals springing from fermenting substances, or of the production of *Entozoa.* For why should this impulse be so partial and limited? And why should we not find new species springing up around us on all hands; or why should this impulse have ceased with respect to the larger animals, and still continue in full operation with a few of the inferior classes?

The learned and philosophic naturalist Blumenbach,‡ is of opi-

* O. F. Muller von Würmern des Sussen und Sulzigen Wassers.

† Pallas Elenchus Zoophytorum, p. 28.

‡ Nat. Hist. by Gore, p. 276.

nion that the infusory animals, (*Vibrio aceti,*) found in vinegar and bookbinder's paste, must be of a later creation than the rest of the animal kingdom, because these substances, in which alone they are found, as far as his experience leads him to believe, are artificial inventions of man after he has attained a certain state of civilization. But, besides that we are not fully assured that these are the only substances in which these animalcules are found to exist, it may also be observed, that in a state of nature something analogous to vinegar may be found in the decomposing processes of many saccharine vegetables, and some substances analogous to paste in the soaked seeds of farinaceous plants. By similar reasoning, we might as well assert the later creation of the *Tenebrio moliter*, or meal beetle, most generally found in corn artificially ground into meal or flour, or the *Acarus domesticus*, or cheese-mite, a regular inhabitant of the artificial products of the dairy.

The manner of conception and propagation, as seen in all its various forms, in the different classes of animals, is still to us an impenetrable mystery, much more so the original process by which, from inert matter, sprung life and organization. Some philosophers have eagerly grasped at the idea of the spontaneous formation of animalcules; and, supposing a gradual and progressive extension of organization from these up to the most perfect and complicated animals, have thus endeavoured to account for all the phenomena of life. But, besides that all such progressive changes is directly contradicted by the actual state of animal existence, even this primitive formation with which they set out, is a mystery totally inexplicable. Mere matter of itself, is inert, and incapable of assuming organization and life. Some vivifying principle must have been added. Some First Cause must have given a determinate form, and prescribed to such creations regular and definite limits.*

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## ART. II. *An easy mode of washing Precipitates, or filtering large quantities of Liquid.* By JAMES F. W. JOHNSTON, A.M.

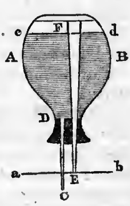
ONE of the most tedious, and yet to the analytical chemist most frequent and most necessary operations, is the washing of precipitates on the filter. The irksomeness consists in its being necessary constantly to watch over the process, so as to keep the precipitate covered with water; and it is rendered tedious, and often imperfect, by the impossibility of continuing the operation during the night. By standing over night, the precipitate dries and consoli-

* The arguments for the other side of the question of spontaneous generation, are fairly stated in an article by Dr. Scouler in a recent number of the Glasgow Medical and Surgical Journal. ED.

dates, so as afterwards scarcely to admit of thorough washing. If the precipitate be covered with liquid, and the neck of the funnel placed so deep in water that the bottom of the filtering paper may touch its surface, the passage of the fluid, and the consequent drying of the precipitate, will in certain circumstances be prevented, but still there will be a partial consolidation, and a great delay in the process.

In like manner, when a large quantity of liquid is to be filtered, in requires constant attention in filling up the funnel, so as to cause the whole to pass through in the shortest time possible.

All the inconveniencies now adverted to, are prevented by the following very simple arrangement:—



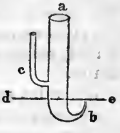

AB (in the Fig.) is a common wide-mouthed flask or receiver of any dimensions; CD is a tube of a quarter of an inch diameter at D, and drawn out to a point of one-tenth of an inch at C; EF is a stronger tube, having a diameter of three or four-fifths of an inch at E, and of an inch or more at F. Both are fitted into a tight cork as represented in the figure. CD terminates at the interior surface of the cork D, and protrudes towards C, half an inch beyond the other tube. The termination, F, of the wider tube is about half an inch from the bottom of the flask.

When a vessel thus provided is nearly filled with water, and inverted, as in the figure, the air ascends by the wide tube EF, and a stream of water rushes from C with a velocity proportioned to the pressure. Let *a b* be the surface of the water in a funnel, if the flask be lowered upon it, the liquid will continue to flow till the termination, E, of the wider tube reach the surface AB of the fluid in the funnel. The air can then no longer gain admission by E, and therefore the stream at C will stop. But AB remaining stationary, the liquid in the funnel will subside and leave the point E, when the air will again enter, and the stream from C will flow till the fluid reach its former level *a b*, when it will again stop, and the same series of alternations will go on till the flask AB is empty.

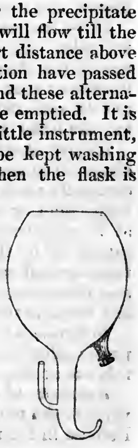
By means of this simple arrangement, in a flask of sufficient dimensions, the washing of precipitates, or the filtering of a large body of fluid may be carried on, with little or no trouble, for any length of time. It may be got up also in five minutes, the tube EF being simply the neck of a broken retort. When empty the flask is easily filled again, without extracting the cork, by inserting a small funnel into E.

There is but one disadvantage attending this little apparatus: When the surface of the fluid comes up to the point E, the liquid rises in the tube EF, till it reach the level, *c d*, of the water in the flask. In mere filtrations this is of no consequence; but, in washings, a portion of the precipitate ascends with the fluid, and though the greater part generally falls down again into the funnel, a small quantity still adheres to the sides of the tube. It is for this reason that the tube must be wider towards F; for when its diameter is uniform, the air rushing in at E, pushes the liquid over the edge F, into the flask. When constructed as in the figure this does not take place. Where minute accuracy is not required, the small portion adhering to the tube will be of little consequence; in analytical investigations, however, it involves the necessity of carefully cleaning out the tube.

This rude arrangement I have described chiefly for the sake of those who cannot themselves work in glass, and who have no access to those who can. To others I can recommend a far more perfect, more elegant, and more ingenious little instrument, lately invented by Berzelius, and described in a letter I received from him a few days ago. It is in fact quite a beautiful little machine, and will be received as a most welcome gift by every practical chemist.




*a b*, in the marginal figure, is a tube of about half an inch internal diameter, drawn out to a fine point, and bent up at the lower extremity: *c* is a wide thermometer tube, inserted into the side of *a b*, and bent up till parallel with it: *a b* is fixed into the mouth of a flask of water, which is then inverted. The air enters by the tube *c*, and makes its way into the flask, expelling the water in a stream from *b*. If the extremity *b* is now suspended over the precipitate upon the filter, the air will enter, and the stream will flow till the surface, *d e*, of the water in the funnel rise a short distance above the point *b*. All action will then cease, till a portion have passed through the filter, when it will again commence, and these alternations will terminate only when the flask has become emptied. It is difficult to form an idea of the utility of this little instrument, without having employed it. A precipitate may be kept washing all day and all night, requiring attention only when the flask is empty.



A flask with two necks, one drawn out to form the instrument, and the other with a stopper for pouring in the water, as represented in the figure, would form a very elegant arrangement, and do away with the necessity of removing the instrument from the bottle every time it required filling up.

The instrument may be had in great beauty, and at a very trifling expense, from Mr. Conolly of Lothian Street, to whom I have made known the most efficient dimensions.

Portobello, *12th July* 1830.

ART. III. *On the Geognostic Age of the Metalliferous Veins of Leadhills, Wanlockhead, and Glendinning, in the Counties of Dumfries and Lanark.* By WILLIAM AINSWORTH, Esq.

AN accurate opinion may be formed of the age of mineral veins from a knowledge of the rocks in which they occur, and a study of the phenomena of position, as also by a comparison of the riders or veinstones, and accompanying fossils, with the simple minerals which are met with in veins of the same character in different geographical situations. The latter, simply oryctognostic method, has not received all the development of which it is capable, and presents difficulties which will only vanish before a very extensive acquaintance with the products of different mineral veins.

The vein-stones of the Leadhill and Wanlockhead mines, occurring in the same formation, are nearly similar. They are quartz, sulphate of barytes, calcareous spar, arragonite, sidero-calcite or brown spar, and asbestus.

The ores are lead glance, hydroxide of manganese, oxides of lead, sparry iron-ore, calamine, brown iron-ochre, iron pyrites, azurite (hydro-carbonate of blue copper,) carbonate of lead, phosphate of lead, sulphate of lead, and fibrous hydrate of iron or brown hæmatite.

The veins are wrought for the lead glance alone.

The vein-stones of Glendinning are quartz and calcareous spar; the ores, radiated gray antimony, brown blende, fine-grained lead glance, and iron pyrites.

If we compare these results with the mineralogical characters of two other well-known metalliferous deposits, as those of the Hartz and of the Pyrenees, we find the vein-stones at Clausthal to be calcareous spar, quartz, and sulphate of barytes; in the Pyrenees, quartz, carbonate of lime, sulphate of barytes, and fluate of lime, but the latter very rarely.

*Quartz* accompanies veins of different ages. It is, however, most abundant in the oldest veins of the intermediate series. It more especially accompanies the various formations of lead glance with native gold, or with silver, and lead glance with blende. It occurs at Wanlockhead as a loosely-aggregated arenaceous rock, easily disintegrated by the hand. This is also the case in the Hartz. It is the principal vein-stone of the mines of Laguore, (Pyrenees;) but, as a disseminated mineral, is wanting in almost all the transition and metalliferous porphyries of Mexico.

*Sidero-calcite,*—carbonate of lime, manganese, and iron,—accompanies calcareous spar and sparry iron-ore; also quartz and sparry iron-ore at Baigorry, in the Pyrenees.

*Sulphate of barytes* and *calcareous spar* begin to accompany veins of the middle age. The former was observed by Picot de la Perouse in the mines of Baigorry, Aulus, &c.*

* Journal de Physique, T. xxvi. p. 428.

*Asbestus.*—This mineral was met with formerly in a vein called Clanriscar vein, to the west of Susanna vein (Leadhills.) It occurs as a variety at Wanlockhead. Its fibres, instead of being parallel, are interwoven, (mountain leather;) its colour is yellowish-white, and it is meagre to the touch.

*Arragonite.*—This mineral is not mentioned by Jameson; its situation is not anomalous. La Perouse found the corraloid arragonite in the cavities of decomposed sparry iron-ore, in the mines of the Pyrenees. It is met with at Eisenerz, in Styria, &c.

With respect to the ores, I may merely mention, that the brown iron-ochre or hydroxide of iron, is, with quartz, the principal veinstone of Belton-grain at Wanlockhead, and of the lead glance vein at Laguore, in the Pyrenees. The calamine which accompanies lead glance and brown iron-ochre, in transition limestone, appears to be a silicate. The carbonate of lead and the phosphate and arseniate, with which the latter is generally associated, occur in most metalliferous deposits containing lead. The sulphate is not so common. Gray antimony ore is, according to Werner, of a middle age.

We were already aware, from the labours of Professor Jameson, that the metalliferous veins of Leadhills and Wanlockhead occur in a formation of greywacke and greywacke-slate.

The term greywacke has been conferred, by the geognosts of the Wernerian school, on every conglomerate and fragmentary or arenaceous rock of transition formation that is anterior to the red sandstone and coal formation, including Anagenites, or rounded or oval parts of primitive rocks, with a schistose or talcose cement, mimophyre, distinct grains of feldspar in an argillaceous paste, or pisolitic fragments of schistose and slaty rocks. It has also further been applied to schistose rocks, including the quartzoze, porphyroidal, and micaceous Phyllades of Alexander Brongniart.

The term of greywacke slate has been used, as in the "Mineralogical Description of the County of Dumfries," not as is usual in oryctognostic geognosy, to denote the same rock assuming a slaty structure, but as the geognostic application of all the schistose rocks which accompany the greywacke formation; as if clay-slate, because it accompanies granite, should be called granite-slate.

Considered in their utmost generalization, the range of transition rocks in which occur the metalliferous veins of Leadhills, Wanlockhead, and Glendinning, consists of clay-slate, generally carburetted or anthracitous, with subordinate beds of ampelite, lydian stone, and flinty slate, greywacke and greywacke-slate, with beds of compact feldspar and diorites, and a subordinate formation of pitchstone.

*Clay-slate.*—This rock is generally blackish-blue and carburetted, is sometimes of an ash colour, or smoke-gray. In its vicinity to greywacke, it is glimmering from intermixed scales of mica. It is wrought in many places for the roofing of houses.

*Ampelite* or *Alum slate.*—Extensive beds of alum-slate occur on the flanks of Hartfell, at Birkhill, Kirkmichael, Evan Bridge, &c. It appears to be like the ampelite of the Pyrenees, an anthracitous clay-slate, intimately mixed with iron-pyrites, more or less decomposed, which may probably be referred to the white sulphuret of iron of Hauy, and which Mr. Pattinson pointed out to me in the metalliferous sandstones of Alston Moor.

*Flinty Slate* or *Siliceous Schist.*—This rock occurs in considerable beds in the valley of Leadhills, and in several ravines in other parts of the country. The black variety, known by the name of lydian stone, is the most common. The colour of the latter approximates so closely to that of the rock in which it is contained, that the limits of the bed can only be traced with difficulty.

*Greywacke.*—I observed two varieties of this rock in the hills of Dumfries: 1st, an anagenite, composed of rounded fragments of quartz connected by a basis of clay-slate; and 2d, a psephite, or fragments of clay-slate imbedded in an argillaceous paste,—the latter contains quartz, mica, and sometimes feldspar, as accessory parts.

*Greywacke-slate.*—I would distinguish by this name a rock with the same composition as common greywacke, and from which it is only distinguished by the relative proportions of its elements, and by its structure. The fragments are less, the cement more abundant, and the whole rock has a schistose or leafy structure. Its colour is ordinarily gray or grayish black, sometimes reddish: it contained anthracitous fragments, mica, talc, and even pyrites, but I met with no vegetable impressions.

*Compact Feldspar.*—In driving a gallery through a hill near the toll-bar at Wanlockhead, the workmen have cut through a bed of a very compact and hard petro-siliceous rock, about three fathoms in thickness. A similar bed occurs on the hanging side of the Susanna vein, and traverses the village of Leadhills; and this, as it sometimes contains imbedded grains of grayish-coloured quartz, scales of black mica, and crystals of pale flesh-coloured feldspar, has been called a greenstone by Jameson. The compact feldspar passes from mountain-green to yellowish-white and grayish-white, which is the most common colour. It contains little crystals of iron pyrites, but is sometimes exempt from all admixture. This rock is met with in clay slate and in greywacke slate. We find it under similar circumstances in the valley of Arran, in the Pyrenees, and at Poullaouen in Bretagne; mixed with disseminated crystals of feldspar, hornblende, schorl, and quartz, in the Pyrenees, the Hartz, and in the eastern part of Upper Egypt. Compact feldspar, mixed with hornblende, alternates with transition clay-slate at Allenborg in Sweden.

*Diorite.*—Diorites or greenstones (an intimate mixture of feldspar and hornblende) are often associated with transition rocks; while dolerites (an intimate mixture of feldspar and augite) are only found associated with trachytes or basalts. This results from observations made on both continents. Transition diorites are most common on the southern aspect of the transition rocks of Dumfries-shire.*

*Pitchstone.*—As early as in 1805, Professor Jameson made known the peculiar formation of pitchstone, which occurs in Todshaw Hill, and the hills called Castle hill, Watch Craig, and Wat Carrick, on Eskdale Muir. This pitchstone sometimes contains crystals of feldspar, becoming a stigmite or pitchstone porphyry, and I found it accompanied by a compact feldspar, or petro-siliceous rock, with crystals of glimmering, and sometimes of vitreous, feldspar. This rock also occurred in globular and in columnar concretions. Contemporaneous masses of pitchstone could be observed inclosed in the trachytic rock, as were also distinct masses of the same rock verging into pitchstone in the centre. This formation was referred to the newest flœtz trap formation by Professor Jameson. De Humboldt was also much embarrassed by the connexion, in the equinoctial part of the new continent, of porphyries often argentiferous with trachytes containing obsidian.

Contrasting the mineralogical structure with the physical aspect, we find that the central districts of this country of mountains, including the culminating points of the Lowthers and Hartfell, are composed of clay slate, in many places fit for economical purposes. Greywacke slate succeeds towards the sides of the chain, where common greywacke, which appears subordinate to the former, constitutes rounded hills of a lesser elevation.

To the south, the transition rocks are separated from the coal formation by trap rocks, while to the north they are succeeded, though at some distance, by dome-shaped mountains of phonolites, as Tinto Hill, &c.

Though we may distinguish several well-marked groups or associations, from the structure and relations of composition, or the oryctognostic characters, in the transition formations, yet, as De Humboldt has remarked, the constancy of binary or tertiary associations characterizes the transition formations, much more than the analogy which the succession of homonymous rocks presents in every group, and thus clay-slate and black limestone, clay-slate and porphyries, clay-slate, diorites, and greywacke, porphyry and sienite, granular limestone, and anthracitous mica-slate, are observed to form geognostic associations in countries the most remote from one another. This is eminently the case with the transition forma-

* An intelligent miner of Leadhills took me to the summit of a hill in that vicinity, which was literally covered with highly crystalline diorites, in concentric layers, and which he supposed were *in situ*, and belonged peculiarly to that hill, the till or soil of which he made me remark was much deeper than that of any other hills in the vicinity. Was this a formation of greenstone in balls, similar to that to the south of Popayan, and at the Alto de los Robles in Mexico? Greenstone boulders are not, however, uncommon in the plains of Dumfries-shire.

tions, which now occupy our attention, and in which clay-slate and greywacke are to be seen over considerable spaces, without being accompanied by black limestone.

The two varieties of clay-slate, distinguished by being of a silvery lustre and steatitic character, passing into talc-slate, and the green clay-slate, in very thin laminæ, highly carburetted, may alternate or succeed to one another, as in the mines of Mellada, Anunas, and Payas; but there can be no doubt, from the observations of Charpentier, that greywacke and clay-slate are in general more ancient than black limestone. When nearest to the primitive formations, the latter is subordinate, while in the newest part of the transition formation, clay-slate is only found subordinate to limestone.

When we consider the frequency of these associations, and the periodical alternation, or the development of a partial member of the same association enveloping or reducing one another (by an unequal increase of bulk) to the state of simple subordinate beds, we are not astonished at this partial development of one or two terms in the series. Thus the transition formations of the Cotentin and Alps of Switzerland, contain no porphyry; the same formations in the Venezuela contain neither greywacke nor porphyry. In the Pyrenees they contain no granite nor sienite. In Hungary, according to the observations of M. Beudant, they also contain no greywacke.

Thus, if we leave the consideration of the types of local superposition, to resolve these formations into groups by geognostical generalization, we shall at once find that the transition rocks of the counties of Dumfries, Lanark, and Selkirk, reposing in their south-western extremities on primitive rocks, belong to the same great formation of clay-slate that crosses the Western Pyrenees, the Alps of Switzerland, between Hartz and Glaris, and the north of Germany from the Hartz as far as Belgium and Ardennes. It is the clay-slate of the Cotentin, Brittany, and Caucasus. It includes the schistose rocks in Norway, placed below the porphyries and green sienites. It is, according to De Humboldt, the green clay-slate of Malpasso, in the Cordillera of Venezuela, and the clay-slate in the sienites of Guanaxuato, in Mexico. It is at once distinguished from the transition sienite and porphyry of Snowdon and Ben Nevis; the greywacke and transition limestone? of May Hill, Longhope, and of North Wales; and it is equally well distinguished from the greywacke, phonolites, argillolites and argillophyre (claystone and claystone porphyry,) of the Pentland Hills. Professor Sedgewick is, I understand, engaged in investigating the mineralogical structure of the Cheviot Hills, with outlying phonolitic domes, (sources of the Jed;) and I have every certainty that his researches will throw additional light upon the mineralogical constitution and geognostic age of these neglected mountain chains.

# SCIENTIFIC REVIEWS.

1. *Ueber die Polypen im Allgemeinen und die Actinien insbesondere.* On the Polypi in general, and the Actiniæ in particular. By Wilhelm Rapp, &c. With Three Coloured Plates. Weimar, 1829. 4to.
2. *System der Acalephen, &c.* System of the Acalepha, being a detailed description of all the radiated animals of the Medusa Tribes. By Dr. Frederick Eschscholtz, &c. With Sixteen Copperplates. 4to. Berlin, 1829.

The vast tribes of animated beings which occupy the lowest place in the scale of organization, present to the observing naturalist an almost inexhaustible field for his researches. Notwithstanding the valuable accessions to our knowledge in this department of zoology, which have been furnished by the labours of Ellis, Cavolini, Savigny, Lamouroux, and numerous others, both of our own and other countries, it must nevertheless be admitted that numberless blanks still remain to be filled up by the diligence of future inquirers. And, indeed, when it is considered that the creatures to be studied are for the most part of excessive minuteness, and inhabit an element different from our own, some of them being fixed at almost unfathomable depths in the ocean, whence they are brought within our reach only by some rare and fortunate chance, it will not be wondered at that a multitude of circumstances respecting their structure and mode of life should still be involved in obscurity. To dispel at least a portion of this darkness, and afford an additional contribution towards perfecting this branch of the science, is the object of the works of which we now propose giving some account.

The essay of Professor Rapp consists of an attempt towards a natural arrangement of the polypi, under which head he means to include not only those animals to which naturalists in general apply the term polypi, viz. the naked and solitary polypi, and those grouped together on a common stock, but also the *Actiniæ,* which animals he considers to be so nearly allied to the former, both in structure and mode of life, that they cannot well be separated in a natural classification. As the horny or calcareous stems with which the greater number of polypi are connected, present far fewer difficulties in the way of investigation than the animals themselves, or at least the parts which in a more eminent degree are possessed of animal properties, it was natural for zoologists, in their systematic arrangements of the different species, to direct their chief attention to the various conditions of the stem, while they attached only a secondary importance to characters which might be derived from the animals. This circumstance has served to hinder the advancement of this part of zoology in several ways; and in particular it has been the cause of introducing among the polypi many natural productions, bearing a certain resemblance to them in external appearance, but which differ from them entirely in almost every other respect, nay in some cases do not even belong to the animal kingdom. In proof of this, it is sufficient to refer to the diversity of natural objects which have been brought together in the chaotic genus Alcyonium. The author, therefore, proposes to take the animal itself as the basis of his arrangement, while he uses the characters derived from the nature of the stem only in establishing the subordinate divisions.

According to this method, all polypi are arranged into two great divisions, the Exoaria and Endoaria, which differ chiefly in their mode of propagation. In the first, or Exoaria, the parts destined for this purpose grow from the external surface: they consist either of solitary naked ova or germs, or of small capsules, each of which bursts and discharges a number of ova or young animals already formed. In the Endoaria the ova are produced in the interior of the body, and are either conveyed outwards by means of oviducts which open by separate orifices, or they are discharged by the mouth. The singular mode of propagation by sprouts is not taken into consideration here, because it belongs in common to all the polypi, and consequently can afford no ground of distinction between them.

The division Exoaria comprehends three families: 1. the Hydræ; 2. Corynea, consisting of the genera Sertularia, Tubularia, and Coryna, also characterized by this mode of propagation; 3. Millepora. The families belonging to the Endoaria are, 4. Alcyonea, the Polypes Tubifères of Lamarck, of which the genera are the Anthelia and Xenia of Savigny, Ammothea of Lamarck and Lobularia, distinguished from each other chiefly by the mode of connection of their tubes, and by the circumstance of the animals being capable or incapable of withdrawing themselves into the tube; 5. Tubipora, consisting of but one genus; 6. Corallia, whose genera Corallium, Gorgonia, Isis, Antipathes, are characterized by peculiarities in the structure of the stem; 7. Pennatulæ, the genera of which are almost the same as those given by Cuvier; 8. Zoantha, whose two genera Cornularia and Zoanthus, are distinguished from each other by the number of their tentacula; 9. Madrepora: the author considers the animals of this family to be nearly allied to the Actiniæ, from which, however, they differ in propagating by ova or germs, while the Actiniæ produce the young alive. The M. denudata (Cavolinia rosea, Schweig.) seems to form the transition between them. The genera of Madrepora enumerated are those of Lamarck.

The Actiniæ are treated of at greater length, and in some degree form the subject of a distinct part of the work. All the known species are described with many interesting observations of the author relative to their history, which are partly new, partly in confirmation of facts previously observed by others. Of the twenty-three species described, two, viz. A. filiformis and A. depressa are new, having been discovered by the author himself, the one on the coast of Norway, the other in the Mediterranean. Coloured representations of a few specimens of Actiniæ are given in three very well executed copperplates which accompany the work.

The method of arrangement adopted by Professor Rapp appears to us certainly to possess considerable merit; but we doubt much whether, in the actual state of our knowledge, it be applicable in every instance. In some cases the animals are in all respects but imperfectly known; and of their mode of propagation at least, from which it is proposed to draw their most distinctive characters, we know absolutely nothing. In proof of this, we need only refer to the Millepora, which stand among the Exoaria, though the author himself is constrained to admit that their mode of propagation is altogether unknown. By this classification, moreover, animals are included under the name of polypi, which seem to us to differ too much in their structure to be classed together. Between the Hydra and Actiniæ there are no doubt various transitions connecting them together; but the more complex structure of the latter would, in our opinion, entitle them with equal justice to be placed among the Echinodermata; at any rate, it must be sufficient to require their separation from the polypi.

But however difficult of practical application, no attempt at classification on a new principle is without its advantages. By it we are made to contemplate objects in a different point of view, and are thus led to perceive relations between them which had lain concealed from us before. On this account alone, therefore, the essay of Mr. Rapp would be entitled to credit, and this is much enhanced by the numerous valuable facts and observations with which it every where abounds.

The work of Eschscholtz treats of those gelatinous marine animals commonly known under the name of Medusæ, the different tribes of which are comprehended by naturalists under the general appellation of Acalepha. The author has enjoyed extensive opportunities of studying these animals in a recent state; and, on comparing the results of his own inquiries with what was previously known on the subject, he found that they presented so much that was new in regard to the systematic arrangement of the Acalepha, that he resolved, in place of publishing the facts in a detached form, to incorporate them in a work that should contain a complete history of the animals in question, with the classification and descriptions of all the species hitherto discovered.

The species described amount to about two hundred, of which the author has himself examined more than a third. They are arranged into three orders, viz.

1. Ktenophoræ, (Rippenquallen.) With a large central diges-

tive cavity. Organs of locomotion, small filaments disposed in rows on the external surface of the body.

2. Discophoræ, (Scheibenquallen.) With a large central digestive cavity. The organ of locomotion of a discoid or bell-shaped figure, forming the principal part of the body.

3. Syphonophoræ, (Röhrenquallen.) Digestive apparatus consisting merely of absorbent tubes, without a central cavity. Organs of locomotion one or more contractile cavities opening exteriorly, or air bladders; often both together.

We shall not attempt to follow the author into the subdivisions of these orders, but, for the present, shall confine our notice to the introductory part of the work, which, being devoted to general considerations respecting this tribe of animals, and containing a very clear and instructive account of their anatomy and physiology, presents topics of more general interest. To one or two of these we would now venture to call the attention of our readers.

One rather important fact relative to the structure of the Ktenophoræ, is, in a great measure, a discovery of the author himself. We shall give it nearly in his own words. "From the bottom of the stomach a short and straight canal leads towards the posterior extremity of the body, and there opens externally. This structure has much resemblance to an intestinal canal, yet it seems to be connected merely with the peculiar mode of locomotion in these animals, and, properly speaking, forms no part of the digestive organs. In swimming, the mouth of the animal is kept wide open, and is directed forwards, hence the water enters the cavity of the stomach, out of which it must be afforded a free exit at the opposite extremity, otherwise it would oppose such resistance as would effectually prevent all progressive motion." p. 12. Fabricius, (Fauna Grœnlandica, p. 361. *seqq.*,) seems to us to have observed this structure in some species of Beroe; at the same time he certainly was not aware of the use which is ascribed to it by the author.

The organs of locomotion are either active or passive. In the Ktenophoræ they are very remarkable, differing altogether from those of the other two tribes. The author thus describes them: "They consist of very small pectinated organs, which are disposed in long narrow stripes on the external surface of the body, being placed with their flat surfaces contiguous to each other. Each pectinated organ is made up of a considerable number of short, flat, pointed filaments, of equal length, set together like the teeth of a comb, which, in the Ktenophoræ of the usual oval form, have their points directed backwards towards the closed extremity of the animal. They are moved in the same way as fins, being slowly erected and then struck backwards with a sudden motion. When all the rows of these pectinated fins are set in motion, the animal is moved more or less rapidly onwards with the wide opening or mouth directed forwards. In most cases the rows of fins are uncovered;

but, in the genus Pandora, they can be inclosed by means of folds of the skin. The animal has also the power of moving either the whole or only a part of them; in the latter case, the body usually acquires a rotatory motion. The fins, when separated from the body, still continue to move briskly for some time. While in motion, the different rows of fins display the most beautiful iridescent colours, with metallic lustre. The stimulus by which they are set in motion, depends probably on a system of vessels similar to that described by Tiedemann in the Echinodermata; for there runs a vessel under each row of fins." p. 3, 4. These last-mentioned vessels we are inclined to view in a totally different light; which opinion, indeed, we shall find expressed by the author himself, a little farther on, when he speaks of the respiratory organs.

In the Acalepha of the two remaining orders, the organs of locomotion are entirely different. The Discophoræ move onwards by suddenly contracting their discoid or bell-shaped body against the water; and in the Syphonophoræ the process is somewhat similar, the animal being furnished with one or more hollow contractile organs, which act on the water in the same way as the general mass of the body in the Discophoræ.

Among the passive organs of locomotion the author reckons the air-bladder of the Physophoridæ, and the cartilaginous or calcareous body, filled with air cells, which is found in the inside of the animal in Rataria, Velella, and Porpita. The Discophoræ, or Medusæ proper, are described by many observers as possessing air vesicles, by which they are supported in the water, of which circumstance Peron was so convinced, that he assumed it as a foundation for his arrangement of these animals. Mr. Eschscholtz, however, informs us that these supposed air vesicles are in reality not so, the appearance of them being occasioned by air entering into the sacs adjoining the stomach, to replace the water which escapes when the animal is taken out of its native element. To the passive organs of locomotion also belongs the cartilaginous sail in the Velella, by means of which the animal is carried by the winds along the surface of the water.

The next point of interest to which we shall advert, is the circulating system in the Acalepha. No distinct vessels have as yet been detected in the Discophoræ; but, in the animals of this order, the digestive cavities are of great extent, and often ramified like vessels through their surface; which structure may probably compensate for the want of a more perfect circulating system. Most of the Syphonophoræ have distinct vessels, which spring from the roots of the tentacula and the absorbing tubes, and spread out into branches on the internal surface of the cavities, by means of which, as already noticed, these animals propel themselves through the water. The last-mentioned organs, therefore, would appear to serve also for respiration, since, while the animal is in motion, the fluids in the vessels, distributed on their parietes, must be continually exposed to the influence of successive portions of the surrounding element. This union of the locomotive and respiratory functions in the same apparatus we shall find still more strikingly exemplified in the Ktenophoræ.

The Ktenophoræ possess a much more complete circulating system; its extent and mode of distribution, however, have hitherto been little more than matter of conjecture; and we are indebted to the author himself for the first account of it in all its perfection. He has traced the connection of the vessels with most success in the genus Cestum; but as the vascular system in the animals of that genus, owing to their singular form, presents several peculiarities, which would render the whole difficult to be understood without the help of figures, we prefer giving the author's description of it in the Beroe. This animal is of the usual oval form, the body being traversed by the cavity of the stomach and the short canal for the transit of water, which opens posteriorly. "From the posterior end of the body where the short tube opens, arise eight canals of uniform diameter, which run forwards towards the large anterior opening or mouth, near the margin of which they terminate in an annular vessel. In this course they are placed immediately under the rows of pectinated organs or fins, whose direction they follow exactly, and send off large branches, which are distributed both to to the adjacent parts of the surface and deep into the substance of the body. On the parietes of the large cavity within the body two large vessels are conspicuous, which rise, by a narrow commencement, from the annular vessel and run backwards, taking up in their course all the twigs which come from the first-mentioned external vessels. It is probable that the two internal vessels, which are to be regarded as veins, terminate in another annular vessel at the posterior extremity of the body, and that from this posterior annular vessel, after it has received small twigs conveying nutritious fluids from the stomach, the eight external canals, which, in their turn, are to be looked upon as arteries, take their rise. Such a connection, however, though extremely probable, has not been actually traced, on account of the difficulty of investigation, which arises from the great thickness of the body at the posterior part." P. 15, 16. The vessels are filled with a transparent and colourless fluid, with small globules of a light yellow colour, which may be seen in motion. The author adds: "From the distribution of the vessels just described, it will appear evident that the rows of fins perform a twofold function, being at the same time organs of locomotion and of respiration; and that they are consequently to be regarded as gills." *Ib.*

From these facts, also, it further appears, that in the Acalepha of this order the water is renewed on the surface of the respiratory organs by means of a mechanism more or less similar to that which has been observed in a great variety of other invertebrate animals. But this is a subject on which we cannot enlarge on the present occasion; we shall content ourselves with remarking, that the facts above related acquire great interest when viewed in connection with some recent researches on the respiration of aquatic animals, of the chief results of which there is an account in the last number of this Journal.

Much additional matter respecting the structure and mode of life of the Acalepha is to be found in the descriptions of the particular genera and species; but our limits do not permit us to go beyond the specimens already selected.

Before concluding, we have to say, that the method followed by the author in his arrangement of the Acalepha, as far as a slight perusal enables us to speak, appears sufficiently clear and satisfactory; though, we confess, this is a subject to which we have not paid that attention which should entitle us to consider ourselves competent judges. We intended giving an outline of the classification, for the sake of those who may not have an opportunity of referring to the work itself, but this, we find, in order to be in any way useful, would occupy far too great a space.

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*Voyage du Comte Potocki, &c.* Travels of Count Potocki. Vol. II. Primitive History of the People of Russia.

*Essai d'une Statistique, &c.* Essay on the General Statistics of the Empire of Russia. By J. H. Schnitzler.

The aim of historical researches is truth in the past, as that of statistics is truth in the present; and their utility is in showing us the course which events have followed to arrive at their present condition, and, by analogy, in throwing some light on the conjectural roads of the future; for the past has worn out all the combinations with respect to us, in the same manner as we have done with regard to posterity.

Researches on the people and the language of a nation are not of the same direct utility as researches on the agriculture, arts, &c.; nevertheless it is a study to whose aid many philosophical views may be brought. For example, it is pleasing to see how a people exhibits a character at the moment when it appears in history, how civilization modifies this character, and how, afterwards, all the events in the history of this people are only results of this character combined with circumstances. Such observations present themselves at each step in historical researches as in the study of other sciences, which all offer many subjects capable of being philosophically applied, independently of their respective and particular objects.

When we read the History of Russia and of Peter the Great, by Count Segur, we cannot help, on seeing so much external lustre and such abundance of ornament, thinking that the matter has been sacrificed to the form; and we feel doubtful whether so elegant and finished an author can have been at the trouble of making himself an antiquary or a scholar, and condemn his lively imagination to the dry study of the Ukases of Tzars and chronicles of monasteries.

It may appear singular in the nineteenth century, amid the important interests which occupy the attention of Europe, to agitate questions of history, and to ask ourselves whether the empire of Nicolas I. is the same as that of Ruric and Vladimir, the representative of the Sclavonian race? if, towards the thirteenth century, a forgotten invasion of Tatars did not break that chain which linked the Sclavonian populations to the dynasty of their Russian kings? lastly, if Russia has at the present day a right to claim as its domain and its patrimony the sovereignity of the different branches of the great family which covers almost the whole of northern Europe? and yet it is to this reunion that is now directed the whole efforts of the policy of the Tzars. A question which history would, however, soon answer in the negative, pointing to the thirteenth century as the period when Russia ceased to be Sclavonian, will in future only be discussed on the field of battle by the colossal power of Muscovy, which calls itself the Sclavonian monarchy by excellence. The democratic institutions of the Sclavonians—of Novogorod, the queen of cities—of Kief, with its bazaars, its traders in the merchandize of the east, and its sumptuous edifices, and of twelve other different governments, became confounded with their conquerors, the Varec Russians, who first came from Scandinavia under Ruric. They received the gift of Christianity from Constantinople, and civilization began to make some progress among them.

In the twelfth century, the duchy of Vladimir and Touzdal, the first Sclavonian colony, which rose amidst uncultivated lands and impenetrable forests, overthrew Kief. The barbarians had not power to keep their conquests. Touzdal fell under the effect of intestinal dissensions; there was nobody to oppose the invasions of the Tatars; and, by the thirteenth century, the Sclavonian-Russian state was no longer in existence.

The history of Gallicia and Lithuania is still more complicated, alternately under the power of the Poles, the Russians, and the Tatars. They were subjected by the Hungarians, and afterwards formed new and independent Sclavonian-Russian states. Lithuania, with a population of Prussians and Podlaques of the same origin as the Samogitians and Sclavonians, rose, as if by enchantment, in the fourteenth century, under the hero Gedymin, conquered the north, shone for an instant, and then confounded itself with Poland, which bore it down in its own ruin. In the beginning of the fifteenth century, the king of Poland, master of Gallicia by right of succession, of Kief and of the empire of Ruric by the union of Lithuania, was the true representative of the Sclavonian race; and Muscovy, or the duchy of Touzdal, was then entirely strange to Russia, and its population was a confused mass of Tatars, of emigrated Sclavonians, of Mercians, of Ostiaks, of Petchoses. At a subsequent period Peter the Great moulded Russia with his powerful hands into its present state, and called himself Emperor of all the Russias, though he did not possess them; and in 1763, Catherine II. obliged Poland to acknowledge her title of Empress of all the Russias, and to give to the Muscovites the title of Russians; but this kind of political baptism, obtained by force, could not transform Muscovy into a legitimate heir of a Sclavonian-Russian state. Muscovy, having conquered the vast Lithuano-Polish confederation, now rules the Sclavonians, but does not represent them; its origin is different, it comes from Asia; its national spirit is different, being humble, servile, and accustomed to the yoke; its manners and its laws are different; and if, at a future period, it should raise serious pretensions to the dispersed inheritance of the great family of Sclavonians, it will have no other title to present to Europe than the right of the strongest and of the sword.

To name Peter the Great would be to recall one of the most surprizing features of modern history,—the birth of Russia, and the entrance of a new people on the political stage. In the words of De Segur, "greater than his empire, he filled it: he more than covered it in all its parts, and opened the immensity of land, of ocean, of the industry of his subjects." But these enthusiastic pictures will give us little idea of the reality. A life that shall be at once pure and glorious, is one of those wonders which are seldom met with except in ancient times. Washington is perhaps the only exception. Such a life is the alliance of moral force with justice, —genius put in the service of virtue. Without force you will only have an honest man on the throne; without virtue either a great warrior or a great governor: but it is impossible to cast the vices of Peter on the barbarism of Russia, and to impute his virtues to himself, and his crimes to the people. It is impossible to wipe out the blood-spots, which, in the eyes of posterity, will ever stain his glory. Alexis had solidly laid the foundation of the Muscovite civilization, and planted Polish and Lithuanian colonies on the banks of the Wolga. But Peter the Great, of an enterprizing genius, firm, and ambitious, inflicted this civilization on his subjects as a punishment, and the results of this hasty trial cannot be better judged of than by Mr. Schnitzler's present statistical work.

The analysis of the origin of the different tribes, or the knowledge of the elements of that immense population which had to undergo the reform of Peter, is, strictly speaking, the object of the Count Potocki's second volume; and we find, in the elaborate details, and yet great clearness of this work, many important additions to the labours of Guldenstaedt, Chardin, Georgi, and de Rechberg. It is customary to view the Russian population as an aggregate of races, of which the Sclavonian constitutes one of the principal elements. Next come the Polish race, the Letto-Lithuanian, the Hunno-Finnish, the Finnish or Souomic, the Khasovas or Samoiedes, the Mongolian, the Mandjour, the Turkish, the Caucasian, the Valaque, and the German race. Count Potocki, after some preliminary remarks, refers these different races, and their more complicate tribes, to Sclavonian origins, to Lithuanian or Celto-Scythic, to Gelic or Valachian, to Sarmatic, to Tchoudic and to Scythio-Skolatic origins. The people of the Caucasus he refers to Iberian, Phrygian, and Armenian origins. M. Klaproth has added a note on the identity of the Ossetes and the Alains, and another on the Boukhars, whom Georgi and most writers place among the Turks, but who, as Pallas remarked, belong really to the Persian origin, and Klaproth points out the importance of this fact to the the ethnographic system of the interior of Asia.

From the history of this vast country, and from the results presented to us by its present condition, we may remark, that after an age and a half of pretended civilization, Russia is even, in the present day, almost entirely governed, commanded, and represented by European courts and by strangers. Its language is despised by the enlightened portion of its inhabitants, though it is rich and flexible: its literature is little more than the echo of the literature of its neighbours: its industry a bad assimilation of the manufactural products of the continent and of Great Britain: and this is the inevitable consequence of the attempt made by Peter and his successors exclusively to favour strangers, even to the prejudice of their own subjects.

Ignorance is profound, and almost universal in Russia; it is masked among the great by a few superficial facts, but is excessive among the people. We find from Mr. Schnitzler's work, that Russia, with a population of more than 54,000,000 of men, possesses only seven universities, attended by about 3,000 pupils, 55 gymnasiums, 9 military schools, only 511 reading county schools, and some parish schools in the German provinces, and the colonies of the same nation established on the banks of the Wolga. The government of Tomsk, among others, had, in 1824, two schools frequented by 100 scholars out of 340,000 inhabitants; so that, in the whole of Russia, we cannot average more than one scholar out of 794 individuals, and a considerable portion of these belong to the Polish university of Wilna. The printing establishments, not counting those belonging to the different governments, are about 40: there are 32 libraries and 9 type-founders.

Internal commerce is almost unknown; and there is perhaps only one great road practicable in every season, that from St. Petersburgh to Moscow. The Russian jurisprudence is a mass of incoherent jargon, inapplicable to the present situation of the country: the administration of justice is an object of commerce, which cannot astonish us, when we know that an office of the importance of civil magistrate, has not a revenue of more than L.15 a-year; and this is the common lot of almost all the public functionaries in Russia.

The insufficiency of their salary obliges them to complete it at the expense of the people; and government shuts its eyes at these depredations; for it is not sufficiently rich to pay those whom it employs.

Such a picture may be considered as the last result of the immature measures of Peter the Great,—the necessary consequence of giving an impulse to the riches and prosperity of a country, by engrafting the manners, creeds, and opinions of strangers, and changing the character of the people, instead of founding a national and popular civilization, which progressively, and in the lapse of time, would have become the bulwark of the nation's power, and the glory and patrimony of all.

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*Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne.*—Vol. I. Part I. With Eleven Plates. Newcastle, 1830.

What a consolatory sight it is to the lover of the study of nature, to observe the zeal and activity in the cause of natural history which is now diffused throughout the land, after so many years of indifference and sluggishness! From a concurrence of happy circumstances,—from the peacefulness of the times in which we live,—from the taste which has been excited amongst almost all classes for the admiration and observation of nature,—from the general change which has taken place in the style of our publications, the ponderous quarto being converted into the convenient duodecimo, and the mysterious language of science being translated into the vernacular tongue,—and, perhaps most particularly, from a certain knowledge of nature's works having been recognized as indispensable to the gentleman and the man of the world,—Natural History is coming to be promoted and cultivated amongst the elements of knowledge. The boudoir teems with the elegant publications which emanate from the cultivators of this science; facts observed, and phenomena investigated, form the topics of ordinary conversation; and men unite themselves into Societies for the immediate prosecution of their favourite pursuit, in all those places where circumstances have combined to facilitate their studies. In the northern counties of England, the naturalists have instituted a society of this kind, and have chosen Newcastle as the most favourable seat for their establishment,—first, on account of the two great natural products of coal and lead, for which that neighbourhood is so remarkable; and secondly, because of the great facilities which that town possesses for making collections in the several departments of natural history, in consequence of the many vessels which are perpetually trading out of its port to the various parts of the world. The advance which this society has already made, is truly remarkable, though the first year of its existence is not yet completed; and it speaks forcibly of the prolific nature of its resources, and of the earnest spirits which animate its meetings. To give an idea of the progress it has made, we need say no more than that the first part of a volume of Transactions is already in our hands, and that a second is passing through the press. Anxious to acquaint our readers with the merit due to those gentlemen who have laboured so indefatigably, and shown themselves so well able to appreciate the importance of the district in which they live, we seize the earliest opportunity of giving an analytical notice of their work.

The investigation of the coal-fields was to be one of the most prominent of the society's objects; and, true to their intentions, a very considerable portion of the volume before us, is occupied by geognostical details of a local character. The phenomena accompanying the distribution of basaltic dykes, have long been considered as of peculiar interest: they have been followed in their intricate details in the coal-field with astonishing perseverance, and they have been studied both in relation to their mineralogical structure, to the contortions and dislocations which they may have produced in the adjacent strata, and to the oryctognostic changes to which they have given birth. We have on this subject, *A Notice of a Whin Dyke lately discovered in the Fenham Division of Benwell Colliery, by* John Buddle, Esq.; *A Notice on the Effects of a Basaltic Dyke at Butterknowle Colliery, by* Mr. Michael Forster; *A Notice of a Bed of Whin at Stanhope, in Weardale, by* W. C. Trevelyan, Esq.; and *Observations on the Geology of Ratcheugh Crag, near Alnwick, by* Mr. Francis Forster. From the term discovery made use of by Mr. Buddle, it will be immediately seen that the strata of the Newcastle coal-field, from their extensive workings, are so extremely well known, that the occurrence of even a whin dyke—or at least of one that cannot be associated with others previously known—is a novelty.

The whin dyke described by Mr. Buddle depresses the seam of coal a few feet below its natural level, thinning it as if by pressure into a mere *leader*, and deteriorating the quality of the coal. The seam is in one case changed into shattered glance coal. The memoir is principally occupied by details appertaining to geognostic geography.

The "Cockfield Dyke," the object of Mr. Michael Forster's observations, is from 18 to 20 yards in thickness, and its line of bearing nearly from east to west. By the intersection of other dykes of considerable magnitude, its original thickness is greatly diminished, and its line of bearing altered several degrees to the south of west. In driving a discovery drift, the seam of coal was found displaced by a layer of basalt and charred coal, intimately mixed together, and having the same thickness and inclination as the seam itself. The drift was not continued through this bed, on account of its great harduess, arising, the author supposes, from the surrounding strata preventing the expansion which takes place in the artificial caking of coal. Leaders of charred coal were observed, also extending upwards from the mixture below. Mr. F. Forster has described the nature and properties of some of these specimens. The basalt, from the mixed stratum of basalt and coke, is fine-grained and compact, and interspersed with crystals of feldspar: sp. gr. 2.672; fuses into a brown glass. The coke was mixed with irregular streaks of carbonate of lime, and rather abundantly interspersed with sulphuret of iron: sp. gr. 1.957, that of the coal which it represents being 1.275: on calcination, it gave about 23 per cent. of lime and iron. But in other cases, specimens were found in actual contact with basalt, which gave 64 parts of carbon, and 34 of volatile matter in the 100.

The bed of whin described by W. C. Trevelyan, Esq. and mistaken by Westgarth Forster, (who is no geologist,) for the great whin-sill, occurs in the lead measures at Stanhope in Weardale, and is only of partial extent. It appears to occur in the fourth or three-yard limestone.

The basalt of Ratcheugh Crag, the subject of Mr. Francis Forster's memoir, appears to be a continuation of the same bed which forms the Dunstanborough Castle Cliff, as well as the bold escarpment extending southward behind Craster Sea Houses. It forms a cliff of about nine feet high, and faces to the west. The effect of the basalt on the limestone, and their relation to the dyke of Snableases Quarry, are extremely interesting.

We observe, as a general result, that the geologists of Newcastle are unanimous in their opinion on the origin and nature of basalt and diorites. Their labours have already tended to throw much light upon the phenomena and accidents attending their distribution in the coal and lead measures. The excellent tables which they possess of these strata, would enable the merest tyro to study them with advantage; and we hope that, with a little more method and the same perseverance, we shall gradually have the whole of these phenomena laid before us in an analytical view, or so as to be applied to geognostic generalizations.

Before we leave the geological part of the transactions, we must allude, in terms of high commendation, to two other memoirs, one by Mr. William Hutton on the new red sandstone of the county of Durham, below the magnesian limestone; the other, entitled Observations on the South Welsh Coal-Basin, by Mr. Francis Forster. The labours of Professor Sedgewick have gained us a more intimate acquaintance with the situation of the magnesian limestone of Sunderland and Hartlepool. The new red sandstone which occurs beneath it, is an equivalent to the red sandstone, named, on account of its being more metalliferous, *red dead lier* by the German miners; or to the Exeter red conglomerate: it is the lowest of three beds of new red sandstone, as given in Mr. de la Beche's table of sedimentary deposits. The distribution and the demarcation of the different beds composing this formation, are delineated with a care and accuracy that lead us to hope great things from the abilities of the author. Mr. Forster's memoir will be a paper of reference, and is, from the minuteness of its details, an important addition to British geology. We know that our friend, Mr. H. L. Pattinson, has some better things on hand than his communication about the hazel nuts, to which we can only allude.

In the department of *Botany* we have only one paper:—"*Remarks on the distribution of the indigenous Plants of Northumberland and Durham, as connected with the Geological Structure of these Counties*; by Mr. N. J. Winch.—The subject is of considerable importance, and one which marches with the progress of the two branches of knowledge which it calls to its aid; and from a familiar acquaintance with which, it springs as naturally as a plant from a rich and luxuriant soil. The authorities which the author at the very onset gives for what appears to some to be a bursting of the streams of knowledge over their boundaries, is superficial and inappropriate; and, as might have been prognosticated, we find that our author has been able to glance at, but never to obtain a profound view, or commanding grasp, of the philosophy of his subject. It is too late now to point out where the intellect may be schooled to such a task: we will merely mention that the paper may be perused with considerable advantage, and that it could not but contain many interesting facts; one of the most marked of which has been obtained from Professor Sedgewick. The table is very good as a table of comparison, and is a useful addition to the volume. We shall probably extract it in another place.

In *Zoology* several interesting papers will be found scattered through the volume. Mr. Selby has described at length, and illustrated by several anatomical figures, the new wild swan (*Cygnus Bewickii*) discovered by Mr. Wingate; and which has also formed the subject of a valuable article by Mr. Yarrell, in the last volume of the Linn. Trans. The Hon. H. T. Liddell has a notice of the honey buzzard, (*Falco apivorus,* Lin.) "an extremely rare bird in the British isles." The specimen was shot in the parish of Whittingham, Co. Northumb. Aug. 31. 1829. Dr. Johnston contributes an account of a whale stranded, in September last, near Berwick-upon-Tweed, with a figure; the species is the *Balæna boops,* Lin. —the *Balænoptera borealis* of Lesson; in whose "*Cétacés,*" by the way, Dr. Johnston would have found a figure, which gives a better idea of the animal than can be derived from his plate, where it is sketched, as it happened to be found, with the belly upwards. Mr. Alder gives a catalogue of the land and fresh water shells found in the vicinity of Newcastle; in which, we observe, he remarks, and probably with justice, that the *Helix vitrea* of Capt. Brown, published in this Journal, seems to be the *H. crystallina,* Drap. The Rev. Mr. Turner's notice of the curious feats of a spider, the only other paper in this department, will be found amongst our Natural-Historical Collections.

On the whole, this first part of the Society's Transactions is highly creditable to so young an institution. The work will be indispensable to the student of the natural history of Great Britain; and we strongly recommend it to the patronage of our readers. Any little faults which the critic may detect in these first fruits, should meet with an indulgent eye; for we are convinced that, coming from such good husbandmen, they give promise of a noble harvest.

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*Elements of the Economy of Nature.* By J. G. M'Vicar, A.M.

Our review of this work, in the Number for July last, will be fresh in the recollection of our readers. We have received a long letter from Mr. M'Vicar on the subject, from which it is only doing the author justice to extract the following:—

"You mention that I am wrong as to two matters of fact with which you happened to meet. I doubt not but there are many; nevertheless, you will find that I am right in the two cases brought against me. With regard to the atomic structure of ammonium I am astonished, if it be the same gentleman who has reviewed me on atomic chemistry, and has pointed out this circumstance; for that which he says I affirm with regard to the structure of ammonium is identical with that which he says is the general belief. Azote having in my work the same atomic weight as Dalton assigns it, that is, half that which the reviewer has in his eye; one atom of azote and two of hydrogen, according to my views, give the very same composition as one of azote and four of hydrogen according to the other view. With regard to the specific gravity and volume of iron, the facts alleged in my work I learned at iron-foundries, when I was studying the phenomena of this curious substance. I may mention, with regard to its volume, that it is an universal practice to make the mould, into which liquid cast-iron is poured, 1-8th of an inch per linear foot larger than the metal is required when fit for use; because it is found that average cast-iron contracts from the liquid state to that fit for use by this amount."

In reply to the astonishment of Mr. M'Vicar, we quote the three lines which led us astray. Speaking of ammonia, he says,—

"When under the metalliferous induction of the mercury, and of what may be regarded as the metalliferous pole of the voltaic axis, those particles of hydrogen which are not attached to the axis, *are given off*, and a form, which is that of arsenic, without its two terminal particles of hydrogen, remains."—*Elements*, p. 309.

We took these words as they stand, and understood them in their common acceptation, which, without reference to the atomic weight of azote, which has nothing to do with the matter, is simply that to form ammonium, ammonia *gives off* hydrogen. We are happy, however, to find that M. M'V. does not mean to advance such a statement, and consequently that his words are to be interpreted according to his views of ultimate atoms.

In the case of cast-iron Mr. M'V. is right as to the practice of foundries, and still he is wrong in his book. He has a most perverse way of drawing conclusions, being determined to see something new in the most common facts. Cast-iron, it appears, after being poured into the mould, contracts 1-8th of an inch nearly per linear foot—and yet cold cast-iron swims upon melted cast-iron; and these two facts seem to Mr. M'V. so totally irreconcileable, that nothing but some hidden mystery of magnetism is sufficient to account for them. Now we shall take the trouble of making it all plain to Mr. M'V. Liquid cast-iron has a certain bulk and density. It is poured into a mould. At the instant of congelation it expands in consequence of the new and less-compacted arrangement of the particles, incident to the change of state. It has now a bulk *greater* and a density *less* than when in the fluid state, but always fixed and determinate for the point of congelation. As it cools, this bulk diminishes, till at the temperature of the air it has shrunk in the quantity above stated; but it is still less dense than it was in the fluid state, and therefore it swims on melted cast-iron.

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## Wernerian Natural History Society.

Since the publication of our last number, a pamphlet of twenty-six pages, entitled " An Address to the Members of the Wernerian Natural History Society, by their Secretary,"—and, under the cloak of " A Defence" of the Society, the President, and the Secretary, containing an angry attack upon Mr. Cheek, one of the Editors of this Journal,—has been circulated in this city and elsewhere. Mr. Patrick Neill, the author of the pamphlet, is a gentleman whose name we have, on account of his office, been unwillingly obliged to connect with certain transactions in which we believe his disposition would not have permitted him to involve himself, if he had not been instigated by some very powerful motive; and, as far as we are Editorially concerned in this matter, we are inclined to acquit him entirely of all *malice prepense* in those doings to which he has been a party. But the dispute, as promoted in this pamphlet, has now assumed the character of a private quarrel, and the whole affair must accordingly pass from our cognizance; for the character of this Journal will not allow of its name being mixed up with the squabbles and recriminations of individuals. Public questions, connected even remotely with science,—either on the management of our institutions, or on the capacity of our scientific men to fill the places which they occupy,—the Editors will most readily discuss; but personal invective is not a subject for their criticism. Had the Secretary of the Wernerian Society thought proper to address the Editors of this Journal, in vindication of the President's conduct, his communication would have been noticed with all due courtesy: but as Mr. Neill has chosen to single out Mr. Cheek, and to level unmeasured vituperation personally against him, we must leave Mr. Cheek to pursue his own course, and to answer the attack made upon him in his own way,

In his address, Mr. Neill attempts to implicate the Wernerian Society in support of the coterie, by pretending that we have attacked that institution, and by ingeniously volunteering a defence. We think it right to repeat, in this place, that the Wernerian Society has never been the object of our censure; that the party alone which mis-governs it, is answerable for the torpidity in which it was found. But its slumbers have happily been disturbed, and we trust that it will survive to view our exertions in the proper light.

# ORIGINAL COMMUNICATIONS.

(*Continued.*)

**[The following articles were not received in sufficient time for insertion in the proper place; but we have thought it better to break into the continuity of our plan, than to delay the publication of papers of so much interest. ED.]**

ART. IV. *On the Circumstances under which Germs or Buds are produced in Trees and Woody Shrubs.* By WILLIAM COLVILL, Esq.

THE object of the present essay is to endeavour to elucidate the circumstances under which germs or buds are produced in the more perfect forms of vegetable life. When it is considered that branches, flowers, and, consequently, fruits, are, in our temperate climate, all developed by the medium of buds, the inquiry must be deemed one of very great importance. It has accordingly attracted the attention of many celebrated men, and from their observations various theories have been deduced.

Pliny considered that buds derived their origin from the pith,* and Malpighi that they originate in the pith or cellular tissue, one of the chief offices of which he believed to be the protrusion of buds.† Again, Du Hamel and Knight suppose that buds originate in what the former denominates pre-organized *germs*, existing in the proper juice, and deposited by it in its descent, so as to pervade the whole of the plant.‡ The latter opinion is that which is now generally entertained; but, with all proper deference for the great names by which it is supported, the doctrine appears to be inconsistent with the experience of practical horticulturists.

It is a well known rule amongst gardeners that, in pruning trees, care must be taken to cut a branch within from one-fourth to half an inch above the eye; because, "when this is not done, and half an inch or more of shoot left without a bud, the consequence is, the stump dies back to the bud in the course of the season, and, if not carefully cut off, will end in a decaying orifice, both unsightly and injurious."‖ In like manner Forsyth recommends, that, in heading down very old cherry trees, some incisions should be made in the branches in the spring before the operation is performed, "observing to make them above the joint where the bud should come out;" because, as he remarks, "if you cut just below a joint, the shoot will die as far as the next bud or joint." §

If Du Hamel's theory were correct, however, in supposing that

* Nat. Hist. lib. xvii. cap. 21.

† Anat. Plant. 13.

‡ Keith's Physiological Botany, Chap. iv. sec. 4, sub-sec. 4.

‖ Loudon's Enc. of Gard. 1885.

§ Forsyth on Fruit Trees, Cap. v. p. 71.

the pre-organized *germs* are deposited, so as to pervade the whole of the plant, it is evident that the precautions here recommended would be totally unnecessary, because these *germs* would exist, and should consequently germinate equally above and below the eye or joint. But in wood whose age is not such as to have totally obliterated all traces of the eye upon the bark, it is seen that such a result does not follow, but that the wood dies down to the next joint or eye, at which, or in whose neighbourhood alone, the new germ or bud is protruded. How far this new germ or bud is connected with the joint or eye remains to be investigated. In the meantime it appears that we are entitled to draw the conclusion, that the pre-organized germs of Du Hamel do not pervade the whole of the plant as he supposed.

Another theory has been advanced by the acute author of the article on Vegetable Physiology in the Library of Useful Knowledge.* Of all the theories this seems to agree most nearly with the test of experience, although it is not by any means completely satisfactory. At one part it would appear that the author meant to distinguish betwixt a *germ* and a *bud*. "All branches," he says, "proceed from germs, formed in the earliest unfolding of the parts in which they appear, although the buds produced from these germs may not be protruded until the tree be greatly advanced in age." By the word *germ*, however, he evidently understands merely the *bud* in a less advanced state; for he afterwards says, that the *germ* is "the lateral progeny of the plant, generated at the period of the developement of the stem or the branch on which it appears *as a bud*." In following out the present inquiry, therefore, I apprehend that there will be no inaccuracy in supposing that *germ* and *bud* mean the same thing, viz. a bud in its different stages of advancement."†

To explain this theory a little farther, I shall take the liberty of quoting a few more passages. Speaking of the germ, he says that, when it is neither destroyed nor unfolded into a perfect bud or branch, it "will advance to the surface of the next year's belt of wood, and so on progressively, or perish with the destruction of the tree." He adds, that "no determinate period is fixed for the protrusion of the germ into a bud; but, at whatever time this may happen, its course is traceable from the medullary sheath, to the surface on which it appears, by a pale streak of parenchymatous matter traversing each annual concentric ligneous layer."

This theory accounts justly enough for the progress and production of the buds formed upon a branch in the first year of its growth; but, on subjecting it to the test of experience, it will be found to be very far from affording a satisfactory explanation respecting the

* Lib. of Useful Knowl. No. XIV. Chap. v.

† It must not be supposed that it is meant to object to this distinction, which has been sanctioned by the most celebrated botanists, (Sir J. E. Smith, Sprengel, &c.) but it is proper to point it out to prevent misapprehension.

origin of the whole of the buds which are developed upon the trunks and branches of trees.

Let us take a twig of the apple or pear tree, the growth of the present year. It will be observed that the leaves are arranged on this young branch in a peculiar spiral form. Cut the twig at one or both ends, so as to leave only eight of these leaves upon it; and, on measuring this portion, it will be found to be in general not less than five, nor more than nine inches in length. Suppose it to be the least of these dimensions, viz. five inches.

It is well known that the buds are axillary, produced betwixt the leaf stalk and the stem; and, consequently, the number and disposition of the buds or germs are determined by that of the leaves.* Here, then, we have eight germs or leaf-buds in the space of five inches. That we have no more has been already shown by the practical observations of Loudon† and Forsyth,‡ who find that no germs are produced upon the shoots betwixt the eyes or leaf buds. The author of the treatise on vegetable physiology in the Library of Useful Knowledge, has therefore accounted satisfactorily for the manner in which these eight buds or germs may be protuded upon the bark of trees within the space of five inches; but it is well known to practical horticulturists that when an old tree is headed down, instead of eight buds more than forty buds are frequently produced, within the like space. Where, then, do the remainder originate? This will form the subject of our present inquiry.

The manner in which the author of the treatise on Vegetable Physiology, now referred to, has explained the progress, and the protrusion on the bark of the old stem or branch, of the primary germs or buds originally formed upon the twig, is perfectly satisfactory, and will be found to be confirmed by actual observation. Coinciding, therefore, with his theory so far as it goes, I expect to be able to demonstrate that the remaining germs produced when an old tree is headed down, originate in these primary buds. To enable me to do so, it will, however, be necessary to recur shortly to the anatomy of the bud.

Buds are described by De Candolle|| as consisting of the rudiments of the young shoot, enveloped in coverings formed of the foliaceous organs, sometimes in their natural state, but oftener converted into scales by a species of abortion occasioned by their position. The scales of the buds, therefore, may be considered to be deformed leaves. But, as has been already stated, in the axilla of of the leaf, or betwixt the leaf-stalk and the stem, the germs or buds of the apple and pear tree are produced. Nor is this peculiar to these species of trees, but the observation is applicable to most of the trees and woody shrubs distinguished by botanists

* De Candolle, Organographie Vegetale, Tom. II. p. 218.

† Enc. of Gard. 1885.

‡ Forsyth on Fruit Trees, p. 71.

|| De Candolle, Organographie Vegetale, lib. iv. cap. 6.

as *dicotyledonous*. Although, then, the leaf itself be deformed, it does not follow that the germ or leaf-bud should be abortive; but it may exist, situated like the scale itself, close to the base of the original bud. A careful examination, with the assistance of a microscope, will confirm this supposition. But it is not necessary to have recourse to microscopical observation to substantiate the fact. If, in spring, when the buds begin to shoot, a lateral twig of the preceding year's growth be cut off below the whole leaf buds, but not close to the stem, in a short time the remaining small portion of the twig will be encircled, close by the stem, with a number of buds or germs developing themselves in the axilla of what were the scales of the bud from which the twig was produced. This fact completely proves my position, that the malformation of the leaf, by its conversion into a scale, does not effect the existence of its leaf bud. Instead of one bud, therefore, pushing its way through the concentric layers of wood, as demonstrated by the author of the treatise on Vegetable Physiology, before quoted, it is evident that there are a number of buds. Besides this, each of these buds, under favourable circumstances, will be found from time to time to produce other buds, which likewise accompany them in their annual progress towards the surface of the several ligneous layers. In the course of time, therefore, it follows, that these buds must have greatly accumulated in number, and that the older the tree, the more numerous will they be. Accordingly we find that such is the fact. In the spring of the present year, my attention was directed to a great number of the stems of the common furze or whin, in a hedge which had been headed down in the course of the winter. On every one of the stems I observed clusters of buds, arranged round the stem in an order corresponding with that in which the leaf buds are arranged on the young twig of furze. In the clusters the buds were arranged close to each other, and the number in each cluster appeared to be proportioned to the size, and consequently to the age of the stem; the clusters on the smaller stems containing fewer, and on the larger a greater number of buds or germs. In some species of apples, (as the codlin, the Arbroath oslin, &c.) in the wild cherry, and the common birch, huge clusters of such germs or buds, well known to gardeners by the name of *burrs*, are often seen protruding from the bark. These may be traced to the same origin.

But it must be remarked, that it is not on every tree that these buds are connected in clusters. In heading down young trees before they have attained such an age as to obliterate the traces of the eyes on the external bark, it will be observed, that while the young buds shoot from the neighbourhood of the eyes, in some trees they are at a greater, and in others at a less distance from the eye itself. The cause of this is evidently the greater or less angle at which the buds are produced, and which is known to differ in the different species of trees.* For this reason it is, that on heading down trees, the germs or buds sometimes appear to be disseminated over the whole surface of the stem, and at other times they are generated close by the eyes.

To prove the accuracy of this view of the mode in which buds are usually produced, let me now direct the reader's attention to an exception. If a Scotch fir tree be headed down so as to deprive it of its branches, no new buds will be developed on the trunk or stem, but the tree will die. An examination of a young shoot of this tree will furnish a satisfactory explanation of the cause of this. It will be seen that the buds upon this shoot are principally terminal, and although a few arise laterally, they are uniformly at a considerable distance from the base of the shoot. The leaves, therefore, which constitute the scales of the bud, do not inclose in their axillæ any germs or leaf buds whatever, and the whole buds on the shoot which are not destroyed, are, in the course of time, developed either as branches or as flower buds. Thus no primary buds remain to be developed on the stem when the tree is headed down; and it has been already shown that no scale buds exist to be protruded here as in other trees. If more were wanting, therefore, to establish the preceding theory of the circumstances under which buds are produced on the stems of trees when cut down, it is furnished by the above exception, (which I believe is not peculiar to the Scotch fir,) demonstrating that, when these given circumstances are wanting, no germs or buds are formed.

To conclude, it must be remarked, that I have here endeavoured to explain the circumstances of the production of germs or buds in ordinary cases only. It is well known that occasionally buds are produced upon the roots of plants. To this subject I have not yet directed my attention. Permit me to remark, however, that some powerful connection seems to exist betwixt the bud and the root. In making cuttings we all know that one or more buds must be put under ground to insure the production of roots; and it is equally well known, that if an apple tree with a *burr*, or one of the clusters of buds before described, be planted in the ground, in such a manner as that the burr shall be covered with mould, the branch uniformly pushes out roots, and becomes a separate and independent tree.

*Abbey House, Arbroath,* 21*st Aug.* 1830.

A paper "On the Origin of Buds," by the Rev. Mr. Keith, will be found in the last (the xvi.) vol. of the Linn. Trans. p. 421, in which he opposes the theory of the writer in the Library of Useful Knowledge, in its universal application. After stating that the opinion of this author has not the merit of originality, having been previously advanced by Mrs. Ibbetson, by Du Petit Thouars, and even by Duhamel himself, (though he afterwards abandoned it,) Mr. Keith,

* Vide Keith's Phys. Bot. Vol. I. c. ii. sec. 1. sub-sec. 2.

to illustrate his views, relates the case of an elm tree which had been wounded by decortication. On the edges of this wound was formed a lip of new bark and wood, whose surface was marked with ridges and furrows indicating a growth of at least three years; and from the last and innermost ridge there had issued two shoots of several inches in length, in the course of the preceding summer. The author infers that these shoots could not have originated in, nor proceeded from the pith or centre layers of wood, because the vitality of the outer layer had been destroyed by means of its exposure to the atmosphere, in consequence of the decortication of part of the trunk, so that it could no longer afford a passage for a centrifrugal band. Further, on dissection he found that the buds had no radiant nor radical connection with the centre of the stem, a layer of dead wood intervening, to which the bark and wood of the lip were indeed vegetably agglutinated, but not connected by a continuity of living growth. Beyond that layer the medullary rays began anew and took a totally different direction. "Hence," Mr. Keith remarks, "it follows irresistibly, that the shoots in question originated merely in the lip, and sprung from buds, which, if not formed by, were yet conveyed to, and deposited in the alburnum through the medium or agency of the proper juice, without having ever been connected with the pith or central layer of the incipient stem, and without having been annually protruded towards the circumference through each successive layer of wood"; in short, that "a plant may contain latent germs besides those which are annually carried outwards in a horizontal direction;" though the fact of their evolution must be viewed as an exception to the general rule, rather than as an illustration of the law.

As to the *origin* of buds, in cases where the horizontal progression of the germ is impossible, Mr. Keith advances the theory that "the bud or buds already existing in the embryo plant have the power of generating new buds, which the plant has the power of propelling to their appointed stations:"—"say that this process is effected by the bud or buds lodged in the embryo plant, or protruding from the surface of the shoot, and the new formed bud, or rudiment of a bud, a minute, and insulated, and imperceptible globule or filament; there is nothing incredible in the supposition of its being carried upwards with the current of the ascending sap in its passage through the alburnum; or, of its entering even the plexus of the vessels of the inner bark, being again carried downwards with the current of the descending and proper juice, as well as ultimately deposited in a situation favourable to its future evolution." "Not," the author continues, "that the horizontal progression of the bud, as a general rule, is to be denied. The fact is established beyond a doubt. But that the exception to the rule must be accounted for also; and even upon the principle of the rule itself, I am not sure that the longitudinal progression of the bud may not be occasionally wanted, if it were but to bring buds up to the point of their horizontal protrusion."

It will be interesting to compare the opinions of Mr. Keith with the ingenious views contained in the preceding paper. From the talent for inquiry exhibited by the author of this memoir, we consider it to be a duty which he owes to this most important science, physiological botany, that he continue to pursue these researches; and we trust that we shall be again favoured with the fruits of his "leisure hours."—Ed.

* Phil. Mag. vol. xlv. 56.
† *De la Terminaison des Plantes.*

ART. V. *Notice of a Sword-Fish recently caught in the River Tay.* Communicated by ROB. KNOX, M.D. F.R.S.E., &c.

THE sword-fish (*Xiphias Gladius*) is of comparatively rare occurrence in the British Seas; a specimen, which may be considered as of larger dimensions than usual, was captured about the end of July, and being sent to Edinburgh was purchased by Dr. Knox. We have received from that gentlemen the following Notice regarding it.

The sword-fish in question was found entangled in the nets of the salmon fishery in the river Tay, and was dispatched by the fishermen with pitchforks. Although one of the men had been on the station (near the mouth of the river) for many years, he had not seen any fish like it; and it was brought to Edinburgh by them, under an impression that nothing of the kind had been seen before. It was stated by the men to have been a female. Its stomach was empty.

Its total length was found to be nine feet when measured from the extremity of the snout to the middle of the caudal fin; the snout itself,* or the projecting part of the upper jaw, from which the animal derives its name, measured, from the apex to the nostrils, 2 feet 8 inches; breadth between the nostrils 4½ inches. The length of the mouth or *gape* was 10 inches, and of the tail, from point to point, 2 feet 2 inches. The distance from the root of the tail to the termination of the dorsal fin was 6 inches.

Some naturalists † consider that there is but one species of this genus, and they reject the determination of Dr. Leach, who, finding in the specimen examined by him, (taken in the Firth of Forth,) the dorsal and anal fins *interrupted*, concluded that it belonged to a species different from the common *Xiphias Gladius*, and gave to it the name of *X. Rondoletii.* The explanation which naturalists give of the interuption of the dorsal and anal fins is that, as is expressed by M. Cuvier, the intervening portion is worn away with age, so that at last there seem to be two dorsal fins; or, as is the opinion of Dr. Fleming, it is the result of accidental laceration. "The intervening low membrane," he observes, "is frequently lacerated, and has led several observers to conclude that this fish possessed two dorsal fins."‡ But several objections might be made to these assertions.

It will be freely admitted that the series of spines placed on the dorsal vertebræ is uninterrupted, but not so the projecting part of

* Pennant doubted the stories told of the extreme hardness of this part of the animal, and of its occasionally piercing the solid timbers of vessels; but an examination of the specimen now before us, compared with the accounts of others worthy the highest credit, has convinced us that no reasonable doubt can be held of the truth of these accounts.

† Fleming's British Animals, p. 220. ‡ Ibid.

the fin, or lophiodermic portion, which not only suffers a manifest interruption, having altogether disappeared for the space of nearly three feet, but has its place occupied by a structure altogether peculiar, and differing from what we should have expected, had this part of the back ever been occupied by a series of bones, and an elevated portion of the skin,—in plain language, by a fin having a proper ichthyological character. To suppose that all this has disappeared by the mere effect of age, were altogether unreasonable; and to imagine it to be caused by an accidental laceration, were an assumption gratuitous, and refuted by bare inspection of the parts. For in place of portions of this dorsal fin, which might reasonably have been expected to have remained in fragments at various intervals, if laceration had been the cause of its imperfection, we find an uniform smooth surface, of a whitish colour, and therefore contrasted with the neighbouring parts of the skin,—of a somewhat different texture, being rather softer,—and characterized by a series of openings, placed at the distance of about 1 or 1½ inch from each other, of an oval shape, large enough to admit of the insertion of a tolerably sized crow-quill. These apertures have a defined edge, and lead to somewhat elongated *culs de sac*, lined by a mucous membrane, and having no communication with each other; deeper than these cavities, and unconnected with them, except that they were placed immediately below them, are found the spines, which are obviously the skeleton of the dorsal fin, resting on the spinous processes of the vertebræ. No one, I think, conld say that these were mere accidental appearances; they seem to be rather a character of this part of the animal.

I shall send for your next number a sketch of what I have described, and then naturalists may judge for themselves; but, in the meantime, until the fin of the young Xiphias be dissected, and the fact of a continuity of all its parts, osseous as well as dermic, shown to hold in youth, I must consider the opinions which have been advanced on this matter to be mere assertions.

There is then a species of the Xiphias in which the dorsal fin appears to be interrupted; and the question consequently is, whether this be a character which it possesses at birth? if so, is it specific? Does it come on with age? an opinion, to say the least of it, extremely improbable; or is it sexual?* I cannot allow the opinion, that it is a mere accidental laceration, to occupy me for one moment.

The anal fin was not quite interrupted; it was merely very low. A slight ridge of skin marks its presence in the middle of the fin, but it contains in this part no osseous spines nor skeleton. Portions of it were so far detached from the larger anterior part, that they seemed at first to be entirely separate, and appeared to project, (though I should not wish this to be considered as certainly

* Dr. Leach's specimen and mine were both females.

made out,)through openings similar to those on the back. But the interrupted fin is a peculiarity which does not exclusively belong to the Xiphias; it extends evidently to other genera of the Scombroides, as is evident from an engraving, given by M. Bory St. Vincent, of the *Scombre pelamide*.* In this fish, the dorsal fin presents, first, as in the Xiphias, a greatly elevated portion, which gradually diminishes, and is at last seemingly interrupted; then there arises a second considerably elevated portion, supported like the other by spines or radii. This suddenly diminishes, and from the point of this diminution to the caudal fin, (a considerable space,) the dorsal line is occupied by eight small detached fins, seemingly unconnected with each other.

But, returning to the Xiphias, it appeared to me, as I have said, that these portions of the caudal fin projected through openings of the same nature as those I have described occupying so large an extent of the dorsal line; but this fact I could not make out so distinctly as quite to satisfy myself. I offer it therefore rather as a conjecture, to be confirmed by others. In the mean time, it is obvious that to describe these fins accurately, the language of naturalists would require to be considerably modified.

The elevated ridges on each side of the body, near the setting on of the tail, projected very considerably, the left more than the right. They resembled strongly the dorsal fin of the porpess, in being composed internally of a similar looking substance, and in not possessing spines nor bones to support them; their uses cannot well be guessed at.

The radii branchiostegi are seven in number on each side.

The internal organs had been coarsely removed, previous to the specimen coming into my possession, and putrefaction had done much towards destroying their texture. A small portion of the ovarium, containing myriads of very minute ova, proved the sex. The pancreatic cœca were extremely numerous, and the tubes leading from them to the duodenum so large as readily to admit a finger. The liver had been removed altogether. There was a very obvious gall-bladder, and likewise a urinary bladder. Various *Entozoa* inhabit many of these viscera, specimens of which have been preserved.

We may then still, I think, retain the characters of this variety at least, of the Xiphias, as given with great accuracy and correctness by an excellent observer, Dr. Leach,† until it be shown either that it is a distinct species, or merely a variety of the *Xiphias Gladius*, dependent on other causes than those already stated by naturalists. The language of systematic works, in characterizing the Xiphias, is, "anal and dorsal fins entire;" but this is not strictly applicable to the specimens seen by Dr. Leach and by myself. The

* Voyage, Collection de Planches, 1804.

† "Pinna dorsalis nigra, interrupta, intervallo exarato."—Leach, Mem. Wer. Soc.

expressions used by him, then, are preferable, "*dorsal fin interrupted*;" and this is strictly true as to its projecting or lophiodermic part. But we have seen that the anal fin is not entirely interrupted.

Dr. Leach, at the conclusion of this memoir, makes an observation deserving the attention of the naturalist:—

"Since the above was written, I have been informed by Mr. Bullock, that some years since he saw in the Firth of Forth several living specimens of a Xiphias playing in the water. I think he saw seven or eight, and he was so near as to be enabled to observe the dorsal fin to be undivided: it is therefore highly probable that the *Xiphias Gladius* may also be a native of our seas, or perhaps be the other sex of this."

By a reference to the paper of Dr. Leach, it will be found that I have been able to make several additions and corrections to his excellent memoir.

It may not be irrelevant to remark here, that it might much benefit natural history, were a few concise instructions for the preservation of objects relating to that science, and more particularly to zoology, drawn up, and circulated widely through the medium of the daily and periodical press.

Most uneducated persons still fancy that naturalists are mere collectors of pebbles, shells, insects, and of the skins of animals; and accordingly, the persons who captured the Xiphias, with a description of which we have been favoured, imagined that they should not in any way diminish the value of the specimen, by removing the parts they imagined most likely to putrify. With the best intentions, they seem to have proceeded on the principles laid down in certain instructions, drawn up and circulated some time time ago by a person who might naturally enough be supposed to know something of zoology, but who, in fact, is at least half a century behind all real zoologists of the present day. Proceeding agreeably to these instructions, they had removed the heart and brain, and most of the abdominal viscera; in a word, all those organs whose examination afford so much valuable information to the zoologist. But, really, zoology in all other parts of the world, and in all other hands, is no longer the science of ill-stuffed birds and worse-stuffed quadrupeds; and this fact, though yet but little understood in this country, must soon make its way.—Ed.

# GEOGRAPHICAL COLLECTIONS.

## *A Visit to Hartfell and Birkhill Spas, in the County of Dumfries.*

The ridge of transition rocks which traverses the northern part of the county of Dumfries, attains its maximum height at Hartfell, (3300 feet.) From the Lowthers (3130 feet) to this point the country is rugged and mountainous, and is often constituted of uplands crowned with small hills, and more rarely of mountains, descending in long acclivities, or cleft perpendicularly to their bases. It is difficult in the disorder produced by such an arrangement, to trace the connection of the different ranges, or to assign to each its relative importance. As we approach Hartfell, however, the ranges become more distinct, and we find streams following the long line of a transverse valley, or pouring through successive circular basins, admitted on all hands to have been originally lakes. It is another question whether the vale of Annan was once the bed of a stream far greater than the present one,*—whence could such a stream have originated? It is true that we can trace, along the course of this romantic valley, depositions which are not of a diluvial character, but the same case occurs in Ettrickdale and in Eskdale. The origin of these depositions, however, may probably be referred to the period when the waters were retained in these long vallies by the disruption of the trap rocks many miles from their source, and time or accident may have effected the opening by which the valley has been laid bare, and the present small stream left to flow in the *thalweg* or central line. The deep ravines and high glens that join this line on all sides, or inclose its highest termination,—the angular debris and cemented fragments of the rocks in the immediate neighbourhood, covered by pebbles rolled from afar, and incasing the acclivities, or forming a deep bed, covered with river sand and gravel, in the bottom of the valley, are the monuments of these great changes, between periods of quiescence and periods of the rapid passage or descent of waters from their former level.

Whether we ascend the verdant Annandale from the south, along the road that skirts the acclivities of its lateral mountains, or whether we stand upon the ridge at its northern head, and glance at the stream winding like a silver thread amid groves and meads, or washing the foot of beech-crowned hamlets, we are forced to recollections of this character; and when we leave the beaten track, and tread the brown heather and moss, through narrow vales, with precipitate acclivities rearing their bare heads to the clouds, we feel inspired with admiration at the extent of these great phenomena, and the power of the causes which produced them.

The bleak vale of Hartfell branches off from the striking ravine of Errickstane to the east, and at the immediate entrance its stream bursts through a rocky barrier, reeling over in numerous rapids, and shaded by the only few trees that are met with in the ravine. During our walk, a nest of young merlins were fanning the breeze with their spread tails, and winging their first flight from one side of the ravine to the other; it was just enough to save them from being caught. The distance from the entrance of the vale to the foot of the mountain is not great; but half way up the valley we first meet with a bed of the alum slate, or rock from whence the mineral waters issue. A level had been driven into the hill, but we were not aware whether in pursuit of a metalliferous vein, or merely for the alum slate.

Ravines of the character of Hartfell and Birkhill, (head of Moffat water,) owe their actual appearances entirely to the action of present causes. The rock in their vicinity is entirely composed of beds of alum slate, which is slaty and friable, and easily decomposed by the action of air and moisture, and still more easily wrought upon by mountain torrents laden with gravel and sand. The abrupt acclivities shiver like the shale of the millstone-grit, (as at Mam Tor in Derbyshire, Alston Moor, and in Lanarkshire,) or like the shales of the lower fresh

* Jameson's Mineralogy of Dumfries-shire.

water formation, (Montmartre;) and are constantly crumbled down by variations in heat and moisture.

No house nor cottage of the most humble kind awaits the stranger on his arrival at Hartfell,—a little rocky building, a fit residence for the hoary genius of the place, points out the spring; it is, indeed, a dangerous vicinity, and alterations of situation in this erection, and even of the spring itself, may be expected with the course of time.

The mineral water, dripping at the time we visited it from the upper end of the apartment, was observed to form a pond on the floor, which might be crossed by means of stepping-stones. Its taste was slightly acidulated; it sparked on being poured into a glass; and it deposits iron in its course.* The spring seems hurtful to vegetation and to animal life. Mosses grow on its borders, but perish in its waters, where every thing is more or less tinged with a dirty yellow. A piece of written paper had been placed on the wall, and the ink-marks were entirely effaced. A Trichomanes, which we picked up in the stream, had become hard and friable; the water did not, however, appear to affect an aquatic insect which we put into it, though not another living thing was to be seen. The temperature of the air in the shade, on the 29th of July, was 25° cent. The temperature of the water in the well was 9°. The temperature of the air, at the head of the ravine of Hartfell, remained the same; while that of a well spring, the thermometer being let down by a string did not indicate less than 10°. In another running spring, surrounded by vegetation, near the summit of the mountain, it descended in five minutes to 5° above 0, or freezing point. These hills were covered with snow in the month of June.

It appears that the waters of Hartfell Spa increase in strength, or in the quantity of mineral ingredients held in solution, when the stream is more abundant, owing to parts of the rock, not constantly under their influence, being then acted upon; and it has been supposed that from this circumstance not only would a great variation ensue in the quality of the waters, but that, with the progress of time, the chemical constitution of the spring might be entirely different. When, however, we consider that the nature of a spring is not that of a running stream, excepting in particular cases, as in limestone, and between strata of an opposite nature, but is a percolation or filtering of water to form a stream issuing at the surface of the earth, we do not see that such a supposition meets with any strong support; while, on the contrary, it appears evident, from the friable slate constantly opening new interstices, and every fragment exposing successive portions to the same influence, that time will have little, if any sensible effect upon the constitution of the spring, as long as it issues from the same bed.

In the ravine upwards from the well, the mountain stream runs at different angles, but sometimes in a line parallel to the direction of the laminæ of the rock. The rock becomes more and more fine in its slaty structure towards the summit: in some beds it is dark-coloured, from the presence of carbonaceous matter; in some a grayish-white, with a silky lustre; and in others it is of a brown-red cast, from the presence of iron. It is apparently from one of the latter beds that Hartfell Spa takes its origin; the colour is, however, entirely to be attributed to the effects of decomposition. The stream has left a nearly isolated peak, of considerable height, over one side of which it rushes in a small cataract.

We may proceed to Birkhill, on the road to Selkirk, by the continuous valley of Moffat Water, or from Hartfell Spa, traversing the mountain of that name, and enjoying the extensive scenery of the plains of Dumfries-shire, the hills of Cumberland, and the distant waters of the Solway Firth mingling in their outline with the gray horizon. Hartfell, on the eastern side, has an abrupt and

* For the chemical analysis of these waters, we refer our readers to Dr. Garnet's Tour. Since iodine and bromine are supposed to exist in all mineral springs, it would be interesting to know if they occur in mineral waters of the transition formation.

precipitous acclivity, and gives origin to some of the finest glens in this part of the country. A little to the north, these glens, with their tributary hills, contain a series of lakes, which lie like mirrors in their rocky frames. In summer time their still surface is scarcely disturbed, except when the shadowy outline of overhanging trees is broken by the leap of the trout, or the splash of the duck settling on the glassy surface.

Birkhill, which stands at the head of these lakes, is marked by three different ravines, all of which are in the alum slate, which re-appears at this point, and gives origin to the very same appearances, if not quite on the same scale of magnitude, at least in greater beauty than at Hartfell. There are numerous mineral waters here, with more abundant efflorescence than at the latter place, but they have not been subjected to chemical analysis. Two pretty cascades roll down a precipice on the side of one of these ravines. They are caused by the cropping of the transition clay slate. Foxes abound in these glens, in which the soil is easily burrowed, and where nature provides them with numerous secure places of retreat, in the deep holes of the ravine side. A shepherd of the vicinity assured us of his having been at the killing of twenty-seven young and old ones within the last two years.

We terminate our notice of these mineral waters, by expressing our sorrow that more attention has not been paid to them, situated as they are in a country well suited for healthy bodily exercises, at an elevation that ensures the presence of a light and bracing atmosphere, and themselves peculiarly adapted for many medical cases which require the invigorating aid of exercise and of mountain air. We wonder that the dark vale of Hartfell has never been brightened by the smiles of the fair, or echoed to the sound of voices joyous at the return of health.

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## *Geographical Society of London.*

In our last Number, (p. 362,) we gave a detailed notice of the steps which had been taken for the organization of a Geographical Society in London, up to the beginning of July last; and we now present our readers with a full report, from an official document, of the establishment and the further proceedings of the new institution. Indeed, we shall make it a duty to keep our eye constantly fixed on the progress of this Society, which is so intimately connected with the objects of our periodical; and we feel assured that its directors will take every opportunity of enabling us to extend the knowledge of their invaluable undertaking. We would wish to identify ourselves, in a measure, with the Geographical Society of London, which may thus stretch out its own arm to the remotest corners of the land.

At a meeting of the Society, held at the Rooms of the Horticultural Society, Regent Street, on Friday the 16th July, J. Barrow, Esq. in the Chair, the resolutions proposed at the meeting of the members of the Raleigh Traveller's Club, on the 24th May, (and printed in our last No.) were with slight alterations adopted; and the following noblemen and gentlemen were nominated as the council and officers of the Society for the first year.

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The Right Honourable Viscount Goderich, F.R.S.

VICE-PRESIDENTS.

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| W. R. Hamilton, Esq. F.R.S. | H. G. Ward, Esq. |

" *The Chairman then addressed the following Observations to the Meeting, explanatory of the general views of the Society.*

" THE ' Geographical Society of London' being now established, the Provisional Committee cannot close its proceedings without adverting to the gratifying fact of there being enrolled, on the List of its Members, within so short a space of time, considerably more than Four Hundred names. From this great and increasing number, and still more from the general character of the Subscribers, it is fair to conclude that a favourable opinion has been formed of the utility likely to result from the labours of such a Society. The *degree* of utility, however, which will be really affected, the Committee deem it almost unnecessary to observe, must depend on the attention and assiduity which the President, the Vice-Presidents, and the Council may bestow on its concerns, quite as much as on the stock of knowledge they may bring to the consideration of the several subjects that will come before them. And not on the Council alone will depend the extent to which the useful labours of the Society are expected to be carried, but in a very great degree also on the assistance which they may receive from the many individuals eminent in the Arts, Sciences, and Literature, and from the distinguished Officers of the Army and Navy whose names appear on the List of Members.

" The many opportunities that are afforded to Officers of the Army, while on Service abroad, and the promptitude and ability with which they avail themselves of them, (as the Office of the Quarter-Master-General and the Board of Ordnance so amply testify,) are the best pledges of what may reasonably be expected from that quarter; and the more so since the Committee has had the satisfaction to witness the readiness with which so many distinguished Officers of the Royal Artillery and Engineers have come forward to join the Society.

" With the same confidence the Committee look for aid from the Officers of the Sister Service, who on their own peculiar element in particular, will it is hoped, be assisted by other experienced Navigators, whether of and belonging to the Corporation of Trinity, the East-India Company, or to any other Maritime Service. On the exactitude of the minutest details of Hydrography must always depend the safety of Commerce and Navigation. Numerous dangers unquestionably exist in various parts of the ocean, that have not yet been ascertained, while others that have no existence still figure on our Charts, to the dread of Navigators. It has been well observed, that " the man who points out, in the midst of the wide ocean, a single rock unknown before, is a benefactor of the human race;" and scarcely less so is he, who, after careful examination, is able to decide that a rock or shoal, which appears on a chart, is either misplaced or has no existence.—These, it is true, may not be ranked among brilliant discoveries; but the smallest obstruction, whether rock or shoal, that exists in the ocean, may have been, and, so long as its exact position remains unascertained, is still likely to be, the cause of destruction to life and property. It may also be noticed that many practical observations are still desirable on the prevailing winds and currents, and more particularly on tides, of which there are various peculiarities among the islands and along the different coasts of the ocean, concerning which facts and observations are still wanting, for establishing one general theory that shall be found applicable to every part of the Globe.

"Every accession, therefore, to hydrographical knowledge,—a real danger discovered—a fictitious one demolished—or a peculiarity ascertained,—must be of great importance to Navigation, and a fit object for promulgation by the Society.

"The Committee, however, are also willing to hope, that many valuable contributions on Geographical subjects will be received from other individuals, whether on the List of Members or not, than those who are thus professionally qualified and invited to furnish them; particularly from such of their countrymen as have permanent residences abroad, from the various public authorities in the British colonies, and from those who have travelled, or may yet travel, in foreign countries. It is not for the Committee to specify in detail the various points of information which should engage the attention of the traveller; but they may observe that every species of information, connected either with Physical Geography or Statistics, if it have only accuracy to recommend it, will be acceptable; and in cases where the stock of information, generally, in the hands of any individual, is not of sufficient magnitude or importance to form a volume for publication, if sent to the Society, it will be made available, in some form or other, in its Transactions. The routes, for example, which travellers may have pursued through portions of countries hitherto but imperfectly known, or inaccurately described,—the objects of Natural History that may have presented themselves,—the meteorological and magnetic phenomena that may have been observed,—the nature of the soil and its products, of its forests, rivers, plains, mountains, and other general features of its surface; but above all, the latitudes and longitudes of particular places which the Resident or Traveller may have had the means of determining to a degree of precision on which he may rely;—such notices of detached portions of the Earth's surface, when regular surveys cannot be held, are of extreme importance, as furnishing the only means by which anything approaching to correctness in our general Maps can be attained. And the Committee cannot, therefore, entertain a doubt, that it will constitute a part of the Transactions of the Society to publish such detached pieces of information bearing on such of these points, as may be thought of sufficient interest and importance to be communicated for the use of its Members, and of the public at large.

"There are many other means besides those now mentioned by which geography may be advanced, but which are too numerous to be here specified at length. In addition to the few, however, which have herein been noticed, as well as in the printed prospectus already circulated, the following points, may be briefly stated, as being among the most important that will probably engage the attention of the Society:—

"1. The Composition of Maps, illustrative of particular branches of geographical knowledge, more especially those relating to orology, hydrology, and geology.

"2. The establishment of new divisions of the Earth's surface, formed upon philosophical principles, and adapted to different departments of science; more especially as regards those divisions which are founded on physical and geological characters, on climate, and on distinctions of the human race, or of language.

"3. A more uniform and systematic orthography than has hitherto been observed, in regard to the names of cities and other objects; and a more precise and copious vocabulary, than we at present possess, of such objects.

"4. The preparation and improvement of road-books for different countries, of gazetteers, and of geographical and statistical tables, and all such matters as are of general utility.

"The Committee cannot take it upon itself to pronounce to which, of so many important considerations as have been enumerated, the attention of the Society should be *first* directed; the order of precedence must obviously, in some measure, depend on the means, rather than the wishes, of the Council; but the Committee are willing to hope that, sooner or later, most or all of the subjects mentioned will engage that attention of the Members to which they appear to be fairly entitled; and that the range of investigation will in no respect be less comprehensive than the title of the Society implies.

"In making these observations, which have reference chiefly to facts, the Committee wish, however, to guard themselves against any supposition, that might be entertained, of their being hostile to theory; or of recommending to the Society to limit the reception of communications to such only as are the result of actual observation and experiment. On the contrary, they are fully aware that great benifits have been, and yet may be, derived from speculative Geography. Theories that do not involve obvious absurdities or impossibilities, but are supported by reasonable probabilities, may serve as guides to conduct to important discoveries; by exciting curiosity they stimulate inquiry, and inquiry generally leads to truth. Reasonings and suggestions, therefore, in regard to parts of the world deserving of minuter investigation, which are little known, or of which no good account has yet been given, the routes to be observed in examining them, the chief subjects of inquiry, and best modes of overcoming the probable difficulties that may occur in the research,—all these will form proper subjects for admission into the proceedings of the Society.

"And lastly, The Committee having reason to think, that at no great distance of time, the Society will be able to obtain suitable apartments for the reception of Books, Maps, Charts, and Instruments, they would venture to suggest, that donations of such materials as may tend to the elucidation and extension of Geographical Science would afford facilities to the attainment of its views. And they are willing to hope that, aided by such means, a Library of Books and Manuscripts on Geographical Subjects, with a collection of Charts and Maps, may be formed, that will not be undeserving of public approbation and patronage.

"*The Admission Fee and Annual Subscription, or, in lieu thereof, the Composition, to be paid to Messrs.* Cocks *and* Biddulphs, *Bankers*, 43, *Charing Cross; or to the* Secretary, 99, *Quadrant, Regent Street, to whom also Applications for Admission to the Society may be addressed.*"

Early in November next a general meeting is appointed to be held, for the purpose of deciding on a code of regulations and by-laws, for the management of the Society.

The high respectability of the Society, at its very formation, may be estimated by the subjoined list of members, amounting on the 22d July last to 440.

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With the view to make this Journal a perfect record of the Society's history, we shall from time to time give a supplementary list of additional members, together with a detail of the proceedings; and we hope in this way, and by labouring for the advancement of the institution, to render our work valuable to its supporters.

### *Brief Narrative of De Humboldt's Travels in Russia.*

*Extract from a Letter from M. de Humboldt to M. Arago.—Oust Kaménogorsk, Upper Irtych, Siberia, Aug.* 28. 1829.—Travelling for nearly the last two months beyond the frontiers of Europe, to the east of the Ural, and in the restless life which we pass, I have lost many occasions of giving you a token of my existence and of friendship. It is impossible in this hasty letter, (we arrived in this fort, on the frontier of the Step of Kirguiz, about 4 o'clock this morning, and we must advance this night to the east towards Boucktorma, Narim, and the first post of Chinese Mongolia;) it is impossible, I say, to communicate to you the substance of the observations which we have made since our departure from St. Petersburgh on the 8th of May. You will find no other interest in the perusal of these lines, than that of learning that the scientific object of my journey has been completed beyond my hopes: that, in spite of the fatigues I have undergone, and the distance I have travelled, (we are already more than 5600 versts from St. Petersburgh, 320 of which we have passed in this part of Asia,) my health is good; that I suffer with patience and courage; that I have much reason to congratulate myself on my companions, MM. Rose and Ehrenberg; and that, laden with geological, botanical, and zoological collections from the Ural, the Altaï, the Obi, the Irtych, and Orenburgh, we hope to return to Berlin towards the end of November.

Our route has been by Moscow, Nijneï-Novogorod, and thence on the Wolga to Cazan, and to the ruins of the Tatar village of Bulgari. From Cazan we ascended the Ural by the picturesque vallies of Koungour and Perme. Throughout the whole journey from Novogorod to Catherineburgh, and to the platinum-washings of Nijneï-Tagilsk, we were accompanied by Count Polier, whom you will recollect to have seen at Paris. He has been exercising his fine talent for landscape-painting in these savage regions. Fixed by marriage in Russia, he is zealously occupied in improving the working of mines.

We spent a month in visiting the gold mines of Borisovsk, the malachite mines of Goumeselevski and of Tagilsk, and the washings of gold and platinum. We were astonished at the *pepitas* (water-worn masses) of gold from 2 to 3 lbs. and even from 18 to 20 lbs, found a few inches below the turf, where they had lain unknown for ages.

The position and probable origin of these alluvia, mixed generally with fragments of greenstone, chlorite-slate, and serpentine, was one of the principal objects of this journey. The gold annually procured from the washings amounts to 6000 kil. The discoveries beyond 59° and 60° lat. become very important. We possess the teeth of fossil elephants, enveloped in these alluvia of auriferous sand. Their formation, consequent on local irruptions and on levellings, is perhaps even posterior to the destruction of the large animals. The amber and the lignites which we discovered on the eastern side of the Ural, are decidedly more ancient. With the auriferous sand are found grains of cinnabar, native copper, ceylanites, garnets, little white zircons, as brilliant as diamonds, anatase, albite, &c.

It is very remarkable, that in the middle and northern parts of the Ural, the platinum is found in abundance only on the western, European side. The rich gold-washings of the Demidov family at Nijneï-Tagilsk, are on the Asiatic side, on the two acclivities of the Bartiraya, where the alluvium of Vilkni alone has already produced more than 2800 lbs. of gold. The platinum is found about a league to the east of the line of the separation of waters, (which must not be confounded with the axis of the high summits,) on the European side, near the course of the Oulka, at Sukoi Visnin, and at Martian. M. Schvetsov, who had the good fortune to study under Berthier, and whose learning and activity have been most useful during our travels in the Ural, discovered chromate of iron, containing grains of platinum, which an able chemist at Catherineburgh, M. Helm, has analyzed.

The washings of platinum at Nijneï-Tagilsk are so rich that 100 *puds* (about 400 lbs. Russian) of sand afford 30 (sometimes 50) *solotniks* of platinum, whilst the rich alluvia of gold at Vilkni, and other gold-washings on the Asiatic side, do not give more than 1½ to 2 solotniks in the 100 puds of sand.

In South America, a very low chain of the Cordilleras, that of Cali, also separates the auriferous and non-platiniferous sands of the eastern declivity, (Popayan,) from the sands of the isthmus of the Raspadura of Choco, which are very rich in platinum as well as gold. M. Bousingault may perhaps already have thrown a new light on this American formation, and his observations will derive some additional interest from those which we have made in this place. We possess pepitas of platinum of many inches in length, in which M. Rose has discovered beautiful groups of crystals of the metal. As to the greenstone-porphyry of Laya, in which M. Engelhardt has observed little grains of platinum, we have examined it on the spot with much care, but the only metallic grains which we have been able to detect in the rocks of Laya, and in the greenstone of Mount Belayr-Gora, have appeared to M. Rose to be sulphuret of iron; this phenomenon will be a subject for new research. The work of M. Engelhardt on the Ural seemed to us to be worthy of much praise. Osmium and iridium have also a particular locality, not amongst the rich platiniferous alluvia of Nijneï-Tagilsk, but near Bilembayevski and Kichtem. I insist upon the geognostical characters drawn from the metals which accompany the grains of platinum at Choco, Brazil, and in the Ural.

These last lines were written on the 20th August. I have abandoned the pen for the last eight days, to occupy myself with taking lunar distances; for this southern extremity of Siberia, where the sources of the Obi and the confines of Chinese Mongolia are found, require much attention in the geographical determination of places,—the rate of the chronometers alone being liable to alteration by the rapidity of the journey. I have been since the 13th to visit the Chinese picquet (outposts) in Dzongarie. We have been obliged to leave our carriages at Oust Kamenogorsk, to make use, in these frightful roads, of the long Siberian carriages, in which one lies down. But before speaking of the journey we have passed in the midst of the celestial empire, I must follow the thread of our travels. After having visited the north of the Ural by Verkhoturia and Bogeslavsk, taken azimuths to determine the positions of the northerly peaks, visited the mines of beryls and topazes at Moursinsk, we travelled from Catherineburgh, which we left on the 6th July, through Tobolsk and Jioumère, where the family of Batou-Khan formerly resided.

We intended to go directly through Omsk to Slatooust; but the fineness of the season induced us to add the Altaï and the high Irtych, (3000 versts round,) to the original plan of our excursion. The governor-general of Western Siberia, General Villiaminov, gave us one of his aides-de-camp, M. de Yermolov, for an escort. General Litvinov, who commands on the whole line of the Kirguiz, took his place in coming from Tomsk to the mountains of Kolyvan, and escorted us to the Chinese post. We arrived here by Kaïnks and the step of Baraba, where the musquitoes rival those of the Orinoco, and where we were smothered under masks of horse hair. Here are the romantic lake of Kolyvan, and the famous mines of Schlangenberg, (in porphyry,) of Reiders, and of Siriaïnovski, which annually yield 40,000 lbs. of auriferous silver. At Oust we had the first view of the chain of the Kirguiz.

We took the route of Baty, by the fort of Boukhtarma and of Krasnoyar, where, passing the whole night of 16th to 17th August (new style) for observation, I saw the singular phenomena of the polar bands. At Baty there are two Chinese encampments, on the two sides of the Irtych,—miserable *yourtes* inhabited by Mongolian or Cambauzian soldiers. A little Chinese temple is seen on an arid eminence. The Bactrian camel with two humps pastures in the valley.

This frontier of Mongolia supplied M. Ehrenberg with numerous plants and new insects. But what renders the journey in the Altaï particularly import-is, that no where else in the two worlds, does the granite with common large feldspar, deprived of albite, and unaccompanied by gneiss and mica slate, exhibit proofs of irruption and effusion, as in the Altaï. We do not only see the granite penetrating in veins which are lost towards the top in the clay-slate, and making its way to the surface through this rock, but also distinctly spreading out over it, and covering a continuous space of more than 2000 toises: then conical hills, and little bells of granite, and domes of trachytic porphyry, dolomites in granite, veins of porphyry, &c. &c.

M. Rose discovered, in the north of the Ural, a place where the porphyry, cleft and partly rounded, had converted, by contact, lime into jasper, divided by parallel bands. I have also seen these striæ and silifications at Pedrazio. The Ural is also remarkable for the intimate connection of the euphotide (serpentine) chlorite slate, with pyroxenic greenstones containing more hornblende than pyroxene. I have endeavoured to observe the temperature of the earth, (it is often above 2° cent.) and the inclination and magnetic intensity in the places which had not been visited by MM. Hansteen and Ehrmann. The same points prove the motion of knots from east to west, which you have noticed in your report on the voyage of M. Freycinet. But the post is going, and leaves me not a moment to re-write or correct this confused letter.

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### *Principal Sovereigns of Asia and Northern Africa.*

*Ottoman Empire.*—This monarchy comprises Turkey in Europe, (of which Moldavia, Wallachia, Bulgaria, Servia, and Bosnia, form a part,) Asia Minor, the islands of Candia and of Cyprus, a great part of Armenia, Kurdistan, Irack, Arabia, Mesopotamia, Assyria, Syria, Palestine, Egypt, and a great part of Nubia; we except from these the new Grecian state. The surface of the whole of these countries is about 1,064,000 square miles, and their population may be esteemed at 25,000,000 of souls.

Sultan Mahmoud II. son of Sultan Abd'oulhamid, born the 20th of July 1785, and proclaimed in the place of his brother Mustapha IV. dethroned the 28th of July 1808.

*Egypt.*—Mohammed-Ali, born at Cavala in Romelia, in 1769, (1182 of the Hejira,) son of Ibrahim Agha, proclaimed pacha the 14th of May 1805, in place of Khorschid-Pacha; confirmed by the sultan Selim III. the 1st of April 1806.

*Bagdad.*—Daoud-Pacha.

*Moldavia.*—Jean Stourdza, Moldavian, elected hospodar the 16th of July 1822, and proclaimed at Yassy the 21st of the same month.

*Wallachia.*—Gregory Ghika, elected hospodar the 16th of July 1822, and inaugurated by the Pacha of Silistria the 21st of September 1822.

### *Vassals of the Ottoman Empire.*

*Tripoli.*—Sidi Yousouf, Karamanli, pacha, succeeded in May 1795, to his father Ali, son of Mohammed; the number of his subjects is esteemed at two millions.

*Tunis.*—Sidi Hasan-Bey succeeded to Homouda-Bey the 23d of March 1824. His estates have about 2,800,000 inhabitants.

*Algiers.*—Houssain, son of Hasan ancient minister of the interior, succeeded the 1st of March 1818, to the dey Ali. Houssain was 54 years old at the period of the conquest of Algiers by the French, and the population was estimated at two millions and a half.

*The Scherif of Mecca.*—Yahia, son of Sourour, replaced, the 2d of November 1813, his uncle, the scherif Ghaleb, deposed by the pacha of Egypt, Mohammed Ali, and who died at Salonica in 1818.

*Iman of Hyemen.*—N——— succeeded in 1815 to Tamy, chief of the tribe of Asir; made prisoner by the Arab Hasan, son of Khaled, ally of the pacha Mohammed Ali, and put to death at Constantinople in 1819. The Iman of Hyemen resides at Sanaa.

*King of Senaar.*—Bady VII. son of Tahl, 29th king of the race of Foundjis, a tribe that took its departure from the interior of Africa, and which went and established itself at Senaar, towards the end of the 15th century. In June 1821, Ismael, son of the pacha of Egypt, obliged them to recognize the supremacy of the Sultan Mahmoud.

*Empire of Morocco,* in the north-west of Africa; its surface is 130,000 square miles, and the number of its inhabitants is esteemed at 4,500,000.

Mouley-Abh-Errahman, sultan, eldest son of Mouley Hescham, son of Sidi Mohammed, succeeded to his uncle Mouley Souleman the 28th November 1822.

*Kingdom of Abyssinia* has an extent of 130,000 square miles, with 1,500,000 inhabitants. Ista Guarlow, successor to Ayti Egwala Sion, of the dynasty of Solomon, which has reigned without interruption from 1268, resides at Gondar. He enjoys much consideration, but has no power, and possesses no revenue but what the independent governors of the provinces will allow him. These governors are Selassy, the most powerful of all, successor to Wassen Segued, cheif or Murd-Asimadd of Sehon and of Efat, who has taken the title of king; Scham Temben Guebr Michael, chief of Tigré, successor of Ras Welled Selassy; Gukho, successor to Fasil, chief of Amhara, (Gojam; N———, son and successor of Hellé Mariam, governor of Samen, upland of Abyssinia.

The Gallas have for a long time invaded the southern part of the country; the most powerful tribe is that of Edehon, commanded by the Liban and by Godji.

*Iman of Mascate.*—The states of this prince are situated in the eastern part of Arabia, and comprise the country which is ordinarily called the kingdom of Oman. Its possessions have an extent of about 500 English miles along the coast; the capital is Mascate. The number of inhabitants does not probably exceed more than 2,000,000. The annual reveuue of the Iman is about 2,500,000 francs. Seid-Said succeeded to his father Seid-Sultan, about the year 1864. He is the third descendant of Ahmed, son of Said, founder of that power.

*Persia,* 350,000 square miles, 9,000,000 inhabitants, and a revenue of 80,000,000 francs.

Feth-Ali-Schah, of the Turkish tribe of Kadjars, named Baba-Khan previous to his ascending the throne, son of Houssaien Kouly-Khan, born in 1768, succeeded in 1796 to his uncle Agha-Mohammed-Khan, founder of the dynasty. Abbas-Mirza, presumptive heir to the crown, was born in 1785.

*Afghanistan,* between Persia and India, 172,000 square miles, 6,588,000 inhabitants, and 45,000,000 francs of revenue.

The crown is hereditary in the branch of the family of the Saddouzi, which descends from Ahmed-Scah-Abdalli; the royal title is Schahi-devri de vrân. The monarch Ghasnevide Sebecteghin submitted the country in 997; Babour conquered Ghazna and Caboul in 1506; the Afghans conquered Persia in 1720; and were submitted in 1737. Ahmed-Schah-Abdalli was crowned at Candahar in 1747. His son Timour-Schah reigned from 1773 to 1793; Zeman-Schah to 1800, when he was dethroned by his brother Mahmoud, who, three years afterwards, was driven out hy his brother Schoudjah, who in turn was expelled by Mahmoud in 1809. During these disorders Rundjet-Singh, sovereign of Lahor, conquered Cachemir and Peschawer, when the son of Yar-Mohammed-Khan, the third brother, reigned under his tutorship: in 1826, Mahmoud took his departure fiom Candahar, and re-united his troops to those of Feth-Ali-Schah, whilst Schoudjah was a fugitive in English India: the emirs of Sinde have obtained possession of a part of the country.

*Beloutchistan,* to the south of the country of the Afghans, contains about 3,000,000 of inhabitants.

Mahmoud-Khan, about 47 years of age, succeeded to his father Nasir-Khan in 1795: the latter had submitted the Mekram towards the latter end of his reign; his son abandoned it in 1809.

*Balk*, conquered in 1825 by Mir Mourad-bey, who drove out Nedjib-Oullah-kan, governor for the king of Caboul.

*Bokhara*, 173,000 square miles, 2,500,000 inhabitants, 12,000,000 francs of revenue.

The great khan of Bokhara and of Samarkand, Batkur-Khan, succeeded to his father, Mir-Haider-Khan in 1826; the intermediate reign of his brother, Mir Houssain, only lasted four months. The governor of Hisard is Seid-Atalik-bey, father-in-law of Mir-Haider.

*Kholand*, comprising the country watered by the upper part of the Syr-Dari or Schoum.

Emir-Khan, prince of Farghanah and of Kholand.

*Badakhschan*, comprising the country watered by the upper part of the Arnou-Daria or Oxus.

Mirza-Abd'oul Ghafoul, son of Mohammed Schah, resides at Farzabad, a town different from Babakschan, and placed to the south of this.

*Kharism*, on the inferior Oxus, with 350,000 inhabitants, partly nomades.

Bahman-Kouli-Khan succeeded to his father Mohammed-Rahin Khan in 1826; the title of these princes, of Ouzbeke origin, is Taksir-Khan; they reside at Khiva.—*Asiatic Journal of Paris.*

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### *Journals and Periodical Publications of Poland.*

The periodicals of Poland, according to the most recent statements, and bringing them into their relation with the population of the different parts of Poland, would be as follows:—

| | *Population.* | *Journ.* | 1 *Journ. to* |
|---|---|---|---|
| 1. Independent Poland, Republic of Cracovia, | 107,934 | 5 | 21,586 |
| 2. Russian Poland; or the governments of Wilna, Grodna, Minsk, Bralystak, Vitcpsk, Mohclow, Walhynia, Podolla, Ukraine, or of Kiou, Courland, | 11,289,100 | 2 | 5,644,550 |
| Of kingdom of Russian Poland, | 4,688,289 | 37 | 110,000 |
| 3. Prussian Poland, | 1,984,124 | 1 | 1,984,124 |
| 5. Austrian Poland, | 4,226,969 | 4 | 1,056,742 |
| Total, | 22,296,416 | 49 | |

A great falling off, with respect to literature, has more especially taken place in the provinces entirely under the Muscovite empire. In 1823 the new system of government was adopted by the Emperor Alexander, and the supreme authority was vested in the hands of the Great Duke Constantine, and from that period we may date all the misfortunes of the Poles. Till then Wilna was the centre of knowledge for all dismembered Poland, and surpassed Varsovia with respect to literature; for not being, like it, distracted by the wars of Napoleon, she could offer an asylum to those who devoted themselves to the sciences. In 1823, there were in that city as many as ten journals and newspapers, characterized by a conscientious and learned direction; at the present day we can only name two, and they are subjected to a kind of military censorship. The same decline distinguishes Prussian Poland, where the number of inhabitants who speak Polish diminishes every day, whilst the use of the German language is more and more extended. Austria is in that respect less fatal to Poland than Prussia.

On the other hand, the progress in the other parts of Poland is astonishing;

and we more especially see a difference in the present population of the provinces which, up to the year 1815, were known as the Dutchy of Varsovia, comprising the republic of Cracovia, the Russian kingdom of Poland, the Duchies of Posen and Thorn.—*Revue Encyclopedique.*

*Statistical Society of Paris.*—A society of this kind has been instituted by the exertions of M. C. Moreau. Its objects are those of general statistics, and embrace, consequently, all the branches of human knowledge. The society will be composed of resident, non-resident, corresponding, and honorary members. All friends of science, strangers or Frenchmen, however far they may be from the seat of the society, may become members. The Duke of Orleans is the patron. The honorary presidents are the Dukes of Cadore and of Dondeauville, Counts Simeon and d'Hauterive, and Jomard of the Institute. The president is the Count A. de Laborde. The vice-presidents are Count Noé, Barons Juchereau, of St. Denis, and de Montemart-Boisse. Secretary, M. de Montveran. There is besides a committee of administration of which M. Cæsar Moreau is the director, and M. Sarans the secretary.

*Libraries in the Faro Islands, in Iceland, and in Greenland.*—It is some time since there have been endeavours made to establish libraries in Greenland, Iceland, and the Faro islands. Sir George Mackenzie, in a spirit of philanthrophy, claimed our exertions on the part of Iceland, which had for so long a time been the favourite seat of literature. It appears that Professor Rafn established a library at Godthaab, in Greenland. This has lately received from the King of Denmark a present of 55 volumes, so that it has now 82. The library of Reckeaveck, in Iceland, now possesses 5129 volumes; that of Thorshavn, in the Faro Islands, contains 1678 volumes; and that of Olgord, in the northern part of Iceland, 858.

*Grecian Sepulchre at Monte Video.*—A correspondent in the *Revue de Deux Mondes*, states, we do not know upon what authority, that Grecian relics have been found in the environs of the above-mentioned place. They consist of a grave-stone, with characters which have since been partly deciphered: "Under the reign of Alexander, son of Philip King of Macedon, in the 63d Olympiad, Ptolemaios." There was further an excavation containing two swords, a helmet, and a shield. Thus, a contemporary of Aristotle might have trod the soil of Brazil and the Plata. There is a very high degree of improbability both in the details and in their results.

*Miscellaneous Intelligence.*—A museum devoted to the fine arts and antiquities has been established at Ægina; it already contains several statues and heads, inscriptions, reliefs, vases, and other objects of art.

The Society of Statistics of Marseilles has proposed a prize on the following questions:—1. The actual statistics of the commerce and of the different branches of industry of Marseilles. 2. To indicate the means of extending and of developing the commerce and industry of that city.

A petition for the admission of the tobacco of Australia into the harbours of this country, is, we believe, about to be laid before the House of Commons. A communication by steam-boats is also said to be about being established between India and the Australian colonies. The boats will touch at Swan River.

Mr. John Willis, Professor of Geography at Shrewsbury, is travelling in Upper Canada, and has been well received by the native Indian tribes. He is about to endeavour to reach the Russian establishments on the Pacific Ocean, from whence he will take his departure from Kamtschatka, and from thence go by land to St. Petersburgh.

# NATURAL-HISTORICAL COLLECTIONS.

## Baron Cuvier's *Lectures on the History of the Natural Sciences.*

Lecture X.—The Natural Sciences under the Ptolemies.—The three great branches of natural history, zoology, botany, and mineralogy, had arrived in a few years, and by the labours of two individuals alone, at a considerable degree of perfection. If at this period the same method had been persisted in, the study of nature had been pursued, and the observations which were made had been classed, there is no doubt that the sum of positive knowledge would have continued to increase rapidly. But after the death of Theophrastus, Greece was agitated by troubles which no longer allowed the study of natural history, (which requires tranquillity, and a certain preparation,) to be prosecuted; and soon the speculative studies could alone be continued at Athens, and even these, in those days of persecution, no longer shone with the same lustre as in the fine days of the republic.

Science took refuge at this period in Alexandria; but even in the Museum the great activity which had originated from the impulse given by Aristotle, very soon slackened. Some of the learned men, adopting the dreamy philosophy which already began to prevail in the capital of Egypt, wandered out of the proper direction,—others abandoned themselves to a certain indolence, which made them neglect direct observation. Having the power to use a very large library, an entirely new resource, and whose utility on that account was more accurately felt, they occupied themselves in discussing the facts which the books furnished to them, instead of thinking of obtaining new ones. Criticism took birth from their labours, undoubtedly a very useful art, but which at that period was somewhat premature. All sedentary studies, such as we call cabinet studies, mathematics, history, poetry, were cultivated in preference, and the natural sciences were soon no longer followed but in their relation to medicine. Botany ceased to be studied for itself, but it was still the object of the labours of the Rhizotomæ, who applied themselves to the study of the medicinal properties of plants.

These Rhizotomæ, who were in some manner herborists, and who enjoyed the same reputation as physicians, were nevertheless not ordinarily destitute of general knowledge. Euthydemes of Athens, who first cultivated the melon, from seed which had been brought from Persia; Clearchus, who introduced the plum-tree; Phragas of Ereses, and some others, whose names have been preserved, were not strangers to philosophical studies, and it is remarkable that they all belonged to the peripatetic school.

A hundred years previous to the period with which we are now occupied, anatomy did not exist, and Hippocrates, as we have previously stated, only knew of human organization, that which he could externally perceive, or which he had occasion to observe in the treatment of wounds. A little earlier, it is true, Alcmeon appears to have made some interesting discoveries on the internal structure of animals; but the prejudices of his age did not allow him to publish them nor to pursue them. Heraclites, who devoted himself to the same studies, was obliged to retire among the tombs. The science did not, then, exist before Aristotle, who, by the study of comparative anatomy, arrived suddenly at sufficiently exact and general notions, and who even, for particular cases, indicated, often with much accuracy, the variety of organization from one animal to another.

The investigations of Aristotle were followed by the physicians, and applied to the human species. But as in Greece every mutilation practised on a dead person, even with a scientific view, would have been looked upon as a horrible profanation, as a crime deserving the punishment of death, those who wished to instruct themselves in anatomy, were obliged to go into Egypt, where the practice of embalming had necessarily given some notions of the arrangement and the structure of the principal viscera, and must furnish new occasions for observing. But this journey became infinitely more profitable when the Ptolemies were masters of the country. These enlightened princes, emulous of contributing to the progress of human knowledge, gave permission to dissect to several Greek physicians. Their protection placed anatomists beyond the reach of popular fury; but it could not preserve them from the atrocious calumnies which were disseminated against them. It was even pretended that they had dissected living men.

The first who obtained a name among the anatomists, the chief of the school, if we may thus express ourselves, is an Asclepiad of Cos, named Praxagoras, contemporary of Theophrastus, and probably a disciple of Aristotle. It was he who first gave a name to the arteries, and established the distinction between these vessels and the veins, demonstrating that the latter contained blood after death, whilst the others are entirely empty. He first showed that the pulse exists in the arteries. Medical men, it is true, in the time of Hippocrates, and even anterior to that period, made use of the indications of the pulse; but they did not take into account the origin of this motion. Praxagoras, who made this discovery, had no notion of the circulation of the blood.

Two other medical men, still better known, are Herophilus and Erasistratus, who both lived principally in Egypt. Herophilus, born in Chalcedonia, was of the family of Asclepiadæ. He was a pupil of Praxagoras, and became afterwards the physician of Ptolemy, son of Lagus. It is to him that belongs the merit of having discovered in the nerves the organs of sensation and volition, and of having carefully distinguished them from tendons, ligaments, and other white tissues with which they were previously confounded. He described different parts of the brain; the curvature of the corpora striata; the choroid plexus; the calamus scriptorius; and, lastly, that vascular arrangement which, in the present day, we call, from his name, torcular Herophili. He described the internal membranes of the eye; the hyoid bone; the pulmonary vein, which he calls arterial vein. He also gives to a part of the small intestines the name of duodenum. Lastly, he recognized the isochronism of the pulsations of the heart and arteries. It would appear that there was only one step further to the discovery of the circulation; and yet Herophilus had no more idea of it than Paraxagoras.

Eristratus, born in the island of Cos, attended, during some time, the lectures of Aristotle, of whom he was the grandson; and, after the death of this philosopher, he attached himself to Theophrastus. He was physician to Seleucus Nicanor; and every body knows how he discovered the love which the son of this prince, Antiochus Soter, had for his mother-in-law, Stratonice. He afterwards quitted Syria and came to Alexandria, where he devoted himself with ardour to the study of human anatomy. His labours are considerable. We are indebted to him for the capital discovery that all the nerves terminate in the brain either immediately or through the medium of the spinal marrow. He compared the brain of man to that of a great number of animals, and not only in a general manner, as Aristotle had done, but taking it part by part. He recognized the lacteal vessels on a kid that had just suckled. He was acquainted with the internal valves of the heart, and described the tricuspid valves. This was another step towards the knowledge of the circulation, which he, nevertheless, did not arrive at; and an interval of more than seventeen centuries elapsed between his discovery and that of Servetus. He even thought that the air passed from the lungs into the arteries, and from thence into the heart; and it was on this idea that he based his practice. Erasistratus founded at Pergamus a school of medicine, which perpetuated itself to the fourth century. He was, like Herophilus, very learned in botany. The works of these two medical men are lost; and we only know of their labours by the mention which Galen has made of them.

While the learned men of the museums were causing science to advance at Alexandria, some travellers continued to go to distant countries in search of information. Thus, Megasthenes, who had been sent by Nicanor to a king of India, whom the Greeks have called Sandrocottus, wrote a relation of his journey, which is lost; but of which Strabo, Arrian, Ælian and Athenæus have preserved fragments. In it we find the description of many remarkable plants and animals; of bamboos; of white monkeys with black faces; of shells, in which pearls are found, &c. In all the narratives of journies which the ancients have left us, we find a number of gross tales. But if, taking them as pure falsehoods, we concluded from them that the author was deserving of no confidence, we should deprive ourselves frequently of very useful sources of information. We must carefully distinguish what the traveller relates as having seen, from what he relates only as having heard said. In this latter case he has been exposed to interpret literally a narrative full of metaphorical expressions, or to reproduce, as he may have received it, a popular belief. Thus, Megasthenes says, that in the Caucasus there exists a race of men whose feet are directed behind. There can be no doubt that this tale was told him in the country, when, in the present day, they believe in the existence of beings thus formed—a kind of wicked genii, who come during night to torment man. It has been a reproach to Megasthenes to have stated that bears exist in Southern India. We were not acquainted with any in that country; but, for five or six years back, no less than three species have been discovered.

We have said that the sciences flourished in Egypt under the reign of the first Lagides. Ptolemy Soter had founded the library. Ptolemy Philadelphia had encouraged by example the study of natural history; the third king of that race, Ptolemy Euergetus, was also a protector of learned men. With many great faults this prince had also some great qualities; he extended his conquests to the south; and an inscription has been found on the frontiers of Nubia, which alludes to his victories over the kings of Syria. In this campaign elephants were for the first time employed; they exceeded in strength and in courage the elephants of India which were made use of in the army of the enemy, and which contributed very much to the success of the conqueror. The fourth of the Ptolemies, Philopater, after a reign of considerable length, left a kingdom, much weakened, to his son, Epiphanes, then a child. The great men thought that they would act wisely in placing the young prince under the tutorship of the Roman people; but this measure, instead of producing the effect which they had promised to themselves, only increased their troubles, and from that time science began to decline in Egypt. This country, during the time of its glory, besides the naturalists of whom we have spoken, had also learned men of another order, profound mathematicians and great astronomers: such were Euclid; Eratosthenes, who first endeavoured to measure the earth by ascertaining the length of a degree of the meridian; Hipparchus, to whom we are indebted for the first catalogue of stars and a knowledge of the precession of the equinoxes. We must also mention Aratus, who had composed a poem on the constellations, and another on anatomy, after the discoveries of Erasistratus. It was during the reign of Philometer, the sixth of the Lagides, that Hipparchus flourished. After the death of this great man, the science, which he had caused to make so great a progress, remained stationary during a space of three centuries.

Ptolemy Physcon, who ascended the throne of Egypt after the death of his brother, Philometer, was a debauched and cruel prince. During his reign the learned men of Alexandria were obliged to disperse themselves. Greece had formerly lost her learned men from the effects of the civil war of which she had been the theatre. The troubles of Egypt brought her new ones. The refugees were obliged, for the sake of subsistence, to teach in the towns of continental Greece and of the islands. They for a time brought back the pursuit of good studies. Physcon, though a persecutor of learned men, was not an ignorant man: He had written a commentary on Homer, and even a work on natural history, in which he speaks of the fish of certain rivers of Africa. This prince is the first who succeeded in breeding pheasants, which he had obtained from Medea. These birds multiplied sufficiently to have supplied his table; but he abstained from eating them, he considered them so extremely precious. In a journey which he made to Rome, he relates that he was struck with the quantity of peacocks that were in that city.

It was at the period of the dispersion of the learned men, that the library of Pergamus began to increase. It had been commenced under Eumenes II. grandson of Eumenes, founder of the kingdom. There was soon an emulation between the kings of this country and those of Egypt as to who should have the most books; whence there was an order not to carry any paper out of Egypt. The learned men of Pergamus then made the discovery of parchment,—a most important discovery, and one to which we are indebted for the preservation of almost all the works of antiquity. At the revival of letters, in fact, few or no manuscripts were found on papyrus, which may easily be conceived, since these leaves were much more easily injured than our own paper. Since that time, some have been found preserved with the mummies; but their contents have hitherto given us very little information.

After Physcon, a still more barbarous prince reigned, and who pushed stupidity so far as to destroy the monuments of ancient Egypt. Thebes having risen up against him, he gave orders that the temples and the palaces, of which that city was full, should be thrown down. He only left standing what he could not overthrow.

He showed himself a greater enemy to learned men than even his predecessor had been, and finished by driving out the few that still remained in Egypt. It was nevertheless in his reign that Agatharchidas flourished, a peripatetic philosopher, who, as well as we can judge from a fragment preserved by Phocion, had occupied himself with much success with natural history.

Agatharchidas was a native of Gnidos, and probably belonged to the family of Asclepiadæ. He passed all his life in Egypt, and was even tutor of the tenth Ptolemy, Alexander II. The fragment which we possess, relates to the history of the Red Sea. The author describes the different nations that inhabit the borders of that sea. He makes us acquainted with their manners and the nature of their food. People were met with at that time on the coast of Abyssinia who fed on grasshoppers; others eat the flesh of wild beasts. He also speaks of the animals of these different countries, especially of those which had been brought to Alexandria. Thus he describes pretty accurately the rhinoceros, the giraffe, which he calls camelo-pardalis, a species of hyæna called crocutta, and some other quadrupeds; he describes also the pintado. He speaks of the hot springs that are met with in some of the provinces; of the gold mines, and of the manner in which this metal is wrought. In one word, this fragment is very precious for the natural history of Africa. Agatharchidas was the last naturalist of the Grecian period at Alexandria. Different causes had combined to stifle the natural sciences in Egypt. In the first place, the furious stupidity of the last Ptolemys, and the increasing influence of the Romans, who only prized the branches of human knowledge that were applicable to war; but, above all, the introduction of a new philosophy, the new Platonism, a mixture of Jewish ideas with the notions of the Platonists.

Before Egypt fell entirely under the yoke of the Romans, the famous library of Alexandria was consumed by fire. Cæsar, attacked by the inhabitants of that city, was obliged to fire their fleet to effect his escape. The fire communicated itself to the houses near the harbour, and at length reached the edifice where the books were preserved. What is very singular is, that Cæsar, who speaks of the burning of the fleet, does not mention a word of that of the library. Lucan, in his Pharsalia, does not speak of it either. It would have been nevertheless a fine subject for poetry with him, and quite to his turn of mind. The first writer who speaks of this destruction is Plutarch, who lived 200 years afterwards. It further appears that every thing was not lost, and that the library consisted of two buildings, only one of which was consumed. Antony, to repair this disaster, gave, it is said, to Cleopatra, the books of the kings of Pergamus. After the death of Antony, Egypt ceased to be an independent kingdom, and in future we shall only have to mention it as a part of the Roman empire. Soon afterwards the kingdom of Pergamus became also a Roman province. Natural science had been cultivated with some success, and the last king, Attalus III., had himself been much devoted to botany. The king of Pontus, Mithridates Eupator, had also applied himself to that science; and it was on his account that names of men were first given to plants. This prince was more especially desirous of knowing plants which were considered as antidotes. The use of poisons was so common at that period, that it is not astonishing that he wished to preserve himself from them.

Nicander, physician to the last king of Pergamus, also wrote on poisons. He has left two poems, the one entitled Theriaca, relating to venoms, which are applied externally,—the other, entitled Alexipharmaca, treating of poisons which are given internally. In his Theriaca he describes animals whose bite is venomous. He speaks of twelve species of serpents,—one of them is the *Coluber Haje* of Linnæus. It is the serpent which was carried by the Egyptian boatmen, and the one which Cleopatra made use of to destroy herself. Nicander relates its battles with the ichneumon. Another snake described in this poem is the *Cerastes*, (horned viper of the ancients,) which inhabits plains of sand; the ten other species are less easily recognized. Nicander speaks afterwards of the Geckos, of venomous spiders, and lastly, of eight species of scorpions, described in such a manner that they might probably be recognized by a person living on the spot; and his descriptions would even be very useful indications to a traveller.

In the Alexipharmaca Nicander treats of poisons taken internally. He describes venomous plants, and the properties of their juices. Many erroneous statements are met with in this poem. We nevertheless perceive that botany had made some progress. Several plants which had not been mentioned by Theophrastus are introduced. Nicander says that rats are fond of the root of the Aconite. The fact passed for a long time as false, and has only lately been recognized as true.

Nicander wrote about a century before Christ. In his works, which belong to the end of the Grecian period, we already see evident signs of decline: we meet with neither order nor method, nor any scientific object.

(*To be continued.*)

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*Distribution of Plants.*—The Algæ are exclusively the inhabitants of the sea, and they present to us this singular phenomenon, with respect to the geographical distribution of plants, that whilst under the equator the vegetation of the continents astonishes us by the size of the foliage, the thickness and elevation of the stalk or of the trunk, according to the character of the species, the contrary exists with respect to the marine algæ; for it is under that climate that they are reduced to their minimum proportions. But we see these plants increase gradually in size as we approach the cold latitudes of each hemisphere, and we shall lastly remark, that it is in the countries which produce vegetables with the slenderest leaves, as the resinous trees and the heaths, that we find in the greatest abundance gigantic Algæ, composing in their mass a submarine forest at the bottom of all gulfs. Some species of Algæ even represent, in their fan-shaped conformation, the image of the leaves of the palm trees of the torrid zone.

We may deduce from this observation, which hitherto had escaped naturalists, this remarkable consequence in the geographical distribution of plants,—that where the great vegetable forms disappear from the terrestrial surface, they pass under the water.*

* In the article "Mer" of the Dict. Class. d'Hist. Nat., Bory St. Vincent, in attempting a distribution of seas from the character of its vegetation and animal productions, has, we think, previously arrived at conclusions which would comprise this statement. Ed.

These Algæ, sometimes of a prodigious length, when torn from their retreats by currents or by violent tempests, may become points of recognition to navigators uncertain of their position. They are for them so many notices scattered upon the surface of the seas, which would inform them not only of an approach to land, but in what country they are; for different and very distant countries do not generally produce the same Algæ.

In the Austral hemisphere pyriferous Macrocystes announce Magellan's Straits, the Trumpet Varec signalizes the Cape of Good Hope, the elegant Cystosira trinodis, and its companion, the Cystosira moniliformis, equally inform us of an approximation to the shores of New Holland; lastly, in the seas which surround the islands of Newfoundland, of St. Peter, and of Miguelon, so often hidden in dense fogs, the navigator will know that he has arrived on a rocky coast, when he observes a large Laminaria, with an arborescent frond, ornamented laterally with folds, like so many festoons. The tubular foot of this plant, which I have called Laminaria longicrioris, furnishes a tubular swelling, by the aid of which it floats on the surface of the sea, while the large leaf in which it terminates, descends and gradually buries itself in the water, curving round in the form of an arc.—*Extract from a Flora of Newfoundland and of the Islands of St. Peter and of Miguelon, by M. de la Pylaie.*

*On the Forms and Relations of Volcanoes, from the Observations of Leopold de Buch; by* Mr. Elie Beaumont.—The manner in which the effused or upraised craters have been formed, appears to be at the present day one of the principal problems of geology. Its solution, which can only be obtained by the means proposed by Mr. Elie Beaumont, by a study of the forms and relations of volcanoes, would immediately give the key of volcanic phenomena, and would probably also lead us to find that of a much more important phenomenon—the upraising of chains of mountains. De Buch first pointed out the fact, that in countries where all the rocks present more or less completely the characters of volcanic products, many cavities which have the form of craters, have never been craters of eruption. The oxidated crust of the earth has been elevated by the action of an internal power; a crater of effusion, (*cratère de soulevement,*) has been formed, but no permanent canal of communication has established itself in this opening between the interior of the globe and the surface. The volcanic action which has produced this imperfect volcano often makes way at a short distance, giving birth to little craters of eruption, as on the island of Palma, which are generally on a strait line which passes through the centre of the crater of effusion.

There is a connexion, but not an identity, between the causes of the mechanical action which produced the craters of effusion, and those which continue to sustain volcanic phenomena. There can be no doubt, from the discovery of primitive blocks in the cleft which gives access from Caldera to the island of Palma, that the mechanical action which produced the craters of effusion developed itself beneath the primitive rocks. It was already known, from the time of Dolomieu, that the seat of volcanic eruptions was also placed beneath the same rocks.

Craters of effusion have seldom been produced in an isolated manner; on the contrary, many have formed themselves in the neighbourhood of one another, either by grouping themselves around a central and principal volcano, or forming themselves in a line whose direction is in relation to the great accidents of the soil of the country. These centres of eruption thus grouped, are not independent of one anothei. The periods of eruption may be the same or different; and by comparison of the catalogue of eruptions, we find that Vesuvius, Ætna, and Stromboli are not only distinct volcanoes, but belong to separate groups, while the volcanic phenomena of the Canary Islands depend on one another. Each of the Canary Islands, nevertheless, consists of a central crater of effusion of a considerable diameter, on whose external ridges basaltic columns or *fuzes* rise on all sides. These islands cannot be the fragments of a great continent. They are a re-union of islands which have been elevated, the one beside the other, and in an isolated manner, from the bottom of the sea. All the volcanoes in the globe may be divided into two classes—central volcanoes, and volcanoes in line; and these two classes do not differ from one another in composition, or in products. The former always constitute the central point of a great quantity of mouths of effusion, almost equally scattered in every direction. If we consider chains of mountains as masses which have been elevated upon large clefts by the action of melaphires (black or augitic porphyries,) we shall understand to a certain degree the situation of volcanic mouths. Effused islands with craters of effusion often lay the foundation of the first class; this is probably often the case in the South Seas.

Of volcanoes in lines Mr. Elie Beaumont mentions the suite of islands in the Grecian Archipelago from the isthmus of Corinth to the island of Santorin. Such, also, are the volcanoes of the Archipelago of Java, the Straits of Sunda, and the Cordillera of the Andes.

In speaking of volcanoes we are always led to speak of trachytes and basalts. Volcanic products, trachytes, and basalts are three neighbouring groups, but distinct, if non-stratified rocks. Some lavas, as those of the island of Lancerota, might be taken for basalts. Basalts are sometimes as intimately connected with conglomerate as trap rocks with the tufas, which are inserted in their masses.

Basalts, like trap rocks, appear to have been raised to the surface of the earth by irregular openings, or by clefts in the solid crust, accompanied by considerable quantities of incoherent fragments, which have remained interjected, under the form of conglomerates, between the different masses, when these are stretched over the pre-existing soil.

Basalts of a more recent origin have often been cast up through the mineral crust of the globe, in points previously marked out, in the disposition of the elements of our globe, to present craters of effusion, in the midst of which cones of true volcanoes of eruption would show themselves.

Trachytic masses, accompanied by their conglomerates, in producing themselves under the form of cones, of domes, or of rounded masses, more or less irregular, appear to have prepared the plan for volcanic centres.

We shall give the geological result of these researches at a future opportunity.

*Fossil Animals of Russia.*—Mr. Fischer proves, by his notices on the fossil animals of Russia, that in following the track of Baron Cuvier, he has studied with the greatest care that branch of knowledge which has been termed Zoognosy. According to the form of the teeth he divides the genus Elephas into five species:

1st, ***Elephas mammonteus***, whose remains have been found in a great number of localities in Russia; among which he adds, to those which Pallas has recounted, the sands which occupy the summit of the hills of Vorobieff near Moscow; the Rouza of the Moscowa, the mouth of the Lopasnia, in the Oca; and, generally speaking, the alluvium of all the rivers in the government of Moscow; in that of Vladimir, the environs of Lake Pereslavl, and the shores of the Oca, near Mourom; in that of Kalouga, the banks of the Ister, where a tusk of this animal has been found among others; in that of Toula, a great number of localities, such as the banks of the Ocetr and of the Oca, the environs of Verew and Kachira; in that of Riazan, the district of Zaraïsk, and the banks of the Pronia; in that of Orloff, the sandy banks of the Nougr; in that of Pollava, the banks of the Oudal; lastly, in that of Orel, the district of Briansk.

2d, ***Elephas panicus***, so called because the lateral furrows of the molars remind one of the flute of Pan. This precious relic, figured in the Memoirs of the Academy of St. Petersburg, was found in the government of Moscow; but was destroyed at the burning of that city.

3d, ***Elephas periboletes***, of which a tooth has been discovered on the banks of the little river of Vekcha, district of Yourief, government of Vladimir.

4th, *Elephas campylotes*, an extremely rare species, of which the University of Moscow possesses a tooth; but of which the precise locality is not known.

5th, *Elephas pygmæus*, the smallest species known, since the crown of the tooth figured by Mr. Fischer is only 4 in. 5 li. in length, 2 in. 6 li. in width, and 3 in. 8 li. in height. It was found at Ratmir, on the banks of the Moscowa, and near the little river of Tcherka, in the district of Serpoukboff.

The genus Rhinoceros has only offered to Mr. Fischer the species known under the name of *Rhinoceros tichorhinus*, and *Rhinoceros antiquitatis* or *Sibericus*. It exists in the alluvium of the Protva, in the environs of Moscow, near the mouth of the Lena, and of the Yama, and in the government of Simbirsk. One of these horns is cited, which was 32 inches in length.

The alluvium of Russia does not contain the fossil bones of any gnawing animals. Mr. Fischer cannot decidedly state if the bones of a lorus, which were brought from Tartary by Dr. Pander, are really fossil.

With respect to the reptiles, Mr. Fischer is the first who mentions the existence of their remains in the soil of Russia; he gives figures of a shell and several bones, which, from the thickness of the scales, he supposes was a marine species, and which he for the present denominates *Chelonia radiata*. He is not aware of the locality of these bones; but they are imbedded in a hard clay from Siberia.

He terminates his memoir, by the description of a fish, of which he gives a figure, and which appears to be related to the Gadi, and by some words on a vertebra of three inches in diameter, which he cannot approximate to that of any known species. This fish is imbedded in a limestone, penetrated by oxide of copper, from Siberia. The vertebra is entirely siliceous, or perhaps, as he says, its impression has been replaced by a siliceous mould. It has been found in the island of Taman, in the Black Sea.

*Silver Mines in Sweden.*—An inhabitant of Stockholm, M. Segerman, has communicated to the Board of Finance of Sweden, a memoir, in which he states that he has discovered, in the mountains of the province of Calmar, mines of silver whose veins are many miles in extent, and whose produce will suffice to redeem all the Swedish bills without any need of a foreign loan.—*Bull. de Soc. Geog. May*, 1830.

*Notice of curious Mechanical Feats of a small Species of Spider*, (Aranea extensa?) By the Rev. William Turner. *From the Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne.* Vol. I. Part I.—On the 1st of the present month, I attended, with several other gentlemen, the trial of a new steam-engine, built by Mr. Robert Stephenson, for the Liverpool Railway; at the close of which our friend and associate, Mr. Mackreth, observed to me, that though Mr. S. was a great mechanic, he could show me one still more extraordinary. On calling upon him the next morning, he brought out a tumbler glass, which he had inverted on the table over the sprig of a laurustinus bush, on which he had observed a very small spider. Supposing that it might want air, he had slipped under the edge of the glass a small roll of paper. In less than three days the little animal had filled the interior of the glass with minute, almost invisible, threads, by means of which it had raised the sprig into the middle of the glass; and, not content with this, had raised also the coil of paper, which by some accident had slipped from under the edge; after this, it laid, upon one of the upper leaves, a large ball of eggs, and having thus completed the ultimate object of its existence, it died, and fell into the meshes of its own web. This glass, with its contents, I have now, by Mr. Mackreth's permission, the honour of exhibiting to the Society. How this little artist should have accomplished the herculean task of raising a weight several hundred times greater than itself, and for what purpose it should have done this, are questions which may well deserve consideration. I have not observed any similar feat recorded of spiders in the volume on Insect Architecture in the *Library of Entertaining Knowledge.*

*Table of the Numerical Distribution of the Indigenous Plants of Northumberland and Durham; by* NAT. JOHN WINCH, Esq.

## PHÆNOGAMOUS PLANTS.

### DICOTYLEDONES.

| Orders. | Species. | Orders. | Species. |
|---|---|---|---|
| 1. Ranunculaceæ, | 27 | | 398 |
| 2. Berberideæ, | 1 | 40. Campanulaceæ, | 5 |
| 3. Nymphæaceæ, | 3 | 41. Lobeliaceæ, | 1 |
| 4. Papaveraceæ, | 7 | 42. Valerianeæ, | 5 |
| 5. Fumariaceæ, | 4 | 43. Dipsaceæ, | 6 |
| 6. Cruciferæ, | 50 | 44. Compositæ, | 92 |
| 7. Violaceæ, | 6 | 45. Boragineæ, | 19 |
| 8. Cistineæ, | 2 | 46. Convolvulaceæ, | 4 |
| 9. Droseraceæ, | 2 | 47. Plantagineæ, | 6 |
| 10. Frankeniaceæ, | 1 | 48. Plumbagineæ, | 2 |
| 11. Polygaleæ, | 1 | 49. Oleineæ, | 2 |
| 12. Malvaceæ, | 4 | 50. Ericeæ, | 6 |
| 13. Hypericineæ, | 8 | 51. Pyroleæ, | 5 |
| 14. Carophylleæ, | 36 | 52. Apocyneæ, | 1 |
| 15. Lineæ, | 4 | 53. Gentianeæ, | 8 |
| 16. Tiliaceæ, | 3 | 54. Solaneæ, | 7 |
| 17. Acerineæ, | 2 | 55. Primulaceæ, | 14 |
| 18. Geraniaceæ, | 14 | 56. Lentibulariæ, | 4 |
| 19. Oxalideæ, | 1 | 57. Scrophularineæ, | 31 |
| 20. Portulaceæ, | 1 | 58. Orobancheæ, | 3 |
| 21. Crassulaceæ, | 9 | 59. Melampyraceæ, | 2 |
| 22. Saxifrageæ, | 9 | 60. Verbenaceæ, | 1 |
| 23. Salicariæ, | 2 | 61. Labiatæ, | 39 |
| 24. Rhamneæ, | 1 | 62. Thymeleæ, | 2 |
| 25. Ilicineæ, | 1 | 63. Polygoneæ, | 20 |
| 26. Celastineæ, | 1 | 64. Amaranthaceæ, | 1 |
| 27. Leguminosæ, | 48 | 65. Chenopodeæ, | 23 |
| 28. Rosaceæ, | 50 | 66. Scleranthеæ, | 2 |
| 29. Pomaceæ, | 6 | 67. Urticeæ, | 5 |
| 30. Grossulaceæ, | 6 | 68. Resedaceæ, | 2 |
| 31. Onagrariæ, | 9 | 69. Euphorbiaceæ, | 9 |
| 32. Circæaceæ, | 2 | 70. Empetreæ, | 1 |
| 33. Halorageæ, | 3 | 71. Ceratophylleæ, | 1 |
| 34. Umbelliferæ, | 47 | 72. Ulmaceæ. | 6 |
| 35. Stellatæ, | 12 | 73. Amentaceæ, | 37 |
| 36. Caprifoliaceæ, | 9 | 74. Cuculiferæ, | 6 |
| 37. Lorantheæ, | 1 | 75. Coniferæ, | 4 |
| 38. Cucurbitaceæ, | 1 | 76. Myrticeæ, | 1 |
| 39. Vaccineæ, | 4 | 77. Callitrichineæ, | 2 |
| | 398 | Species, | 783 |

### MONOCOTYLEDONES.

| Orders. | Species. | Orders. | Species. |
|---|---|---|---|
| 78. Aroideæ, | 1 | | 19 |
| 79. Typhaceæ, | 5 | 81. Pistiaceæ, | 2 |
| 80. Fluviales, | 13 | 82. Juncagineæ, | 2 |
| | 19 | | 23 |

| *Orders.* | *Species.* | *Orders.* | *Species.* |
|---|---|---|---|
| | 23 | | 59 |
| 83. Alismaceæ, | 5 | 90. Asphodeleæ, | 8 |
| 84. Hydrocharideæ, | 2 | 91. Smilaceæ, | 6 |
| 85. Irideæ, | 2 | 92. Butomeæ, | 1 |
| 86. Orchideæ, | 20 | 93. Junceæ, | 19 |
| 87. Melanthaceæ, | 2 | 94. Cyperaceæ, | 60 |
| 88. Amaryllideæ, | 4 | 95. Gramineæ, | 90 |
| 89. Liliaceæ, | 1 | | |
| | 59 | Species, | 243 |

PHÆNOGAMOUS PLANTS.

| *Orders.* | | *Species.* | |
|---|---|---|---|
| 77 | Dicotyledones, | 783 | |
| 18 | Monocotyledones, | 243 | |
| 97 | | | 1029 |

CRYPTOGAMIC PLANTS.

| | | | |
|---|---|---|---|
| Vascular— | | | |
| Characeæ, | 5 | | |
| Equisetaceæ, | 7 | | |
| Marciliaceæ, | 1 | | |
| Lycopodineæ, | 4 | | |
| Filices, | 25 | | |
| | | 42 | |
| Cellular— | | | |
| Musci, | 179 | | |
| Hepaticæ, | 45 | | |
| | | 224 | |
| Agames— | | | |
| Algæ, | 179 | | |
| Lichenes, | 281 | | |
| Hypoxyla, | 80 | | |
| Fungi, | 423 | | |
| Byssoideæ, | 19 | | |
| | | 982 | |
| | | | 1248 |
| Species, | | | 2274 |

*Trans. of Nat. Hist. Soc. of Newcastle, &c.* Vol. I. Part 1.

*Russian Diamond Mines.*—When, in the year 1826, Professor Engelhardt undertook a scientific journey into the Uralian Mountains, he remarked that the sands in the neighbourhood of Koushra, and those of the platina mines at Nigny-Toura, strikingly resembled the Brazilian sands in which diamonds are found. Baron Humboldt, during his late residence in the same country, confirmed this resemblance; and examinations having been made according to his advice, a young countryman who was employed in washing the auriferous sand, on the grounds of the Countess Polier, discovered a diamond on the 20th of June last, which was nothing inferior to those of Brazil; soon after, many others were found superior in weight to the first. Thus Russia has added this source of riches to those which of late years it has obtained in the form of gold and platina mines from the Ural chain of mountains.—*Revue Encyc.*

*Mines of Silver or Argentiferous Lead in the Caucasus.*—Dr. Meyer, a member of the scientific expedition sent to the Caucasus by the Imperial Academy of Sciences of St. Petersburg, has informed the Academy that M. de Engelhardt believes he has found in the Caucasian mountains, about 120 versts from the fort Grosnaïa, rich mines of silver or of argentiferous lead, on whose existence the academician Hamel made a communication to the Academy last year.—*Bull. de Soc. Geog.* May, 1830.

*Seat of the Sense of Touch.*—The presence in insects of the ganglion which represents the brain, is not absolutely necessary for the existence of the sense of touch. After decapitation they feel on the surface, and in their limbs, by means of their other ganglions, such impressions as may be made on them. The spinal marrow of reptiles, young birds, and young mammiferous animals, seems also capable, after the destruction of the brain, of being modified by irritations, of feeling them, and of occasioning, in consequence thereof, durable and calculated movements, which are not to be confounded with those convulsive and fugacious motions that are attributable solely to irritability. M. Calmeil thinks that this faculty of the spinal marrow is probably diffused throughout its whole extent. Further, it is probable that in the natural state of our functions the brain is the sole centre of irritability, and that the spinal marrow only becomes sensible when the brain ceases to exist. The co-ordination of our voluntary motions is doubtless attributable only to the brain.—*Med. Journ. quoted in Brande's Journal,* No. XIV.

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*Extracts from the Analysis of the labours of the Academy of Sciences during the year* 1826; *by* Baron Cuvier. *Paris,* 1830.

*Zoology Continued.—Hebenstreit on a new kind of Silk.*—The Academy has received a communication through M. Lenormand, of a curious observation of M. Hebenstreit, Professor at Munich, on the possibility of obtaining silk of any size, and of unequalled texture, from the larva of the tinea of the *Prunus Padus* (St. Lucia-wood). This little insect, scarcely 6 lines long, spins constantly as it is moving about, and weaves amongst the twigs of the sort of awning under which it seeks shelter. If we place a great number of them on a sheet of paper under a glass bell, they speedily cover the surface with a web so fine that the least motion of the air, the heat alone of the hand, destroys it. The web is quite homogeneous and particularly white; but its extreme delicacy does not permit the hope that it can ever be employed for useful purposes.

*MM. Audouin and Milne Edwards on a new genus of Crustacea* (Nicothoa). MM. Audouin and Milne Edwards have discovered on the lobster a little parasitical animal of the class crustacea, which to the unassisted sight presents nothing but a body divided into four lobes or articulations. With the microscope we perceive that the first pair of these lobes is a development of the corselet, and that the second is composed of ovaria. Between the lobes of the corselet is a little obtuse head, bearing superiorly two eyes and two antennæ, and below the jaws, five pairs of feet. Between the two ovaries is a little jointed tube, terminating in hairs. These young naturalists have formed a genus of this animal, which they call *nicothoa.* This parasite is always very firmly attached to the filaments which compose the branchiæ of the lobster. No excitation can make it leave loose; it will rather be torn to pieces; if we plunge the lobster into a deleterious liquid, still the *nicothoa* will not abandon its hold. Even when it is detached, it remains immoveable, though the motion of its internal fluids proves that it continues to live. But it cannot always have been in this state: when it passed out of its egg, it must have sought for a lobster, and on this lobster, for a convenient place to take up its abode. And if the species be not hermaphrodite, the male must have to seek for and fecundate the female. However, we hear of similar changes which take place in another parasite of the family of lernææ, discovered by Dr. Sussiray of Havre. The young have feet proper for swimming, and with age they change their form and become immoveable. Every one knows that something of the same kind takes place in the cocci.*

*Observations on Lithophytes.*—From the examination made by celebrated naturalists of the common red coral, the gorgonia, alcyonia, and a great number of other corals, we know that the stony or horny axes are nothing hut the common skeletons of the compound animals,—that they are covered, during life, with a sensible incrustation or envelope; and that the hydras or polypes, which expand over different parts of their crust, and which have been for a long time taken for the flowers of the coral, are individual animals, which, in their assemblage form the common animals—which have a common nutrition, and whose sensations, even to a certain degree, communicate throughout the whole. It had been concluded that the individual animals become, in all lithophytes, like the hydras; but it is not entirely so. The observations of M. Lesueur, and of MM. Eisenhardt and Chamisso have shown that the animals of many lamellated madrepores resemble the actiniæ as much as the hydræ.

MM. Quoy and Gaymard, the authors of the geological part of the voyage of M. Freycinet, a collection full of the most interesting observations on the animal kingdom, have inserted therein some facts relative to the lithophytes, which they had previously communicated to the Academy, and which add to our knowledge on this curious subject. The *fungiæ*, of the subdivision of the madrepores composed of great strong plates which converge to a hollow centre, or towards a central furrow, are amply enveloped with a red membranous animal crust, plaited in folds, thicker towards the centre, or median furrow, and which cannot be developed without breaking them. It appears, however, that in the centre there is a cavity which is the organ of digestion, and that when the disk is elongated and the centre becomes a furrow, there are sometimes two or three of these cavities. The caryophylliæ, another section of the madrepores, whose branches are terminated by an orbicular star, have this star filled with an animal substance, which produces long cylindrical tubes fixed in the anfractuosities of the laminæ, and whose free extremity is marked with a number of little points. MM. Quoy and Gymard regard those cylindrical productions as the animals of this lithophyte; MM. Eisenhardt and Chamisso, who have also observed them, take them, on the contrary, for the tenticula of an animal, of which there will be one in every star, but whose central mouth they confess they have not seen. Additional observation will be requisite to establish their opinion on this subject.

These learned travellers have made a particular study of that lithophyte composed of parallel tubes, which is known under the name of *Tubipora musica.* They had been long referred to the class of articulated worms; but M. Cuvier determined them to be hydras. Their colour is of a beautiful green, their strong envelope of as beautiful a red; each of them is contained in a membranous sac, whose margins are reflected over those of the tube in which it is inclosed, and the hydra can retract and hide itself altogether, or develope itself and push out tentacula to the number of eight. In the bottom of the sac are filaments filled with granular bodies, which appear to be the ova. The strong tube is elongated by degrees; and from space to space it dilates in a horizontal margin which, uniting itself to those of the adjoining tubes, forms septa by which the whole of the tubes are joined.

(*To be continued.*)

* On this subject, vide Thompson's Zoological researches,—"metamorphoses of the Crustacea."—Ed.

# NATURAL-PHILOSOPHICAL COLLECTIONS.

*Estimation of the Vegeto-Alkali in Peruvian Bark.*—It is often important in pharmacy to be able to tell the value of a sample of bark, by ascertaining the quantity of quinia or cinchonia which it contains. MM. Henry and Plisson, and also M. Tilley, have published processes for this purpose. Professor Gobel applies the following method to obtain the same end:—Two ounces of powdered bark are acted upon, at successive times, by sixteen ounces of water and 180 grains of muriatic acid, specific gravity 1.13, ebullition being occasioned; all the liquids are to be put together, and caustic potassa added, which produces a brown precipitate; this is to be re-dissolved in dilute muriatic acid, again precipitated, and so on, until the precipitate is quite white; it is then to be dried, and treated with cold strong alcohol, to separate the quinia and cinchonia from each other.

M. Veltman has devised the following process, which may be applied to small quantities; it is easy of execution and exact:—55 grains of the bark in fine powder is to be mixed with an equal quantity of washed siliceous sand, the grains of which are about half the size of poppy seed; this is to be well mixed with five drops of muriatic acid, and 20 drops of alcohol, and pressed lightly into a glass tube 4¾ inches long, and 0.6 of an inch in diameter, one end of which has been covered with a little piece of muslin, and then inserted into a close vessel. The other end of this tube is to be connected by a bent tube with a small flask filled with a mixture of an ounce and a half of alcohol, and 20 drops of muriatic acid; the bent tube should be 0.2 of an inch in diameter; one end should go to the bottom of the flask, the other should reach the surface of the mixed bark and sand. The alcohol in the flask is then to be boiled by a small spirit lamp. It will pass through the tube and extract all that is soluble. If the ebullition is performed slowly, the last drops of alcohol pass nearly colourless. The reddish brown alcoholic tincture is to be precipitated by hydrated lime; after twelve hours it is to be separated by a filter, the liquor is to be rendered slightly acid, evaporated until in a soft state; then dissolved in 120 grains of water, and precipitated by a few drops of caustic ammonia. The precipitate being dried, indicates the quantity of alkali in the bark. In this way, M. Veltman found that from 3.3 to 6.0 parts of vegeto-alkali were combined in 100 parts of different varieties of bark. *Bull. Univ.* C. xx. 297.

*Svanberg's Researches on the Heat of the Planetary Space.*—It is known that Fourier, in his valuable researches into this subject, deduced from the laws of radiant heat that the temperature of the planetary space is—50° Cent.=58 Fahr., and that the earth has nearly reached its limit of cooling. Svanberg has built his researches upon a different prineiple, and has obtained the same result. From his letter to Berzelius on the subject, we extract the following:—"Led by these considerations, and by the many known affinities between light and heat, which are especially remarkable in the acknowledged property of solar light to develope heat in opaque and imperfectly tranparent bodies, I began by supposing that the planetary space (considered as perfectly pellucid) never undergoes any change of temperature either from the action of light or of radiant caloric, and that, therefore, the capacity for elevation of temperature above what reigns in the etherial regions, can exist only within the limits of the planetary atmosphere. Further, that the rapidity of the change of temperature at an indefinite height above the surface of the earth, is always proportional to the rapidity of the atmosphere's corresponding change of capacity to absorb light. In this way I obtained the temperature of the atmosphere, (expressed in a function of an indefinite height above the earth's surface) containing only two arbitrary constants, of which the one is also a function of the time, and is determined always by immediate observation of the given temperature at the moment on the earth's surface; the other, namely the temperature of the planetary space, is constant, even in regard to the time.

"The numerical solution pre-supposes accurate observations of temperature at isolated points to a considerable height above the earth's surface, which, however, are unfortunately so extremely few, that we can have recourse among newer observations but to a single one, that of Gay-Lussac, in his aeronautic expedition. It were to be wished that the same experiments were repeated particularly in the neighbourhood of the equator, where the oscillations around the mean state of the atmosphere, and consequently the prejudicial influence of accidental circumstances, are less to be dreaded. In the meantime, availing myself of this observation, I have obtained for the planetary space a temperature of —49.85 Cent. which differs only by 1-7th of a degree from the result of Fourier, deduced from the laws of heat radiated from the mass of the earth, the temperature of which he supposed to have reached its asymptotic state of absolute unchangeableness on the whole. Without believing in the identity of light and heat, or in the certainty of our photometric knowledge, I have thought it not entirely void of interest to see what result, in relation to this point, could be obtained from Lambert's statements, in gard to the absorption which takes place in a ray of light passing from the zenith through the whole atmosphere, calculated on the supposition that the differential of the increase of temperature is always proportional to that of the so absorbed light. By this process I have obtained for the required temperature —50°35. I was most agreeably surprised by so remarkable an agreement between both of these results and that which Fourier derived from principles so different; and it affords an additional reason why the function I have given for the temperature should be taken into due consideration. The immediate results of the same are, that the temperature diminishes with a constantly diminishing velocity, as we ascend in the atmosphere, and that even at a given height, this velocity is greater the higher the temperature at the earth's surface.

"Without having in view any examination of the formula for determining heights by the barometer, I have, in the application of them to the observations of Gay-Lussac, shown, that in the determination of heights so uncommon as that of Gay-Lussac, causes of error may intervene, which, in the case of lower and more common heights, it is not necessary to take into account. To me that function is of importance, since from it I have derived a function for the refracting power of the atmosphere at all points of the trajectory of light, and I have, by way of preliminary, treated in considerable detail the formulæ derived from it, for the definitive determination of the refraction itself, in which I have proceeded so far that I have at last commenced the purely mathematical investigation of the required problem, such as it becomes after the strictest discussion of all the physical points connected with it."—*Johnston's Analysis of Berzelius' Arsberättelse. Brewster's Journ*, No. V. N. S.

*On the Artificial Formation of Urea; by* WOHLER.—This is one of those rare results which approximate the productions of art to those of nature, and lay open the possibility of imitating her in some of her elaborations, though they unfortunately afford little ground for the flights of those airy speculators who hold up the probability of our being soon able to dispense altogether with the agency of nature in the production of the animal and vegetable substances, upon which we at present depend for our existence.

If *Cyanite** of silver be treated with a solution of sal-ammoniac, or cyanite of lead with caustic ammonia, there is formed, instead of cyanite of ammonia, a crystalline matter which has all the properties of pure urea, and which therefore *is Urea.*

* This is prepared with Wohler's acid, which we have shown must be called the Cyanous, and its compounds, of course, Cyanites.

The constitution of Urea, according to the analysis of Prout, compared with one atom each of ammonia, cyanous acid, and water, is as follows:

| | Urea. | Cyanite of ammonia. |
|---|---|---|
| Hydrogen, | 2 atoms. | 4 atoms. |
| Carbon, | 1 | 2 |
| Oxygen, | 1 | 2 |
| Azote, | 1 | 2 |

From which we see that the elements in both are in the same proportion; which confirms the experiments of Wöhler. Yet urea is not a cyanite of ammonia, for stronger bases do not develope ammonia. The atoms, therefore, must have combined themselves in a different manner, so that the cyanite of ammonia, from being a compound atom of the second, has passed to the state of a compound atom of the first order. This is one of those few examples from which we can accurately and strictly deduce the law, that the same number of single atoms may combine in different ways, so as to produce bodies of very different characters and properties.—*Ibid.*

### *Mean Temperature of the Air and of the Earth in some parts of Eastern Russia; by* A. Kupffer.

*Mean Temperature at Casan*, lat. 55° 40′. long. 47° 9′.—The observations were made in the garden of the University, in the shade, under a tent erected on the spot, where the air circulated freely, at 9 A.M., noon, 3 P.M., and 9 P.M. An accident happening to the maximum and minimum thermometer, prevented the continuance of the observations for more than three months.

| | 9 a. m. | noon. | 3 p. m. | 9 p. m. |
|---|---|---|---|---|
| Mean temp. | +2.0 R. | +2.4 | +2.5. | +1.6 |

Mean of the maximum and minimum in December 1828, January and February 1829.

| | |
|---|---|
| December | —8.7 |
| January | —15.2 |
| February | —15.1 |

The greatest cold occurred on the 18th and 19th of January; the corrected spirit-thermometer was down at 31° 7. R. A little mercury exposed to the air in a bottle froze almost entirely. The greatest heat was on the 8th of July; it was +24° 8. at 3 P.M. Excessive cold is very rare at Casan, where the thermometer often falls to —25°; the temperature of summer is sometimes +26° to 27°.

| | | Mean of the observations. | Mean from 7 a. m. to noon. |
|---|---|---|---|
| Mean temperature of | 1814 | +2.5 | |
| | 1815 | 2.7 | 2.3 |
| | 1816 | 3.5 | 3.1 |
| | 1817 | 1.5 | 2.0 |
| Mean | | +2.6 | +2.5 |

On adding the mean temperature of 1828 = +2 R., we have, for the mean temperature at Casan, in the garden of the University, 40 metres above the level of the sea, +2.4. These observations confirm the remark that the mean temperature of October nearly equals the mean of the year, and that the mean of April approaches it.

The temperature of springs is obtained from those, which come from a sufficient depth and with sufficient abundance not to change on contact with the air;

two springs observed at different periods gave +5° 2. From other observations the mean temperature of the earth at Casan may be taken at +5°.

*Mean Temperature of the Air at Zlatooust,* lat. 55° 8′, long. 57°; height above the level of the sea 370 metres.

The observations made by M. Eversmann, from 1817 to 1820, in the morning, and at 2 P.M. gave for the mean result,

| | 1818. | 1819. |
|---|---|---|
| Winter months, | — 12,23 | — 13,33 |
| Spring, | + 1,93 | + 1,36 |
| Summer, | +12,69 | +12,95 |
| Autumn, | — 0,57 | + 1,99 |

And for the mean of all the months of these two years, +0,6

*Temperature of the Earth at Kisnekejva? to the east of the Ural.*—Lat. 54° 5′, long. 60°; 300 metres above the level of the sea. At 25 metres beneath the surface, in a disused gallery, the water of a pool was +3° 5 R.

*Temperature of the Mines at Bogoslovsk,* lat. 60° long. 60°, height 200 metres.—In the mines of Tousjensk? to the east of Bogoslovsk, the temperature of drains, at 112 metres depth, was +5°. In those of Frolow? at 65 metres, +3° 2; a spring at 56 metres, +2° 7.

On dividing the sum of the differences of depth by that of the differences of temperature, we find an increase of depth of 24 m. 4 for each degree of the octogesimal thermometer.

On comparing the results with those of other observers, we obtain, for the mean result, 25 m. 25 for every octogesimal degree.

We commit an error by deducing the temperature of the earth from that of springs, unless they be very deep, — perhaps at least 25 metres.

*Temperature of the Earth at Nijneï-Taghilsk,* lat. 58°, and at *Werkhotourie,* a t. 59°.

These two places are on the eastern acclivity of the Ural, at nearly 200 metres elevation. At the mines of Nijneï-Taghilsk, the water at 65° had a temperature of + 3° 9 R., which gives, on deducting 25 m. of depth, 2° 3. A pit of 5 m. gave + 2° 6. At Verkhotourie a spring gave + 2° 1, from which deducting + 0,2, we have + 1° 9.

The observations of Wahlenberg, Humboldt and de Buch have proved that, in high latitudes, the temperature of springs is greater than the mean temperature of the air, and that the contrary is the case in low latitudes. M. Kuppfer has collected, in a table, the results of the most exact observations, in addition to those which he has himself made; and it results that the temperature of the earth changes also with the longitude.

On distributing the observations under four meridians, reducing them to the level of the sea, and adding 2-5th° R. for every hundred metres of elevation, we find, taking the extreme results,

At the 1st meridian of 0° long. for 15° and 60° lat., 19° 6 and 7° 0.

At the 2d meridian, 60° long. east of Paris, for 30° and 60° lat., 18° and 3°.

At the 3d meridian, 60° long. east of Paris, for 54° 4′, and 60° lat., 4° 7, and 2° 3.

And at the 4th meridian, 80° long. west, for 10° and 40° lat., 20° 5 and 10° 2.

From which we may deduce the following results:

1st. That the temperature of the earth is not equal throughout the same parallel; drawing lines through all the points of equal temperature, we have curves which M. Kuppfer calls isogeothermal lines, whose inflexions resemble those of the isothermal lines, without being confounded with them.

2d. The temperature of the earth decreases regularly from the equator to the pole, which explains why the temperature of the earth, in low latitudes, is inferior to that of the air, which diminishes very little from the equator to the 200° of latitude; that of the earth, constantly decreasing, must be inferior.

3d. The decrease of the temperature of the earth, according to the latitude, is represented by the equation.

$$a - b \sin. \ 2\, l = t.$$

or $a$ and $b$ are unknown constants which are to be determined; $l$ the latitude, and $t$ the temperature of the earth.

M. Kuppfer does not admit, with M. de Buch, that the temperature of the soil can be explained by the absorption of pluvial waters.

M. K. remarks, that although the formula represents perfectly the observations; like all formula with arbitrary constants, whose value is determined by observations, it can only give approximations, and will be inexact on points far from those of the observations. If the minimum were not placed at the pole, but a little on this side, the formula would not give it, since it is at its smallest value when $t = 90$; it would only represent the observations to the minimum of temperature, and would give too low a temperature to the pole.

It results from the tables given by M. Kuppfer, that the temperature of the earth at the equator is greater in the middle of Africa than in the sea between Africa, the East Indies, and New Holland: that it is less on the western shores of Africa and the western coasts of America; and that in the centre of America it has a considerable value. Under the meridian of Africa the isogeothermal lines to 50° lat. present a marked convexity, whose summit is directed towards the north. Under this meridian are the two active volcanos, Ætna and Vesuvius, many hot springs, and almost every where basaltic and porphyritic rocks. Perhaps the maximum of the temperature of the earth is not at the equator; but this hypothesis is founded only on one observation in the southern hemisphere at Congo.—*See Mr. Kuppfer's paper at length, Ann. de Chim. et Phys. Dec.* 1829.

*New Preparation of Caoutchouc for various purposes.*

To the Editor, &c.

Will you do me the favour to mention, in the next number of your Journal, that I am about to lay before the Society of Arts a new method of preparing caoutchouc, so as to render it useful in various ways, and more especially suitable for covering preparation bottles and jars. It may be easily followed by any one, and is cheaper in the end than any other substance. The elastic covers cling firmly to the body on which they are extended, may be removed and re-applied at pleasure, and completely prevent the evaporation of alcohol, water, and of those fluids which have no chemical action on caoutchouc.

I shall soon make public, through the medium of your Journal, an adaptation of my method to the putting up of preparations in turpentine, and other fluids which dissolve caoutchouc when in contact with it, which, by preventing evaporation, will, I trust, prove valuable to the collectors of anatomical preparations. I remain, &c. Montgomery Robertson.

22, *Great King St. Edinburgh, July* 28, 1830.

*Observations made relative to the Figure of the Earth, during the Voyage of the Coquille.* M. Duperrey was provided with two invariable copper pendulums, which had been previously employed in the voyage of the *Uranie.* They were tried at Paris before the departure, and after the return of the expedition; at Toulon, whilst the vessel was preparing; at the Malouin Isles, in 54° 31′ 43″ of S. lat.; at Port Jackson, on the east coast of New Holland; at the Mauritius; and at the Isle of Ascension, within the tropics. M. Matthieu has deduced from his calculation of the observations at the Malouin Isles and at Paris, this important result, in opposition to the old opinion, that the north and south terrestrial hemispheres have very nearly the same form. From M. Freycinet's observations it results that there is, at the Mauritius, a cause of local attraction so intense that it altered the time of a chronometer 13 or 14 seconds daily. It is obvious how interesting it would be to observe, in M. Duperrey's experiments, whether the accidental influence has been as manifest. *Fourier, Rapport.*

# CATALOGUE RAISONNÉ.

## Dictionnaire des Sciences Naturelles. Tome LX. 1830.

The greater part of this volume is occupied by the article on Zoophytes, written by Mr. de Blainville. It contains a general enumeration of all the species now or lately included in the class, arranged according to a new system. This is preceded by a history of the labours of those naturalists who have studied the zoophytes, (including notices of their various systematic arrangements,) and by an interesting summary of the present state of knowledge with regard to their anatomy, physiology, and natural history. The author divides the species enumerated in his work into three sections, two of which include what he calls "false," and the third "true zoophytes." One of the sections of "false zoophytes," is formed by the *Physophora, Beroe*, and their allied genera, and by the *Entozoa* and *Infusoria*. These the author considers as entitled to a higher place than zoophytes in the zoological scale. The other comprises such organized beings as the *Corallinæ* and *Nematophytæ*, which are considered as vegetables, and grouped together under the name of *Pseudozoa*. The "true zoophytes" are divided into two types, one of which, named *Actinozoa*, includes all those whose parts are arranged circularly around a central point or axis; such as, the *Echinodermata, Acalepha, Milleporæ, Sertulariæ, Dennatulæ*, &c. The second type is named *Amorphozoa*, and embraces the *Spongiæ, Scyphiæ, Tethyæ*, &c. The *Actinozoa* form five classes:

I. Echinoderma, comprising the genera *Holothuria, Echinus, Asterias, Comatula, Encrinus*, &c.
II. Arachnoderma, *Euryalæ, Rhizostoma, Cyanea, Velella*, &c.
III. Zoantharia, *Lucernaria, Actinia, Madrephyllia, Madrepora*, &c.
IV. Polypiaria, *Millepora, Eschara, Flustra, Sertularia, Plumatella, Hydra*, &c.
V. Zoophytaria, *Tubipora, Isis, Gorgonia, Antipathes, Pennatula, Lobularia, Alcyonium, Cliona*, &c.

Perhaps the greatest innovation in this arrangement, is the placing of the Madrepores in the same class with the *Actiniæ*. This is the result of the interesting observations of Messrs. Quoy and Gaimard, made in the course of the late French voyages of discovery. Their researches have left no doubt of the resemblance in structure between the animals which form the Madrepores, and the *Actiniæ*. In describing the Amorphozoa, the author does justice to the valuable researches of our countryman, Dr. Grant, on the anatomy and functions of the sponge.

## Some Observations on the Common Bat of Pennant, By the Rev. L. Jenyns, M.A. F.L.S.—*Lin. Trans.* XVI. 169.

Mr. Jenyns considers our common bat to be identical with the *Pipistrelle* of French authors, differing from the *Vespertilio murinus*, Lin. (to which species it has been commonly referred,) in colour and general appearance,—in the shape of the auricle and its operculum, and in some of the relative dimensions,—but most palpably in the absolute size. "In the detailed descriptions of the *V. murinus*, given by Geoffroy and Desmarest, we find the average measurements of this species to be nearly as follows:—Length of body three inches and a half; head about one inch; tail about two inches; and the extent of wing fifteen inches and upwards. Whereas in our common English bat, the length, measured from the nose to the insertion of the tail, is only one inch and seven lines; that of the head six lines; of the tail fourteen; and the extent of the wing rarely, if ever, exceeds eight inches and a half."

On the Organs of Voice in Birds, with numerous Plates. By WILLIAM YARRELL, ESQ. F.L.S.—*Ibid*, p. 305.

The object of this paper is the description of the muscles which are attached to the different parts of the windpipes of birds.

"The muscles of the glottis, or superior larynx," says the author, "are uniformly two pairs in all the birds I have examined; but the muscles of the inferior or true larynx, all largely supplied with nerves, vary from one pair to five pairs, according to the genus or species, affording a corresponding increase in the various qualities of the voice.

Some few birds have no true muscles of voice at the inferior portion of their tracheæ. Cuvier describes the king of the vultures as being without any; and this is also the case with the condor and the spoonbill.

The division of birds possessing *one pair* of muscles of voice, is by far the most numerous, including the genera *Falco* and *Strix;* some of the *Insessores*, all the *Rasores*, *Grallatores*, and *Natatores*, with a few exceptions only, which Mr. Yarrell indicates. These muscles, on account of their place of insertion, have been named sterno-tracheal.

Some of the birds possessing *two pairs* of true muscles of voice, may be considered as exceptions to a general rule, rather than otherwise, since they belong to those orders which usually possess but one pair." The Indian crowned pigeon, the wood-grouse, and, among the *Natatores*, the velvet duck, the golden eye, the red-breasted merganser, and the gannet, have a second pair of muscles of voice.

Tracheæ possessing *three pair* of the muscles of voice, are confined entirely as far as Mr. Yarrell's observations have extended, to the Psittacidæ.

Mr. Yarrell has not met with any bird possessing *four pairs* of true muscles of voice.

Those which possess *five pairs* are the *Corvi*, starling, thrush tribe, larks, buntings, finches, warblers, swallows, &c.

*Considerations sur les Blocs, &c.* Considerations on the transported Blocks of Primitive Rocks. By ENGELSPACH LARIVIERE. Brussels, 1829. Pamphlet in 8vo.

*Over der Steenen, &c.* On the Stones and Pebbles of the Heaths of the Netherlands. By P. S. SCHULL.—*Bydrarg. tot de Naturk.* No. I. 1830.

We have already had occasion to analyze several papers on the interesting subject of the dispersion of boulders and transported blocks on the plains of Germany, Holland, and the Netherlands; and perhaps, after the philosophical generalizations of Professor Brongniart, we felt most pleasure in the novel views of Count Romanzof. Mr. Westendorp, in a Dutch memoir, occupied himself with the same investigations in an historical point of view, and the geological bearing is the object of Mr. Engelspach's memoir. The blocks of Campine and of the Drenthe are quartzites, dolomites, limestones, compact feldspar, granites, protogyne, sienite, pegmatite, hornblende rock, diorite, hyalomicte, mica slate, gneiss, and dolerite. The author considers as transported the white quartzites, (sandstone,) of the duchy of Luxembourg, and describes the granite boulders of Westphalia, Pomerania, Poland, Mecklenbourg, Brandenbourg, &c. He accounts for the dispersion of these blocks by several of some rocks less hard, the effect of volcanoes, and the impulse of large masses of ice. The author believes, like most other geologists, that these blocks came from Scandinavia. It will be remembered, howcauses. The first is a projecting force; the second the deterioration ever, that Omallius d'Halloy has advocated an opinion much more in harmony with the progress of the science. He supposes that commotions or earthquakes have brought these granitic boulders, existing previously under the sand of the countries in which they are at present found, to the surface of the soil.

Mr. Schull's memoir is of considerable interest, and embraces the history of the Belgian downs. In the Bruyeres, (Ericetæ,) called Mokereide, there occur chalk flints, which do not come from the chalk formation of Low Saxony, nor of Westphalia, nor of Scandinavia. In the Bruyeres of Amerefort, we find blocks of granite of gneiss, sienite, porphyry, and diorite. The blocks diminish in size as we approach the south. Their direction from N.N.E. to S.S.W. is the same as that of the rivers, mountains, lakes, and even seas of Scandinavia, from which country the author also derives them. Mr. Schull connects their origin with former changes of climate, and the breaking up of ice; but he thinks that their regular arrangement was effected by the industry of the Goths, Vandals, and Huns, who came from the countries farther north, and piled up these remnants of an extraordinary revolution.

Enumeration of the Mosses gathered in the Island of Sardinia, by Fr. A. Muller; as well as those which Mr. Fleischer found at Smyrna.—*Flora,* 1829. Pp. 385. *With a Plate.*

The journies which are made in different countries, at the expense of the Esslingen Society, have already been noticed by us, and the advantages which accrue to science from them are very numerous. The enumeration which we notice, comprises the first part of the mosses gathered in their travels by Messrs. Muller and Fleischer, and is editrd by the first of these zealous travellers. The countries visited by them, present a certain number of mosses common to most European countries. There are further eight new species established by Mr. Bruch, known as one of the first myologists of Germany.

Determination of the Geographical Positions of Malta, Milo, and Corfu. By M. P. Daussy, Engineer-hydrographer.—*Connaissance des Temps for* 1831. P. 78.

A memoir discussing the longitude of Malta, Milo, and Corfu, was presented some time ago to the Academy of Sciences of Paris. For a long time, the longitude of the former place was given entirely on the authority of the ancient observations of Chazelles and of Father Feuillée, which were made in 1693 and 1708. The observations of Baron Zach afterwards differed from those of Capt. Gautier, which, made in 1816, had been admitted into the *Connaissance des Temps.* Mr. Daussy, by recalculating all the observations of which he possessed the data, supposes it to be 48′ 44″, 5 = 12° 11′ 17″. For Milo Mr. Daussy adopts 1 h. 28′ 27″, 45 = 22° 6′ 50″. He further fixes the longitude of Corfu, which, in the same work, had hitherto been placed, according to the observations of Captain Gautier, at 1 h. 10′ 23″, 17 = 35′ 45″.

Dissertazione in cui ei stabilisce per ipotesi che Civita Castellana, è l'anticho Veio. By the Chan. Franc. Morelli. In 8vo. Terni, 1825.

Three countries dispute the advantage of having been the seat of the famous town of Veie. The island of Farnese, the Mount Lupoli, and the city of Castellana. Francois Morelli endeavours to establish, by a great number of authorities, by historical evidence, as well as by inscriptions and monuments, that the Civita Castellana was formerly the Veie that was beseiged by Camillus, and destroyed by the Romans.

*Handbuch der Gesammten Mineralogie, &c.* Manual of Practical Mineralogy. By Fr. Aug. Walchner, Professor in the Polytechnic Institution of Carlsruhe. Part I. comprising Oryctognosy. In 8vo. Pp. 600. Four Plates. Carlsruhe.

Mr. Walchner, who teaches with great success in an establishment devoted to the arts and sciences, has conceived the project of writing a manual, which should present mineralogy principally in its technieal relations, and which may serve as a basis chiefly of his own lectures. The manual will consist of two volumes, the first of which has alone appeared. The author has arranged minerals according to their electro-positive elements, and, with some slight changes, has followed the system which Berzelius published in his first system of mineralogy in 1819.

Commentatio de *Ursi longirostris* Sceleto. In 4to. 20 Pp. Two Plates. By HERMANNI DE POMMERESCHE. Berlin, 1829.

The animal represented in the memoir, first figured by Cotton, (Anim. Drawn, &c. 1788,) who calls it Peter bear, has been described by a number of naturalists, and under different names, till Mr. Tiedemann gave it that of *Ursus longirostris*, which the author is inclined to preserve. The memoir only contains the figure and description of the skeleton of the animal.

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## PROCEEDINGS OF SCIENTIFIC INSTITUTIONS.

### LONDON.

*Geological Society. May* 21. Grenviille Lonsdale, Esq., Ensign in the Third Foot, was elected a Fellow of this Society.

At this meeting, Messrs. Sedgwick and Murchison's paper on the Austrian Alps was read.

June 4. Reverend Richard Dawes, M.A., Fellow and Tutor of Downing College, Cambridge; Rev. Charles Currie, M.A. Fellow of Pembroke College, Cambridge; Rev. Thomas Musgrave, M.A. Fellow of Trinity College, Cambridge; William Devonshire Saull,, Esq. of Aldersgate Street, London, and Francis Ellis, Esq. of the Royal Crescent, Bath, were elected Fellows of this Society.

A paper was read entitled, " On the Geological Relations of the South of Ireland, by Thomas Weaver, Esq. F.G.S. F.R.S. M.R.I.A.," &c.

*Horticultural Society. May* 4.—The following paper was read:—An account of an economical method of obtaining very early crops of new potatoes. By Thomas Andrew Knight, Esq. F.R.S. &c. President.

The following specimens, &c. were exhibited:—Sweeney nonpareils, from T. N. Parker, Esq. One hundred sorts of apples, from Mr. Hugh Ronalds. Models of apples, pears, plums, cherries, &c. by Mr. William Tusson. Several sorts of tulips, from Mr. Henry Groom. Twelve sorts of apples and a eollection of flowers, from the Garden of the Society.

The following candidate was balloted for and dully elected: Jame Dunlop, Esq.

*May* 18.—The following papers were read: Upon the cultivation of Epiphytes of the Orchis tribe. By John Lindley, Esq. F.R.S. &c. Assistant Secretary. An account of the method of obtaining very early crops of green-peas. By Thomas Andrew Knight, Esq. F.R.S. &c. President.

Exhibited. A dish of forced cherries, from Mr. Benjamin Law. A forced cherry-tree, from the same. A bundle of asparagus consisting of 125 heads, weighing twenty-eight pounds, from Mr. Wm. Robert Grayson, of Mortlake. A scarlet Brazilian pine-apple, from the Garden of the Society. Asparagus blanched in tubes, and also grown in the common way, from the Garden of the Society. A large collection of flowers, from the same place.

Major-Gen. Thomas Bligh St. George, was balloted for and duly elected a Fellow.

*June* 1. The following papers were read: Some account of a new cherry called "the early purple guigne." By Mr. Robert Thomson, under-gardener in the fruit department of the Garden of the Society. Some remarks upon the cultivation of the strawberry; in a letter to Mr. Lindley. By Mr. John Fairbairn, F.H.S. On a method of forcing cherry-trees; in a letter to Mr. Lindley. By Mr. Benjamin Law, of Northampton.

Exhibited. Seven sorts of pelargoniums, from Mr. Russell of Battersea. A specimen of a hybrid cactus from the Comte de Vandes. Various flowers from the Society's Garden; together with a Trinidad pine-apple; and specimens of cherries grown under different circumstances.

*June* 15. Exhibited. Seedling Azaleas, from the Earl of Carnarvon. Double Sempervivens rose and la Tourterelle rose, from Mr. James Young. Caprifolium pubescens, from Robert Barclay, Esq. Cypripedium spectabile, from Mr. Wm. Malcolm. Cactus speciosisimus, from Mr. Henry Groom. A collection of pinks, from Mr. T. Hogg. A model of a wheel water-engine, from Mr. Siebe, the inventor. A large collection of flowers, from the Garden of the Society.

## FOREIGN.

ACADEMY OF SCIENCES.—*Meeting of April* 5, 1830.—Baron Cuvier read a memoir entitled considerations on the sternum.

*Meeting of April* 12.—Mr. Benjamin Delessert communicated two notes to the Academy, addressed to him from Edinburgh, by Mr. Smith. The first of these notes was relative to the discovery of a new milk tree found at Demerara, and to which Mr. Walker Arnott gave the name of *Tabernamontana utile.* The second note related to the germination of the nepenthes.

Mr. Arago read a letter of M. Dumas on the properties of a specimen of rock salt sent from Saxony by M. Boué.

M. Flourens read a memoir on the influence which water exerts on the respiration of fishes.

M. Latreille read a memoir on the Bombyx of the ancients.

Dr. Deleau, jun. read a memoir on Dactylogy.

M. Cauchy read a mathematical memoir.

M. Geoffroy St. Hilaire, unwilling to continue the discussion between Baron Cuvier and himself, mentioned his intention of publishing a work in which he hopes to refute victoriously the arguments of M. Cuvier.

*Meeting of the* 19*th April.*—M. Blumenbach was elected to the seat vacant by the death of Dr. Young.

M. Castero presented to the Academy a mechanical contrivance for the prevention of the overturning of the stages called *omnibus.*

M. Aldini presented to the Academy a work of Mr. Waston on the means of preventing the sinking of vessels.

M. Arago presented a tube full of the crystals of Palladium, sent to him by De Humboldt.

M. Coquebert Montbret made a verbal report on the journey of M. Caillié to Timbuctoo.

*Meeting of May* 3, 1830.—M. Julia Fontenelle communicated to the Academy a note relative to pretended human fossil bones which had been found in travertino near Martres de Veyre. They presented about 50 per cent. of phosphate of lime.

M. Arago exhibited to the Academy two fragments of an oak singularly struck by lightning. They had been transmitted by the Duke of Chartres.

M. Coquebert Montbret made a communication on a memoir of M. Bernard Petri, relative to the means of increasing the production of wool on sheep without increasing the expenditure of their maintenance.

M. Dureau de la Malle read a memoir on the development of the intellectnal faculties in wild and in domestic animals.

M. Becquerel read a note on the means of separating lead and manganese from the compounds in which they occur.

*Meeting of the* 10*th of May.*—M. Bertrami presented to the Academy sixteen Mexican tables, which assisted him in drawing up the genealogy of the Azteque and Tolteque kings.

Dr. Rousseau addressed to the Academy some observations for the Monthyon prize.

Baron Cuvier in his name and in that of Messrs. Prouy and Savart, made a favourable report on a memoir of M. Bennati, relative to the mechanism of the human voice in song.

M. Majendie reported on the discovery of *salicine* by M. Leroux.

A memoir of Messrs. Lamé and Clapeyrow on the solidification of a liquid globe by loss of heat was read.

M. Couverchel read a memoir on the ripening of fruit.

Geographical Society of Paris.—*Meeting of the* 8*th January*, 1830.—Mr. H. Tanner, of Philadelphia, sent a copy of his new map of the United States of America to the Society.

M. de Hammer sent several copies of an itinerary map of the road followed by Sultan Mahmoud IV. from Constantinople to Bagdad.

M. Jomard announced the return of M. Gourmelen, who has traversed different countries of Asia.

M. Jomard communicated some details on the progress of regeneration in Egypt.

The Central Commission of the Society decided that a Bunten's Barometer should be entrusted to M. Yosy, who is on the point of departure for America.

*Meeting of January* 22.—M. Jomard announced that M. Le Prieur, naturalist, is about to go to Cayenne.

M. Sueur Merlin communicated, in the name of M. de Blosseville, a note relative to the hydrography of the Tonga islands.

Mr. Warden communicated a note on the American expedition to the Antarctic pole; observations on the variations of the magnetic needle in the gulf of St. Lawrence; information on the Ottawa or great river; aud an analysis of the third report of the Presidents and Directors of the rail-way company from Baltimore to the Ohio.

M. de la Pylaie read a note on the objects of his flora of Newfoundland.

*Meeting of the* 5*th January.*—Baron de Derfelden communicated two letters from M. Siebold to Baron Capellen.

M. Jomard announced the approaching departure of M. Botta for Arabia and Egypt.

M. Sueur Merlin announced that M. Michaud is charged by government with a mission in Palestine.

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## MISCELLANEOUS INTELLIGENCE.

*Greek Calendar.*—The Greek Calendar, the abolition of which was in vain attempted by the Emperor Alexander, has just been abolished in Russia, with the consent of the Synod.

*Muscular Motion.*—A machine has been invented in France, the object of which is to give to the human body a muscular exercise, considered to be efficacious in nervous disorders.

*Indian Corn.*—It is stated in a letter from Paris, that in consequence of the total failure of the crops of Cobbett's corn in the vicinity of the French capital last season, very few experiments of the kind will be tried this year. A farmer near Rouen is said to have lost 15,000 francs by his speculations in this way.

*Agriculture.*—A preparatory school of agriculture has been established at Paris. Among the proposed objects of instruction are, the French, English, and German languages, linear, topographical, and descriptive drawing, the elements of mathematics, general notions of natural philosophy, and mineral and vegetable chemistry, the principles of vegetable physiology, general notions of mechanics, hydrostatics, and hydrodynamics, rural architecture, the elements of manufacturing and commercial economy, &c.

*Science in Russia*—The Emperor of Russia assigned 10,000 rubles per annum for the continuation of the researches necessary to ascertain the exact measure of the degree. M. Struve, the eminent astronomer of Dorpat, is charged with the direction of this labour, which will last for ten years. Two officers have been sent to Finland to make observations; and M. Struve is also to undertake a journey on this subject.

*Switzerland.*—The population of Switzerland amounts to nearly 2,000,000. The federal contingent consists of 33,758 men; the reserve doubles that force; the armed landwehr consists of 140,000; total, 207,516 men; not comprehending the federal staff. In case of necessity, the country can recall the 18,136 men at present in the service of several foreign powers.

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## LITERARY NOTICES.

A new edition of Major Rennell's Geography of Herodotus is in the press... Mr. Barbié de Bocage proposes publishing a work in three volumes, with an Atlas, on the History and Geography of the Regency of Algiers.

*List of New Books.—Natural History, and Philosophy.*

Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, vol. i. part 1st...Principles of Geology. By Charles Lyell, F.R.S., &c. vol. 1st...Murphy's new Theory of Astronomy, 8vo...Observationes de Avium Arteria Carotide communi, auct. Cha. L. Nitsch. 4to. Halle.

*Geography and Travels.*

Pinnock's Geography of the British Empire, 18mo...Scottish Tourist and Itinerary, with plates, 12mo...Description de la Grec. Par G. B. Depping, 4 vols. 18mo. Paris...Notice sur les Basins de mer et des Limans on lacs d'Odessa. Par P. C. Kepithes, Odessa...Voyage Archæologique dans l'ancienne Etrurie. Translated from the German of Dorow. By F. B. Eyries, in 4to. Paris.

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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.

# INDEX TO VOLUME SECOND.

*The original papers and communications are marked thus* *.

## A


* Aberdeenshire, Rev. J. Farquharson on the native forests of, 5, 81.
Academy of Sciences of Paris, extracts from the analysis of its labours in 1826, 457. Proceedings of the, 78, 158, 312, 468.
*Acalepha*, Eschscholtz' System of the, *reviewed*, 405.
Acid in the urine of herbivorous animals, 383.
Active Molecules, M. Raspail's notice on, 384.
* *Aconitum ferox*, Mr. J. Pereira on the physiological effects of, 235.
Agriculture, school of, established at Paris, 470.
* Ainsworth, W. Esq. on the geognostic age of the metalliferous veins of Lead-hills, Wanlockhead, and Glendinning, 400.
* Air-pump, Mr. Kemp's description of a new Torricellian, *with a plate*, 95.
Aldebaran, notice respecting its emersion and immersion, 300.
Alloy in silver detected by the magnetic needle, 303.
*Amphiuma*, Baron Cuvier on the genus, 378.
Amsterdam and St. Petersburg, communication by steam-boats between, 131.
Animals, fossil, found in Russia, 453.
*Annuaire du Bureau des Longitudes*, for 1830, *noticed*, 72.
*Anthropogénèse*, or the generation of man, by M. Demangeon, *reviewed*, 196.
Arborization of calcedony, 153.
Arcana of science and art, *reviewed*, 120.
* Arnott, G. A. W. Esq. F.L.S. &c. his notes on *Aspidium aculeatum*, and its allies, 243.
Asia, Williams' Essays on its ancient geography, *reviewed*, 100.
Asiatic provinces of Russia, scientific expedition to, 48.
* *Aspidium aculeatum*, and its allies, Mr. Arnott's notes on, 243.
Aurora borealis, notice of an, 301. Its influence on the magnetic needle, 69.


## B


Babbage's Reflections on the decline of science in England, *noticed*, 305,—*reviewed*, 349.
Bat, observations on the common, 464.
Bell's System of geography, *reviewed*, 108.
Births and deaths, numerical relation of, 367.
Blocks, transported, on the heaths of the Netherlands, 465.
Boblaye's M. le Capit. notices of the Morea, 44.
Bogota, on the origin of the people of the upland of, 355.
Bones of mammiferæ and birds found near Perpignan, 153.
Botanical excursions, Esslingen society for, 281.
Boulders, on the large ones which are found scattered over different formations, 71.

Brewster, Dr. on double refraction produced by simple pressure, 70. His Journal of Science, *noticed*, 307.
British Flora, by Professor Hooker, *reviewed*, 177.
Brodie collections, notice respecting the, 228.
Bromuret of carbon, account of, 233.
* Brown, Capt. Thomas, F.L.S. &c. his description of a new flounder, 99.
* Buds, W. Colvill, Esq. on the circumstances under which they are produced in trees and shrubs, 421.
*Buccina*, a new principle in boxwood, 304.
Burchell, Mr. his return from South America, 159.
Bushmen, notice respecting the, 365.
* Bushnan's, J. S. Esq. observations on the roots which yield the ipecacuanha of commerce, 17.

## C

Caillié's journal of a journey to Timbuctoo, *reviewed*, 182.
*Calceolariæ*, hybrid, 376.
Canada, account of its rivers, 129.
Canal, projected, between the Rhine and the Danube, 49.
Cast-iron, on the expansion of, 67.
* Caoutchouc, notice respecting a new preparation of, 463.
Caverns with bones, M. Tournal's theoretical considerations on, *noticed*, 72.
* Caverns of Derbyshire, notes on the, by the Editors, 168.
Cephalopodous Mollusca, chromophorous globules of the, 296.
*Cetacés*, Lesson's natural history of, *reviewed*, 198.
* Chactaw or Choktah Indians, Mr. Young's notices of the, 13.
Champollion, arrival of objects of antiquity collected by, 131.
Cheese, its chemical composition, 300.
China, proposed visit of Professor Newman to, 131.
*Chinioidia*, not a distinct principle, 301.
Cobalt, facts relative to the history of, 381.
College in New South Wales, 390.
Colours of the cephalopodous mollusca, 296.
* Colvill, W. Esq. on the circumstances under which leaves or buds are produced in trees and woody shrubs, 421.
Crocodile of Egypt, 378.
Currents in liquids, M. Dutrochet's remarks on, 152.
Cuvier's, Baron, lectures on the history of the natural sciences, 51, 132, 213, 285, 309, 447. Views respecting the unity of organization, 37.
*Cygnus Bewickii*, characters of, 62.

## D

Decrepitating common salt, 352.
De la Beche's notes on conglomerate and gravel deposits, *noticed*, 75.
Demangeon's *Anthropogénèse*, *reviewed*, 196.
* Derbyshire, notes on the caverns of, by the Editors, 168.
Diamond mines of Russia, 456.
*Dictionnaire des Sciences Naturelles*, T. LX. *noticed*, 464.
Distribution of Plants, 451.
Doubly refracting structure, Dr. Brewster on its origin, 70.
Dugés on the structure and formation of the operculum in mollusca, *noticed*, 307.

## E

Earth, observations relative to its figure, 463.
Edinburgh University, notice respecting the, 313.
Edwards *sur les caractères physiologiques des races humaines*, *reviewed*, 31.
* Eldon Hole, (Derbyshire,) account of a descent into, by the Editors, 168.
Electric currents, non-interference of, 231.
Electricity, physiological phenomena produced by, 232.
Elements of the economy of nature, M'Vicar's, *reviewed*, 258, 419.
Elk, fossil, Dr. Hibbert on the history of the, 63.
Entomology, British, Stephens' illustrations of, *reviewed*, 29.
* Equivocal production of animals, Mr. Rhind's examination of the opinions of Bremser and others respecting the, 391.
Eschscholtz' system of the Acalepha, *reviewed*, 405.
Excavation of valleys, Professor Sedgwick's remarks on the, 143.
Eye, properties of the impressions produced by light on the, 68.

## F

* Falls of the river St. John, Mr. R. Foulis' account of the, 165.
Faraday, Mr., his lectures on Mr. Wheatstone's discoveries relative to linear conductors of sound, 149.
* Farquharson, Rev. J. F.R.S. on the native forests of Aberdeenshire, 5, 81. His remarks on the varieties of the Scotch fir, 320.
Fellatahs, notice of the, 282.
Figure of the earth, observations relative to the, 463.
* Filtering liquids, an easy mode of, described by Mr. Johnston, 397.
* Fir, Scotch, Rev. Mr. Farquharson's remarks on the varieties of the, 320.
Fischer's *Handbuch der Zoologie*, notice of, 154.
Fleming's, Dr. notice of a submarine forest in Largo Bay, *noticed*, 308.
Formations, M. Jobert on their division, *noticed*, 72.
Formic acid, formation of, 302.
Fossil animals of Russia, 453. Bear, notice of a, 308. * Remains found near Kilmarnock, Dr. Scouler's account of, 4.
* Foulis, Robert, Esq. his account of the falls of the River St. John, 165. * His account of the islands in Passamaquoddy Bay, 201.

## G

Gardens and menagerie of the Zoological Society, *reviewed*, 185.
*Gasteropoda*, Dr. Kleeberg on the mucous ducts of the, 63.
Generic characters of plants, 388.
Geographical botany of Germany and Switzerland, 126. Intelligence, 50. Positions of Malta, Milo, and Corfu, 466. Society of London, notices of, 158, 362, 433. Society of Paris, annual notice of its labours, 47, 121. Prizes of, for 1830, 359. Proceedings of the, 311, 469.
Geography, Bell's system of, *reviewed*, 108.
Geological Society of Paris, 159. Of London, proceedings of the, 310.
Geology, new French journal of, 159.
* Gillies, John, M.D. M.W.S. account of the volcano of Peuquenes, (Chile,) 315.
Grecian sepulchre at Monte Video, 446.
Greek calendar abolished in Russia, 469.

* Greville's, R. K., LL.D. F.R.S.E. F.L.S. description of some new mosses from South America, 1.

Grouse, American, Mr. Wilson's account of a new species of, 140.

## H

Heat of the planetary space, 459.

* Hebrides, Outer, Mr. Macgillivray's account of them, (*continued from Vol. I.*) 87, 162, 321.

*Hectostoma*, a new genus of parasitical worms, 154.

Hermaphrodism, Dr. Knox's theory of, 58.

Hibbert, Dr. on the history of the fossil elk of Ireland, 63. His inquiry respecting the fossil animals of the Velay, 308.

*Hieracium* and allied genera, M. A. Monnier's monograph on the, 155.

Hoffman's geological map of the north-west of Germany, *noticed*, 74.

* Holy Island, descriptive notice of, 41.

Hooker's British Flora, *reviewed*, 177.

Humboldt, M. de, notice concerning, 50. His travels in the Ural, notice of, 366. Brief narrative of, 441.

Hya-hya, or milk tree of Demerara, account of, 61.

Hydrography of Russia, 210, 276.

## I J

Jardine's, Sir W. queries respecting the natural history of the salmon, &c. 59.

Ice, formation of, at the bottom of running water, 55.

Icebergs met with in low latitudes in the southern hemisphere, 281.

Indian corn, its failure in France, 470.

Ingouches, manners of the, 131.

Insects, notices respecting, 379.

* Johnston, J. F. W. A.M. his notes on the university of Christiana, 244. * His account of an easy mode of washing precipitates, or filtering large quantities of liquid, *with figures*, 397.

* Ipecacuanha of commerce, Mr. Bushnan's observations on the roots which yield the, 17.

Iron pyrites, notice respecting its composition, 304.

* Islands of Passamaquoddy Bay, described, 201.

Ivory's, Mr. letter relating to the figure of the earth, *noticed*, 306.

## K

Kater's pocket azimuth and altitude instrument, 151.

* Kemp, K. T. Esq. M.R.P.S. on a new Torricellian air-pump, *with a plate*, 95.

Kirgheses of Omsk, situation and rural economy of, 283.

* Knox's, Dr. theory of hermaphrodism, 58. * His notice of a sword-fish caught in the river Tay, 427.

## L

Lake of Haarlem, draining of the, 368.

Lauder's, Sir T. D. account of the floods of Morayshire, *reviewed*, 343.

Lea, Mr. Isaac, his monograph of the genus *Unio*, *reviewed*, 185.

Leonhard's *Agenda Geognostica, noticed*, 154.
Lesson's *Histoire Naturelle des Cetacés, reviewed*, 198.
Lesson and Garnot's Zoology, in Duperrey's voyage round the world, *noticed*, 74.
Libraries in the Faro Islands, Iceland, and Greenland, 446.
Light, on the properties of the impressions produced by it on the organ of vision, 68.
Lindley's Outline of the first principles of botany, *noticed*, 305. Genera and species of orchideous plants, *reviewed*, 346.
Linnæan Society, proceedings of the, 310.

## M

* Macgillivray, W. A.M. his account of the Outer Hebrides, *continued from Vol. I.* 87, 162, 321. His arrangement of British plants, *noticed*, 388.
M'Vicar's Elements of the economy of nature, *reviewed*, 258.
Magnetic needle, influence of the aurura borealis on the, 69.
Manual of natural history, M. Rang's, *noticed*, 155.
Manual of mineralogy, Walchner's, *noticed*, 466.
Map of the heavens, 386.
Maturation of fruit, 293.
Maw's Passage from the Pacific to the Atlantic, *reviewed*, 24.
Metallic rods or wires decompose water after their connection with the galvanic pile is broken, 303.
* Metalliferous veins of the counties of Dumfries and Lanark, Mr. Ainsworth's remarks on the, 400.
Meyer's *Nova Plantarum Species, noticed*, 74.
Mollusca, organic composition of the shell of, 222.
Morea, M. Boblaye's letter on the, 44.
Morton's synopsis of the organic remains of the ferruginous sand of the United States, *noticed*, 307.
* Mosses, Dr. Greville's description of some new ones, brought by Dr. Gillies from South America, 1.
Mosses of Sardinia, 466.
Mucous ducts of the *Gasteropoda*, Dr. W. Kleeberg on the, 63.
Mulberry tree, its original habitat, 379.
Musca, notice respecting the genus, 379.
Muscular motion, notice respecting a machine for, 469.
Museum established at Ægina, 446.

## N

Natural sciences, Baron Cuvier's lectures on the history of the, 51, 132, 213, 285, 447.
Necrological notices, 313.
Negro stomach, peculiar formation of the, 143.
New Holland, proposals for a scientific expedition to, 49.
New South Wales, account of a volcano in, 62.
Niagara, Mr. Robert Bakewell jun. on the falls of, *noticed*, 72.
Numerical signs used by different nations, 388.
Nuremberg boy, account of the, 146.

## O


* Orchilla, its latitude corrected by J. A. Macwhirter, Esq. 368.
* Organized bodies, suggestions on their relation with the conditions of their existence, 65.
Organs of voice in birds, notice of Mr. Yarrell's remarks on the, 465.
Ottoman empire, vassals of the, 443.
Oxide of iron, artificial crystals of, 302.


## P


Paris, account of its scientific coteries, 116.
Pelvis in the river trout, 478.
* Pereira, Jonathan, F.L.S., his account of the physiological effects of *Aconitum ferox*, 235.
* Peron's Peninsula, in Western Australia, account of, 249.
* Peuquenes, (Chile) Dr. Gillies' account of the volcano of, 315.
Pholonitic rocks, M. Gmelin's analysis of, 295.
Phrenology, opinions of scientific men respecting, (*Dr. Alison*) 57. (*Baron Cuvier*) 147.
Physiological phenomena produced by electricity, 232.
Plants of Northumberland and Durham, Mr. Winch's table of, 455. Distinctinctive character of their roots and stems, 293.
* *Platessa carnaria*, Capt. Brown's description of, 99.
Poland, journals and periodical publications of, 445.
Polish Jews, account of the, 284.
*Polypi* and *Actiniæ*, Rapp on the, *reviewed*, 405.
Potocki's travels in the Steps of Astrakhan and the Caucasus, *reviewed*, 191, 411.
* Proto-nitrate of mercury, Dr. O'Shaughnessy on a singular crystallization of, 229.
* Pyrenees, general considerations on the, 203.


## R


*Races humaines*, Edwards *sur les caracteres physiologiques des*, *reviewed*, 31.
Rapp on *Polypi* and *Actiniæ*, *reviewed*, 405.
* Rathke's discoveries respecting the respiratory organs, 173.
Refraction double, Dr. Brewster on its production by simple pressure, 70.
Respiratory currents of aquatic animals, 374.
* Respiratory organs, on the double type of the, 173.
Respiration of fishes, influence of water on the, 145.
* Respiration, Dr. Sharpey on its mechanism in aquatic animals, 334.
Revolving motions produced by the combination of alcohol with laurel oil, 302.
* Rhind, William, Esq. his examination of the opinions respecting the equivocal production of animals, 391.
Rivers of Canada described, 129.
Roots and stems of plants, characters of the, 293.
Rossel, Mr. de, account of his death, 128.
Russia, Asiatic provinces of, scientific expedition to the, 48. Hydrography of, 210, 276. Schnitzler's essay on the general statistics of, *reviewed*, 411.

## S

St. Hilaire, Geoffroy, his answer to Baron Cuvier, respecting the unity of organization, 112.
* Sales, valley of, descriptive notice of the, 124.
Salicine, discovery of, 230.
Salmon, Sir W. Jardine's queries respecting the natural history of the, 59.
Schlechtendal's Linnæa, *noticed*, 306.
Schnitzler's essay on the general statistics of Russia, *reviewed*, 411.
School of arts at Brussels, 390.
Schulz, Dr. assassination of, 50.
Science in Russia, 470.
Scientific coteries of Paris, 116.
Scottish naturalists, proposed meeting of, 234, 313, 389.
* Scouler's, John, M.D. F.L.S., &c. account of some fossil remains found near Kilmarnock, 4.
Sea, chronological table of its encroachments, 298.
Shamrock of Ireland supposed to be the wood-sorrel, 148.
* Sharpey, W. M.D., on the respiratory currents of aquatic animals, 334.
Shell of Mollusca, M. Robineau-Desvoidy's views respecting its organic composition, 222.
* Sherriff, Mr. F. H., on a remarkable peculiarity in a fall of snow, 58.
Siebold, Dr., arrested in Japan, 128. Notice respecting, 337.
Silver mines in Sweden, 454.
Snake poisons and their remedies, 389.
* Snow, Mr. Sherriff, on a remarkable peculiarity in a fall of, 58.
Society of Arts, proceedings of, 309.
——— Geographical, of Paris, acts of, 79.
——— Geological, proceedings of, 77, 467.
——— Horticultural, proceedings of, 76, 467.
——— Linnæan, proceedings of, 77.
——— Natural History, of Newcastle, proceedings of, 78, 311.
——— Royal, proceedings of, 77, 157, 310.
——— Royal, of Edinburgh, proceedings of, 75.
——— Royal Physical, proceedings of, 75, 156.
——— Wernerian, proceedings of, 76, 156, 269.
Sound, breadth of the, 48.
Sound, linear conductors of, 149.
Sovereigns of Asia and Northern Africa, 443.
Sowerby's Supplement to English botany, *noticed*, 71.
Spider, mechanical feats of a, 454.
Spots of the sun, their supposed influence on temperature, 66.
Spring-tides, note on the difference in the height of, 301.
Statistical Society of Paris, 446.
Stature of man, 62.
Steenhoom's expedition to New Guinea, 367.
Stephens' Illustrations of British entomology, *reviewed*, 29.
Stokes' botanical commentaries, *noticed*, 387.
Stomach of the negro, its peculiar formation, 143.
Sun's spots, their supposed influence on temperature, 66.
Swan River, notices respecting, 159.
Swan, characters of the new wild one, *Cygnus Bewickii*, 62.
Switzerland, population of, 470.
* Sword-fish, Dr. Knox's account of one caught in the River Tay, 427.

## T

*Taberna montana utilis*, the hya-hya, or milk tree of Demerara, 61.
Temperature of the air and earth in Eastern Russia, 461.
Thompson's zoological researches and illustrations, *noticed*, 73.
Tiedemann and Treviranus' *Zeitschrift fur Physiologie, noticed*, 306.
Timbuctoo and Jenné, Rene Caillie's journal of a journey to, *reviewed*, 182.
Tobacco, Australian, petition for its admission, 446.
* Torricellian air-pump, description of a new one, by Mr. K. T. Kemp, 95.
Touch, seat of the sense of, 457.
Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, *reviewed*, 415.
Travels in the steps of Astrakhan and the Caucasus, by Count Potocki, *reviewed*, 191, 411.
Trial by jury established amongst the native inhabitants of Ceylon, 278.
Tristan d'Acunha, notice respecting, 275.

## U V

* Valley of Sales, descriptive notice of the, 124.
Vegeto-alkali in Peruvian bark, 459.
Veie, notice of a dissertation on, 466.
* Visit to Hartfell and Birkhill Spas, in the county of Dumfries, 431.
*Unio*, Mr. Lea's monograph of the genus, *reviewed*, 185.
Unity of organization, review of the recent discussion respecting, 37, 112.
* University of Christiania, Mr. J. F. W. Johnston's notes on the, 244.
Volcano in New South Wales, 62.
Volcanoes, their forms and relations, 452.
Voyage of circumnavigation in the sloops Moller and Seniawin, 50.
*Urea*, its artificial formation, 460.
*Ursus longirostris*, notice of a description of its skeleton, 467.

## W

Waardenburg's *Commentatio de Historia Naturali Animalium Molluscorum, noticed*, 155.
Walckenaer's general history of voyages and travels, *noticed*, 154.
* Washing precipitates, an easy mode of, described by Mr. Johnston, 397.
Water pipes, notice of a memoir on the laying of, in Paris, 67.
Wernerian Natural History Society, account of the, 269, *354, 420.
Williams's essays on the geography of ancient Asia, *reviewed*, 100.
Willis, Mr. notice respecting his journey in Canada, 446.
Wilson, James, Esq. his account of new American grouse, 140.
Wurtemberg, Professor Memminger's description of, *noticed*, 73.

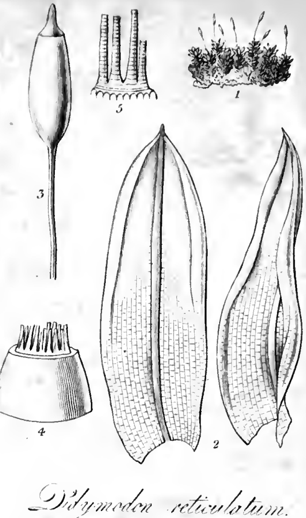
## Y

* Young's, F. B. Esq. notices of the Chactaw Indians, 13.

## Z

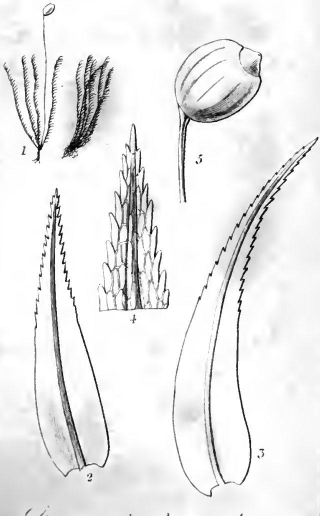
Zoological periods, Marcel de Serres', 294.

*Anictangium orthotrichoides.*

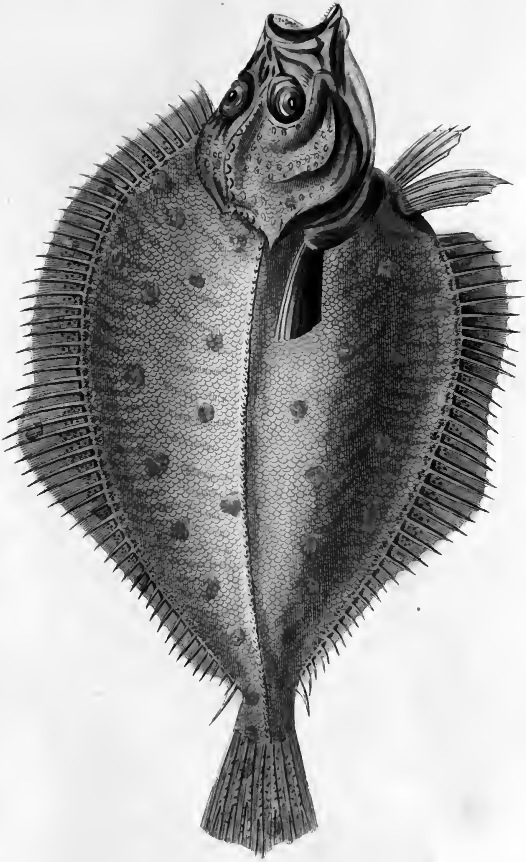


*Didymodon reticulatum.*

*Tortula carinata.*



*Bartramia fontanoides.*



*Platessa carnaria.*
*The Flesh-coloured Fluke.*

Drawn by Capt.ⁿ T. Brown

Engᵈ by W.H. Lizars

Fig. 1.

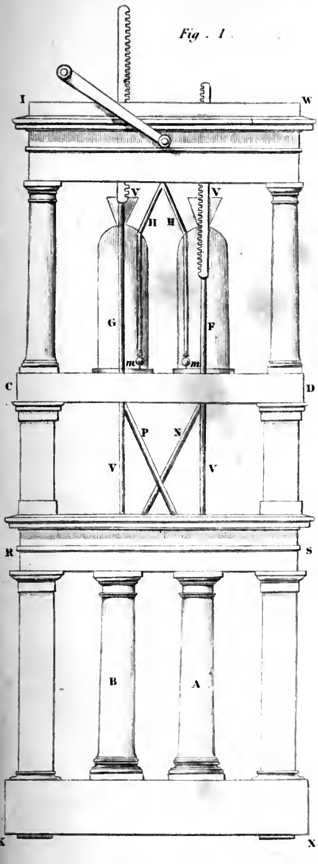
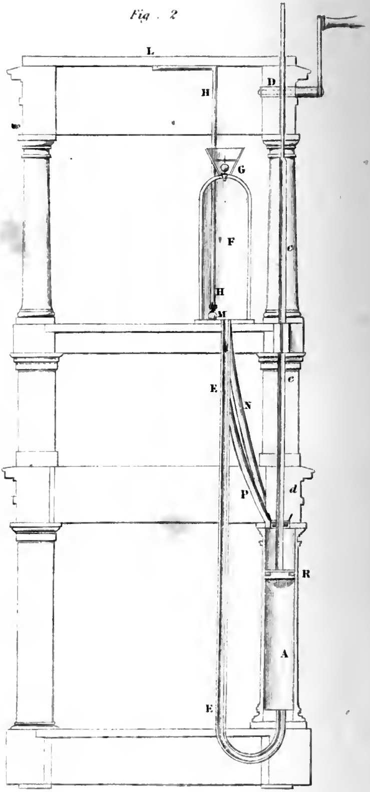
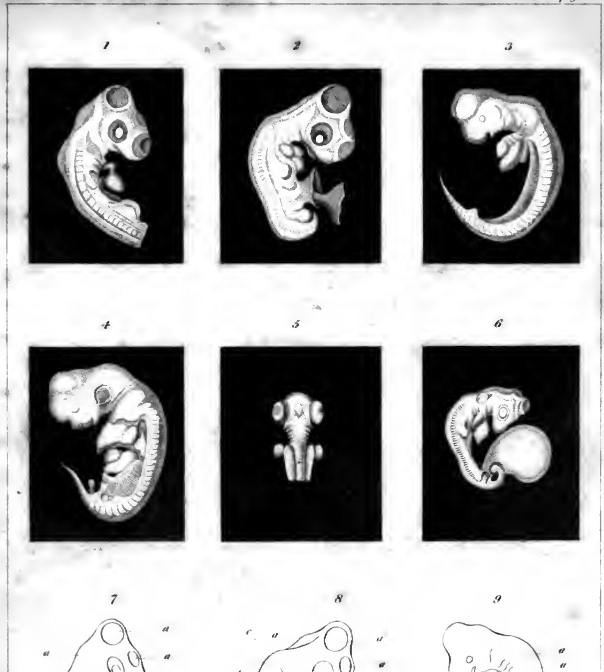



Fig. 2.




FALLS OF S$^{T}$ JOHN'S, NEW BRUNSWICK.

W.H. Lizars Sculp$^{t}$




W.H. Lizars sculp!

*On the development of the Respiratory Organs.*

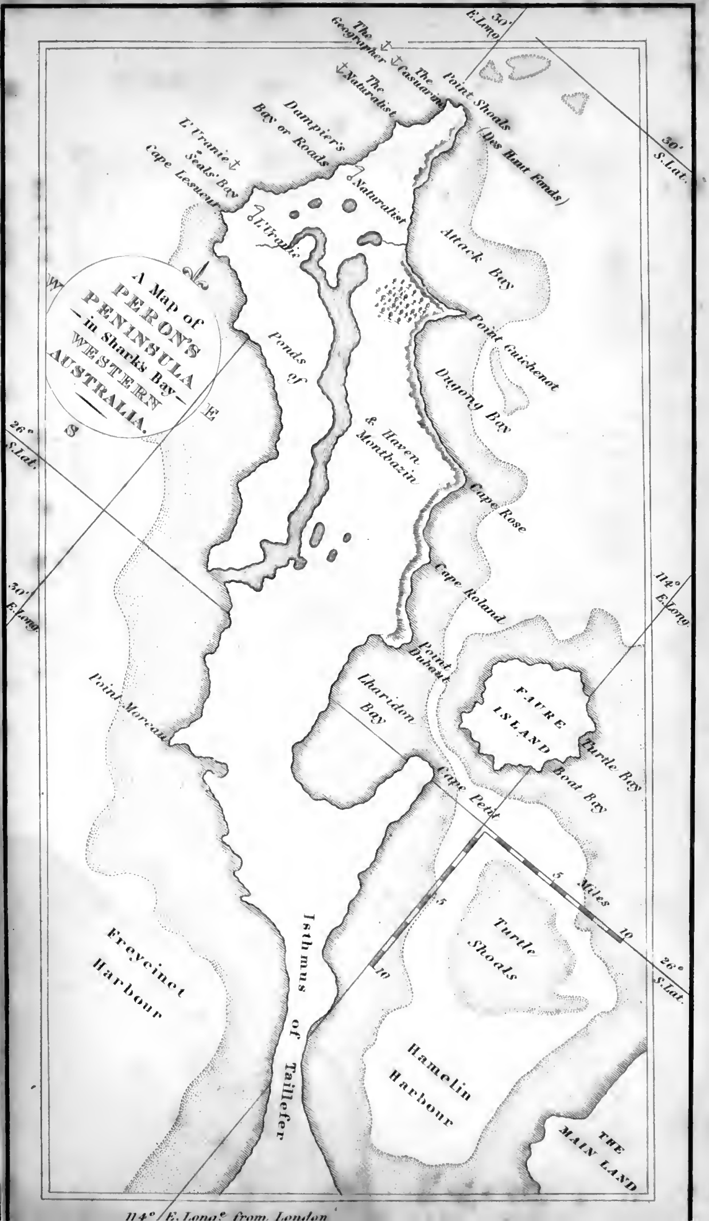

A Map of
PERON'S
PENINSULA
in Sharks Bay
WESTERN
AUSTRALIA.
The Geographer
The Casuarina
The Naturalist
Point Shoals (Des Haut Fonds)
Dampier's Bay or Roads
L'Uranie
Seals' Bay
Cape Lesueur
Naturalist
L'Uranie
Attack Bay
Point Guichenot
Ponds of
& Haven Montbazin
Dugong Bay
Cape Rose
Cape Roland
Point Dubout
Lharidon Bay
FAURE ISLAND
Turtle Bay
Boat Bay
Cape Petit
Point Moreau
5 Miles 10
Turtle Shoals
Freycinet Harbour
Isthmus of Taillefer
Hamelin Harbour
THE MAIN LAND
26° S.Lat.
30' S.Lat.
30' E.Long.
114° E.Long.
114° E.Long. from London
W
E
S

*Fig. 2.*

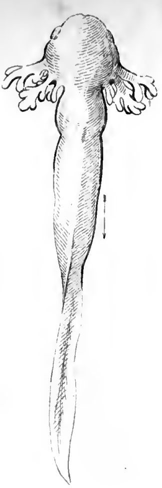


*Fig. 5.*

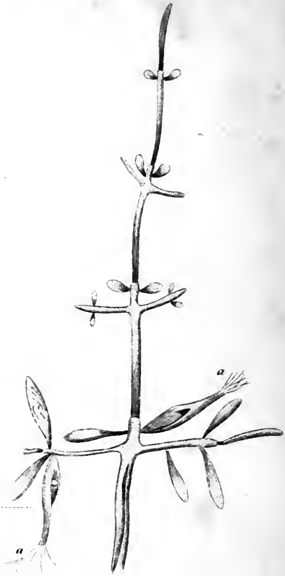



*Fig. 1.*

*Fig. 3.*

*Fig. 6.*

*Fig. 4.*