# THE ANNALS

AND

# MAGAZINE OF NATURAL HISTORY,

INCLUDING

## ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'MAGAZINE OF BOTANY AND ZOOLOGY,' AND OF LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ: ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; a vere eruditis et sapientibus semper exculta; male doctis et barbaris semper inimica fuit."—LINN.

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Erratum, p. 278, l. 10, for "Switzerland, to the height of 11,000 feet," *read*, "Switzerland, *and* to the," &c.

# THE ANNALS

AND

# MAGAZINE OF NATURAL HISTORY.

"................. per litora spargite muscum,
Naiades, et circùm vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
*Parthenii* Ecl. 1.

No. 62. SEPTEMBER 1842.

## 1.—*Description of two new species of Kangaroos from Western Australia.* By John Gould, Esq., F.L.S., &c.

M. Priess, who has just returned from Western Australia, where he has been for some years assiduously engaged in collecting specimens of natural history, having kindly placed in my hands two new and highly interesting species of Kangaroos, I hasten to avail myself of the pages of your valuable Journal, in order to make them known to the scientific world as quickly as possible.

The first of these new kangaroos is a fine large animal, which in general appearance closely resembles the *Macropus major*, but differs in being altogether more slender in form and in the much darker colouring of the fur of the upper surface, particularly at the base of the ear and back of the neck; the fur is also more woolly in its texture: this animal, on account of its fleetness, I propose to name

### Macropus ocydromus.

Macr. *Macropo majori* assimilis, differt autem statura graciliori, vellere magis lanuginoso, et colore nigrescenti-vinoso corporis superioris, præsertim ad basin aurium et ad nucham.

*Hab.* Swan River, Western Australia.

*Male.*—Face and forehead dull cinnamon brown, becoming darker over the nose and forehead; cheeks without a white stripe; the upper lip and chin beset with a number of long and short fine black hairs, those on the edge of the upper lip being rigid; base of the ears and occiput blackish vinous brown; the remainder of the ears clothed externally with short grizzled hairs, the tips of which are white, and the base brown, forming a strong contrast with the dark colouring of the lower part of the ear; internally the ear is clothed with long white hairs; the blackish brown colouring of the occiput is continued down the back of the neck and over the middle of the back, becoming lighter as it proceeds downwards towards the tail; throat, fore part of the neck and chest brownish white; sides of the body, flanks, and under surface dull cinnamon brown; arms and hands grizzled brown externally, becoming lighter on the inner surface and much darker towards the extremities, the hair at the base of the nails being blackish brown; thighs, legs and feet similar to the fore-arms, the toes and hairs at the base of the nail being lighter brown; a deep vinous brown mark extends along the ridge of the tail, gradually passing into black at the tip; the remainder of the tail dull cinnamon brown.

*Female.*—Similar in colour, but much lighter in every part.

| | Male. | | Adult female. | |
|---|---|---|---|---|
| | ft. | inch. | ft. | inch. |
| Length from the nose to the extremity of the tail... | 6 | 8 | 6 | 2 |
| ——— of tail ........................................ | 2 | 11 | 2 | 7 |
| ——— tarsus and toes, including the nail ...... | 1 | 1 | 0 | 11½ |
| ——— arm and hand, including the nails ...... | 1 | 1 | 0 | 11¼ |
| ——— face from the tip of the nose to the base of the ear ........................................ | 0 | 7½ | 0 | 7¼ |
| ——— ear ........................................ | 0 | 4½ | 0 | 4¼ |

The other animal is a third species of that rare form to which I have given the generic designation of *Lagorchestes*. It is about the size of a rabbit; the fur is long, dense, and very soft to the touch; the upper surface of the body beset with numerous long, fine white-tipped hairs, extending beyond the general fur nearly two inches, rendering it at once a most conspicuous and remarkable species. Like the two other members of the genus the fore-feet are extremely small and the claws sharp; the ears, on the other hand, are larger in proportion to the head than in either the *L. conspicillata* or *L. Leporoïdes*.

The long white-tipped hairs has suggested for this animal the name of

LAGORCHESTES ALBIPILIS.

Lagorch. statura *Cuniculi*, et pilis longis albidis ultra vellus densum et permolle usque ad uncias duas productis conspiciendus.

*Hab.* Western Australia.

Nose, face and forehead grizzled brown and grayish white;

external surface of the ear grizzled gray and black; internal surface thinly clothed with white hairs; all the upper surface mingled gray, reddish brown and black, distinct black fascia being apparent on the lower part of the back and rump; the base of the fur on all the upper surface is black, succeeded by fawn-white and tipped with dark brown; the lengthened hairs dispersed over the back are black for three-fourths of their length and tipped with white; throat and under surface dull buffy white, the base of the fur being deep gray; arms brownish white; legs grizzled brown and fawn colour; toes covered with long glossy brown hair; tail thinly clothed with short brown hairs on the sides, a narrow line of black along its upper surface gradually deepening as it approaches the extremity, where the hairs lengthen and form a small tuft; under surface of the tail clothed with stiff dirty white hairs, which increase in length as they approach the extremity.

The *female* is so similar that a separate description is unnecessary.

| | ft. | inch. |
|---|---|---|
| Length from the tip of the nose to the extremity of the tail ... | 2 | 3 |
| ——— of tail ........................................ | 1 | 0½ |
| ——— tarsus and toes, including the nail .................. | 0 | 4¼ |
| ——— arm and hand, including the nails .................. | 0 | 2¼ |
| ——— face from the tip of the nose to the base of the ear . | 0 | 3¾ |
| ——— ear ........................................ | 0 | 2¼ |

I cannot conclude without expressing my obligation to M. Priess for the readiness with which he afforded me the use of these valuable specimens for my "Monograph of the Macropodidæ," and also for his kindness in promising me the loan of the other novelties he has collected.

July 18, 1842.

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## II.—*Contributions to Structural Botany.* By W. Hughes Willshire, M.D., M.B.S., Lecturer on Botany at Charing Cross Hospital.

[Continued from vol. ix. p. 86.]

5.—In that remarkable member of the family *Bromeliaceæ*, *Tillandsia usneoides*, I have met with a form of vegetable tissue, which, as far as I am acquainted, has hitherto remained unobserved. I may first remark, that after a lengthened search I have been unable to detect any appearance of stomata in any portion of this parasitical plant, and that I entirely agree with Miquel, that it must be regarded as a *false parasite*, and not as a *true one*. The whole of the stem and leaves of the plant is covered with large transparent furfuraceous scales, the bases of which appear to me to perform a glandular office, and present, with respect to their structure, rather a peculiar appearance: the cells of which they are composed are devoid of colour, save the four central ones, which are filled with a yellowish green or brown fluid; the fourfold development of the cells appears to be derived from the transverse and longitudinal division of a primordial cell. Beneath the scales is the epidermis, which is composed of a thin cellular tissue, having sinuous walls, next to which is a layer of cellular and parenchymatous matter, whose cells are more or less filled with green, and sometimes purple colouring matter; next, and forming the centre of the stem, is the woody tissue, which is composed of a fine, rather tough, cordlike, and dark-coloured bundle of woody fibre or liber cells, having a very few excessively delicate spiral vessels, the spire of which, however, I have not succeeded in unrolling: the whole of the woody matter is of a bright yellow brown colour by transmitted light. In the leaves the central cord separates into smaller ones, which run parallel with the edges of the foliaceous expansion. It is in the pericarp, however, that the particular form of tissue exists to which I at first alluded: if the inner brown-coloured portion of this organ, which easily separates in the dry state from the external and lighter-coloured layer, be examined, it will be found that it consists of three distinct layers of tissue, the central one of which is very distinct from the others; the upper and under layers are composed of cellular tissue, possessing no colouring matter in the cells, at least in the state in which I have had an opportunity of examining it; the upper or most internal one being very thin and delicate: between them is placed a series of longitudinal fibres or hollow cellular bands, connected together by a great number of small parallel transverse ones, which latter have elongated oval spaces between them. These series of anastomosing bands appear to be perfectly continuous with each other; at the inosculating places of the transverse with the longitudinal ones no septa or partitions exist, and the central hollow of the fibres is like that of a single though variously divided tube. It is from this layer that the deep brown colour of the inner surface of the pericarp is derived, every band or fibre being filled and extended by a brown colouring matter. In the spaces intervening between the transverse bands the colourless membrane of the cellular layers is distinctly seen; a large transparent globule I have also generally observed lying in the centre of the spaces referred to. Now if this structure is to be referred to that form of tissue called *cellular fibrous tissue without membrane*, it certainly can only be regarded as a *variety* of structure not individually noticed before; but I am inclined to believe it is otherwise, and that it is a form having its origin in a manner quite distinct from that in which Schleiden has shown fibre without membrane arises. It appears to me to have its origin from primordial membrane alone, and that the formation of a secondary layer,—a spiroidal fibrous one,—has nothing to do with it. The layer of tissue at first was a common cellular one, composed of several parallel series of square-shaped cells, having rather wide intercellular spaces between them: as the increase of development ensued, the primary membrane forming the superior and posterior walls of the cells became absorbed, leaving only the lateral ones, which thus formed a series of membranous walls to a continuous and inosculating series of intercellular spaces: the edges of these walls finally becoming connected or grown together, and the intercellular spaces filled with colouring matter, an apparently fibrous tubular layer is the result.

In *Bromelia nudicaulis* it has been remarked by Dr. Lindley, that the membrane of the cuticle breaks into little teeth of nearly equal width when torn; I have observed the same circumstance to occur in *Tillandsia usneoides*.

6.—In the spirally-twisted fruit-vessel of *Loasa lateritia* common cellular tissue is displaced by another structure, in order to admit of that peculiar direction which the pericarp assumes. This structure consists of elongated cells, closely approaching to, or even apparently identical with, one portion of the woody tissue of the stem, and which are marked longitudinally by a single row of dots or pores exactly like those on the ducts of the vascular system of the plant: the fibres of the different layers cross each other obliquely, so that when two layers are examined under the microscope the structure is *netted*, and between each mesh a single pore is seen. The seeds are enveloped in a rather lax covering of membrane, which is traversed by anastomosing tubular fibres of a bright brown colour, and which at the edges of the seed becomes expanded into a wing.

7.—Meyen is right in affirming what has been denied by Korthals, namely, that the glandular hairs of *Drosera* contain spiral structure. In the centre of the hair I have generally succeeded in unrolling a spiral vessel; this by Meyen is said to be single, but in many hairs I have found more than one. Korthals is also wrong in his description of the glandular head: I have never been able to discover any hollow there; the centre is in fact of a dense consistency, formed of elongated cellules, assuming in the mass an oval shape. The whole hair is enveloped by a layer of tissue, which is derived from the epidermis of the leaf, and which in old hairs becomes loose and lax, like a sheath. The cells containing the colouring matter are elongated, fusiform, or club-shaped.

## III.—*Note on the appearance of Clouds of Diptera.* By Robert Patterson, Esq., Member of the Nat. Hist. Soc. Belfast, &c.

The appearance of Dipterous insects in large numbers is in certain localities and at certain times a matter of common observation. About Lough Neagh myriads of *Culicidæ*, *Tipulidæ* and *Ephemeridæ* are seen, and *Culex detritus* is recorded by Mr. Haliday* as rising above trees, so as to resemble the smoke of a cottage chimney. In Phil. Trans. 1767, it is stated that in 1736 the common gnat (*Culex pipiens*) rose in the air from Salisbury Cathedral in columns so resembling smoke, that many people thought the cathedral was on fire. In Norwich, in 1813, a similar alarm was created. At Oxford, in 1766, "a little before sunset, six columns of them were observed to ascend from the boughs of an apple-tree, some in a perpendicular and others in an oblique direction, to the height of fifty or sixty feet †."

A phænomenon similar to that last mentioned was this summer observed for some days at Belfast. Wherever there were trees, columns of insects were seen, and attracted the notice of even the most incurious. They began to appear a little before seven o'clock, and diminished in numbers as the light decreased, so that by half-past nine few were visible. On the evening of June the 11th, I went with Messrs. Bryce and Hyndman to the house of our fellow-member Mr. Grattan, situated on the north side of the bay, and about half a mile from the town, for the purpose of observing them. The following notes were there drawn up, our remarks being limited to an irregular semicircular area, having an average diameter of seventy or eighty perches.

The insects appeared in columns above the trees, the shade of colour varying according to the greater or less density of the mass from that of light vapour to black smoke, the columns not only differing in this respect from each other, but each column being frequently different in different parts. They might have been mistaken for dark smoke-wreaths but for their general uniformity of breadth, and for a graceful and easy undulation, similar to that of the tail of a boy's kite, when at some height and tolerably steady. The individual insects flew about in each column in a confused and whirling multitude, without presenting in their mazy dance, any ot those regular figures which gnats frequently exhibit over pools of water. The motion of their wings filled the air with a pe-

* Entom. Mag., No. 11. p. 51. † Kirby and Spence, vol. i. p. 114.

culiar and not unmelodious humming noise, like the distant sound of the machinery of a spinning-mill, but more varied.

The columns rose perpendicularly to the height of from 30 to 60 feet, and in some instances to the height of 80 feet. They were equally abundant over trees of every kind, as ash, beech, birch, poplar, &c., and so numerous were these distinct columns, that so many as from 200 to 300 were visible at the same time. As each column was every instant undergoing a change in density of colour, diameter, elevation or form, the phænomenon was one of exceeding interest, especially as connected with the living myriads, which in these aërial gambols gave expression to their enjoyment.

Some individuals were taken in a gauze net, and on examination by Mr. Haliday proved to be *Erioptera tricialis* ♂ (Hoffmansegg); others taken two evenings afterwards at the Royal Academical Institution (where they presented the same appearance, but in smaller masses) were *Chironomus testaceus** (Macquart); so that different species would appear to have occasioned a similar phænomenon in different localities.

As we are at present ignorant of the conditions which are requisite to call these tiny multitudes into existence, the state of the barometer and thermometer for some successive days is given as recorded by Mr. Bryce :—

| | Thermometer. Mean of 9 A.M. and 2 P.M. | Barometer. Mean of 9 A.M. and 3 P.M. |
|---|---|---|
| June 9 | 69·125 | 30·398 |
| — 10 | 69·25 | 30·332 |
| — 11 | 69·50 | 30·400 |
| — 12 | 73·75 | 30·450 |
| — 13 | 69·62 | 30·378 |

During all these days there was a very light summer wind between E. and N. On the 13th, between two and six P.M., a thunder-storm with rain passed north by west over Lough Neagh, Antrim, &c., and was followed by a diminished temperature.

I have been unable to define the precise range in which these singular assemblages of insects appeared. About Belfast they were everywhere abundant over trees. At the residence of one gentleman, about a mile to the north of the town, they came forth in myriads; and when the noise of their wings first attracted his attention, he for a moment supposed it to be the sound produced by letting off the steam from a steam-vessel at a distance. By a lady on the

* In the box sent to Mr. Haliday, containing probably above 100 specimens of this insect, there was but one female.

evening of the 11th, and by another on the evening of the 13th, it was mistaken for the sound of something boiling, and one of them hastened from the hall door into the house to see that her servant was not neglecting some culinary matter then in progress. At Colin Glen, about four miles west of Belfast, they were observed on the 12th. On the evening of the 11th, the person who has the care of the Friar's-bush burial-ground, adjoining the Botanic Garden, thought the dark smoky-looking columns which he saw were caused by something being burned in the garden, and ascended the highest part of the ground to ascertain if such were the case. I observed the insects on the evenings of the 10th, 11th, 12th, 13th and 14th; but on communicating these particulars to my friend Mr. Thompson, I was gratified by finding that they had attracted his notice above the trees in front of his residence on the 9th; and he has obligingly placed at my disposal the following note respecting them:—

"Belfast, June 9, 1842.—When returning from the Botanic Garden to town this evening at eight o'clock, and about a quarter of a mile from Donegal Square, my attention was arrested by what appeared to be several narrow columns of black smoke rising into the air above the trees to a great height 'like the mast of some tall ammiral.'—Looking upon them as smoke, I could not understand why a portion of one should occasionally vibrate, or as it were, break down, until it would touch a neighbouring column to the east of it, while another would play a similar part towards a column on the west. The whole appearance seemed to indicate an extraordinary state of the atmosphere, though I could not conceive the gentlest zephyrs blowing different ways so near each other and about the same time. On approaching nearer, however, the phænomenon was explained, and proved to arise from columns of a large species of midge instead of smoke. The trees along the west side of the square are deciduous and chiefly elms (*Ulmus montana*), about forty-five feet in height, forming a continuous row, and the summit of almost every tree (for there evidently was no favouritism as to species) seemed to be emitting smoke—sometimes in two or three distinct columns. The insects presented themselves in masses of every form, the most remarkable of which was still the tall mast-like column. One cloud of them appeared above the middle of the spacious street, where numbers of persons were now assembled gazing and wondering at the singular spectacle. There were as usual several swifts (*Cypselus apus*) flying about the Square, and I particularly remarked, that although they occasionally passed very near the masses of insects, they never once swept through any congregated party of them. For some time past the weather has been remarkably fine, dry and warm, as was this day.

"My brother, as I afterwards learned, remarked the same appearance this evening above the trees at the Grove, a mile distant from

Belfast, in an opposite direction from Donegal Square. Leaving town for some time on the following day, I had not any further opportunity of witnessing the interesting phænomenon.

"W. Thompson."

## IV.—*On the spongeous origin of Moss Agates and other siliceous bodies.* By J. S. Bowerbank, Esq., F.G.S.*

[With Three Plates.]

In the course of the last session I had the honour of submitting to the Geological Society a paper "On the structure and origin of the flinty bodies of the chalk and greensand formations of England," in which I endeavoured to prove that the greater portion of these siliceous masses were derived from the silicification of spongeous bodies which existed at the bottom of the sea at the periods of the deposit of these strata in as great abundance as their recent types are now found in the ocean, both in tropical and temperate latitudes. In my description of the organic contents of the flints and cherts there described, I mentioned the frequent occurrence of spicula among these remains. From their appearance in bodies which bore every appearance of being true keratose sponges in which spicula were not at that time thought to exist, I was led to believe that the sponges which had originated these siliceous masses were an order of the tribe differing from our recent keratose types only by the possession of siliceous spicula, and therefore, although not absolutely belonging to the same genus as the sponges of commerce, yet so nearly allied to them in every other respect as to leave no reasonable doubt of the true spongeous nature of the fibre that abounds in them. Since that period I have received from my friend Rupert Kirk, Esq., of Sydney, numerous specimens of at least three distinct genera of sponges, and among them many keratose ones, which upon examination with a microscopic power of 500 linear, proved to contain siliceous spicula in great quantities. This circumstance induced me to suspect their presence in the sponges of commerce, and upon examining them carefully I detected spicula in each of the two species from the Mediterranean as well as in that from the West Indian Islands, although, I believe, every author who has hitherto described the sponges of commerce has denied their existence in these bodies. Since the publication of these facts, I have had the opportunity of examining two species of keratose sponges in the collection at the British Museum, which are preserved in spirit in the state in which they were immediately after being taken from their native element, and in both these specimens

* Read before the Geological Society of London, April 7, 1841.

the interstices of the horny fibre are filled with a semipellucid fleshy matter, in which numerous spicula are found imbedded. I will not enter into a lengthened detail of the investigations of these recent forms, as they have already been given to the public in two papers. The first "On the keratose sponges of commerce," I had the honour to read before the Microscopical Society of London on the 27th of January 1841*, and the second "On the structure of a keratose sponge from Australia," is published in the 'Annals and Magazine of Natural History,' April 1841. It is necessary to state thus much, as the discovery of siliceous spicula in recent sponges removes the discrepancy that appeared to exist between the recent and the modern types of a portion of the animals under consideration. The fibre in all the sponges of commerce, as well as in many keratose species from Sydney, that I have examined, is solid; but in one species, *Spongia fistularis*, Lamarck, described by Dr. Grant in the 'Edinburgh Philosophical Journal,' vol. xiv. p. 339. the structure is truly tubular; and this is the only recent type of the form that I am acquainted with, although, as it will be hereafter seen, this tubular form of the fibre is of frequent occurrence in the fossil sponges.

The results arising from the examination of the siliceous bodies of the chalk, greensand and oolitic formations, induced me to extend my researches to other siliceous masses; and with this view I obtained, through the kindness of Mr. Tennant, a considerable number of polished specimens of moss agates from Oberstein in Germany, from Sicily, and other localities.

I examined these specimens as opake objects by direct light concentrated on their surfaces by the application of a convex lens, and in many cases the results of the examination far exceeded my expectations of being able to detect the organic structures imbedded in them. Upon a minute and careful examination of numerous polished slabs of the moss agates of Oberstein, almost every specimen presented strong evidence of their spongeous origin. The structure and arrangement of the fibre of the sponge is rarely to be found in a state of perfect preservation throughout the whole of the mass, but usually presents the appearance of having suffered to a great extent by maceration and disruption of its component parts previous to its fossilization. Generally speaking, the fibres adhere together in confused and ropy masses, with here and there one or two in a somewhat better state of preservation, and occasionally, especially near the external sur-

* Published in the Transactions of the Microscopical Society, part the first, vol. 1, p. 32.

face of the original mass, small portions of the tissue are sometimes observed in so perfect a state as almost to deceive the observer into believing them to be fragments of recent sponges. In some parts of the mass, especially near that which is in the finest state of preservation, parts of the structure may generally be seen in all the intermediate stages between perfect preservation and nearly complete decomposition, where the organic tissues have resolved themselves into a shapeless mass, only to be recognised as formerly having belonged to the sponge by the aid of the surrounding, connected and less decomposed parts of the animal structure.

The siliceous matter in which these remains are imbedded usually presents a clear and frequently a crystalline aspect, while the remains of the organized matter is strongly tinted with colour: bright red, brown and ochreous yellow are the prevailing colours, but occasionally the fibre is milk white or bright green. Sometimes the interior of the tubular fibre only is filled with colouring matter, while the sides are of a semipellucid or milky white; in others the whole of the fibre is impregnated with it. The colouring matter is generally confined within the bounds of the animal tissue, leaving its surface smooth and uninterrupted; but occasionally the fibre is not only completely charged with it, but its surface is also slightly encrusted by it.

These are the usual characters presented by the greater portion of the moss agates of Oberstein and other parts of Germany.

It would be taxing the patience of the reader to too great an extent if I were to attempt to describe the whole of these siliceous bodies that I have subjected to examination; I shall therefore confine myself to a detailed description of a few of the most characteristic specimens, and especially to those which afford the strongest and most perfect evidence of their organic origin.

The first of these specimens is a moss agate, said to be from Sicily. The structure of the sponge tubuli is very obscure in the greater part of the mass, but at the margin of the specimen the tubes are in as perfect a state of preservation as if they were those of a recent sponge immersed in Canada balsam; in this state they are represented in Pl. I. fig. 1. anastomosing precisely in the same manner as those of the Mediterranean sponge, and where they have been divided at the surface of the specimen they are frequently observed to be hollow. No spicula are present, but it is evident that it was a true keratose sponge. The greater part of the specimen consists of innumerable bright red fibres of nearly an uniform diameter, ramifying in every direction, frequently terminating as if broken, and presenting appearances of much confusion and disarrangement, as at *a*, *a*, fig. 2, and no remains of the structure surrounding them are perceptible. But in some few portions, and especially near the margin where the perfect sponge-tubes are found, we perceive each of these red fibres to be enveloped by the semipellucid and horny-looking substance of the sponge, as seen in the centre of Pl. I. fig. 2, thus proving that the *red* fibre is in reality the cast of the interior of the tubular sponge fibre; and if we compare them with the hollow spaces of the perfect tubes, we find them to be as nearly as possible of the same diameter.

In the portion of the agate represented by Pl. I. fig. 2, there are parts of the tissue seen at *b*, *b*, *b*, into which the red pigment does not appear to have entered, and when the fibre is in the most perfect state of preservation this is usually the condition in which it is found; and it is natural that such should be the case; for in the recent type of these sponges, *Spongia fistularis*, it is always found, that although the internal cavity is continuous throughout the whole of the fibrous structure, yet that it is universally closed at a short distance before it arrives at the natural termination of a fibre.

In another specimen, which is in my possession, of a moss agate from Oberstein, we have the spongeous structure in a different form. In the first specimen described the most striking feature is the bright red fibrous-looking casts of the interior of the sponge-tubes; while, in this, we have in the best preserved parts of the structure the walls of the tubes themselves impregnated with the red pigment and the interior of the tubes filled with pellucid silex; while in that portion which has suffered most by decomposition, there is a confused mass of bright red with obscure traces of fibrous structure, with here and there a fibre in a sufficiently good state of preservation to enable us to recognise the whole as the same substance as the more perfect structure, but so obscured by decomposition as to render it perfectly undistinguishable from inorganic and extraneous matter, if it were not for the better state of preservation of other parts of the sponge.

Another agate which I examined I found to be, literally speaking, a complete mass of sponge. The fibre of the centre of this specimen, for about one-third of its diameter, is of a bright red colour, the surrounding part is of an ochreous yellow, but the organized structure does not vary in any respect but in colour. There are the casts of a few small foraminated shells dispersed amid the spongeous tissue, and in a few irregular cavities which occur in it I observed that the silex was arranged in that peculiar stratified mode which stamps it as an agate. In the fourth agate examined, the sponge-tubes were seen in a fine state of preservation in several parts of the specimen, and were very similar to the tubes described in the former instances, both in their dimensions and mode of arrangement. The substance of the tube is of an opake white, while the interior is filled with the bright red pigment before described. In this case also, as in the former ones, the fibrous casts of the interior of the tubes occupy a great part of the space within the agate, with an occasional intermixture of what is evidently a disorganized or semi-decomposed mass of the horny tubes.

The fifth specimen is also a keratose sponge, the tubes of which are very slight, and the points at which they anastomose are more distant from each other than in the former cases that have been described. The sides of the tubes are composed of the red pigment which usually does not extend beyond the boundary of the horny substance; but in some parts of this specimen it not only thus supplies the place of the horny matter, but a quantity of it has also been deposited around the tubes, greatly increasing in appearance their natural diameters, and indicating the strong elective attraction that has existed between it and the animal substance of the sponge: and this is rendered the more evident by this red pigment not being perceived in any other part of the siliceous mass beside that occupied by the sponge-tubes, either in a state of perfect preservation or of semi-decomposition; the whole of the spaces between these portions of animal matter being occupied with unstained and beautifully pellucid silex.

The fibres of all the specimens hitherto described are truly tubular, and in this respect strongly resemble in their structure the recent *Spongia fistularis*. In their arrangement of their fibres and their mode of anastomosing they appear very closely to resemble the sponges of commerce and many of the Australian keratose species.

Such are the prevailing characters of the sponge tissues to be found in the German and Sicilian moss agates. I have examined nearly 200 of these interesting bodies, and in the whole of them I have been enabled to discern spongeous tissue either in precisely similar states to those tissues that I have described at length, or in some modification of them; and it is only in very few cases indeed that a careful and patient examination of a specimen, however indistinct it might at first have appeared, has not been rewarded by finding in some part of it, not only the casts of the interior of the fibre, but portions of the fibre itself in a sufficiently perfect state to leave no doubt remaining upon my mind of the truth of its animal nature.

The green jaspers of India are also fruitful sources of spongeous tissue; and generally speaking, the organic structure is in a better state of preservation than it is in the moss agates of Germany and Sicily. The green colouring matter in these siliceous mosses is found, with very few exceptions, to be confined within the boundaries of the sponge fibre, the surrounding siliceous matter consisting of minute pellucid radiating crystals, which have for their bases the sponge fibres, amid which they have been deposited. Upon taking some small thin pieces from various parts of a large mass of this mineral in the possession of Mr. Tennant, I found every fragment of it to abound with beautifully preserved ramifying sponge fibres; and upon examining numerous small rough specimens of this substance, some of which I obtained from the same gentleman, and others from a lapidary in Clerkenwell, I found the whole of them to abound, in a similar manner, with well-preserved fibres of various species of sponges. On a few of these small rough specimens a portion of the natural external surface remained; and upon examining this as an opake object with direct light and a microscopic power of 500 linear, I found some of them to be furnished with minute contorted tubuli very similar to those which I described in a former paper as occurring upon the surface of chalk flints *. Upon examining some very dark-coloured polished specimens of a green jasper which I obtained from Mr. Tennant, I found the spongeous structure in a more perfect state of preservation than in any of the specimens previously examined.

The fibres in this case are not disposed in the same manner as in the sponges of commerce, but are arranged in a series of thin plates, resembling very much in their appearance portions of macerated woody fibres of the leaves of some endogenous plants. This singular form of tissue I believe to be exceedingly rare among recent sponges, as I have met with it in but one species which came among the large collection of sponges received from my friend Rupert Kirk, Esq., of Sydney, who obtained them on the coast in that neighbourhood. On examining about seventy thin sections of green jasper which I obtained from a lapidary in Clerkenwell, and which were said to have been imported from India, I found the results equally satisfactory: every specimen afforded undeniable evidence of spongeous origin, and in the greater part of them the organic structure was in so perfect a state of preservation as readily to admit of their being recognised as distinct species. Among this series of specimens there were several slices which had evidently been cut from the same mass which pre-

* Transactions of Geological Society of London, New Series, vol. vi. p. 183, pl. xviii. fig. 2.

sented appearances of an exceedingly singular nature. The substance of the sponge in this instance appears to have suffered so much by decomposition as to prevent its being detected in its original fibrous form. It has, in fact, become a confused magma of disintegrated spongeous matter, only to be recognised as such by the frequent occurrence of similar decomposed material in other bodies of the like description. Amid these remains of the sponge there are an innumerable quantity of globular vesicles of nearly a uniform size: many of these are simple and transparent, and only to be recognised as organized tissue by the regularity of their size and form, and by having universally dispersed over their outer surfaces minute irregular particles of an opake black matter: but by far the greater number of them are furnished with a globular opake body of about one-third their own diameter, which usually occupies the vesicle, and which causes it, when in this perfect state, and when seen with a linear power of about 150, and represented by Pl. I. fig. 3, very strongly to resemble the separated ova of the frog when immersed in water. Along with these vesicular bodies, there are numerous small brown fibrous masses which resemble very small keratose sponges: the largest of these are about five or six times the diameter of the vesicles, and they are seen decreasing gradually in size until they may be traced to be identical with the nucleus contained within the vesicles, but in a higher stage of development, as represented at Pl. I. fig. 4. *a*, *b*, *c* and *d*. Upon carefully examining the other specimens of this series, I found in several of them similar vesicular bodies of a large size imbedded amid the fibrous tissue of the sponge. They were more sparingly dispersed through the tissue in the latter cases, but in every other respect they closely resembled those first described. These curious vesicles have evidently existed before the siliceous matter became solidified, as each of them has become a base from which a mass of acicular calcedonic crystals has radiated.

From the whole of the circumstances attending these interesting remains, their uniformity in size and shape, their gradual development into small masses of sponge-like tissue, and the great similarity that they bear to the ova of numerous species of British sponges, described by Dr. Grant in the valuable papers on these subjects published in the 'New Edinburgh Philosophical Journal' of 1827, little doubt remains on my own mind that they are the fossilized gemmules of the sponges which have given form to the siliceous masses in which they are imbedded. It is true they differ from the gemmules of the British sponges described by Dr. Grant, as the latter are oviform, while the former are spherical; but this variation is of no moment, as we shall hereafter find that in other cases the fossilized gemmules are oviform like those of various species of British *Halichondria*; while in the recent sponge from Australia, which I have described in the 'Annals and Magazine of Natural History' for April 1841, the gemmules are precisely of the same form as those occurring in the green jasper described above. It is a singular circumstance that the mode of propagation of the sponge should be thus capable of demonstration from the fossil specimens, but the case which I have just described is by no means rare in its occurrence. In an agate which is said to have come from Oberstein, the gemmules are seen apparently in an immature state attached in considerable numbers to the fibre of the sponge; and in the two portions of this specimen, which is represented by figures 5 and 6, and which are drawn to the same scale, it is apparent from the variation in their size that they are in different stages of development. In another agate in my possession, which I believe to be from Oberstein, and in which the spongeous fibre is in a most perfect and beautiful state of preservation, the gemmules are seen sparingly scattered amid the tissue. Some of these have the usual form of round compact globules pellucid for a small space inwards from the circumferential line, but dense and opake thence to the centre; while others appear to have been partially developed without having been ejected from the parent body, as they present the appearance of well-defined globular sponges, whose diameters are three or four times that of the undeveloped gemmules, as represented by Pl. I. fig. 7. If this idea of their development *in situ* be correct, it will perhaps account for the frequent occurrence of the small detached patches of minute sponge-fibre that are so often found imbedded amid the well-developed and large-sized tissue of the sponge which is especially characteristic of the various masses alluded to.

In a fourth agate, which probably came from the same place as the last, the fibre of the sponge has suffered so much by decomposition as to leave but few pieces of it in so fine a state of preservation as that represented by Pl. II. fig. 1. There are none of the gemmules in this specimen which are adhering to the fibres; but although not seen in actual attachment, they are dispersed in great numbers throughout the whole of the mass, and are seen in various stages of development, as represented in Pl. II. fig. 2. Among them are interspersed vast numbers of small pellucid yellow globules, which bear a striking resemblance to similar minute granular bodies that are observed in great abundance imbedded in the gelatinous or fleshy sheath that is found surrounding the fibres of the sponges of commerce, and which are probably incipient gemmules. In a fifth specimen of agate that I procured from Mr. Tennant they assume a very singular appearance. Some of the gemmules are in a very perfect and beautiful state of preservation, and in this condition are separated from each other; while others are observed, apparently, in various stages of decomposition, presenting no definite outline or distinct or regularly marked surface, but assuming the appearance of having been resolved into gelatinous masses which have run together into moniliform strings, in a manner very similar to the mode of arrangement assumed by the discs of the blood when vitality has ceased to exert its repellent influence upon them, as seen in Pl. II. fig. 3.

Numerous other cases might be cited if it were necessary to prove the spongeous nature of these interesting remains, and the frequency of their occurrence in masses of agate; but I shall content myself with selecting but one more; and this I have chosen, not only because it is one of the most perfect and illustrative of the spongeous nature of these remains, but also from its occurrence in a class of siliceous bodies which we have not hitherto noticed. The specimen to which I allude occurs in a siliceous mass from the island of Antigua, and is in the possession of Dr. Robert Brown, who has favoured me with the loan of it. The agate in which this beautiful sponge occurs is nearly four inches square by about two inches thick, and is part of an originally much larger mass. Its natural surfaces do not afford any indication of its spongeous origin when examined by a lens of an inch focus, and the cut or fractured surfaces when examined in the same manner would rather lead us to believe it to be a coral than a sponge, from the whiteness of the tissue and the regularity of the arrangement of the large excurrent canals. There are also plates of spongeous tissue projected from the parietes of these canals towards their centres, which cause them strongly to resemble the sections of the polyp cells of corals; but this resemblance to the coral tribe ceases when a thin slice is examined as a transparent object with a power of 150 linear. The whole is then seen to be composed of the usual anastomosing fibres which are so characteristic of the keratose tribe of sponges. Even in the best preserved parts of the specimen the fibres appear to have undergone decomposition sufficient to render the characters of their surface somewhat indistinct, but not to such an extent as to interfere with their mode of arrangement. A section at right angles to the axis of one of the most distinct and best preserved of the excurrent canals is represented by Pl. II. fig. 4. There are six large plates of reticulated spongeous tissue projecting from the inner surface towards the centre of the canal for about one-third of its diameter, and to the sides of these there are oviform gemmules attached in such numbers as to assume in some parts very much the aspect of a cluster of grapes, and against one portion of the side of the canal they are grouped in a similar manner. The mode of their attachment to the plates of tissue cannot be observed, in consequence, not only of their position, but also from their crowded state; but at the terminal edge of one of the plates which reaches nearly to the centre of the canal, there is seen one of the largest oviform gemmules that is within the field of vision, from beneath which a single fibre of the sponge is seen to emerge and pass towards the centre of the canal, near which it terminates abruptly as if by fracture. There is a gentle curve near the middle of this fibre, in the hollow of which a gemmule is seated that is nearly equal in size to the one adjoining; so that the position and distinct attachment to the fibre of the sponge of this oviform body removes the possibility of a doubt of their being the true ova or gemmules of the sponge. In the two gemmules last described, the nucleus is distinct and well-defined, and is of a size equal to about a third of the smallest diameter of the gemmule; in some of the others it occupies nearly the whole of their interior, while in the greater number of them it is either very indistinct or not at all apparent. In all these respects the gemmules agree perfectly with those before described, as occurring in the green jaspers as well as in the other agatized bodies referred to.

The ova of birds, of fishes, and of reptiles, are always provided by nature with either a bony, horny, or tough membranous covering to protect them from the numerous accidents to which they are of necessity exposed until they arrive at maturity. It is therefore but natural to expect that the ova of the sponge tribe should be furnished with a means of preservation of a similar description, and thus it is that we find them the last and only remains of the sponge from which they date their origin. The presence of the gemmules in the agates and green jaspers that have been already described, is perhaps the strongest evidence of their organic origin that has been adduced, as in most of the cases cited the organic structure of the fibres has been in such a state of decomposition as to afford by no means the amount of evidence of their animal nature, that they are capable of producing, when examined in a more perfect state than that which has hitherto been described.

[To be continued.]

## V.—*Note of Species obtained by deep Dredging near Sana Island, off the Mull of Cantire.* By GEORGE C. HYNDMAN, Esq., Member of the Natural History Society of Belfast*.

WHEN cruising about with my friend Edmund Getty, Esq., in the Gannet yacht on the 19th of July 1841, the following result was obtained by dredging at the depth of forty fathoms, about two miles east of Sana Island. The bottom was shelly, with a proportion of shell-sand. The region "coralline," according to Mr. Forbes's definition. Dredge down three times.

| Species obtained. | No. of specim | No. of specim | Observations. |
|---|---|---|---|
| FISHES. | | | |
| Aspidophorus europæus | 1 | | |
| MOLLUSCA. | | | |
| Chiton lævis ........ .... | 1 | ...... | On fragment of *Echinus*. |
| Capulus hungaricus ... ...... | | 6 | Small and worn. |
| Emarginula fissura ...... . .... | | 1 | Small. |
| Trochus tumidus................ | | 1 | |
| ——— millegranus ... | 1 | 2 | |
| Buccinum undatum...... ...... | | 2 | Largest size, containing *Pagurus Bernhardus*. |
| Fusus despectus ........ ...... | | 3 | |
| ——— corneus ............ | 3 | ...... | One very minute. |
| Natica glaucina, Flem. ........ | | 2 | Invested with *Actinia* (*Adamsia*) *maculata*, and containing *Pagurus Prideauxiana*. |
| ——— Montagui, Forb. ...... | | 2 | |
| ——— Alderi, Forb. ... ...... | | 1 | |
| Rissoa communis, Forb. ...... | | 1 | |
| Orthocera ............... ...... | | 1 | In shell-sand. |
| ——— | | | |
| Anomia ... .......... ... ...... | | 11 | All upper valves. |
| Nucula margaritacea . ... | | 4 | |
| ——— oblonga, Brown' Illus. ................. | | | |
| Modiola vulgaris ........ | | 6 | Small. |
| Nucula rostrata ........ | | 2 | Single valves. |
| Anatina pubescens ..... | | 4 | Single valves. |
| Kellia suborbicularis .. | | 1 | Odd valve. |
| Mactra elliptica ........ | | 20 | Single valves, chiefly small. |
| Goodallia triangularis | | | All dead; two or three of each species perfect, and several odd valves. |
| ——— minutissima | | | |
| Tellina crassa ......... | | 12 | Single valves. |
| Psammobia florida ..... | | 18 | Single valves. |
| Cardium lævigatum..... | | 3 | Single valves, small. |
| Lima subauriculata..... | | 1 | "Nearly half an inch in length," as was a specimen procured by Mr. Jeffreys at Oban. |
| ——— fragilis ............ | | 12 | Single valves. |
| ——— tenera........ ...... | | 160 | Not a single specimen with the valves united, but some of them with the cartilage fresh. Many worn and covered with *Serpulæ* and crustaceous zoophytes. The specimens are generally large—one is 1½ inch in length. Mr. Jeffreys found the species at Oban 1¾ inch. |
| Pecten sinuosus . | | 2 | Single valves. |
| ——— obsoletus . | | 12 | Single valves. |

* This and the following communication were brought before the notice of the British Association at the Manchester meeting by Mr. Patterson.

| Species obtained. | | No. of dea specimen | Observatio |
|---|---|---|---|
| Pecten opercularis ...... | 2 | 50 | Of the living specimens, one was full-grown, the other small. The dead valves were separate and much worn; a few of small size. |
| Pectunculus pilosus..... | ..... | 300 | Only one was perfect, the remainder odd valves mostly old and worn, and incrusted with zoophytes; very few small specimens. |
| Venus ovata ............ | ..... | | Single valves. |
| —— fasciata ............ | 1 | | Single valves. |
| —— virginea ............ | ..... | | Single valves, small and much worn. |
| — cassina ............ | 3 | 21 | The living specimens and the perfect dead shell (the remainder were odd valves) small; the odd valves mostly full-sized. The animal has a large hatchet-shaped foot, and a long siphonal tube |
| Lucina undata. | | | Single valves. |
| Nudibranchia Mollusca ..... | | | A species of. |
| ECHINODERMATA. | | | |
| Stellonia rubens ......... | 1 | | |
| Echinus sphæra, Müll. | 1 | | Large. |
| —— miliaris, Leske. | | | |
| Echinocyamus pusillus. | | | |
| Spatangus purpureus ... | | | From a very small size up to largest. The intestines filled with fragments of shells. Do they eat the shell-fish and break up the shells, or do they swallow the shell-sand and extract the nourishment from it? |
| ZOOPHYTES*. | | | |
| Flustra foliacea. | | | |
| ——— truncata. | | | |
| ——— tuberculata. | | | |
| Thuiaria articulata. | | | |
| Antennularia antennina. | | | |
| Sertularia abietina. | | | |
| ——— polyzonias. | | | |
| Plumularia falcata†. | | | |
| Thoa Beanii. | | | |
| Farcemia salicornia. | | | |
| Notamia loriculata. | | | |
| Campanularia volubilis. | | | |
| Cellepora ramulosa. | | | |
| ——— punnicosa. | | | |
| Crisia eburnea. | | | |
| Discopora hispida. | | | |
| Hippothoa lanceolata. | | | |
| ——— catenularia. | | | |
| Tabulipora obelia. | | | |
| ——— serpens. | | | |
| Lepralia immersa. | | | |
| ——— variolosa. | | | |
| ——— nitida. | | | |
| Cellepora perlacea. Delle Chiaie ‡. | | | |
| ——— Macry. Delle Chiaie? | | | |
| Corallina officinalis. | | | |

* Although Zoophytes were plentiful, no *Algæ* whatever occurred.

† *Pl. myriophyllum* was dredged up near the same locality in June 1842.

‡ These two species (hitherto unnoticed as British) and other minute ones have been determined by Mr. W. Thompson.

## VI.—*Results of deep dredging off the Mull of Galloway, by* Capt. Beechey, R.N. Drawn up by Wm. Thompson, Esq., Vice-Pres. Nat. Hist. Society of Belfast.

Captain Beechey, the distinguished navigator, having in the month of April last been engaged in a survey of part of the Scottish coast in H.M. steam-vessel Lucifer, most kindly undertook to use the dredge in the deepest water in which his soundings might be made, and the following are the highly interesting results obtained on three occasions; the products from the different depths being most carefully kept separate.

| Species obtained. | From 50 fathoms, 8 miles S.S.W. the Mull of Galloway. | | | From 110 to 140 fathoms, 5 miles S.W. the Mull of Galloway. | | From 145 fathoms in Beaufort's Dyke*. | | |
|---|---|---|---|---|---|---|---|---|
| | No. of specimens | | Observations. | | Observations. | | | Observations. |
| Mollusca. | | | | | | | | |
| Trochus papillosus | 1 | ... | Adult ........ | | | 1 | 1 | |
| —— millegranus | .. | ... | A few alive and several dead | ... | Many dead and broken; chiefly small. | 2 | ... | A few dead. |
| —— tumidus ...... | | | | ... | A few dead ......... | | | A few dead. |
| Cypraea europaea ... | | | | | Ditto | | | Ditto. |
| Fusus turricola ... | | | | | Ditto. | | | |
| —— muricatus ... | | | | | Ditto | 1 | 2 | |
| —— Bamffius ...... | | | | | Ditto | | | A few dead; small. |
| —— linearis ...... | | | | 1 | | | | |
| —— costatus ..... | | | | | | 1 | ... | Large. |
| —— corneus ..... | | | | 2 | Small | ... | 1 | Small. |
| Buccinum undatum | | | | 1 | Ditto | ... | 1 | |
| Natica Alderi ...... | | | | 1 | | | | |
| —— Montagui ... | | | | 3 | | | | |
| Nasa macula ...... | | | | | | .. | 1 | |
| Tornatella tornatilis | | | | | | ... | 1 | |
| Eulima polita ...... | | | | | | ... | 2 | Perfect. |
| Capulus hungaricus | | | | | A few dead; small .. | ... | 2 | Small. |
| Emarginula fissura | | | | | Many dead .......... | ... | ... | Several dead. |
| Chiton fuscatus, Br. | | | | | | 1 | | |
| —— discrepans, Br. | | | | | | 1 | | |
| Dentalium entalis . | 3 | ... | Several dead | | Several small; some alive. | ... | ... | A few living. |
| Astarte Damnoniae | .. | ... | Odd valves .. | | Several; alive ........ | ... | ... | A few odd valves. |
| —— scotica .. .. | | | | | Several odd valves chiefly small. | ... | ... | Ditto; small. |
| Lucina radula ..... | | | | | Odd valve. | | | |
| Venus virginea..... | | | | | Odd valves; medium size. | | | A few odd valves; one perfect shell. |
| —— ovata .. | | | Several dead | | Ditto chiefly; a few alive. | | | Very few alive; and some odd valves. |
| — cassina | | | A few young alive. | | Ditto; several small. | | | A number of odd valves of all sizes. |

* A remarkable dyke, beginning about 5 miles S.W. the Mull of Galloway, and extending northward nearly to Corsewall. It is from a mile to a mile and a quarter wide. Its average depth in the centre is 130 fathoms.

| Species obtained. | From 50 fathoms, 8 miles S.S.W. the Mull of Galloway. — No. of living specimens. | No. of dead specimens. | Observations. | From 110 to 140 fathoms, 5 miles S.W. the Mull of Galloway. — No. of living specimens. | No. of dead specimens. | Observations. | From 145 fathoms in Beaufort's Dyke. — No. of living specimens. | No. of dead specimens. | Observations. |
|---|---|---|---|---|---|---|---|---|---|
| Myrtea spinifera . | . | . | | | | | . | | One valve. |
| Saxicava rugosa . | | | | .. | ... | A few odd valves. | | | |
| Nucula minuta . | | | Odd valves .. | .. | ... | Many ditto .. ...... | 1 | | |
| —— margaritacea . | | | Ditto ........ | .. | ... | Ditto ditto; small | .. | ... | A few odd valves. |
| Cardium nodosum, (Turt. Bivalves.) | | | A number, chiefly alive. | .. | ... | Ditto ditto ......... | .. | ... | Ditto. |
| Pectunculus pilosus | | | | | | | .. | ... | An odd valve. |
| Pecten obsoletus... | 1 | ... | Several dead | | | A few odd valves; all sizes. | .. | ... | Several odd valves. |
| —— opercularis .. | .. | ... | Young, odd valves. | | | A few odd valves very small. | ... | ... | Ditto; small. |
| —— sinuosus .. | | | | | | Ditto; medium size. | .. | ... | Two odd valves. |
| Lima fragilis .. | | | | | | A few odd valves..... | 1 | ... | Several odd valves. |
| Mactra elliptica ?... | .. | ... | Odd valve..... | | | Ditto ................ | .. | ... | Two odd valves. |
| Amphidesma prismaticum ..... | | | Ditto. | | | | | | |
| — Boysii ..... | .. | ... | ....... | | .. | Odd valve. | | | |
| Montacuta substriata. | 1 | ... | On *Spatangu. purpureus.* | | .. | A few alive on *Spatangus purpureus.* | | | |
| Modiola communis | 2 | ... | Small ........ | | .. | Living specimens very small; several odd valves of moderate size. | ... | ... | Numerous odd valves; moderate size. |
| — discors..... | | | | | | | | 1 | |
| Mya truncata .. | | | | | | | | ... | Odd valve. |
| Anomia ........ | .. | ... | Odd valve. | ... | ... | Many odd valves ..... | ... | ... | A number of odd valves. |
| Orbicula Norvegica (Crania) ........ | | | | | | | . | 1 | |
| Terebratula aurita | | | | ... | 1 | Perfect | . | ... | Two odd valves. |
| CIRRIPEDA. | | | | | | | | | |
| Balanus ........... | | | | . | ... | Fragments ..... | | | Fragments. |
| Creusia verruca .. | | | | . | ... | Few specimens. | | | |
| ECHINODERMATA. | | | | | | | | | |
| Asterias papposa.. | | | | | ... | One small. | | | |
| Echinus sphæra. Mull. ........... | | | | 1 | 1 | Very small. | | | |
| — miliaris, Leske | | | | 1 | 1 | Ditto. | | | |
| Spatangus purpureus. | . | ... | A few small and alive. | ... | ... | Many alive; all under half size. | | | |
| Amphidotus roseus | | | | 1 | | | | | |
| Echinocyamus pusillus. | | ... | A few living and dead. | ... | ... | A few alive; many dead. | ... | ... | A number, dead. |
| CRUSTACEA (all living). | | | | | | | | | |
| Ebalia Bryerii..... | | | | | | | | | |
| —— Pennantii .. | | | | | | | | | |
| Eurynome aspera.. | | | | | | | | | |
| Hyas coarctatus .. | | | | | | | | | |
| Inachus scorpio .. | | | | | | Small. | | | |
| Pagurus Bernhardus | 1 | ... | In *Buccinum undatum.* | | | | | | No crustacea. |

| Species obtained. | From 50 fathoms, 8 miles S.S.W. the Mull of Galloway. | | | From 110 to 140 fathoms, 5 miles S.W. the Mull of Galloway. | | | From 145 fathoms in Beaufort's Dyke. | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of living specimens. | No. of dead specimens. | Observations. | No. of living specimens. | No. of dead specimens. | Observations. | No. of living specimens. | No. of dead specimens. | Observations. |
| Galathea rugosa ... | ... | ... | ............... | ... | ... | Several small; none exceeding in body 1¼ inch in length. | | | |
| Arcturus longicornis, Westwood... | 1 | | | | | | | | |
| ANNELIDA. | | | | | | | | | |
| Aphrodita aculeata | ... | ... | ............... | 1 | | | | | |
| ZOOPHYTES*. | | | | | | | | | |
| Plumularia falcata . | 1† | ... | ............... | 2† | | | | | |
| —— myriophyllum | ... | ... | ............... | 2 | | | | | |
| Sertularia abietina . | 1 | | | | | | | | |
| —— cupressina ... | ... | ... | ............... | 2 | | | | | |
| —— pinaster, Soland. and Ellis ‡ | ... | ... | ............... | 2 | .. | One specimen. | | | |
| Tubularia indivisa . | ... | ... | ............... | 2 | ... | Ditto. | | | |
| Campanularia dumosa ........... | ... | ... | ............... | 2 | ... | ............... | 3† | ... | Excepting this there are crustaceous species only, as *Lepralia*, &c. |
| Farcimia salicornia | ... | ... | ............... | 2 | | | | | |
| Crisia cornuta ...... | .. | ... | ............... | 2 | | | | | |
| Cellepora ramulosa | 1 | ... | ............... | 2 | | | | | |
| —— Skenei ...... | ... | ... | ............... | 2 | ... | One specimen. | | | |
| Flustra foliacea ... | 1 | | | | | | | | |
| —— truncata ...... | 1 | | | | | | | | |

I beg, in connexion with this and the preceding catalogue (by Mr. Hyndman), to call the attention of naturalists interested in the study of the Mollusca to the results obtained in a third locality on the western coast of Scotland—at Oban —by Mr. Jeffreys, published in Sowerby's 'Malacological Magazine' (No. 2, 1839). Mr. Jeffreys obtained "*Terebratula aurita*§ plentifully in about 15 fathom water," and along with it found "*Crania personata* not uncommon." He procured also the three species of *Lima*—*L. tenera*, *L. fragilis*, *L. subauriculata*—taken off Sana Island. *Nucula minuta* was dredged at Oban as well as off the Mull of Galloway; it has been procured on different occasions by deep dredging in Belfast bay, and many years ago was found at the Giant's Causeway. The *Myrtea spinifera*, of which a single valve was

* No *Algæ* were brought from any of the three depths.

† These numbers denote the different depths at which the species of Zoophytes were found; No. 1. at 50, No. 2. at 110, No. 3. at 145 fathoms.

‡ *S. margarita*, Hassall, seems to be identical with this. My specimen is without vesicles. It agrees with the description and magnified figure of Solander and Ellis better than the figure of natural size.

§ This species was dredged in Belfast bay by the collectors attached to the Ordnance Survey.

brought up off the Mull of Galloway, was found to be not uncommon in deep water at Oban—on the strand at Red Bay, county of Antrim, I found an example of this shell. *Trochus papillosus* and *Eulima polita*, dredged by Capt. Beechey, were not procured at the more northern localities, Sana island* and Oban—of the latter species, a single living example was taken in the course of the Ordnance Survey in Belfast bay. The most northern locality on the Irish coast, in which it had hitherto been obtained, was Dublin bay.

Many observations are suggested by these catalogues, and others of a similar nature in my possession, but to my friend Mr. E. Forbes must be left the treatment of a subject in which he of all men possesses the most ample and important data.

## VII.—*On a new British species of* Alchemilla. By Charles C. Babington, M.A., F.L.S., F.G.S., &c.

In looking over the valuable herbarium belonging to W. Borrer, Esq., I was gratified by finding in it an original *wild* specimen of *Alchemilla*, gathered by the late Mr. G. Don upon the Clova Mountains, in Scotland, many years since, and considered by him as a species quite distinct from *A. alpina*. Upon a careful examination of the specimen and also of a living plant in Mr. Borrer's garden, I was soon convinced that the plant was indeed a distinct species, although it may be found in almost all the British botanical and other curious gardens under the name of *alpina*, the true *alpina* being often nameless in the same collections. Upon inquiry I have always found, that whenever the original source was known from which the roots were obtained, they are stated to have been sent by Mr. G. Don from Scotland. Upon showing the plant to the late lamented Prof. Don, he also informed me that his father had found it in Scotland.

Having now satisfied myself that the plant was a distinct species, and also that it came from the Highlands, I took all the means in my power to ascertain its identity with some described species, but having totally failed, I feel convinced that it has escaped the notice of botanists. It was denominated *A. argentea* by Mr. Don, but that name was never published, and as Lamarck employed the same name for *A. alpina*, I have considered it advisable to give a new name to this plant, as the employment of *argentea* (although a most excellent and descriptive name) would only tend to create confu

* In June 1842, Mr. Hyndman dredged a full-grown *Trochus papillos.* near Sana Island.

sion. It is right to state that Mr. W. C. Trevelyan, in the 2nd edition of his paper upon the botany of the Feroe Isles (printed at Florence), has shortly characterized our present subject under the name of *A. argentea* (Don). He finds it to be plentiful in those islands.

I propose to name and characterize the plant as follows:—

*Alchemilla conjuncta* (Bab. MSS.). Foliis radicalibus peltato-palmatis 5-7 partitis, laciniis oblongis obtusis apice adpresso-serratis subtus albo-sericeis ad ⅓ conjunctis. corymbis parvis lateralibus terminalibusque distantibus.

A. argentea, *G. Don, MSS.! in Borr. Herb., Trevelyan in Bot. of Feroe Islands*, not *Lam. Enc.* 1. 77.

Closely allied to *A. alpina*, but usually much larger in all its parts, and distinguished by not having its leaflets separated to their base, broader, more silky beneath, and spreading from the petiole in such a manner, that in the radical leaves the two external leaflets almost, if not quite, touch each other, so that at first sight the whole leaf presents the appearance of being peltate. The stems have long alternate spreading branches which are often again subdivided, and the flowers, which are more silky and upon longer stalks than those of *A. alpina*, are collected into small, nearly simple, distant corymbs. In *A. alpina* the leaflets are separated to the base, and form a digitate not at all palmate leaf, the outer ones being very distant from each other, or even nearly opposite.

## VIII.—*Contributions to the Ichthyology of Australia.* By John Richardson, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

### Gerres filamentosus (*Cuv. et Val.*).

No. 4. Mr. Gilbert's collection, Sept. 1840.

This fish, Mr. Gilbert informs us, is an inhabitant of a freshwater swamp at Port Essington, but he does not state whether the swamp communicates with the sea or not. The *Gerres lineatus* is also said to be taken in the freshwater lagoon of Colluco, but as the other species are marine, it is probable that these enter the fresh waters at certain seasons from the sea. Mr. Gilbert's specimen was obtained in the month of September. The same species was obtained by Messrs. Quoy and Gaimard at New Guinea, and by Messrs. Kuhl and Van Hasselt at Java. In the 'Histoire des Poissons' the *woodawahah* of Russell (p. 52. pl. 68.) is considered to belong to this species; but this appears to be somewhat doubtful, from the second dorsal spine being represented as no stronger than the rest, and its filamentous tip as being very little prolonged. Russell's specific character also states "*spinâ anali unicâ*," whereas in our example of *filamentosus* the second and third spines are both very conspicuous and longer than the soft rays of the fin, the second being the strongest one, and but just perceptibly shorter than the third.

Both the anal and dorsal spines are much compressed. The first dorsal spine is very short, the second is as broad again in the direction of the axis of the fish as any of the others, and its filamentous tip, which in Mr. Gilbert's specimen is broken off, is stated in the 'Histoire des Poissons' to be long enough to reach to the caudal fin. The lateral line is strongly marked on scales smaller than the others. Rays.—D. 9 10; A. 3|7; P. 15; C. $17\frac{3}{2}$; V. 1|5.

The colours have of course faded in the dried specimen, but the scales still exhibit much pearly and silvery lustre with strong reflexions when moved in the light. Above the level of the pectoral each scale has a deep steel-blue bar along its middle producing about nine longitudinal lines, the intervals and all the under parts being silvery. There are about five of the blue lines with four silvery ones above the lateral line.

Dimensions.

| | inches. | lines. |
|---|---|---|
| Length from intermaxillary symphysis to tip of caudal | 6 | 9 |
| ——— base of caudal | 5 | 3 |
| ——— anal fin | 3 | 10 |
| ——— ventrals | 2 | 2 |
| ——— dorsal | 2 | 2 |
| ——— pectorals | 1 | 8 |
| of gill-flap | 1 | 7 |
| ——— centre of eye | 0 | $9\frac{1}{2}$ |
| Diameter of eye | 0 | 6 |
| Depth of caudal fork | 1 | 0 |
| Height of third dorsal spine | 1 | 0 |
| ——— of third anal spine | 0 | $8\frac{1}{2}$ |

## Chætodon sexfasciatus (*Nob.*), Six-banded Chætodon.

Specimen in the British Museum.

The Chætodons with vertical bands do not appear to be numerous. Two species only are described in the 'Histoire des Poissons,' one of them (*striatus*) with five bands, and the second with eight (*octofasciatus*). A third species with bands (*chrysurus*) is mentioned in the 'Zoological Proceedings' for 1833 (p. 117), as existing in the seas of the Mauritius. Its bands are also eight, but they are angular in the middle. Mr. Gould brought a six-banded species from Western Australia, which is now in the British Museum.

Its profile, including the dorsal and anal fins, and excluding the parts before the eye and half the trunk of the tail with its fin, is nearly orbicular. The profile of the head is concave, and thus causes the snout to appear to project more than it actually does. The curve of the back springs boldly from the middle of the orbit. The large eye just touches without altering the profile, and is the breadth of itself from the end of the snout. The preoperculum is strongly serrated on its vertical edge and rounded corner, but scarce perceptibly so on its horizontal limb. The operculum, as is usual with the Chætodons, is cut away in a wide shallow arc. The lateral line, formed by a series of short tubes, is nearly parallel to the back till it arrives opposite to the ends of the dorsal and anal, when the curve changes to a straight course through the tail. The scales have rectangular bases and sides, with a ciliated semicircular external edge. The uncovered surface is strongly marked by acute furrows corresponding in number with the marginal teeth.

Rays.—D. 10|20, last one divided; A. 3|16 or 17; C. $17\frac{3}{3}$; P. 17; V. 1|5.

The caudal is lunate on the margin: the pectorals are rounded. The dried specimen shows the following markings, but we have no knowledge of the colours of the recent fish. The ocular band occupies the upper surface of the head, from the lips to midway between the end of the snout and the beginning of the dorsal, and curving downwards embraces the whole orbit, becomes narrower on the cheek, yet takes in the angle and most of the upper limb of the preoperculum, and cuts the junction of the suboperculum and interoperculum in its course to the base of the ventrals; its posterior edge makes a curve nearly similar to that formed by the margins of the dorsal and anal fins, but in the opposite direction, and the portion of the head lying before that curve projects out of the orbicular profile above mentioned. The second band, which is also broader above, commences immediately before the dorsal, and touching in its course the margin of the gill-cover and base of the pectoral, descends with a slight curve to the middle of the ventral, which is itself black. The third band encroaches a little on the scaly base of the dorsal, taking in the third and sixth spines, and becoming narrower in its direct course downwards, terminates before and in contact with the first anal spine. The fourth band, commencing near the tips of the first five jointed rays of the dorsal, descends to the first jointed anal rays. It is curved in an opposite direction to the anterior bands, and is broadest at the lateral line. The parts of the dorsal and anal fins behind the fourth band are black, and the fifth band is a narrow curved stripe which crosses the tail, and appears to be a continuation of the black curve formed by the margins of the fins. The sixth band is the narrowest, though blackest of all, and crosses the tail at the base of the caudal. The white spaces between the bands are narrower than the bands themselves. The extreme edges of the dorsal and anal are pale or whitish, and there is a yellowish tint on the caudal, its crescentic margin being very pale.

Dimensions.

| | inches. | lines. |
|---|---|---|
| Length from tip of snout to extremity of caudal fin ........... | 6 | 9 |
| ——————————— base of caudal........................ | 5 | 6 |
| ——————————— anal.................................. | 3 | 6 |

| Dimensions. | inches. | lines. |
|---|---|---|
| Length from tip of snout to dorsal | 2 | 4½ |
| ——— hinder margin of orbit | 1 | 0 |
| ——— orbit to end of dorsal or anal | 4 | 0 |
| Height of third, fourth and fifth dorsal spines | 1 | 0 |
| ——— jointed rays of dorsal | 0 | 9 |
| ——— second anal spine | 0 | 8 |
| ——— jointed anal rays | 0 | 7 |
| Length of caudal fin | 1 | 3 |
| ——— ventrals | 1 | 4 |
| ——— ventral spine | 0 | 9 |
| ——— pectorals | 1 | 3 |

## Drepane punctata, the Spotted Reaper-fish.

*Chætodon punctatus*. Solander, Pisc. Nov. Holl. ined. Parkins. No. 21.

"*Chætodon punctatus*. Habitat in Novâ Hollandiâ propè *Endeavour's Careening place*, ex oceano fluvios ascendens. Corpus latum, ferè subrotundum, valdè compressum. Caput majusculum, infra oculos squamosum, aliàs nudum, supra oculos declive. Oculi magni, iris argentea, pupilla nigra. Os parvum. Dentes setacei, minimi, conferti, tantummodo in maxillis; faux, lingua et palatum glabræ. Maxillæ obtusæ. Nares propè oculos, rotundi, minores aperturæ vix anteriores sed interiores, h. e. dorso capitis propiores. Lingua lata, obtusa, crassa, brevis. Branchiarum opercula nuda, lævissima. Membrana branchiostega 6-radiata. Gula dilatabilis. Humeri elevati crassiusculi. Dorsum acutum, attenuatum, posticè deorsum rotundatum. Latera plana. Linea lateralis ad basin capitis incipit, dorso propior, secundum flexuram dorsi arcuata, in postremâ caudà descendit. Anus ante medium piscis, a pinnà anali remotus. Cauda brevis lata, plana, valdè compressa. Pinna dorsalis, paulo ante medium dorsi incipiens, in summo dorso spinosa, posticè mutica, elevata, usque ad caudam extenditur: pars spinosa 8-radiata; radii 1 et 2 brevissimi, adpressi, 3$^{tius}$ longus dein sensim breviores, 8$^{vus}$ a reliquis ad partem muticam parum remotus: pars mutica 21-radiata, æqualis, posticè rotundata, basi squamosa. Pinnæ pectorales falcatæ, ad caudam elongatæ, muticæ, 17-radiatæ; radius 6$^{tus}$ longissimus. Pinna analis 20-radiata; radii tres anteriores spinosi, breves decumbentes, reliqui mutici, longi, pinnam efficientes parti posterioris dorsalis simillimam, basi squamosam. Pinnæ ventrales ovatæ, acuminatæ, breves, sed pone anum extensæ, 6-radiatæ; radius 1$^{mus}$ spinosus, validus, 2$^{dus}$ longissimus, apice subramentaceus. Pinna caudalis lata, subcuneata, subtruncata, in medio parum rotundata, angulis lateralibus acutis parum productis, 17-radiata. Squamæ mediocres, arctè adhærentes. Br. 6; D. 8|21; A. 3|17; C. 17; P. 17; V. 1|5.

"Color totius piscis argenteus: latera a summo dorso infra medium maculis nigris* ornata; maculæ seriebus transversalibus, inæqualibus dispositæ. Fig. Pict. Piscis sæpè sesquipedem longus."—*Pisc. Nov. Holl.*

* Parkinson has noted beneath his sketch, that "the whole fish is silvery with fuscous spots."

Cuvier considers this fish to be the same with the *Chætodon punctatus* of Linnæus, and also with the *Latte* of Russell (No. 69). Parkinson's pencil sketch above quoted represents the spinous part of the dorsal as lower, and the articulated part as higher than Russell's figure. And on comparing it with plate 179 in the 'Histoire des Poissons,' the mouth appears a little larger, the profile of the nape less gibbous, and the first jointed rays of the dorsal higher, rendering that part of the fin more even anteriorly, though it is equally rounded posteriorly with Cuvier's figure. The anal is also higher anteriorly and is rounded throughout, and a few radiating lines are indicated on the limb of the preoperculum. In all other respects the resemblance between Parkinson's sketch and the plate in the 'Histoire des Poissons' is close. In this work the species is said to frequent the Malabar coast and the seas of Java, New Guinea, and China.

CHELMON MARGINALIS (*Nob.*), the Willèmawillum.

No. 12. Mr. Gilbert's collection.

Only two species of *Chelmon* are described in the 'Histoire des Poissons,' and these are very readily distinguished from each other by the relative length of their beaks and the form and extent of the spinous part of their dorsals, as well as by the very different patterns of colour they exhibit. Mr. Gilbert's fish so closely resembles the best known species, the *Chelmon rostratus*, in general form as well as in part of its markings, that I have some hesitation in proposing it as a distinct species on the strength merely of the characters of a single individual. It wants two vertical bands on the body which *rostratus* possesses, and the anal fin is decidedly more angular than the dorsal, which is rounded, the reverse being the case in *rostratus*. There is also a submarginal dark band round the soft part of these two fins in the proposed species, which is not noted in the descriptions or shown in the figures of *rostratus*. Mr. Gilbert states that his fish is the 'willèmawillum' of the aborigines, and that it frequents shallow rocky places and sandy beaches in all the bays of Port Essington. The faculty of shooting a drop of water from the mouth so as to strike an insect, which the members of this genus possess in common with the *Toxotes*, is, I have reason to believe, enjoyed also by an undescribed New Holland *Holocanthus*, which greatly resembles *Chelmon* in the prolongation of the snout.

The proportions of the Port Essington *Chelmon* are almost the same with those of the common *rostratus*. The snout, measured from the nostrils, is exactly one-sixth of the total length, caudal included; which again is double the height of the body. The anal fin forms a spherical triangle with the apex a little blunt; the dorsal is much more widely rounded, being the segment of an obtuse ellipse. The finely grooved and toothed upper edge of the orbit projects a little, rendering the forehead wider than the occiput or snout. The preorbitar is oblong, with a convex under-border irregularly armed with acute teeth. The ascending limb of the preoperculum is finely and closely toothed; the teeth are a little larger on the angle, and on the lower limb they are more acute and farther apart. The operculum is cut away in a wide and very shallow sinus, the points at its extremities being bluntish. The membranous border is moderately broad. The supra-scapular is toothed, and the scapula, which is more conspicuous, is more strongly and acutely serrated. The humeral is also acutely toothed. The scales are strongly and closely furrowed on the border and ciliated with teeth. The lateral line, traced on scales smaller than the rest, forms an arc of a nearly circular curve, until it comes opposite to the few last rays of the dorsal, when it changes abruptly to a straight course through the tail.

RAYS:—D. 9|29; A. 3|18; C. $16\frac{2}{2}$; P. 15; V. 1|5.

The dorsal, anal and ventral spines are strong and moderately compressed as in *rostratus*. The caudal is square at the end, with a slight tendency to convexity. The scaly sheath envelops the spinous part of the dorsal to the tips of most of the spines. It is the slight development of this sheath in *longirostris*, together with the greater size of the spines, which forms the most striking difference in the shape of that species, exclusive of the greater length of its snout. The first soft ray of the ventral tapers to a filamentous tip, similar to that of the species just named.

The colours cannot be certainly known from the dried specimen, which is otherwise in good condition and presents three vertical bands, all formed by narrow black borders enclosing a nearly even stripe of a somewhat yellower tinge than the rest of the fish, but not of a darker hue. The ocular band commences high on the nape, passes through the eye, and terminates on the fore-part of the interoperculum: it is wider on the cheek than above the eye. The second band takes in the two first dorsal spines and terminates at the ventral: its fore-border cuts the bony operculum vertically a little anterior to its centre, and its hinder one passes down the membranous edge of the gill-flap, the supra-scapular and scapula being included in its breadth. The third band crosses the tail at the base of the caudal. A narrow band of the same kind edges the soft parts of the dorsal and anal, the caudal band just mentioned forming a connecting link between the borders of the two fins. The bands follow the contour of the fins exactly, the anal one being somewhat angular and the dorsal one elliptical, and though they are narrower than the vertical bands on the body, they have broader interior black edges. There is not the slightest trace of the eyed spot on the dorsal, or of the two vertical bands which cross the body in *rostratus*, but there are faint longitudinal lines coincident with the junctions of the rows of scales, the middle sections of the scales being more silvery. Under the microscope the scales appear to be sprinkled with minute black specks. There is a mesial black stripe on the forehead extending from between the eyes to the base of the upper jaw.

| Dimensions. | inches. | lines. |
|---|---|---|
| Length from tip of beak to end of caudal fin | 6 | 0 |
| ——— base of caudal fin | 5 | 0 |
| ——— anus | 3 | 2 |
| ——— pectoral | 2 | 2 |
| ——— ventral | 2 | 2 |
| ——— dorsal | 0 | 0 |
| ——— tip of gill-flap | 1 | 1 |
| ——— centre of eye | 1 | 3¾ |
| Diameter of the eye | 0 | 5 |
| Length of ventral spine | 0 | 10 |
| ——— soft ventral rays | | |
| ——— ninth dorsal spine | | |
| ——— third anal spine ... | | |
| Height of soft dorsal | | |
| ——— soft anal | | |
| ——— body | | |
| ——— body and vertical fins | | |

Platax Leschenaldi (*Cuv. et Val.*?), the Kahi-sandawa.

No. 4. Lieut. Emery's drawings.

The specimen from which Lieut. Emery made his drawing was taken in Talc Bay, and measured eight inches in length, and fifteen between the extended tips of the dorsal and anal fins. The figure does not agree in all points with the 'Kahi-sandawa of Russell, which is the *Platax Leschenaldi* of the 'Histoire des Poissons,' but it resembles it so much, that it seems better to direct the attention of naturalists to it under that designation, rather than under a new specific name. Russell describes four vertical bands as existing in the young of the *Kahi-sandawa*, and states that they disappear as the fish increases in age. The wide range of the Kahi-sandawa, from India to New Guinea, increases the probability of its being also an inhabitant of the seas which wash the northern coasts of New Holland.

Lieut. Emery's drawing represents the dorsal and anal fins as triangular in profile, their posterior edges being not falciform, but almost perfectly straight. The height of the dorsal rather exceeds that of the body, and is considerably greater than that of the anal. The caudal terminates in a slightly waving line, convex in the middle and a little concave towards the two angles, which are acute. The pointed ventrals reach half way along the anterior border of the anal. The profile is steeply convex from the mouth to the ventrals, and also upwards to the beginning of the dorsal, which rising still more precipitously, renders the outline slightly concave before its base. The height of the body, measured a little obliquely, from the base of the first jointed dorsal rays to the beginning of the anal, is equal to the length of the fish, caudal excluded. The caudal forms rather more than a sixth part of the total length. The scales are tolerably large. Fewer rays are indicated in the fins than in any species described in the 'Histoire des Poissons,' the dorsal ones being two less, and the anal ones merely equal in number to those of *batavianus*, but it is not very probable that Lieut. Emery counted all the small posterior rays of these fins.

The colour of the body is primrose-yellow, that of the two vertical bands and the pectoral fin yellowish brown, and of the other fins dark oil-green. The ocular band passes over the forehead, includes two-thirds of the eye and the corner of the mouth, and terminates on the belly before the ventrals. The pectoral band, of nearly uniform breadth throughout and broader than the ocular band, crosses the nape, takes in the edge of the gill-flap, and spreads on the side to the width of two-thirds of the length of the pectoral: it terminates on the belly immediately behind the ventrals. There is a small triangular black mark on the base of the pectoral.

### Platax orbicularis (*Cuv.*), Orbicular Platax.

"*Chætodon orbicularis*, Forskal."
*Platax orbicularis*. Rüppel, Atl. 67. t. 18. f 3; Cuv. & Val. vii. p. 332.
No. 37. Mr. Gilbert's list.

This fish, according to Mr. Gilbert, frequents most parts of the harbour of Port Essington, and swims near the surface, which renders it an easy mark for the spears of the natives, who name it 'be-role-coord.' It agrees in so many points with the *Platax orbicularis* of the Red Sea, first described by Forskal and since figured by Rüppel, that I have no hesitation in considering it to be the same species. Rüppel's figure is stated in the 'Histoire des Poissons' to have been sketched from a young individual, and shows an ocular and a humeral band, which were not visible in the specimen presented to Cuvier by Rüppel, nor do any traces of them exist in the example brought from Port Essington. The vertical bands, so common in the fish of this genus, are said to disappear as the individual increases in age. In the 'Histoire des Poissons' the dorsal is said to be rounded and the anal a little angular. M. Rüppel's figure shows a dorsal more angular than the anal, while in Mr. Gilbert's specimen both these fins are much rounded, the anal however coming nearest to a circular arc, because of its shortness and greater height, the curve of the dorsal being more lengthened, and in proportion a little more elevated anteriorly.

In the dried specimen the back and sides have a tint intermediate between broccoli-brown and honey-yellow, the under parts being paler with much nacry lustre. The pectorals are colourless, the ventrals are broadly tipped with brownish black, and the anterior edge of the anal is widely bordered with the same, the rest of the margin of that fin and the margins of the dorsal and caudal being narrowly fringed with black. M. Rüppel's figure omits the black border of the fore-part of the anal, and shows a broader fringe of that tint on the rest of the fins. His text describes the colour of the fresh fish as brownish and silvery, with an unctuous metallic lustre; the ventrals as blackish brown, and the vertical fins as chestnut-brown, all with black edges; the pectorals being hyaline. Both Forskal and Rüppel notice certain individuals as having small irregular black spots scattered on the sides. The Port Essington fish has about twenty brownish dots dispersed on the flanks behind the pectoral fin and below the lateral line. The caudal fin, which is represented in the figure as being slightly concave on the margin, has in the Port Essington fish also a concave edge, but not evenly so, the centre being convex, yet not projecting so far as the angles, which are rather acute. The thickness of the scaly covering is such that the number of rays in the fins cannot be ascertained except by dissection, and the three works which have described the species disagree in their enumeration. I have therefore taken much pains to be correct in this point, and find them to be as follows:—

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| RAYS:— | B. 6; | D. 5\|34; | A. 3\|26; | C. 18; | P. 16; | V. 1\|5; | Port Essing. specim. | |
| | 5; | 5\|36; | 3,25; | 20, | 16; | 1\|5; | Rüppel. | — |
| | 6; | 3\|33; | 0\|26; | ....................... | | | Forskal. | — |
| | | 3\|32; | 3\|25: | ....................... | | | Cuv. & Val. | — |

The first dorsal spine is very short; its interspinous bone has been mostly removed from the specimen. The occipital crest is three-sided and tapering, without enlargements. There is a wide furrow between the eyes. The upper margin of the orbit is striated, the suborbitars are irregularly gouged on the surface, and the naked limb of the preoperculum is irregularly striated at the angle, and minutely crenated on its lower limb, the widely rounded angle, and half its ascending edge. The bony operculum is rounded at its upper angle and pretty deeply concave below, the sinus being filled by membrane supported by the projecting point of the suboperculum. This last-named bone is widest at its junction with the interoperculum, but at one-third of its length from thence it suddenly narrows and then tapers to its point. There are three small pores on each limb of the lower jaw. The teeth form a dense brush-like band on each jaw, the dental surface being flat. The teeth of the outer row are rather the strongest and are tricuspid, the middle point being the largest and longest.

There are fifty scales in a row between the gill-opening and caudal fin, and about fifty-five in a vertical line, of which fifteen are above the lateral line. They are roundish, with from eight to twenty-four furrows on their basal borders, varying according to the place from whence they are taken.

Rüppel states eighteen inches as the usual length of the species. The Port Essington specimen measures as follows:—

| DIMENSIONS. | inches. | lines. |
|---|---|---|
| Length from intermaxillary symphysis to tip of caudal ......... | 17 | 6 |
| ——————————— base of caudal ...... | 14 | 6 |
| ——————————— anus .................. | 8 | 2 |
| ——————————— edge of gill-cover ... | 5 | 0 |
| ——————————— centre of orbit......... | 2 | 9 |

| Dimensions. | inches. | line |
|---|---|---|
| Diameter of orbit | 1 | 2 |
| Length of ventral fins | 4 | 6 |
| ——— pectorals | 3 | 0 |
| ——— caudal | 3 | 0 |
| Height of anal | 3 | 3 |
| ——— dorsal, measured directly | 2 | 7 |
| ——— dorsal, measured along the rays | 4 | 6 |
| ——— body between fore-part of dorsal and anus | 10 | 2 |
| ——— fish including anal and dorsal | 14 | 2 |

[To be continued.]

## IX.—*Observations on the genera* Zygnema, Tyndaridea, *and* Mougeotia, *with descriptions of new Species.* By Arthur Hill Hassall, Esq., M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

It is the general belief of Cryptogamic physiologists that union of the filaments of the different species composing the genera *Zygnema*, *Tyndaridea*, and *Mougeotia* is indispensable to the production of fertile spores. This belief I consider to be erroneous so far as the genus *Zygnema* is concerned, as I think that I have the means of satisfactorily proving. In three species of *Zygnema* which I have recently met with, and which I have named *Zygnema quadratum*, *Z. intermedium* and *Z. angulatum*, the filaments do not unite, and yet all equally produce spores, only two of which, however, it is remarkable to observe, are placed in contiguous cells, and on one side of each of these a cell void of contents is invariably situated, a channel of communication being set up between every two cells, that is, between an empty one, and that which contains a seed, by means of a hollow process, situated at the point of junction of the cells, through which the contents of one cell passes into and mingles with those of the other *.

From a consideration of the structure of these species, the accuracy of which cannot be doubted, it is evident that conjugation is not essential to the production of spores, and therefore, that the supposition entertained by some that the entire of one filament contains fertilizing matter, and the other that which is to be fertilized, is erroneous; while it is apparent from the disposition of the spores, not more than two being juxtaposed, and of empty cells, that each filament includes both forms of reproductive matter so disposed as to lie in adjacent cells.

Should future observation disclose the fact, that this alter-

* A species of *Mougeotia*. *M. notabilis* likewise produces spores without conjugation of the filaments.—A. H. H.

nate disposition of spores and empty cells does not invariably prevail, this will not affect the truth of the statement that spores are sometimes formed without union of the filaments, for that is incontestably proved by reference to the species of *Zygnemata* spoken of above; nor does it disprove the theory of the formation of spores by the mingling of the contents of two adjacent cells, the one of which is provided with fertilizing matter, the other with that which is to be fertilized; for in the supposed instances of departure from the arrangement referred to, it might be fairly inferred that those spores not in communication with an empty cell would not be fertile. It must be borne in mind, likewise, that the material contained in the spiral tubes previous to its passage from one cell to the other, contracts itself into a little mass not usually of a regular form, but which might assume the appearance of a spore without possessing the fertile properties of one. This must be discriminated from the true spore.

The formation of spores without union of the filaments is not confined to these three species, but occasionally happens with some other species of the genus, more especially with what is to be regarded as a variety or condition of *Zygnema porticale* (*Z. quininum* of Agardh). In this the same disposition of spores and empty cells is remarked, but there is no direct channel of communication between the cells, the coalition of the contents of which being brought about by the rupture of the partitions which separate them, when these do not give way, the cells swell up and assume a remarkable moniliform appearance not peculiar to the species, but occurring in several others where union is prevented by any cause. It is curious to notice also that many of the cells throw out irregular and blind processes, thus evincing a strong tendency towards union with the cells of other filaments, which union would appear to have been frustrated by the operation of some unexplained cause; perhaps the motion of the water in which the species was growing.

In a species of *Zygnema* which I have named *Z. polymorphum*, the spores are likewise formed in some of the filaments without union, but somewhat differently from the manner in which this is brought about in the species hitherto spoken of. In this there is no alternate arrangement of spores and empty cells, a spore being placed in every cell; but these cells it is to be observed are twice as long as those which contain spores formed in the usual way by the union of the cells of different filaments; so that each spore contained in these elongated cells is constituted of the same quantity of material as the regularly formed spores, but that the elongated cells at the period of the formation of the spores in them had still to undergo a further and final division. It would be an interesting, but not an easy task, to determine whether spores formed in this manner are productive or not.

The length of the cells is very variable, not only in the species of this genus, but in all *Confervæ*, both marine and freshwater, simple and branched, this being the necessary result of their principal mode of development, viz. by the continued growth and subdivision of the cells composing them*. Such is the extent of this variation in the length of the cells, that some are twice as long as others in the same filament with every intermediate shade of length. Uncertain as is the length of the cells during the growth of any species of *Conferva*, yet this will be found to be pretty uniform when the growth has ceased, and the state of conjugation commenced; and when in the following descriptions mention is made of the length of the cells, it is to be understood that the reference relates to their length in that state, unless when otherwise indicated.

## Genus Zygnema.

* Conjugation parallel; spores oval, and contained within the cells of one or other filament.

*Zygnema maximum.* Filaments highly mucous, and of a light green colour, their diameter and length being very considerable; cells when in a state of conjugation a little longer than broad, prior to which however they are frequently not half so long as broad: winding round the interior of these are about eight spiral tubes filled with granular matter, the granules being small.

This is the finest and largest of all the *Zygnemata* hitherto described, the diameter of the filaments greatly exceeding those of *Zygnema nitidum*, *Conjugata princeps* of Vaucher. I have met with it several times, and have found it in considerable quantities in two localities in a pond on Nazing Common, Essex, and in a slow stream near Enfield Highway. There is no *Conferva* known to me with which it can possibly be confounded. When kept in a small vessel of water, it, like the following species, passes into decay in a few hours.

*Zygnema bellis.* Filaments about a foot in length, with truncate extremities, of considerable diameter, mucous, glossy, and of a deep and beautiful green colour; investing membrane of the cells very evident and transparent; in some filaments, five or six lax spiral tubes may be faintly dis-

* See Annals for July 1842, upon the subject of the growth of *Confervæ*.

cerned winding round the interior of the cells: these contain the reproductive globules, which are large and distinct, with a dark central nucleus; cells in the young filaments scarcely so long as broad, but rather longer than broad in those which have conjugated. Seeds oval, sometimes almost circular, lying in inflated cells, the cavity of which they do not fill.

This well-marked species has occurred to me in several localities in the vicinity of Cheshunt, in one of which, viz. in two sheltered ponds, communicating with each other by a narrow channel, opposite to Sir Henry Meux's house, it is very abundant—not floating upon the surface, but diffusing itself through the water, to which it imparts a rich emerald green colour. The diameter of the filaments is little less considerable than that of *Z. nitidum*, whose equal, if not superior in beauty, this fine species may be fairly considered.

*Zygnema quadrispirale*? Filaments of somewhat less diameter than those of *Zygnema nitidum*; cells from three to five times as long as broad; winding round the interior of these are spiral tubes, usually four in number.

*Zygnema neglectum*. Filaments of considerable diameter and length; cells rather longer than broad, lining the interior of which are spiral tubes, usually three in number, which in the young filaments perform collectively within each cell about six revolutions, but in the more aged filaments a smaller number. Spores occasioning no inflation of the cells.

I should have but little hesitation in referring this species to the *Conjugata adnata* of Vaucher; but abundant as it is, and frequently as I have observed it, I have never met with it attached to any object, but invariably free and floating, sometimes unmixed with any other species, but more frequently entangled among the filaments of *Z. nitidum* and *Z. quininum*. It is for this reason therefore that I hesitate to regard it as identical with that species. The filaments are intermediate in diameter between that of *Zygnema nitidum* and *Z. deciminum*, to both of which it bears outwardly some resemblance. The number of spiral tubes varies, but is usually three; while in *Zygnema nitidum* the prevailing number is four, and in *Z. deciminum* but two.

Abundant in the neighbourhood of Cheshunt.

*Zygnema pellucidum*. Filaments of more considerable diameter than those of *Zygnema rivulare*; cells usually seven or eight times as long as broad, never less than five, and frequently as many as ten times: four faint spires scarcely at all visible in the more aged filaments wind round the interior of each cell.

I suspect that the mode of conjugation of this species is angular, resembling that of *Zygnema curvatum*; but I am not certain that it is so.

In a pond in Mr. Yorke's brick-field near Cheshunt.

*Zygnema rivulare.* Filaments seven or eight inches in length, usually attached; cells varying in length from eight to four times their breadth, being at the period of conjugation nearly four times as long as broad: three spiral tubes wind round the interior of each cell, performing in those cells whose length exceeds the diameter by eight times from sixteen to twenty revolutions, and in those half as long as the preceding half as many revolutions.

The above is an exceedingly well-marked, and in this vicinity abundant species, and I am surprised that it has not before been described. It is most frequently attached either to stones or wood in the New Barge and Lea rivers, but it is occasionally found mixed up with other floating species in still water. The filaments nearly equal in diameter those of *Zygnema deciminum*, from which however it is readily distinguished by the greater length of its cells, and the presence of three closely coiled spiral tubes: sometimes however there are but two spirals, and then the resemblance to *Zygnema deciminum* is much greater.

*Zygnema Grevilleanum.* Filaments about equal in diameter to those of *Zygnema rivulare*, round the interior of the cells, which are generally about eight times as long as broad, but frequently much longer; two lax spiral tubes are disposed so as to cross each other and describe in each cell three or four oval spaces.

To this species, probably the most elegant of the genus, I have taken the liberty of assigning the name of Dr. Greville, author of the excellent 'Algæ Britannicæ,' as a slight mark of personal respect, as well as an acknowledgement of the eminent services rendered by that gentleman to natural history.

*Zygnema subventricosum.* Diameter of the filaments about equal to that of *Z. commune*; cells at the period of conjugation about six times as long as broad, but prior to that time frequently much longer: within the interior of each cell a single spiral tube performs five or six revolutions, and at the situation of the joints two short semicircular lines are to be noticed: spores large, occasioning the cells in which they are placed to assume a ventricose form.

This species is to be distinguished from *Zygnema commune* by its longer and ventricose cells, and by the presence of the curved lines at the joints, which are however met with in other species besides this.

In a small lake belonging to Mr. Bridgman near Cheshunt, and at other places.

*Zygnema æquale.* Filaments of less diameter than those of *Zygnema subventricosum*; cells usually eight times as long as broad, containing about six turns of a single spiral tube; spores oval, contained within the cells, the inflation of which they never occasion.

I have given this species, which cannot be confounded with any of the others described in this paper, the specific denomination of *æquale*, on account of the evenness of the filaments, which when they contain the spores never exhibit the smallest trace of inflation, and the uniform length of the connecting tubes.

Neighbourhood of Cheshunt.

*Zygnema commune.* Cells about three times as long as broad, in the interior of each of which a single spiral tube performs about two and a half revolutions; spores not producing any inflation of the cells in which they are placed.

This species has occurred to me in the neighbourhood of Cheshunt, and in ponds at the back of the Norland estate, Notting Hill.

*Zygnema catenæforme.* Cells rather more than twice as long as broad, each containing about two revolutions of a single spiral tube; spores largely inflating the cells in which they are contained.

It is scarcely possible to distinguish the filaments of this species from those of *Z. commune* before conjugation: after this has occurred, the difference in the length of the cells and the form of these is so obvious as to leave but little doubt of its being distinct from that species. If a condition of any, however, it is of *Z. commune*.

Mr. Bridgman's pond, Cheshunt.

*Zygnema malformatum.* Cells about twice as long, in each of which a single spiral tube performs usually two revolutions: spores lying obliquely in the cells, which are a good deal distorted for their accommodation.

I should hesitate to regard this as distinct from *Z. commune*, but that it has occurred to me in considerable abundance, unmixed with any filaments which I could decidedly refer to that species.

Cheshunt.

*Zygnema brevissimum.* Cells scarcely so long as broad: a single spiral tube performs one turn and a half within each cell; spores usually oval, but occasionally almost circular, their long diameter being placed transversely in the cells.

This species comes very near to the *Conjugata condensata* of Vaucher, who however represents the spores as being in that species always of a perfectly circular form. Those cells, which have not conjugated from some cause or other, frequently swell up and assume a beaded form.

Vicinity of Cheshunt.

*Zygnema polymorphum.* Filaments of less diameter than in any of the preceding species; cells at the period of conjugation about three times as long as broad: a single spiral tube performs three or three and a half turns within each cell; spores not occasioning any inflation of the cells.

The above is the description of the species in its regular form, from which, however, some of the filaments differ considerably. Thus, in some, many of the cells which have not conjugated are observed to have become inflated, and to present a very characteristic appearance; in others, in which the cells are six times as long as broad, and which have not conjugated, spores completely formed, but of a very elongated shape, are placed one within each cell, the inflation of which these spores have not as yet occasioned: in a third set, which likewise have not conjugated, the spores have become perfectly formed, are much shorter, and now have produced considerable enlargement of that part of the cells in which they lie; and lastly, in other filaments there is a regular alternate disposition of spores and empty cells.

This species comes very near to the *Conjugata inflata* of Vaucher, in which, however, the spores are represented as lying in inflated cells, which they do not in the species just described.

Vicinity of Cheshunt.

*Zygnema elongatum.* Diameter of the filaments rather less than in the preceding species; cells very many times as long as broad, down the interior of which a single tube passes in a waved manner: at the situation of the joints, the apparatus for the division of the threads, appearing like two curved knife-blades, is situated.

This is one of Vaucher's species, and a very abundant one it is. It is mentioned by Mr. Dillwyn in his 'Synopsis,' but has been excluded from Harvey's 'Manual:' the grounds of this exclusion I am not acquainted with. It is to be distinguished from *Z. tenuissimum*, on the one hand, by its longer joints, laxness of the spiral tube, and greater diameter of the filaments; and from *Z. subventricosum*, on the other, by the less considerable diameter of its filaments, as well as by other characters.

New River Reservoir, Cheshunt.

*Zygnema parvum.* Filaments very slender; cells rather more than four times as long as broad, each containing about two turns of a single spiral tube; spores generally producing a slight inflation of the cells.

The filaments of this species are nearly as slender as those of *Z. tenuissimum*, from which it may be distinguished by its much shorter joints.

Vicinity of Cheshunt.

*Zygnema tenuissimum.* Filaments extremely slender; cells about nine times as long as broad, each containing five or six revolutions of a single spiral tube; spores producing a slight inflation of the cells.

This species is to be distinguished from all others of the genus which I have met with by the minuteness of its filaments.

Vicinity of Cheshunt.

** Seeds produced without conjugation.

*Zygnema quadratum.* Filaments at first cylindrical; cells about nine times as long as broad, each containing from six to seven revolutions of a single spiral tube; spores oval, large, and much elongated, contained within quadrangular enlargements of the cells; tube of communication arising from the point of junction of two cells.

I find this remarkable species very abundantly in ponds on Cheshunt Common.

*Zygnema intermedium.* Filaments nearly equal in diameter to those of *Zygnema quadratum*; cells about five times as long as broad, round the interior of which a single spiral tube performs about four revolutions; spores oval, smaller than those of the preceding species, and not contained in quadrangular enlargements of the cells, but still producing a slight inflation of them: tube of communication placed at the junction of two cells in the same filament.

I have no doubt of this being specifically distinct from the preceding. It occurred abundantly to me at High Beech, Epping Forest, and I have since met with it in other localities.

*Zygnema angulatum.* Filaments at first straight, but at the period of reproduction becoming angulated, the angles being situated at the passage of communication set up by means of a hollow process between almost every pair of cells in the same filaments; spores, oval.

I met with sufficient of this species in the vicinity of High Beech to enable me to preserve several specimens of it.

## Genus Tyndaridea.

It has been surmised of the two little bodies into which the sporular mass in each of the cells of the species of this genus is invariably divided, that the one consists of fertilizable matter, and the other of that which is to be fertilized; and this supposition is in a measure supported by the circumstance of a channel of communication frequently existing between them, but it is opposed by the fact that these little masses are continually undergoing division and separation according to the growth of the filaments; so that each furnishes the material for two others from time to time, which themselves again undergo division. These sporular masses present a different form in each species, and are thereby doubtless designed to assist man in his endeavours to discover the differences between these minute productions; they are, in fact, to be regarded as so many seals placed upon them by their Divine Creator, by means of which they may be frequently distinguished from each other.

*Tyndaridea gracilis* of Vaucher? Filaments nearly equal in diameter to those of *Tyndaridea stagnicola*; cells four times as long as broad, sometimes five times, at first filled with sporaceous matter as in the species of the genus *Mougeotia*, which subsequently contracts into two rarely perfectly divided roundish masses.

It is most probable that the above species is the *Conjugata gracilis* of Vaucher, but this cannot be ascertained with certainty without seeing it in a state of reproduction. The filaments may however be readily recognised by the above description.

*Tyndaridea stagnicola.* Filaments slender; cells about two and a half times as long as broad; sporular masses somewhat cruciform; spores circular, contained within the cells, the diameter of which they entirely fill, as well as a portion of the connecting tube.

I cannot identify the above species with any described by Vaucher or Agardh. The filaments are more slender than those of *Tyndaridea bicornis*, but the species is to be distinguished from all others with which I am acquainted by the circumstance of the seeds passing a little way into the connecting tubes.

Abundant on Hertford Heath.

*Tyndaridea quadriformis.* Filaments more slender than those of *T. interposita*; cells rather better than four times as long as broad; endochrome divided into two quadriform masses.

The cells are longer than those of *T. interposita.*

In ponds near Notting Hill.

*Tyndaridea interposita.* Filaments of less diameter than those of *Tyndaridea bicornis*; cells usually three or three and a half times as long as broad; spores circular, lodged within the cells; endochrome somewhat quadriform.

*Tyndaridea interposita* is to be distinguished on the one side from *Tyndaridea quadriformis* by the greater diameter of its filaments, but somewhat shorter cells; and from *Tyndaridea bicornis* on the other, in having longer cells, but somewhat finer filaments.

*Tyndaridea bicornis.* Filaments of more considerable diameter than those of *T. quadriformis*; cells usually better than twice as long as broad, but sometimes longer and sometimes shorter than this; endochrome consisting of two distinct masses united to each other by a lengthened tube of communication, and emitting a kind of ray or prolongation from each angle of their distal extremities: spores circular contained within the cells.

I have a suspicion that this is the species which is usually taken for the *Tyndaridea cruciata* of Vaucher, which has however filaments of more considerable diameter and rather shorter joints. It is by no means an uncommon species, but I have only met with it in a state of conjugation in the Diana pond, Bushey Park.

*Tyndaridea abbreviata.* Filaments of rather greater diameter than those of *Tyndaridea stagnicola*; cells usually a little longer than broad, but sometimes not so long; endochrome divided into two little masses, which, when magnified, resemble trees in miniature; these are connected by means of a transverse process, which may be compared to the trunks of the trees: spores circular, contained within the cells.

This species approaches somewhat near to *Tyndaridea stagnicola*, from which, however, I am satisfied that it is distinct, having had the opportunity of comparing the two species in specimens in which the spores were perfect in both. From *T. stagnicola* it is to be distinguished by the somewhat greater diameter of the filaments, and by the shortness of the cells, the spores appearing frequently to be in contact, so close are they in this, while in *T. stagnicola* there is a distinct interval between them equalling that of the diameter of the spores themselves.

### Genus Mougeotia.

*Filaments* articulated, simple, at length generally united in pairs, either with or without the intervention of transverse tubes, and either angularly or parallelly. *Endochrome* at first filling the cells, but subsequently contracting into longitudinal or slightly spiral lines. *Spores* round, situated either in the cells or in the transverse tubes.

The genus *Mougeotia*, as above defined, appears to be a very natural one. The angular conjugation of the filaments is usually regarded as the most important characteristic of the genus. It is not so, however; for we have angular union of the filaments in an undoubted species of *Zygnema*, *Z. curvatum*. The character of most importance to notice is the circumstance of the cells being at first filled with granular matter, which subsequently generally contracts into longitudinal or slightly spiral lines.

*Mougeotia major*. Filaments of more considerable diameter than those of *Mougeotia genuflexa*; cells usually five or six times as long as broad; conjugation angular, and without the intervention of tubes.

This species approaches very closely to *Mougeotia genuflexa*, but differs from that species in the much greater diameter of the filaments and shortness of the cells.

In ponds in brick-fields near Notting Hill.

*Mougeotia glutinosa*. Filaments of rather less diameter than those of *M. genuflexa*, conjugating angularly; cells six or seven times as long as broad, those being the longest which have conjugated, at first filled with sporaceous matter, which frequently contracts into longitudinal lines: sporidium quadrangular, lodged between the filaments, which do not enter into its formation; spores when perfect somewhat oval.

This is a very distinct and fine species, occurring abundantly in boggy ponds on Hertford Heath. Not unfrequently a number of contiguous parts of cells unite, forming arched loops or links, separated from each other by the square ovarium, which is the chief characteristic of the species.

*Mougeotia transversalis*. Filaments more slender than those of the preceding species, conjugating angularly; cells about six times as long as broad, united by transverse tubes.

This is by no means an uncommon species, although it is rarely met with in a state of conjugation: there is no other species of the genus with which it can be confounded.

Pond in the parish of Enfield.

*Mougeotia reticulata.* Filaments nearly as slender as those of *Vesiculifera bombycina*, conjugating angularly; cells about six times as long as broad, united by transverse tubes of remarkable length.

Frequently a number of pairs of cells will unite in the same filament, as in *Mougeotia glutinosa* and *M. cærulescens*; these however are not as in them contiguous pairs, but alternate, so that four or five filaments are sometimes united with each other by means of those alternate cells, which have not conjugated in the pair of filaments which were the first to become united.

*Mougeotia alpina.* On a careful examination of a specimen of this interesting Conferva, kindly forwarded to me by Dr. Greville, I came to the conclusion that it ought to be regarded as a member of the family of *Conjugatæ*, and that the conjugation was most probably angular. On informing Dr. Greville of my opinion, that gentleman wrote me word, that Mr. Shuttleworth, who had examined some of his specimens, had arrived at the same conclusion, and considered it to be identical with the *Seda capucina* of Bory, *Mougeotia capucina* of Agardh. This led me to compare specimens of both species, which I was enabled to do through the kindness and liberality of Dr. Greville, who has placed in my hands the whole of his valuable collection of *Confervæ*; and the result of this comparison is, that I feel assured of the distinctness of the two species, the cells being in *Mougeotia capucina* many times longer than those of *M. alpina.* Outwardly the resemblance between the two species is very striking—the texture and colour being nearly the same in both, although the purple is somewhat richer in *Mougeotia capucina**.

*Mougeotia scalaris.* Filaments about equal in diameter to those of *Mougeotia genuflexa*, conjugating parallelly; cells about four times as long as broad; spores oval, lodged in the transverse tubes by which each pair of cells is united.

That this species is really to be regarded as a *Mougeotia*, notwithstanding its parallel conjugation, there cannot be the slightest doubt, from the circumstance of the sporular matter at first filling the entire cavity of the cells, and subsequently sometimes contracting into longitudinal lines, as in the other

* Sir William Hooker has likewise with great liberality permitted me to make use of his collection of *Confervæ*, so rich in authentic species.

species of the genus *Mougeotia.* In no case is there ever any trace of division in the contents of the cells, nor are the spores ever circular: to both these points I particularly attended.

Pond in the parish of Enfield, also near Notting Hill.

*Mougeotia distans.* Diameter of the filaments about equal to that of *Mougeotia genuflexa*, extremities pointed; cells four times as long as broad, conjugation parallel, connecting processes very long; spores oval, contained within the cell.

I have only met with one specimen of this very distinct species.

Cheshunt.

*Mougeotia ovalis.* Filaments about two inches long, of rather less diameter than those of the preceding species, and conjugating parallelly; cells nearly twice as long as broad, those becoming inflated and oval which receive the spores, which are oval, and nearly fill the cavity of the cells.

Of this distinct little species I lately received two specimens from the Rev. David Landsborough, collected by that gentleman in the parish of Stevenston, Ayrshire: one of these happening fortunately to be in seed, I was enabled to ascertain its distinctness, which I otherwise could not have done with the same certainty. In young filaments the cells are so full that the joints are invisible.

*Mougeotia notabilis.* Filaments rather slender, not conjugating, at first cylindrical, but subsequently becoming angulated, the angle of flexion being situated in the centre of each cell; cells usually about eight or ten times as long as broad, but frequently longer; spores non-symmetrical, a single one being placed in the angle formed *in each of the cells.*

When I first noticed this singular species I was under the impression that it was to be regarded either as *Mougeotia glutinosa* in an incomplete state, with the filaments just about to unite to form the quadrangular sporangium, or as a distinct species that had not as yet arrived at the perfect stage of its formation; reflection, however, soon convinced me that neither of these ideas could be correct, but that it ought to be considered as a distinct and perfectly formed production, a view which I was at first most unwilling to adopt, for it presents in the circumstance of the formation of a spore *in each of the cells of all the filaments,* an anomaly which I am not able to account for physiologically; in all other cases the spores being the result of the union of the contents of two distinct cells, placed either in the same or different filaments. That it is not *Mougeotia glutinosa* in an imperfect condition, is proved first by the smaller diameter of its filaments, but more especially by the position of the angles of flexion, these being placed indifferently on either side of the filaments, and not on one side, as would be the case were the filaments intended to unite with each other, so that this arrangement of the angles of the cells forms a positive obstacle to their union; for even were the cells all of the same length, which they are not, it would still be impossible for the angles of one filament to correspond so as to unite to form the sporangium with those of another filament: and that the species is in itself perfect and distinct in the condition indicated in the definition above, is established by the invariable presence of spores in all the filaments and the non-union of these.

Found in great abundance in ponds in some of the brick fields near Notting Hill.

The genera *Zygnema*, *Mougeotia*, and *Tyndaridea* merge through certain species into each other. Thus the genus *Zygnema* passes into the genus *Mougeotia* through *Zygnema curvatum*, this having relation with the one by its spiral tubes, and with the other by its angular mode of conjugation; and the genus *Mougeotia* into the genus *Tyndaridea* through the species regarded with doubt as the *Conjugata gracilis* of Vaucher, in which the cells are at first filled with endochrome, as in *Mougeotia*, which subsequently becomes divided into two roundish masses, as in the species of the genus *Tyndaridea*. This transition of one genus into the other does not, I think, affect the validity of either.

Accurate figures of all the above species have been preserved, as well as of those already described in British works, and all drawn to the same scale.

## X.—*Excerpta Zoologica, or abridged Extracts from Foreign Journals.* By Dr. Felix von Bærensprung.

*To Richard Taylor, Esq.*

Dear Sir,

Anxious on quitting Germany to possess myself as soon as possible of all information connected with physiology and natural history, and aware from experience of the difficulty of procuring many of the journals, and more especially the dissertations published in that country, some of which are of great value, I requested my friend Dr. F. von Bærensprung to forward to me short notices of what appeared from time to time. I have no doubt that these may be of as much interest to some of the readers of the 'Annals' as to myself, and have therefore put them into English in order to place them at your disposal.

As many of the extracts may have a relation to papers previously published, but which have not been taken notice of in this country, I will endeavour to select some few passages which will bring the information on the subjects of which they treat down to the date of the notices communicated.

Yours truly,
W. Francis, Ph. D.

Soley Terrace, Pentonville.

Entozoa.

The observations on intestinal worms are becoming daily numerous, and all tend to show decidedly that there are yet many profound and dark mysteries, especially with regard to their metamorphoses and migrations, which have still to be unveiled.

Eschricht in a valuable memoir 'On the Origin of Intestinal Worms,' wholly rejects the notion of a *generatio æquivoca*, and maintains that intestinal worms originate in every case from individuals of similar genera; otherwise for what purpose would be the immense masses of eggs and young in the Ascarides and Tape-worms? In what form the intestinal worms find their way into other animals, it is not yet possible to say; but, as an answer to this question in part, it is very important to know that these creatures have recently been observed to undergo metamorphoses and to change their locality: we know of *Ligula* and *Bothryocephalus solidus*, that they only thrive and develope perfectly when they have passed from one animal into another. The observation that many fish have worms in their flesh only at certain periods of the year, seems likewise to indicate such migrations among Entozoa*. Eschricht moreover regards, as of much importance, the question whether worm-diseases are contagious, as an explanation of the manner in which the contagion takes place can only be attempted when such is ascertained.

M. Streckeisen has communicated to the Naturalists' Society of Basle a notice in which he states that he had observed the number of Entozoa in the intestinal canal of several animals to decrease with the commencement of winter, and was thence led to conclude that most intestinal worms are annual, dying off towards winter, and being subsequently reproduced by eggs. This observation agrees perfectly with those of Eschricht, and we are now able to assert that the various periods of the year exercise an essential influence on the increase and decrease of Entozoa.

Prof. Mayer in Bonn (Müll. Archiv, 1842, p. 212. pl. 15.) found a

* In Copenhagen, for instance, it is a common saying that no cod is fit to eat in those months which have no *r* in them, as their flesh then contains worms. Eschricht examined *Gadus Callarias* frequently in the months of May, June, July and August, and found *Echinorhynchi* in their flesh. Bearing in mind these facts, and the discoveries of Miescher, which will be subsequently communicated, there can scarcely be any doubt as to the migrations of the *Echinorhynchi*.—W. F.

*Tetrarrhynchus* inclosed in a distinct cyst beneath the peritoneal covering of the intestinal canal of a young *Testudo Mydas*, which confirms the view that the *Cestoidea* and *Cystica* are not essentially distinct, but can only be sections of the same family. Mayer calls this worm *Tetrarrhynchus cysticus*. Dr. Peters, in a note to the memoir in question, having compared it with Rudolphi's original specimen, pronounces it to be identical with *Tet. macrobothrias*.

Dr. Valentin (Müll. Arch. 1841, p. 435) found in the blood of *Salmo fario* a number of microscopical Entozoa possessing lively motions, effected by means of several variable appendages to one of the sides. Gluge has detected more recently a similar animal in the blood of a frog (ib. 1842, p. 140).

Vogt (ib. 1842, p. 189. pl. x.) has published some contributions to the history of the development of the *Filaria*. He found in the blood of several frogs a number of small worms resembling *Filaria*. In the same frogs were noticed in the ventral cavity several brown fibrous cysts, which were however all empty. In several other frogs were similar cysts filled with young *Filaria*, but in the blood none of these animals could be detected. In another frog several large *Filaria*, more than an inch in length, were situated in the ventral cavity. In the female sexual parts of these, Vogt found embryos which agreed in size and in form with the animals occurring in the blood. From these observations he considers himself justified in drawing the following conclusions: the young are deposited by the mother in the ventral cavity, bore their way into the vessels, circulate for a time with the blood, and are then deposited at suitable places for their development,—the viscera. From the inflammation of the tissues originate round about them fibrous cysts, in which they lie for a time, and then penetrate into the ventral cavity, and the young there produced by them now commence the same course of life.

### Acarus folliculorum.

Simon has described in Müller's Archiv, 1842, p. 278, an *Acarus* which lives in the diseased and normal hair-sacs of man. He calls the animal for the present *Acarus folliculorum*, from its occurring in the so-called *comedones*, diseased hair-sacs (*acne punctata*), which are frequent about the nose and mouth. It was noticed not only on corpses, but also on several healthy persons. Of ten living persons examined, it was found on three perfectly healthy and cleanly persons. It is on an average $\frac{1}{10}'''$ long, and $\frac{1}{50}'''$ broad, and occurs from two to thirteen in each comedon. Its motions are sluggish, and rarely for the purpose of changing its locality. The animal evidently belongs to the *Acari*; the parts of the mouth consist of a snout, the biarticulated palpi, and smaller bristle-shaped mandibles. The anterior part of the body is provided with four pairs of feet, which are three-jointed, and have three claws affixed to the last joint. Four distinct forms have been observed, probably different stages of development of the animal; the first is characterized by the presence of three pairs only of feet, while the other three forms have four pairs, and only differ by the relative size of the abdomen. At times heart-shaped bodies were met with, which Simon considers to be the eggs.

## XI.—*The Birds of Ireland.* By Wm. Thompson, Esq., Vice-Pres. Nat. Hist. Society of Belfast.

[Continued from vol. ix. p. 381.]

### No. 13.—*Hirundinidæ* (*continued*).

The House Martin, *Hirundo urbica*, Linn., is much more choice in his haunts than the swallow, and consequently is by no means so generally distributed over Ireland: in some of the less improved districts it may even be called a local species*.

This species is, according to my observation, invariably later in its arrival in the north of Ireland than either the sand martin or the swallow, and generally appears about the middle of April†.

The "trim and neat" style of the generality of houses erected in the north of Ireland of late years does not present such facility for the nests of the martin as that of an older date, not only the "buttress and coign of vantage" being wanting, but the less feudal, though to the martin equally useful appendage—the antiquated holdfast of the wooden spout, upon which its mud fabric was wont to be raised, and which afforded "ample room and verge enough" for the nest between its base and the spout that it supported. When in Ballymena in July 1833, I observed the predilection of the martin for the older houses to be so strongly marked, that against those in the older part of the town their nests were numerous, while not one was to be seen about any of the erections of late years. With reference to this propensity a second instance may be mentioned, which at the same time suggests another cause that to a certain extent influences the choice of site—that the martin is prone to return to its birth-place‡. During a week's stay in the summer of 1833 in the picturesque sea-bathing village of Portstewart (co. Londonderry), which had been lately built, not one of these martins appeared, though the place was

* In Scotland, on the other hand, the house martin, according to Mr. Macgillivray, "is more widely dispersed" than the swallow.—British Birds, vol. iii. p. 575.

† Mr. Blackwall states that the average time of the martin's appearance at Manchester is the 25th of April, as that of the swallow is the 15th of the same month. It is observed by Mr. Hepburn, that "the house martin arrives at the village of Linton on the Tyne in the last week of April, though in 1839 a few were seen by the 17th of that month."—Macgillivray's British Birds, vol. iii. p. 580. In the same work, p. 592, it is mentioned, on the authority of David Falconer, Esq., "that for the very long period of forty successive years, a pair of them had come to Carlowrie either upon the 22nd or 23rd of April."

‡ Mr. Jesse, in the second series of his 'Gleanings in Natural History,' gives the following extract from the unpublished journal of White of Selborne:—"July 6, 1783. Some young martins came out of the nest over the garden door. This nest was built in 1777, and has been used ever since." A friend has remarked that a nest built against a spout-head in York-street, Belfast, was occupied for four years successively. By Capt. King, R.N., and Mr. Weir, it has been proved that the same birds return annually to the same locality.—See Macgillivray's British Birds, vol. iii. p. 592.

in many respects peculiarly suited to them. Although they had not taken up their abode there, yet in the high and time-worn precipices which rise above the ocean at only a short distance to the eastward of the village, martins were always to be seen, seeming especially graceful as they glided to and from their nests, beneath the summit of the stupendous basaltic arch that rises at the base of the isolated rock on which the ruin of a castle is situated—a locality which I understood they had always frequented.

This *Hirundo* is so partial to the noble basaltic precipices which form the leading features of the north-east coast of Ireland, as in the more genial seasons of the year to be ever seen about them. Throughout their entire range, and against their gloomy cliffs, "its pendent bed" is erected*. About the sea-girt rocks of the peninsula of the Horn in Donegal, those near to Ardmore in the county of Waterford, and other similar localities, I have remarked its presence†. Martins occasionally build against the arch of the bridge. Toome bridge (over the Bann) contained a great many of their nests in 1834, and for a long period is said to have been a favourite haunt: the most lofty edifices are also selected for this purpose.

"It has been observed (says White, in the sixteenth letter of his 'Natural History of Selborne') that martins usually build to a north-east or north-west aspect, that the heat of the sun may not crack and destroy their nests; but instances are also remembered where they bred for many years in vast abundance in a hot, stifled inn-yard, against a wall facing to the south." On this subject the following note was made on the 15th July, 1832:—I this day observed twelve or thirteen nests of the *Hirundo urbica* built against a two-story house at Wolfhill. These were all on the north-west side or front, excepting one, which was at the north-east corner. The other two sides of this house have in part a southerly exposure (S.W. and S.E.), and being fenced in are consequently more private (a road passing those preferred by the martin)—on every side the facilities for its building operations are the same. In front of a thatched

* Dr. J. D. Marshall, in his memoir 'On the Statistics and Natural History of the Island of Rathlin,' remarks, that the house martin "is the most numerous of the genus in Rathlin, where it is found in all parts of the island, as well inland as along the cliffs which overhang the sea." Those preferred for nestling are said to be "the range of white [limestone] cliffs running along the north-western side of Church Bay." In rocks of a similar kind, but in a very different scene, I myself observed a great number of the nests of the martin in June 1835. This was in the chalk-cliffs which rise above the river Derwent, near the village of Cromford in Derbyshire. The nests were built in as far as possible beneath the hanging rocks, in the same manner that they are under a projecting roof.

Dr. Marshall, in the same memoir, mentions that one of these birds which he shot "had its mouth completely filled with insects, among which were a large dragon-fly and one of the *Tipulæ* [*T. oleracea*]." White of Selborne states that swifts and sand martins feed on *Libellulæ*.

† "They breed in the Pyrenees in the rocks in vast numbers, as in the Alps, often far from the habitation of man."—Cook's Sketches in Spain, vol. ii. p. 275.

cottage not more than eight feet high, and which is not only at the side of the highway, but constantly resorted to as a public-house, I remarked several nests of the martin. In the rear of this cottage, which is fenced off from the road, and its walls (from the building being on the side of a hill) considerably higher than in front, none of the nests appear. I recollect that some years ago this species built annually in front of the dwelling-house at Wolfhill, not more than a single nest occupying either gable; and that in considerable numbers their nests were displayed in front of two lofty houses in Belfast. Judging from the situations selected by the martin for its nests on these five houses (the three first mentioned being only a few hundred yards apart), it would seem that the bird is more influenced by the front of a house than by aspect, as the first faces the north-west, the second and third the south-east, and the fourth and fifth the south. In innumerable other instances I have remarked that where facilities for building are similar on all sides the house, the front was thus preferred by the martin, although the nests were opposite every point of the compass, a fact which is particularly apparent in houses situated in streets which intersect each other at right angles. The aspect of the cliffs before mentioned as being tenanted by the martin is as different as that of the houses. One reason why the fronts of houses are thus preferred (and in the instances mentioned we find them to be equally so from the low cottage to the four-story house) is probably on account of the more open space in front allowing of a freer range of flight to and from the nest.

Mr. Selby remarks of this species, that the nest "is closed all around, except a small orifice, usually on the most sheltered side," &c. My observation on the side of the nest chosen for entrance in the north of Ireland does not accord with this, as in nests closely adjoining I find the aperture on every side; as an instance of which it may be mentioned, that of nine nests in front of a house before alluded to, the entrance appeared on the north, south, and west sides, the wall against which they were placed occupying the eastern. On this house—as is not unfrequently the case—several of these architects had, like certain other bipeds when erecting their habitations, taken advantage of their neighbours' gables, and it may be presumed, for a similar reason—that of being saved trouble and expense of labour. All the nests of the martin that I recollect to have seen, with a solitary exception, had the entrance close to the top; but in this instance, although the nest was built against the wall of the house, and beneath a projecting roof, the aperture was placed rather above the centre, in the same manner as that of the wren (*Troglodytes Europæus*). The entrances to other nests on the same house (which is four stories in height) were as usual.

Although the nest of the poor martin is often in this part of the country torn away from the houses of persons who imagine themselves to be possessed of good taste, yet there are others, who, disliking the harsh contrast between its clay-built shed and the snow-white walls of their mansions, and unwilling at the same time to disturb the summer wanderer, have, for the sake of uniformity, had its domicile whitewashed at the same time with their own. I first noticed this in the town of Antrim, where on two houses several nests thus appeared, and was pleased to see their architects flying in and out, thus evincing their contentment with the change. In Hillsborough I afterwards remarked that the same practice had been adopted.

The statement of several continental authors, that house martins, on finding sparrows in possession of their nests, had been known to rise *en masse*, and fill up the entrance when the intruders were within, would seem from the silence of some of the latest British writers of authority on the subject, not to be credited by them. The compiler of the 'Architecture of Birds' sets it down as a "fanciful legend;" but I have unquestionable testimony that a case precisely similar to those related by the authors alluded to, occurred in the next farm to our own, near Belfast, in 1832.

When the house martin returned in that year to a long thatched cottage (belonging to Mr. John Clements) where they had built for many years (and which in that year displayed fourteen of their nests), a pair found that sparrows had taken possession of their domicile. On perceiving this, they kept up such "a chattering about the nest" as to attract the attention of the owner of the house. After its continuance for some time, apparently until they were convinced that the sparrow was determined to retain possession, they flew away, and did not return for a considerable time, when they re-appeared with about twenty of their kindred. With their assistance they immediately commenced "claying up the entrance to the nest." This was done in the course of the day, and next morning the pair of martins commenced the construction of a new nest against the side of their old one, and in it, undisturbed, reared their brood. After some time, the proprietor of the cottage, who had never heard of any similar case, had the curiosity to pull down both nests, and in that occupied by the sparrow found its "rotten corpse," together with several eggs. A particular note of the entire proceeding, as related by Mr. Clements, was made by my brother soon after the occurrence; but to make "assurance doubly sure" before publishing the account, I inquired today (November 2, 1841) of the same person whether he remembered such a circumstance, when he repeated it just as narrated nine years before. Some other persons too of our mutual acquaintance were witness to the chief parts of the proceeding, and saw the sparrow and its eggs in the sealed-up nest*.

What appears to me the most singular feature in this case is, that the sparrow would remain in the nest, and allow itself to be entombed alive; but this bird was sitting on the full complement of eggs, and which were probably in the last stage of incubation, when we know that some birds leave the nest only to procure such a scanty

* Three recent occurrences of a similar nature are recorded by Mr. Weir (Macgillivray, British Birds, vol. iii. p. 591), and two others are alluded to under the head of "Swallow" by the Bishop of Norwich, in his 'Familiar History of Birds,' vol. ii. p. 55, 3rd edition

morsel as will barely support life, and will occasionally allow themselves to be lifted off their eggs, and when placed on again, continue to sit as intently as if they had not been disturbed. The filling up of the aperture is not in itself a singular proceeding on the part of the martin*; but on this occasion, when the assistance of their neighbours was called in, would almost seem to be intended as an act of retributive justice on the sparrow. Their building against the side of the old nest is quite a common occurrence.

I have heard the call of this species exerted to the no little annoyance of persons engaged in the cruel task of pulling down their nests, when the sufferers become as vociferous as their "weak voices" will permit, and thereby attract their neighbours from all quarters, who make common cause with them, each and all endeavouring to deter the spoiler from his work of destruction, "occasionally flying boldly and at the risk of their lives within reach of his outstretched hand; and again, with all the eloquence they can master, seeming most piteously to claim the edifice as theirs †." Martins are generally silent birds, but when congregated for migration their call is often almost incessantly uttered.

This species generally rears two broods during its sojourn. So late as the 23rd of September several old birds were observed to fly so repeatedly to their nests, that I had no doubt they at the time contained young‡. The second brood is generally reared in the same nest as the first, but it is probable that when the nest is not found suitable for the purpose, a second erection is undertaken, as on the 17th of July I remarked seven nests in front of a house, which in the month of October contained nine.

Notes in illustration of Mr. White's remark ('Hist. of Selborne,' letter 18), that the young swallows "at once associate with the first broods of the house martins, and with them congregate, clustering on sunny roofs, towers, and trees," need not be offered; but it may

* Mr. Blackwall, in his 'Researches in Zoology,' states that a pair of martins, on returning in the spring to the nest of the preceding year, endeavoured to dislodge the bodies of their young, which had been deserted; but finding their efforts in vain, "closed up the aperture with clay, thus converting the nest into a sepulchre."

† Audubon (Ann. of Lyc., vol. i. p. 165) mentions a similar trait in the history of an American species, the *Hirundo fulva*, in the following words: —"The energy with which they defended their nests was truly astonishing. Although I had taken precaution to visit their nests at sunset, when I had supposed they would all have been on the sycamores, yet a single female happened to be sitting, and she gave the alarm, which immediately called out the whole tribe. They snapped at my hat, my body, and my legs, passed between me and the nests within an inch of my face, twittering their rage and sorrow. They continued their attacks as I descended, and accompanied me some distance."

‡ In a note contributed to Mr. Bennett's edition of White's 'Selborne,' p. 61, a particular instance is detailed of a pair of martins remaining behind for the purpose of bringing their progeny to adolescence, instead of migrating with the great body of their companions. That the young are often deserted at such times by their parents, has been fully proved by Mr. Blackwall.

possibly be worth observing, that more than once the martin has been noticed by me in company with the swallow in autumn, at places remote from its breeding-haunts. When with Mr. Wm. Sinclaire at the Falls, on the 6th of September 1832, immense numbers of both species were seen in company, and flying so close to the ground as occasionally to stop for a moment, and apparently take their food from the very grass. They also alighted in multitudes on the fruit-trees in the garden, and notwithstanding their decided predilection for perching on dead branches, they on this occasion chose especially for that purpose two large cherry-trees in full foliage. Amongst these birds appeared a solitary sand martin, a species which, as well as the martin, was never before seen about the place, and near to which neither species has any nestling-place. From observing the swallow and the martin thus congregated for some time previous to migration, I have little doubt, great as is the disparity in their powers of flight, that they often leave this country together; indeed both species have been observed to alight in company on vessels very far out at sea*.

Respecting the separate migration of the martin, it may be mentioned, that on the 24th of September 1834, when about Toome bridge, I observed about a hundred of these birds congregated, no other species of *Hirundo* being in the vicinity; and on the eighth of October, when riding near Belfast, a very strong south-west wind prevailing, about twenty martins in a loose flock flew across the road, and proceeded for some time against the wind, at not more than from fifteen to twenty yards' distance from the ground. They, probably from feeling the wind too strong against them, at length wheeled about, rose very rapidly until they attained a great elevation, and in the act of still mounting higher disappeared from my sight, all this time having the wind with them. These birds were believed to be migrating. Feeling the effects of a powerful contrary wind, they may, as some persons believe the *Hirundines* generally to do, have ascended thus high in search of a more favourable current. On this occasion, however, they may not have been successful, as the clouds (which were moderately high) were borne onwards in the same direction as the wind which swept the earth.

The martin is generally stated to remain to a later period in England than the swallow, but I do not recollect any year in which the swallow was not the last of its genus to depart from the north of Ireland.

In the spring and summer of 1841 I observed the house martin as follows:—When sailing from Malta to the Morea, and about fifty miles from Cape Passaro (the nearest land), on the 23rd of April, one of these birds flew into the cabin, and died soon afterwards: it had not met with any molestation on board. No more were seen until the morning of the 27th, when, nearly one hundred miles west of the Morea, a few appeared, and remained through the early part of the day, confining their flight to the lee side of the ship: in the afternoon

* C. L. Bonaparte in Zool. Journ., and Bloxham in Mag. Nat. Hist.

still more were seen hawking about in company with *Hir. rustica*; as flies were numerous, they probably obtained plenty of food: at four o'clock p.m. all were gone. On the 30th of April this species was just commencing nest-building against the houses in the town of Navarino; in May I remarked it to be common about Smyrna; in June at Patras, where it was as usual building against the houses in the town; at Trieste in the same month it was numerous, as it likewise was in July about Venice, Verona, and Milan—in the last city having fine nestling-places about the magnificent Arch of Peace, where its "cradle" was supported on the sculptured leaves adorning the ceiling of the gateway. This notice, compared with that of the swallow, as seen during the same tour, shows that, as in our own northern climate, the *H. rustica* is much more generally distributed than the *H. urbica*.

The most complete history of this species, as observed in the British Islands, appears in the third volume of Macgillivray's 'British Birds,' where the author and his contributors, Mr. Hepburn and Mr. Weir, each and all treat very fully of it from personal observation, the two latter gentlemen having watched its progress of nest-building, frequency of feeding young, &c., with the most praiseworthy and extraordinary patience.

Sand Martin, *Hirundo riparia*. Linn. As the swallow is much more abundant than the house martin in Ireland, so again is that species considerably more numerous than the sand martin:—the last is everywhere a local species. It resorts to suitable places in all quarters of the island.

The sand martin arrives the earliest of the *Hirundinidæ* in the north of Ireland, appearing occasionally at the latter end of the month of March. In 1828 several were seen in a mountainous situation near Belfast by Mr. Wm: Sinclaire and myself, on the 29th of that month, and when pointed out to the respectable farmer at whose place they appeared, he assured us they had been seen there several days before that time.

The observation of the eloquent Wilson (Amer. Ornit.), that the sand martin "appears to be the most sociable with its kind and the least intimate with man of all our swallows," has been objected to as erroneous*, but my observation leads me to consider it as critically correct. Although the sand martin never tenants the swift's favourite abode, the tower or the steeple, attaches not its nest to our dwellings like the martin, nor with the swallow claims the roof of our outhouses for its protection, yet it is in a considerable degree benefited by the operations of man. The excavations in the sand-pit are, when carried to such an extent as to form a high perpendicular front, the means of affording to this bird a place to rear its young in comparative security, and it appears to me that such banks are selected, whether adjacent to or remote from houses, solely from their adaptation to its purposes, and not because it either seeks or "shuns human neighbourhood." The species is as partial to the precipitous

* Rennie, in his edition of Montagu's Orn. Dict. p. 20.

banks which in the very wildest localities rise in picturesque beauty above the river or the lake, as to the stratum of sand which overlies the quarry, or to the sand-pit, where the respective operations of quarrying for stone or excavating for sand are daily in progress.

To the banks of a spacious sand-pit close to the old Malone road, and within a mile of Belfast, a colony of these birds annually repair. Here, in consequence of the sand being in great demand for building purposes, they have the labour of making entirely new excavations for their nests at least once, and occasionally twice, in the season. So great is the demand for this sand, that although the excavation made by the bird will, when the bank is soft, sometimes extend five feet inward, I have known the bank colonized by it to be required for use before the first brood had escaped; and in such case, the labour of forming a second burrow in the same season was commenced.

On the 29th of April 1832, an observant friend informed me, that, of the sand martins' excavations in this place, thirty-two were then made, and that about three days afterwards two more appeared; he also observed the birds employed in carrying hay and feathers into them. When visiting this place on the 18th September of the same year, I reckoned seventy of the perforations of this species.

May 18, 1833.—On the south side of the Malone sand-pit, the sand martins have, since their arrival this season, excavated above eighty holes towards the top of the bank*, some of them not more than two inches apart, although there is an abundance of room; so much indeed that the colony does not occupy more than one-fiftieth part of the bank suitable for their nests.

May 27, 1833.—No excavations have been made here by the sand martin since the 18th inst.†

Of the places around Belfast resorted to by this species, are two, differing much in character; the one a portion of the bank of the

* In this locality, where the birds have a choice of banks from thirty to forty feet in height, and the sand is of a similar nature throughout, they always select situations where they are most out of the reach of enemies of all kinds; so that it cannot here be said that "they exercise their propensity [for boring] without reflection."—Macgillivray's Brit. Birds, vol. iii. p. 599. Where they have not thus had a choice, I have frequently seen their burrows in places where they were subject to be destroyed.

† Sand martins were a full month later than usual in their arrival in the north of Ireland in the spring of 1836 (when all the spring migrants were late), and but comparatively few made their appearance even then. The sand-pit above alluded to, and their chief haunt in the neighbourhood of Belfast, was entirely deserted by them in the summer of that year; and, from the progress of the excavation, not a burrow of the preceding season remained to denote that the species had ever been there. In 1837 I omitted to look after them, but in 1838 they were in numbers here as usual. On visiting the locality on the evening of the 11th of May I saw not less than sixty of these birds flying about, and so many were giving utterance to their feeble note, as to produce a considerable noise. Their burrows of this season were scattered over the entire eastern façade of the sand-pit; and, as usual, all placed near to the top of the bank. At the entrance to three of these holes sparrows were stationed.

river Lagan, elevated not more than six feet above the usual level of the water; the other, a stratum of hard sand only a few feet in thickness, overlying the limestone of an extensive quarry, at an elevation of about 600 feet above the sea; but at these places a few pairs only breed*.

Where banks suitable to the mining operations of the sand martin offer a secure abode in the vicinity of Lough Neagh, the species, as may be inferred from its partiality to water, is abundant. The precipitous sandy banks rising above this vast expanse of waters in Massareene deer-park, near Langford Lodge, and at Glenavy river†, three localities within the distance of a few miles, are resorted to by great numbers.

These birds are so widely distributed over Ireland, in similar situations to those described, that it would be needless to particularise them any further. The most exposed locality in which I have noticed them was about the banks where the river Bush joins the ocean near the Giants' Causeway‡.

When at the Malone sand-pit on the 18th of September 1832, no sand martins appeared. Upon inquiry I learned that the whole colony, excepting a very few birds, had taken their departure about a fortnight before that time. When here on the 1st of October 1833, I was informed that they had departed ten or twelve days previously§. In both years, after the great body of these birds had mi-

* September 1840.—The latter locality has for some years past been entirely deserted.

† Where this river falls into Lough Neagh, Mr. Hyndman, on the 16th of August 1836, remarked several hundreds of these birds congregated, and that about fifty at a time would alight on the beach of the lake, which is there earthy and gravelly. It was very stormy, and the wind blowing upon the shore. The birds did not appear to be feeding when on the ground. Sir Wm. Jardine witnessed a proceeding, similar in some respects, which he relates in the following words: "We once observed many hundreds of the sand martin resting on the sands of the Solway Firth, upon a space not exceeding two acres; a small stream entered the sea, and they seemed partly resting and washing, and partly feeding on a small fly that had apparently come newly to existence, and covered the sands in immense profusion."

‡ Of the seven burrows of sand martins in the county of Antrim, noticed in this paper, five are contiguous to water, to which I believe the species to be partial, although, to use the words of Mr. Macgillivray, they "take up their abode in situations favourable to mining, whether there be water near them or not."

§ On a visit to this place on the 10th of September 1840, not a bird was to be seen, but less than a mile distant I saw several associated with house martins and swallows, of which the latter especially were abundant. The burrows of the sand martin here, this year, are fewer than ever known to me, except in 1836, when there were none at all. Now there are but a few holes at the western and at the southern side, about a dozen at each place. The repeated injuries these poor birds have suffered here, from the banks where they nestled being excavated during their stay, led me to believe that they might have changed their quarters, but in the present season (1842) they are as numerous as ever. They were very late in arrival this year, but all at once on the 25th of April the whole colony—about seventy in number—appeared.

grated, I remarked a single individual, in one instance associated with the swallow, and in another with the martin and it together; and in both cases remote from their burrows. They alighted on houses and trees along with their congeners, as well as accompanied them in flight. In neither year were these sand martins seen after the other species were gone, whence it may be presumed that they set out with them on their migration.

Aristotle mentions the sand martin as frequenting the valleys of Greece, and it was with much gratification that in the first valley, or rather defile, of the Morea visited by me, I saw several of them. This was on the 30th of April, when walking between Navarino and Modon.

Audubon gives a very full and interesting account of this bird as an American species. In Macgillivray's 'British Birds' (vol. iii.) is a very good description of it by the author, enriched by valuable contributions from Mr. Weir and Mr. Duncan.

[To be continued.]

## XII.—*Information respecting Scientific Travellers.*

In a letter to a friend in Belfast, dated Syra, June 27, 1842, Mr. Forbes says:—

"This is the first opportunity I have had of writing to you, or any one else, since the end of February. After the Beacon left Xanthus, Spratt, Daniell, and I, struck into the interior, and wandered about Lycia in all directions until the first week in June. During all that time we had no communication with Europe, and heard no news of any kind—were even completely shut out of the world; but our tour was so intensely interesting, that we did not miss it. Every day we discovered the ruins of cities which have long been lost, and the geological and botanical features of the country were of the highest interest Daniell has written a letter to the 'Athenæum,' giving a notice of our antiquarian discoveries, so that I need not detail them here*.

"On arriving at Rhodes, after being as nearly lost as near could be, crossing the sea in a little Turkish caique, I found a parcel of letters * * *. After waiting seven days at Rhodes we took our passage in a caique for Syra. The second day I was seized with fever, and for eight days lay in a dreadful state in the hold of the caique without medicine or advice. At last a providential wind blew us to Syra, where finding the *Isabella* accidentally in the port we made application through the consul to put her in quarantine, and go to Paros. This was at first refused, but afterwards granted, and my life was saved, for if I had remained two days longer in the caique I should

* This appeared in a late number of the 'Athenæum'; as in that of Aug. 6, did a notice of the winter tour of Mr. Forbes and Mr. Hoskin, communicated by the latter gentleman to the Geographical Society.

assuredly have died. I am now recovering under Harvey's charge but must rest myself for a month to come on board the Beacon."

In another letter, dated H.M.S. Beacon, Paros, July 18, 1842, Mr. Forbes mentions his being then quite recovered from fever, though not very strong.

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## BIBLIOGRAPHICAL NOTICES.

### *Ninth Annual Report of the Royal Cornwall Polytechnic Society.*

Amongst other valuable matter the present report contains an essay on the Zoophytes of the coast of Cornwall, by Mr. Couch, for which the first silver medal of the Society was adjudged. We noticed among other rare and local species there enumerated, the following: *Sertularia Ellisii*, *S. nigra* and *S. pinnata*, *Plumularia pennatula*, *P. Catharina* and *P. myriophyllum*, *Caryophyllia Smithii*, *Actinia bellis*, *Valkeria uva*, *Hippothoa lanceolata*, *Cellepora Skenei*, *C. lævis* and *Lepralia trispinosa*. *Lepralia hyalina* is placed amongst the *Tubuliporidæ*, whereas there can be no question of its really belonging to the genus *Lepralia* of Johnston, as proved by the presence of opercula upon some of the cells. In addition to many rare species, we find also descriptions of some new ones, the characters of which we here subjoin.

Trailing Coral.—*Tubulipora trahens.*

*Spec. Char.* "Polypidom calcareous, creeping, adherent throughout, irregularly and sparingly branched, narrow, with one or two rows of tubes projecting from the upper surface.

*Hab.* "On stones and shells from deep water, not uncommon: Polperro.

"The polypidom varies from a quarter to one inch in length, but is very narrow and slender. The tubes are commonly single, but sometimes are in pairs and project considerably; sometimes in a straight and sometimes in a waved manner. When the tubes are in pairs they are always close together, but each pair are distant from each other in the lengthways of the polypidom. I am unable to refer this to any described species."

*Tubulipora deflexa.*

*Spec. Char.* "Polypidom erect, cylindrical, with waved tubes projecting from all parts.

*Hab.* "On shells from deep water, common: Polperro, Mevagissey Bay, and off the Deadman Point.

"This species is very common; it varies in height from one quarter to half an inch; it is calcareous, white, cylindrical, with sometimes an enlarged globular head. The tubes arise from all parts of the polypidom, and greatly project in a waved form; they are shorter above than below, and their apertures are even and unarmed. The base is slightly spreading, and of a darker colour than the upper portions. I have been unable to identify this with any described species."

*Tubulipora Fungia.*

*Spec. Char.* "Polypidom pedunculated, the upper portion expanded into a flat, round surface; tubes projecting from the upper part of the circumference; centre nearly plane."

*Tubulipora penicillata?* Turton's Lin. vol. iv. p. 615.

"*Hab.* On shells and stones, and shells from deep water; common from the Eddystone Lighthouse to the Deadman Point.

"It is calcareous and about a quarter of an inch in height; the upper portion is expanded into a flat head, having on its superior surface one or two rows of projecting tubes round the circumference; the centre is either plain or marked with a few irregular cells. The cells are distant from each other, with slightly oblique unarmed apertures. The under surface of the head is furrowed without cells, and sloped into the footstalk."

*Flustra Peachii.*

*Spec. Char.* "Encrusting; cells radiating; apertures oval, unarmed, with two punctures at each extremity.

*Hab.* "On dead muscle and oyster shells, in the Fowey River, off the Deadman Point: common.

"Encrusting, membrano-calcareous; cells ovoid, having their longest diameter in the axis of growth; at each extremity two minute apertures; apertures even and unarmed. The cells, which have a radiating distribution, appear somewhat confused from their radiating from so many points and intermingling with each other.

"This species was first found by Mr. Peach of Gowan in the Fowey River; since that time, in company with him, I have found it abundantly encrusting almost every cell dredged up from Mixtow to the mouth of the river. I have since found it in deep water west of the Eddystone and nine leagues south of the Deadman. Not being able to refer this to any described species, and having submitted it to a gentleman well versed in the subject, who has pronounced it new, I beg to give it the name of its discoverer."

From an examination of Mr. Couch's paper it is evident, as might have been looked for from the rocky nature of the coast, that the calcareous species of zoophytes are particularly abundant on the Cornish shore.

## PROCEEDINGS OF LEARNED SOCIETIES.

### ROYAL ACADEMY OF SCIENCES OF BERLIN*.

March 3, 1842.—M. Müller read a notice on some Pathologico-Anatomical Observations on Parasitical Forms made during a journey in Sweden in company with M. Retzius.

When occupied last August in Bohuslän in dissecting different sea animals, MM. Müller and Retzius had occasion to examine a dorse (*Gadus Callarias*) with a lean tail, which, according to the statement of the fishermen, was not eatable on account of sickness. The seat of the disease was the natatory bladder, in which was found a considerable quantity of a yellowish smeary matter without smell. Seen under the microscope it appeared of a very peculiar nature, containing

* From the 'Berichte der Akademie der Wissenschaften zu Berlin.' Communicated by W. Francis.

small bodies of from 0,00058–0,00068″ in length, which resemble in form the ribless *Navicula*, or Agardh's *Frustulia coffeæformis*. They consisted of two plates (*Schälchen*) united in the centre by a granular substance. The bodies are at the commencement undivided, they afterwards split lengthwise, and are only held together by the granular substance; at last they appear to separate completely. They are formed in cells, in which several were found together. From this and from the want of silica in the plates, they are perfectly distinct from the *Naviculæ* and similar infusoria: they appear to belong, together with the Psorospermia of fishes, to a peculiar section of parasitical, vegetative organic forms of specific structure.

The authors have also instituted some inquiry into the development of fungi in the lungs and air-cells of birds. It is not the mould in the lungs of birds just dead, described by Messrs. C. Mayer, Jäger, Heusinger, Theile, and still more recently by M. Deslongchamps, but flat fungous bodies of a firm and uncommonly tough substance. M. Deslongchamps evidently had them before him, they formed the substratum of the mould filaments, which were developed in the lungs and air-cells of a diseased asthmatical eider duck; but he is mistaken with regard to the principal thing, as he considers this disease as an albuminous exudation. The fungoid bodies have been observed once in Stockholm and once in Berlin under quite similar circumstances. The first case was that of a *Stryx nyctea* from Lapland, which lived a part of the winter in Stockholm, but became sick and short-breathed, and then died. It was dissected by M. Retzius. The preparation has been preserved a long time in the Anatomical Museum at Stockholm. The lungs and air-cells are everywhere covered with fungoid, flat, circular, whitish yellow bodies, which have concentric rings on the surface, are in general somewhat hollowed out in the centre, and sometimes provided with cup-shaped corpuscles on the surface, of very small size, measuring from one to two lines and more in diameter. They have a firm hold, but may be removed without injury to the mucous membrane. Several adjacent ones also join, and then have the outer rings in common. At two places the air-cells were thickly covered with confluent bodies from 1 to 1½ line in depth, so that there was a continuous, firm, and almost cartilaginous layer. The second case observed in Berlin was that of an old marsh harrier, *Falco rufus*, which, after having been shot in this neighbourhood two years before, had been brought to the Zoological Museum. A student, M. Dubois, found several white, cup-shaped, flat bodies in the air-cells, and brought a piece of the ventral part of the trunk with the kidneys, which were lined with some of them, to the dissecting-room, asking what they could be. M. Müller could not perceive any structure in them. In Stockholm, last autumn, there was again an opportunity of inquiring into the structure, but it was not attended with success. The firm tough mass appeared under the microscope as if coagulated. M. Retzius since presented a half of the preparation to the Berlin Museum, which afforded M. Müller the opportunity of devoting a longer time to the microscopic investigation of these enigmatical bodies. They certainly possess some structure, but it is not everywhere perceptible; in many places, where fortunate sections were made, perfectly transparent and very minute ramified filaments in an amorphous substance were evident, of a nature so clearly vegetable, that they need but be seen to be convinced of such being the case. MM. Link and Klotzsch at once pronounced them to be vegetable. Still more doubtful are other less regular and thicker filaments, which are here and there ramified, and are characterized by their inflated margins; they are also sometimes separated into single ball-shaped bodies. The vegetable nature of the disease is therefore not to be doubted. The mould filaments existing in two places on the confluent disease, which are nowhere else to be found on the hard surface, are evidently something secondary, as so often happens with regard to fungi. The mould filaments have no resemblance with the filaments in the interior of the disease, are thicker, and evidently articulated, which M. Deslongchamps overlooked; in some spots, capitate asci may be seen, whose clavate ends are covered all round with green spores; they are also found between the filaments. This mould is evidently an *Aspergillus*.

Organs of fructification were not perceived in the fungoid bodies; the latter therefore remind us of the enigmatical *Sclerotia*: direct observations on the latter, namely, *Sclerotium semen*, and *complanatum*, showed however no agreement. *Dacryomyces stillatus* showed still less resemblance in the structure.

[The paper of M. Deslongchamps above alluded to appeared at p. 229. vol. viii. of this journal, and we then called the attention of our readers to the observations made by Mr. Owen in 1832, in his Notes on the anatomy of the Flamingo. In a subsequent number (56. p. 131) Mr. Yarrell communicated a notice of the observations of Col. Montagu on the same subject, which were published so early as 1813. All these observers seem to have overlooked the fungoid bodies on which the mould is developed.—Ed. Ann.]

March 10.—M. Kunth read the first part of a treatise *On the natural group of the* Liliaceæ *taken in its widest sense*, in which his aim was to prove, that if the *Liliaceæ*, *Asphodeleæ* and *Asparageæ* of Jussieu are considered as mere divisions of a larger family, there is no reason to retain the *Melanthaceæ* and *Smilaceæ* as distinct families. With this intention the author first reviewed these five groups, and defined heir limits more accurately. The following are the results of the observations communicated.

The *Melanthaceæ*, which are characterized by the *antheræ extrorsæ*, divided pistil, and the capsular fruit, possess anatropous ovules. With the exception of *Colchicum* and *Bulbocodium*, in which they are hemianatropous, their embryo is very small, and lies hid in the albumen directly above the umbilicus; in *Colchicum*, *Bæometra*, and *Ornithoglossum*, on the contrary, it is situated about a third of the periphery from the umbilicus. This family is divisible, according to the different nature of the anthers, stigmata, and fruit, into five groups, the *Colchiceæ*, (*Colchicum*, *Bulbocodium*, *Merendera*, *Monocaryum*, and *Weldenia* and *Leucocrinum* as doubtful), *Melantheæ* (*Androcymbium*, *Erythrostictus, Melanthium, Anguillaria, Wurmbia, Bæometra* and *Burchardia*), *Tofieldieæ* (*Tofieldia* and ? *Pleea*), the *Heloniæ* (*Helonias, Chamælirium, Xerophyllum*), and the *Veratreæ* (*Amianthium, Schœnocaulon, Asagræa, Veratrum, Zygadenus, Stenanthium* and *Anticlea*, a new genus formed of *Zygadenus glaucus* and *Melanthium sibiricum*). The *Uvulariæ* of Dr. A. Gray are distinguished from the *Melanthaceæ* merely by their coherent pistils, and it would perhaps be more suitable to consider them as a section. Besides the genera mentioned by Dr. A. Gray, there also belongs to this division *Kreysigia*, Reichenb. (*Tripladenia*, Don), *Melanthium indicum*, which constitutes a separate genus, *Streptopus, Hekorima* and *Prosartes*, as well as *Drymophila* notwithstanding the *antheræ introrsæ*. But *Tricyrtis*, Wall., is excluded, and approached to the *Liliaceæ*.

The *antheræ introrsæ*, coherent pistils, and the flattened seeds which are provided with a winged margin, distinguish the *Liliaceæ* of Jussieu from the *Melanthaceæ*, to which they are in other respects very nearly allied. Bernhardi's two divisions are retained, but *Fritillaria*, on account of its anthers, which are fixed internally, is placed near to *Lilium*. *Orithyia* is most nearly related to *Tulipa*, *Rhinopetalum* on the contrary to *Fritillaria*. *Medeola* has anthers like *Lilium*, and must be considered as belonging to the same family notwithstanding the berries. *Methonica* is but a doubtful *Liliacea*, and approaches in many of its characters to the *Melanthaceæ*. The formation of the seed is here the same as in *Colchicum*, and it may be mentioned that Gærtner has figured and described the embryo of *Methonica* quite incorrectly. The seeds have an acrid taste.

The *Asphodeleæ* of Jussieu are very similar to his *Liliaceæ*, but may easily be known from the black testa. Mr. Brown unites with them those genera of Jussieu's *Asparageæ* which have a *testa atra crustacea*, and raises the rest by the name of *Smilaceæ* to a separate family, on account of the thin membranaceous nature of this organ. M. Kunth, on the contrary, thinks that the former, which should keep the name of *Asparageæ*, ought to be placed equal with the *Smilaceæ* in a natural arrangement. In the *Asphodeleæ* three sections have been formed, the *Hyacintheæ, Allieæ* and *Anthericeæ*. The latter have tufted roots; both the former, on the contrary, are bulbous. The *Hyacintheæ* flower in clusters, the *Allieæ* are umbellated. To the first, besides the genera enumerated by M. Endlicher, *Ledebôuria*, the Indian representative of *Scilla*, belongs, and *Cœlanthus*, Willd., which differs from *Lachenalia* by the spur-shaped prolongation of the calyx.

In most of the *Hyacintheæ* the sepals are one-nerved, and only *Cyanotris, Ornithogalum, Myogalum, Albuca* and *Uropetalum* are provided with three or more nerves. *Bellevalia* is enriched with new species, and *Agraphis* again united to *Scilla*. In reference to the last genus, M. Kunth calls attention to the great difference in the number of ovules in the individual species, and also makes the generic character of *Drimia* to depend on the loculi of the ovarium, containing at all times only two ascending ovules near each other.

The *Allieæ* include, besides *Allium*, the genera *Hesperoscordium, Triteleja, Brodiæa, Calliproa, Tristagma, Leucocoryne, Milla* and *Bes-*

*sera,* and form, according to M. Endlicher, the greater part of his *Agapantheæ,* whilst *Allium* is enumerated amongst the *Hyacintheæ.* Perhaps *Tulbaghia* likewise belongs here. In *Bessera, Triteleja* and *Calliproa,* the sepals have three nerves on the back, whilst in all other *Allieæ* they appear to have one nerve. The true *Allieæ* have two upright campylotropous ovules fixed near to each other at the base of the loculus; in *Allium Victoriale,* on the contrary, they are isolated. *A. fragrans, euosmium, striatum, striatellum* and *canadense* possess four to twelve two-rowed hemianatropous ovules, and form a distinct genus, which perhaps coincides with *Hesperoscordium.*

The *Anthericeæ* have a true stem, a clustered or panicled inflorescence, and numerous more or less tuberose thickened radicular fibres. *Eremurus, Asphodelus, Asphodeline* and *Bulbine,* again form in these a small separate group, characterized by the position of the ovules. These are from two to six in number, having the aperture turned downwards, and grown to the inner angle of the loculus, almost the whole of their length, and more or less surrounded with a fleshy arilloid protuberance. The sepals appear one-nerved. To these genera, *Kniphofia, Aloë* and *Lomatophyllum* join on very naturally. In the two first, and probably also in *Lomatophyllum,* the arilloid base of the ovules forms a loose membrane at a later period, which quite envelopes the seed, spreads in the form of wings to the margins, and has been falsely considered as the testa. Accordingly the *Aloïneæ* of Endlicher must fall to the ground, as of the two genera *Sanseviera* and *Yucca,* still reckoned amongst them, the first is distinguished from *Dracæna* merely by solitary ovules, and belongs to the *Asparageæ*; the second, on the other hand, comes nearer to the *Liliaceæ. Hemerocallis, Czackia, Phalangium,* and all the remaining genera, which are considered by M. Endlicher as belonging to his *Anthericeæ,* have collectively anatropous ovules, and the sepals are furnished with three or more nerves.

To the *Conanthereæ,* which on account of the *Ovarium semi-inferum,* can hardly deserve to form a separate section of the *Anthericeæ,* besides *Zephyra, Conanthera, Cumingia* and *Pasithea, Cyanella* also belongs; but *Echeandia* must be removed and placed near to *Phalangium.* The latter likewise applies to *Anemarrhena. Sowerbæa* however does not belong here, but to Endlicher's *Aphyllantheæ.*

## MICROSCOPICAL SOCIETY.

At a meeting of the Microscopical Society held July 20th, 1842, J. S. Bowerbank, Esq., in the Chair, a paper was read by Mr. John Quekett, "On the peculiar arrangement of the Blood-vessels in the Air-bladder of Fishes, and on the evidence they afford of the true function of that organ." The author, after alluding to three principal modifications of the air-bladder in fishes generally, went on to describe that of the cod-fish, which he stated to be a thick muscular bag without any opening externally, and provided on its ventral aspect with a highly vascular body, which has been supposed to perform the office of secreting the air contained in the bladder: the author described the minute arrangement of the vessels in this so-called gland, the capillary system of which was composed of a great number of parallel vessels aggregated together in bundles, and forming loops on the free surface of the gland, and in the other part of the bladder the arrangement was also remarkable for the parallel manner in which the vessels were disposed; in this fish three, but in others as many as six, vessels ran parallel to each other. The fact of the air-bladder being subservient to the function of respiration was supported to a certain extent by the distribution found in the anterior compartment of the air-bladder of the eel; in this fish the vascular net-work approached more nearly that of the cellular lungs of the Batrachia than any other class of vessels. The author concluded by stating that the probable use of the gland in the closed air-bladders might be, not that of secreting air, but of keeping in a pure state the air already there, as those fish provided with a gland generally live in deep water, and from having no outlet to the bladder are unable to change the contents should they have become impure. The paper was accompanied with injected specimens and with diagrams of the most important parts alluded to by the author.

## ENTOMOLOGICAL SOCIETY.

November 1, 1841 (*continued*).—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Descriptions of the Australian species of Lamellicorn Beetles, belonging to the family of the Sacred Beetles. By J. O. Westwood F.L.S.

After noticing the *Circellium hemisphæricum*, Latr., (Guerin, Icon. R. An. ins., pl. 21. f. 3.—*Coprœcus h.* Reich., Ann. Soc. Ent. France. 1842, pl. 5. fig. 2.), the *Aulacium carinatum*, Reich., (*Mentophilus Hollandiæ*, Laporte, Hist. Nat. Ins. Col. 2. pl. 4. fig. 4.), he describes the genus *Tessarodon*, Hope, in detail, giving characters of the type *M. Hollandiæ*, and of the two following new species:—

Tessarodon angulatus, W. *T. subovalis obscurè castaneus, capite et prothorace rudè punctatis, clypeo in medio dentibus duobus conicis, lateribus ante oculos valdè angulatis, tibiis posticis ad apicem appendiculatis.* Long. corp. lin. 3.—Hab. New Holland. Swan River? Mus. Hope.

Tessarodon piceus (Hope MSS.). *T. parvus subovalis castaneus, capite et prothorace rudè punctatis, capitis angulis ante oculos rotundatis, tibiis posticis simplicibus.* Long. corp. lin. $2\frac{1}{2}$.—Hab. Port Essington. New Holland. Mus. Hope.

Descriptions are then given of the two following new genera:—

Cephalodesmius, W. *Clypeus in medio 4-dentatus, dentibus intermediis valdè elongatis. Palpi labiales, articulo 2do tumido, ovato, 3tio minuto. Prothorax magnus, 8-angularis, elytra subcordata. Pedes valdè elongati. Tarsi antici distincti, breves. Tibiæ intermediæ bicalcaratæ, posticæ 1-calcaratæ.*

Cephal. armiger, W. *Niger, capite nitido, punctato, pronoto subopaco, elytris opacis subsulcatis intra marginem lateralem acutè carinatis.* Long. corp. lin. 5.—Hab. New Holland. Mus. Soc. Ent. Lond., &c.

TEMNOPLECTRON, W. *Corpus breve subrotundatum nitidum. Clypeus in lobos duos minutos obtusos productus. Palpi labiales, articulo 2do obconico, 3tio præcedenti dimidio breviori. Prothorax lateribus rotundatis (et cum elytris subcontinuis) anticè parùm angustior. Tarsi antici minuti. Tibiæ posticæ curvatæ intermediæ 2-, posticæ 1-calcaratæ. Ungues subtùs denticulo instructi.*

Temn. rotundum. *T. nigrum, nitidum, tibiis anticis obtusè bidentatis, singulo elytro striis 8 tenuissimis, striâ suturali punctatâ.* Long. corp. lin. 5.—Hab. Melville Island. Mus. Hope.

Descriptions of two new species of *Cremastocheilus*, from Northern India. By W. W. Saunders, Esq., F.L.S.

Cremastocheilus Campbellii, S. *Jet-black, somewhat glossy, antennæ and trophi somewhat piceous. Head elongate-quadrate, slightly emarginate, thorax orbicular, closely and deeply punctured. Mesosternum prolonged, elytra rather broader than the thorax, elongate, deeply punctured and rounded at the apex, legs long.* Length $\frac{6}{10}$ of an inch. Mus. Saunders.

Cremastocheilus brunneus, S. *Head subquadrate, narrowed in front; antennæ black. Thorax more orbicular, with a deep impressed line thickly and deeply punctured, and dark pitchy brown. Mesosternum terminating in a strong, somewhat curved hairy spine. Elytra rather broader than the thorax, elongate; apex angular, slightly punctured, dark brown; legs long, pitchy brown.* Length $\frac{5}{10}$ of an inch. Mus. Saunders.

[These two species enter into Burmeister's new genus, *Cænochilus*, all the species of which hitherto described are natives of Southern Africa.—J. O. W.]

In allusion to Mr. Hope's observations on the habits of the Australian *Coleoptera*, Mr. Edward Doubleday mentioned that he had observed with great surprise, when in North America, that several tribes of insects appeared to possess habits quite at variance with those of the European species of the same groups, *Ips* (for example) being coprophagous, and *Onthophagus* found under carrion.

December 6th.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Mr. S. Stevens exhibited British specimens of *Notaris Scirpi,* a Curculionideous insect new to the British Fauna, which he had obtained from bullrushes at Hammersmith; also various other insects found in bullrushes, and a new species of *Omias* from Ascham Bryant, Yorkshire.

Captain Parry exhibited a small collection of *Coleoptera* from New Zealand, including a new genus of *Lucanidæ*, and many curious *Longicornes*, upon which Mr. Hope made various remarks.

Mr. Westwood exhibited the Coleopterous portion of Mr. Coffin's collection of Mexican insects, and various insects from Sierra Leone from the collection of Mr. Raddon.

Mr. J. Gould exhibited a large and very beautiful wasp's nest, formed by *Vespa holsatica* in a glazed case, accompanied by a note from

Mr. Elliott, detailing the manner of its formation; the case having been placed on the top of a steam-boiler, and some portions of the comb containing grubs, and a number of perfect wasps having been introduced into the case, and an aperture formed at the back for the ingress and egress of the wasps which immediately covered in the grubs, and finished the nest in about five weeks. Mr. Hope stated that he had noticed that wasps are very partial to situations near to chimneys.

A cocoon of very beautiful silk resembling molten gold threads from the Philippine Islands was presented by H. Cuming, Esq.

The following memoirs were read:—

Descriptions of two new genera of *Curculionidæ*, closely allied to *Rhynchites*. By G. R. Waterhouse, Esq., of which the following are the characters:—

MINURUS, Wat. *Rostrum elongatum ad apicem dilatatum. Antennæ elongatæ tenues versus medium rostri insertæ, 11-articulatæ, articulis basalibus subæqualibus; 3bus ultimis remotis, clavam formantibus. Caput elongatum, collo crasso. Thorax subcylindricus basi apiceque truncatus. Elytra oblonga, abdomen tegentia.*

Minurus testaceus, Wat. *Testaceus, oculis nigris capite thoraceque punctatis, elytris profunde punctato-striatis.* Long. corp. lin. $1\frac{1}{6}$. —Hab. Chiloe.

METOPON, Wat. *Rostrum elongatum ad apicem subdilatatum. Antennæ tenues ad basin rostri insertæ, 11-articulatæ, articulis basalibus subæqualibus, tribus ultimis clavam subsolidam formentibus. Caput latum pone oculos paullò elongatum. Oculi laterales rotundati prominuli. Thorax transversus, basi apiceque truncatis. Elytra oblongo-ovata, humeris subrectangulis.*

Metopon suturalis, Wat. *M. testaceus, punctatus, scutello nigro. elytris ad suturam nigricantibus.* Long. corp. lin. $1\frac{1}{4}$.—Hab. Van Diemen's Land.

Descriptions of a new species of *Parastasia*. By J. O. Westwood, F.L.S.

Parastasia rufo-picta, W. *Nigra nitida tenuissimè punctata, fasciâ irregulari ad basin singuli elytri, anticè biramosa, et posticè in medio lati emarginata, pygidio piceo, opaco.* Long. corp. lin. 11. —Hab. Sylhet, East India. Mus. D. Parry.

Notice of a hitherto unobserved character distinguishing the sexes in certain *Cetoniidæ*, consisting of a strong spine at the extremity of the lower lobe of the maxillæ in the females. By J. O. Westwood, F.L.S. (since published in the 'Annals of Natural History').

January 3rd, 1842.—W. W. Saunders, Esq., in the Chair.

The following memoirs were read:—

On *Aporocera*, a new genus of *Coleoptera* allied to *Clythra*, from New Holland. By W. W. Saunders, Esq.

APOROCERA, S. *Antennæ two-thirds of the length of the body*, 11-*jointed, the 3rd and following joints subtriangular, broad and flattened, the 5th being somewhat the largest and broadest. Thorax gibbous in front, as broad as the elytra. Body cylindrical.*

Ap. bicolor, S. *Head red-brown; antennæ black; thorax smooth, shining, deep reddish-brown, with a transverse furrow. Scutellum and elytra black shining green, deeply and coarsely punctured in regular striæ, each elytron with a deflexed lateral humeral lobe; legs reddish-brown, with the tips of the femora and tibiæ, and the tarsi black.* Length ¼ inch.—Hab. New South Wales. Mus. Hope.

Ap. apicalis, S. *Head red-brown; antennæ rather shorter and more slender than in the preceding. Thorax red-brown, as broad as the elytra, with a wide transverse furrow. Scutellum and elytra red-brown, the latter deeply and coarsely punctured in regular striæ, with the apex black: each elytron with a deflexed lateral humeral lobe. Legs red-brown, with the tips of the femora and tibiæ, and the tarsi black.* Length ¼ inch.—Hab. New South Wales. Mus. Hope.

Some account of the natural history of a fossorial hymenopterous insect from Port Lincoln, South Australia. By J. O. Westwood, F.L.S.

The insect in question is a new species belonging to the *Pompilidæ*, and apparently to that division of *Pompilus* allied to *Aporus* in the large size of the collar.

P. audax, W. *P. ater, pubescens, prothorace magno, quadrato, antennis albis, tibiis tarsisque fusco-albidis.* Long. corp. lin. 5½.

Specimens of this insect in the pupa state (almost fully developed) were found in the cells, each of which was about an inch long and half an inch in diameter: several of these cells were attached together, and seemed formed of a succession of short transverse layers of a shining material which had dried into rounded or elongated nodules. It appeared evident that these nests had not been enclosed in a burrow, but were external, the materials having been brought from a distance; thus differing from the habits of the majority of the family. In one of the cells, the remains of a very large spider, which had evidently served as the food of the enclosed larva, were found.

Mr. Newport communicated extracts from various letters which he had received from Mr. Wheekes, of Sandwich, detailing a series of galvanic experiments whereby he had obtained specimens of *Acarus hystrix* (or *A. Crossii*) from mineral solutions acted upon by voltaic currents, in the same manner as Mr. Crosse had obtained the same insect. In this case distilled water had been used, the mineral had been previously submitted to a white heat, and the apparatus had been insulated by being placed in mercury; notwithstanding which a number of the *Acari* had been produced. Mr. J. E. Gray stated that Mr. Children had also instituted a series of experiments at the British Museum precisely similar to those of Mr. Crosse, without obtaining a single *Acarus*.

February 7th.—W. W. Saunders, Esq., in the Chair.

Mr. Westwood exhibited two extremely rare British *Noctuidæ* from the collection of Mr. T. Reeves, Jun., of Carlisle; namely, *Agrotis cinerea*, a beautiful variety, with the ground colour of the fore wings of a more fulvous brown hue than in Mr. Curtis's figure, the base darker, and the bar across the middle of the wing dark brown, t e hind wings with a slight fascia running across them entirely; and *Graphiphora depuncta*, a species which had been hitherto doubtful as British.

The following memoirs were read:—

Descriptions of two new Coleopterous genera allied to *Cryptocephalus*, from New Holland. By W. W. Saunders, Esq.

MITOCERA, S. *Antennæ* $\frac{1}{3}$ *as long again as the body, filiform, 2nd joint small, 3rd and 5th very long, equal, 4th half as long as the 3rd. Eyes reniform. Head vertical; thorax subquadrate; body subelongate, flattened.*

Mitocera viridipennis, S. *Head light red-brown, with the crown and antennæ black. Prothorax red-brown, with slightly raised lateral margins, coarsely punctured. Scutellum and elytra dark shining blue-green, and irregularly punctured; apical margins red-brown. Legs black; femora red-brown.* Length $\frac{7}{20}$ inch —Hab. Swan River. Mus. Hope.

DICENOPSIS, S. *Body short, robust, cylindrical. Antennæ short, not half the length of the body, subclavate, 3rd, 4th, and 5th joints slender and long, the remainder short, forming a kind of lengthened club. Head vertical; eyes reniform. Thorax rounded in front, very convex.*

Dicenopsis hæmatodes, S. *Shining brownish-red, deeply and coarsely punctured; clava of antennæ black-brown; legs brownish-red, apex of tibiæ and the tarsi black.* Length $\frac{7}{20}$ inch.—Hab. New Holland and Van Diemen's Land. Mus. Hope and Westwood.

Descriptions of some new *Longicorn* and *Rhynchophorous* Beetles from the Philippine Islands. By G. R. Waterhouse, Esq.

Doliops (Waterh.) geometrica, Wat. *D. splendidè viridi-æneus, capite lineis tribus; thorace lineis marginalibus et suprà tribus (unâ abbreviatâ) notato; elytris lineis duabus transversis mediis; arcâque transversâ basali irregulari: alterâque triangulari apicali lineis circumdatis, his lineis albo-squamosis.* Long. corp. lin. $6\frac{1}{3}$.

Pachyrhynchus rufo-punctatus, Wat. *P. niger, brevis, capite maculis tribus, thorace maculis duabus discoidalibus maculâque und ad utrumque marginem; elytris guttis 22 rufo-squamosis ornatis.* Long. corp. lin. $8\frac{1}{2}$. Nearly allied to *P. venustus*.

Pachyrhynchus elegans, Wat. *P. splendidè cupreus, capite maculis 3, thorace 2 discoidalibus, undique ad utrumque marginem; elytris maculis* 10 *magnis subocellatis pallidè viridi-squamosis.*

Pachyrhynchus latifasciatus, Wat. *P. splendidè æneus, thorace fasciâ transversa, elytris fasciis* 2 *(in medio interruptis) maculisque* 3 *apicalibus viridi-squamosis.* Long. corp. lin. 6.

Pachyrhynchus concinnus, Wat. *P. ater, elytris punctato-striatis; thorace medio lineâ transversâ lineâque longitudinali posticâ; elytris lineâ transversâ centrali, lineis duabus longitudinalibus, et lineâ marginali; his lineis pallidè viridibus.* Long. corp. lin 6. Resembles *P. chlorolineatus*.

Description of a new British genus of Apterous insect. By J. O. Westwood, F.L.S., &c.

The insect described in this paper had been already brought before the Society, (see Journal of Proceedings, November 2nd, 1840) when it was regarded by Mr. Westwood as an undeveloped *Myriapodous* insect. The researches of Mr. Newport upon the development of the *Myriapoda*, subsequently published, having shown the incorrectness of this opinion, Mr. Westwood refers the insect to the order *Thysanura*, (from all of which it differs generically) under the name of

CAMPODEA, W. *Corpus elongatum parallelum, depressum, molliusculum apterum 13-annulatum. Caput oboratum horizontale. Antennæ 2 elongatæ multiarticulatæ, submoniliformes. Os inferum mandibulis minutis planis latis 4-dentatis. Prothorax brevis, meso- et metathorax majores æquales. Pedes 6, elongati, cursorii. Abdomen segmentis subtus utrinque appendiculo minuto apiceque setis duabus elongatis setosis instructum.*

Campodea staphylinus, W. *Alba, mollissima, agilis, antennis articulis ultra 20 instructis.* Long. corp. lin. 2½. Inhabits damp garden earth. Hammersmith, October 2 1840. July 12, 1842.

Catalogue of the entomological collections, with notes on the habits of the species found in Chusan and the adjacent parts. By Dr. Cantor.

## BOTANICAL SOCIETY OF LONDON.

July 1, 1842.—J. E. Gray, Esq., F.R.S., President, in the Chair.

Numerous donations of plants, specimens of woods, &c., were announced, many of them purchased at the sale of the botanical museum of the late A. B. Lambert, Esq., and presented by some of the members. Mr. Arthur Henfrey (Curator) presented a monstrous specimen of *Scrophularia aquatica*, found by him on 30th June last on an island in the Thames above Teddington. The plant was about three feet high, having a flat riband-like stem, rather more than half an inch broad and scarcely an eighth thick. The flower-stalks grew chiefly out of the flat surfaces, nearly perpendicular to them, a very few only being at the edges and not in any regular order. These flowering-stalks extended over about eighteen inches of the stem, being about forty in number, exclusive of a very dense cluster at the summit of the plant. The flowers all appeared perfect, and the peculiarity of growth seemed to have resulted from a natural grafting of two plants.

Mr. T. Sansom (Librarian) exhibited a monstrous specimen of *Cynoglossum omphalotes* (Linn.), in which three peduncles were united longitudinally from the base to the extremity, terminated by *two* calyces; the *first* being 6-partite, bearing a corolla of six segments, *five* stamens, one pistil, and four seeds. The *second* 9-partite, formed from the uniting of *two* calyces respectively 4- and 5-partite, bearing two distinct petals placed side by side, each 5-lobed, and each with five stamens, and each containing one pistil and a set of four seeds.

Mr. Sansom also exhibited a specimen of *Galeobdolon luteum* (Smith), in which the terminal petal was salver-shaped, 5-lobed, stamens four.

A paper was read from Mr. T. Sansom, being "Notes of the First Excursion of the Members of the Society into Kent in June last; containing the habitats of the rarer species of flowering plants, and also notes on the most interesting specimens collected."

## AMERICAN PHILOSOPHICAL SOCIETY.

Nov. 5, 1841.—The Committee, consisting of Dr. Horner, Mr. Wetherill, and Dr. Goddard, to whom Dr. Harlan's paper, entitled, "Description of the Bones of a Fossil Animal of the Order Edentata," was referred at the last meeting, made a report recommending its publication in the Transactions, which was ordered accordingly.

These bones form part of the extensive collection of fossils recently exhibited in Philadelphia by Mr. A. Koch, by whom they were obtained in Benton County, Missouri.

Among them, more or less perfectly preserved, are two ossa humeri, two tibiæ, two portions of the radius, two of the clavicle, parts of several ribs, twelve vertebræ, a cubitus, twenty-four teeth, eight of them in their sockets, two fragments of a lower jaw, with two and three teeth *in situ*, two fragments of the upper jaw, five ungueal phalanges, the sternum of four articulated pieces, and a part of the ilium and sacrum.

These specimens apparently belonged to three individuals of the same species. They were found, with portions of a mastodon, in company with numerous tropical vegetable remains. They are friable and light, not petrified, but destitute of animal matter.

The teeth are very similar in structure to those of the *Megalonyx*, though the pieces of the lower jaw are stouter: the jaws may have contained six or seven teeth on each side.

The largest os humeri is twenty inches long and fourteen in diameter; it is of a massive structure, and deeply grooved by the muscular attachments. In place of a foramen, as in the humerus of the *Megalonyx*, the exterior surface, near the elbow joint, has a deep groove, for the origin of the flexor muscles. The condyles are of great breadth, as in the *Megatherium*. The inferior articulating surface consists of two facets, one exterior and convex, the other described by Dr. Harlan as concavo-convex, admitting a ginglymous and rocking motion.

The cubitus or ulna is a short and strong bone, with strong marks of muscular attachments: this was part of an animal of less size than that to which the large humerus belonged. A peculiarity of this bone consists in the position of its superior articulating surface, which is nearly in the middle of its shaft; the olecranon process being very long, and extending upwards. The lower articulating surface was articulated with the carpal bones, as well as the radius. The total length of this bone is sixteen inches.

There are four claws, or phalangeal bones of the fore-foot of a small-sized individual: in general form these bones approach nearest to those of the *Orycteropus*.

There are two tibiæ belonging to different individuals of different sizes: one is ten inches five-tenths in length, the other ten inches. This is a short, thick and strong bone. Its upper articulating surface is nearly a circular concave disc. Its lower anterior extremity is marked by a peculiar deep ovoid depression or hollow, for the reception of a corresponding hemisphere, projecting upwards from the astragalus, forming together a structure of joint altogether unique. The motions of the ankle joint were rotatory, but the articulating surface of the lower aspect of the astragalus admitted of ginglymous motion with the os calcis.

The clavicle and ribs, portions of which only exist, are not distinguished by any remarkable characters: but the foramen for the passage of the spinal marrow, in the vertebræ, is exceedingly small, an unaccountable feature in a skeleton, which in all other respects demonstrates great physical strength as one of its most remarkable characteristics.

The portion of sternum belonged most probably to the largest of the three individuals; the animal being apparently less than the *Megatherium*, and larger than the *Megalonyx*.

Dr. Harlan proposes to name this animal "*Orycterotherium Missouriense*."

## MISCELLANEOUS

### LYMPH-GLOBULES OF BIRDS.

It is well known that the blood of vertebrate animals contains, besides the red discs, a few pale globules, which have commonly been regarded as those of lymph. But in birds I have found that the majority of the globules of the juice of the lymphatic glands are rather smaller than the pale globules of the blood, and the same fact is observable in mammals; yet the descriptions since Hewson's time of the lymph-globules of birds have always been drawn from the pale globules of their blood.

This distinguished man states that the particles of the fluid of the lymphatic glands of birds are oval, like the nuclei of their blood-corpuscles. In the 'Phil. Mag.' for February 1840, I described the lymph-globules of the Napu Musk Deer as hardly differing from those of Man, although the blood-discs of this little ruminant, as I had discovered and described in November 1839, are the smallest yet known; and although the *Camelidæ* have oval blood-discs, I found that the globules in the juice of the thymus and of the lymphatic glands, and of the pus of these animals, had the usual circular figure and nearly the same size as the corresponding globules of other Mammalia. [See Med. Chir. Trans. vol. xxiii.] It was to be expected, therefore, that the lymph-globules of birds would have a similar form; and such is the case, as I have lately ascertained. In a few instances from one to five of the globules were enclosed with granular matter in a cell. The following table exhibits, in fractions of an English inch, the average size of the lymph-globules of birds. For the numerous measurements from which these averages are deduced, the original observations may be referred to.

| | |
|---|---|
| Columba Livia, *Briss.* | $\frac{1}{5274}$ |
| Turdus musicus, *Linn.* | $\frac{1}{5090}$ |
| Gallus domesticus, *Briss.* | $\frac{1}{5261}$ |
| Strix flammea, *Linn.* | $\frac{1}{5227}$ |
| Ardea cinerea, *Lath.* | $\frac{1}{5150}$ |
| Corvus frugilegus, *Linn.* | $\frac{1}{5055}$ |
| ——— monedula, *Linn.* | $\frac{1}{5238}$ |
| ——— Pica, *Linn.* | $\frac{1}{5001}$ |
| Pale globules of the blood of the same | $\frac{1}{3555}$ |
| Fringilla Chloris, *Tem.* | $\frac{1}{4924}$ |
| —— domestica, *Linn.* | 1 [illegible] |
| Emberiza Citrinella, *Linn.* | 1 [illegible] |
| Sturnus vulgaris, *Linn.* | [illegible] 152 |
| Garrulus glandarius, *Flem.* | 1 [illegible] |

The difference in size between the white globules of the blood and the lymph-globules is considerable, as shown, for example, in the magpie (*Corvus Pica*); but the magnitude of the lymph-globules does not differ much in different birds, although these globules are generally slightly smaller than those of Mammalia.—*Mr. Gulliver's Contributions to Minute Anatomy*, London and Edinb. Philos. Magazine for June 1842.

### SCARABUS CASTANEUS.

*To the Editors of the Annals of Natural History.*

Gentlemen,—In my paper entitled 'Monograph of the Genus *Scarabus*,' a small group of pectinibranchiate mollusks, published in No. 57 of your Journal, I noted, especially in speaking of the *Scarabus castaneus* of Lesson, that it was the only species I had not faithfully identified. I registered it as a species, relying solely upon a figure under that name in the 'Zoologie de la Coquille'; it appeared to me so characteristic and distinct from any other. It is therefore pleasing to me to be able to announce that I have lately discovered two unquestionable specimens of it in a collection of shells lately made by Richard Brinsley Hinds, Esq. in New Ireland, a rich and very remote portion of the globe, from whence we may yet expect much that is valuable and new.

This interesting series of shells was collected during a voyage of more than seven years in company with Lieut. Capt. Belcher, a gentleman well known in the conchological world for his zeal and great practical ability in knowing exactly how and where to dredge for good shells.

It would perhaps be considered premature to speculate upon what shells may have been brought home by Capt. Belcher himself; it is a satisfaction, however, to know that they are in good hands, and we only hope that the zoology of his expedition will be published in a style of elaborate illustration, equal to the 'Voyage de la Coquille' of Lesson, the 'Voyage de l'Astrolabe' of Quoy and Gaimard, or the 'Voyage dans l'Amérique Méridionale' of D'Orbigny. We are sadly behind our continental neighbours in this respect, and one can scarcely wonder at the very low ebb of conchological science in this country. If the labours of Mr. Cuming had been made the source of a national undertaking, what a glorious and important work would have been the result,—a light for all nations and a credit to our country in particular!

Yours, &c.,

August 20, 1842. LOVELL REEVE.

ARCTIC TERN.

*To the Editors of the Annals of Natural History.*

GENTLEMEN,—I observe in the last number of the 'Annals of Natural History,' that Mr. Strickland reverts to the subject of the Arctic Tern, but as I do not doubt the correctness of that gentleman's observations as to the species he examined, further reply is unnecessary.

As a knowledge of the habits of animals is as essential to the naturalist as it is to be acquainted with their forms, my object in first addressing you on the subject was to correct what appeared to me to be an error as to the birds in question being on their way to the "northern regions" Though, no doubt, many of them do penetrate to the higher northern latitudes during the warmer months, yet as the tern in question appeared inland so exactly at the time when they usually take up their summer quarters, the true inference to be deduced therefrom seemed to be, that they were prevented reaching their accustomed haunts around our own shores by the strong gales which prevailed at the time.

It is not very easy at all times to distinguish between the *S. arctica* and *S. hirundo*, for some of the points relied on by ornithologists as specific may be sometimes observed in birds of the same flock, and may perhaps depend on age or sexual difference. The birds of the season are easily distinguished from the old ones by their gray heads, the black feathers never appearing till the birds are in full summer plumage.

I am, Sir, yours, &c.,

T. AUSTIN.

GALIUM CRUCIATUM.

From a paragraph in the last number of the 'Annals,' vol. ix. p. 519, it would appear that in consequence of the *Galium cruciatum* not being noticed in the 'Flora Hibernica,' it has hitherto been unknown as a native of Ireland; yet K'Eogh, who published in 1735, describes the plant under the English name 'Crosswort,' so minutely as not to admit of any mistake. Harris, who partially investigated the botany of the county of Down in 1743, enumerates the plant in his catalogue, and gives the *identical habitat* where Dr. Hodges found it, and where I have annually for many years observed it growing.

Belfast, Aug. 13, 1842. FRANCIS WHITLA.

*On a new species of* Lagomys *inhabiting Nepal.* By B. H. Hodgson, Esq., Resident at the Court of Nepal*.

Two fine specimens, male and female, lately received from Gosainthan, enable me to add the genus *Lagomys* to the Catalogue of Nepalese Mammals; and it may be remarked as characteristic of the enormous and sudden inequalities of elevation proper to this kingdom, that the tropical genus *Rhizomys*, and the arctic genus *Lagomys* have been taken within forty miles of each other.

The specimens of the latter genus just procured by me were shot by my hunters on the margin of the sacred lake whence the Trisal Ganga River issues, and close to the verge of perpetual congelation. There were but a pair, of which both were obtained, as they moved about in the vicinity of the small natural cavity or rocky fissure that formed their abode. Their stomachs were full of fresh vegetable matter, like the contents of a hare's belly; nor was there near their abode any evidence of the hoarding propensities of the genus, or of a habit of digging for food. The height of the summer being the season at which the animals were taken, may explain the former circumstance however, but not the latter; and though it is said that these rat-hares dig for their food occasionally, I fancy this must be a mistake.

My species appears to be nearly allied to *Roylii*, and possibly may be identical, but I think not. The male of the pair is seven inches long from snout to vent, and the female half an inch less. The general appearance of the species is that of a guinea-pig, but the natives of India, who know no such animal, liken it to a rat; and as its Leporine teeth and soles (of the feet) are not obtrusive signs, the association of it to the Murine race seems natural enough. Its general likeness, for instance, to the *Rhizomys*, or bamboo rat, is very noticeable, particularly as the latter is apt to hide its tail. But a nice observer will at once mark the greater superior massiveness of the head in *Rhizomys*, together with the smaller eyes and ears, and will not be slow to refer these peculiarities to the highly fossorial habits of that genus.

Our present subject, which we shall name provisionally "*Nepalensis*," has a moderate hare-like head, but ears quite similar to those of the common rat, with the exception of that small internal process near the conch, which seems proper to the *Lagomides*. The ear is rather less than half the length of the head, is truncated, rounded, and nearly nude, except on the anterior and incurved edge of the helix, where very short hairs are pretty closely set. The upper and outer pair of front teeth have a very deep longitudinal groove, so as to look like four instead of two; but neither these nor the inferior pair are at all remarkable for size or strength, offering in this respect

* This and the following notice are taken from the Journal of the Asiatic Society of Bengal, No. 35.

a strong contrast to *Rhizomys*. The inner pair of upper teeth are palpable, but minute. The whiskers are long and firm, reaching to the shoulders; the lips and the muzzle entirely furred; the eyes medial; the body full and cylindric; no vestige of tail; the limbs short, but fine, and of nearly equal length and strength before and behind; pentadactylous before, tetradactylous behind; the nails acute; the soles fully clad, except the termino-digital balls, and a tiny carpal pad placed a little behind the elevated thumb. The last-named are the sole parts of the whole body which are denuded of fur. The fur of the animal is Leporine in the general character, but softer and more silky. It is of one sort, about an inch long, and of uniform structure throughout each pile, or hardly perceptible, harsher in its apical portion. On the head and limbs the fur is shorter, more adpressed, and less silky. The general colour internally is blue-black, but externally is deep bay from the snout to the mid-body, and black freckled with paler rufons thence to the vent. Below the chin and belly are pale bay, and the limbs are the same. There is a pale spot, or tuft rather, at the outer base of each ear, and the mustachio is half dark and half light.

The following specific character may, for the present, indicate the animal:—

*Lag. Nep.* with broad, rounded, nudish ears, nearly half the length of the head; soles nude on the termino-digital balls only, and soft equable fur, which is dark bay from the snout to waist, and rufescently freckled black thence to the vent: below and the limbs paler bay: snout to vent 7 inches; head 2; ears 7/8; palm (with nail) 7/8; planta (with nail) 1¼; female similar, smaller, 6½ from snout to vent. Habitat, Himalaya of Nepal.

*Notice of a new form of the* Glaucopinæ, *or Rasorial Crows, inhabiting the Northern region of Nepal.* By B. H. Hodgson, Esq.

Amongst the very numerous forms* presented by the 850 species of birds already known to me as inhabitants of Nepal, there is one which I believe to be still new to science, and to belong to a group, of the occurrence of which, either in these mountains or in the plains at their base, I know of no other instance, save that of the ubiquitous tree-magpies.

The group alluded to is the Glaucopin, or finch-billed crows of Swainson; and the single species I am acquainted with tenants exclusively the immediate neighbourhood of the perpetual snows.

In the lower and central regions our bird appears to be represented

* One of the most remarkable of these is the Cochoa of Nepal, and which was characterized by me under that name in the Journal for June 1836. The expert naturalist would immediately perceive what my inexperience then noted not, viz. that this is a typical *ampeline* form, requiring to be placed between *Ampelis* and *Casmarhynchus*, though Swainson asserts that the group is exclusively American.

To this genus we have since given the classic name of *Prosorinia*. In the same number of the Journal is the description of another rarity, first discovered and described therein, and which Swainson has since called *Nyctiornis*. It is our *Bucia, hodie Napophilus*, a forest haunting bee-eater. Mr. Swainson's name must merge in ours.

by the *Timaliæ* and *Crateropi*, to both of which, and especially to the former, it bears in much of its structure the same close resemblance that it does also in its manners; for all these birds alike have lax feeble plumage, short rounded wings, longish, broad, frail, subgradated tails, and very large, yet not typically, terrestrial feet, though the habits are essentially terrene and rasorial. But whereas the *Timaliæ* and *Crateropi* have a more or less meruline bill, slender, and provided with membraned and open nares, the present birds, which we shall denominate generically *Conostoma*, have the massive bill and simple concealed nares of the magpies. The bill of the *Crypsirinæ vel Dendrocittæ*, or tree-magpies in particular, has much resemblance to that of the *Conostomæ*, owing to the clear arcuation of its whole commissure, and to the perfect entireness of its tip. There are differences, however, between the two even in the bills, inasmuch as that of *Conostoma* is more compressed, with sides less tumid yet broader ridges; while in *Crypsirinæ* the *other* members, such as the long gradated tail, short tarsi, and considerably pointed wings, indicate habits less terrestrial than those of our bird. *Conostoma* is clearly a typical example of the *Glaucopinæ* of Swainson, and its natural position would seem to be between *Glaucopis* and *Crypsirinæ*. In manners the present species is a shy forester, adhering to the wilds, and tenanting the skirts of forests where brush-wood as well as trees abound. Five or six birds are usually found together, chattering, hopping and scraping on the ground, and resorting to the trees and shrubs chiefly for shelter. Their food is principally insects of the soft and imperfect kind in summer; but in winter they doubtless take some vegetable food. Their essential form may be characterized thus:—

Bill short, strong, conico-compressed, with broad rounded ridges and vertical sides; the culmen and commissure entirely arched; the tips equal, obtuse, and entire. Nostrils circular, unfossed, furnished with a membranous raised edge all round, and concealed by incumbent setaceous plumuli. Rictus provided with a close series of short bristles. Wings short, feeble, almost entirely rounded; the 6th, 7th and 8th quills usually equal and longest. Tail slightly elongated, rounded, consisting of twelve broad simple plumes. Feet very large and strong, yet not typically ambulatory. Tarsi elevate, nearly or quite smooth, exceeding much the central toe and nail. Toes medial, unequal; fores basally connected, and outer lateral considerably longer than the inner. Hind-toe large, depressed, exceeding the outer fore, and with its large nail reaching to the middle of the central toe and nail. Nails simple, large, scarcely so acute or so curved as in *Crypsirinæ*.

Habitat, the northern region close to the perpetual snows.

Type, *Conostoma Æmodius*, Nob. new.

*Spec. Char.*—*Conostoma* with head, neck and body above dull olive-brown, clearest on the secondary alars; below paler, and passing into sordid slaty blue, which forms everywhere the interior colour of the plumage. Iris brownish. Bill dull orange. Legs slaty gray. Sexes alike. Bill to tail $11\frac{1}{2}$ inches; bill $\frac{7}{8}$; tail $4\frac{7}{8}$; tarsus $1\frac{1}{16}$. Central toe and nail $1\frac{1}{16}$; hind-toe and nail $1\frac{2}{16}$. Weight $3\frac{1}{4}$ oz.

Mr. Henry Denny, the author of the valuable work on British *Anoplura* noticed in our last number, is desirous of being assisted in his further investigation of the subject, by being furnished with specimens of foreign Lice. He is also anxious to obtain specimens of Intestinal Worms, as he is collecting materials for a Manual of British Entozoa. In a note which we have received from him he remarks :—" If persons possessing specimens of any of these animals obtained from British fishes, quadrupeds or birds, &c., would send me word what they had, I should know whether it would be necessary to forward them for drawing. They can be easily sent by letter; and it is not from recent birds, &c. alone that they are to be procured, but upon skins sent from abroad ; they may frequently be obtained, sticking to the feathers either under the wings or at the base of the beak : any of these, I need scarce say, would be of great service to me ; each, however, must have the *name* of the *bird*, &c. put upon the pill-box or scrap of paper in which they are placed."

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### METEOROLOGICAL OBSERVATIONS FOR JULY 1842.

*Chiswick.*—July 1. Heavy rain : fine. 2, 3. Very fine. 4. Densely overcast. 5. Dry and windy : showery : clear and fine. 6. Very fine. 7. Overcast : rain. 8. Cloudy : heavy rain at night. 9–11. Fine. 12—14. Cloudy and fine. 15. Fine : dry haze. 16. Dry and clear. 17. Slight haze. 18. Sultry. 19. Slight rain. 20. Fine : showery. 21. Densely overcast. 22, 23. Very fine. 24. Cloudless and hot. 25, 26. Very fine. 27. Slight rain in the morning lightly overcast and fine. 28. Thunder-storm early in the morning, most violent between five and six A.M. : sultry . cloudy and fine. 29. Densely clouded : clear at night. 30. Cloudy : fine. 31. Cloudy and fine : clear at night.

*Boston.*—July 1. Rain : rain early A.M. 2. Fine : stormy, with rain, thunder and lightning P.M. 3. Fine : rain P.M. 4. Cloudy. 5. Stormy. 6. Windy. 7. Fine. 8. Fine : rain P.M. 9–12. Fine. 13. Cloudy : three o'clock thermometer 76°. 14–16. Fine. 17. Cloudy. 18. Fine. 19. Cloudy. 20, 21. Cloudy : rain early A.M. 22. Cloudy : rain P.M. 23. Cloudy. 24. Fine : twelve o'clock thermometer 78°. 25. Cloudy. 26. Fine. 27. Fine : rain P.M. 28. Fine. 29. Cloudy . rain early A.M. 30. Windy. 31. Cloudy.

*Sandwick Manse, Orkney.*—July 1, 2. Cloudy. 3. Cloudy : clear. 4. Cloudy . rain. 5. Cloudy : showers. 6. Cloudy. 7. Clear : cloudy. 8. Rain : fine. 9. Bright : drops. 10. Bright. 11. Cloudy . rain. 12. Bright and warm. 13. Damp : showers. 14. Showers. 15. Cloudy : drizzle. 16. Clear. 17. Clear : cloudy. 18. Bright : cloudy. 19. Clear . cloudy. 20. Clear . fog. 21–23. Cloudy. 24. Cloudy : damp. 25. Cloudy. 26, 27. Bright. 28. Showers. 29. Cloudy. 30, 31. Cloudy : damp.

*Applegarth Manse, Dumfries-shire.* July 1. Showers. 2. Wet nearly all day. 3, 4. Showery. 5. Rain and wind. 6. Fair and fine. 7–11. Heavy showers. 12. Fair and fine. 13. Showery. 14. Fair and fine. 15. Very fine. 16. Very fine : thunder. 17. Very fine, but cloudy. 18. Showers. 19—21. Fair and fine. 22–24. Very fine. 25. Very fine : sultry. 26. Very fine : cloudy. 27. Cool and cloudy. 28. Cool but fine. 29. Cloudy and threatening. 30, 31. Very fine.

Sun shone out 30 days. Rain fell 12 days. Thunder 1.

Wind North-north-east 1 day. North-east 2 days. East 4 days. South-east 1 day. South-south-east 1 day. South 4 days. South-west 1 day. West-south-west 2 days. West 9 days. West-north-west 1 day. North-west 3 days. North-north-west 2 days.

Calm 13 days. Moderate 8 days. Brisk 6 days. Strong breeze 3 days. Boisterous 1 day.

| | |
|---|---|
| Mean temperature of the month ............................ | 56°95 |
| Mean temperature of July 1841 ............................ | 51 °35 |
| Mean temperature of spring-water .... .................... | 50 |

*Meteorological Observations made at the Apartments of the Royal Society,* LONDON, *by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse,* DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

**Barometer.**

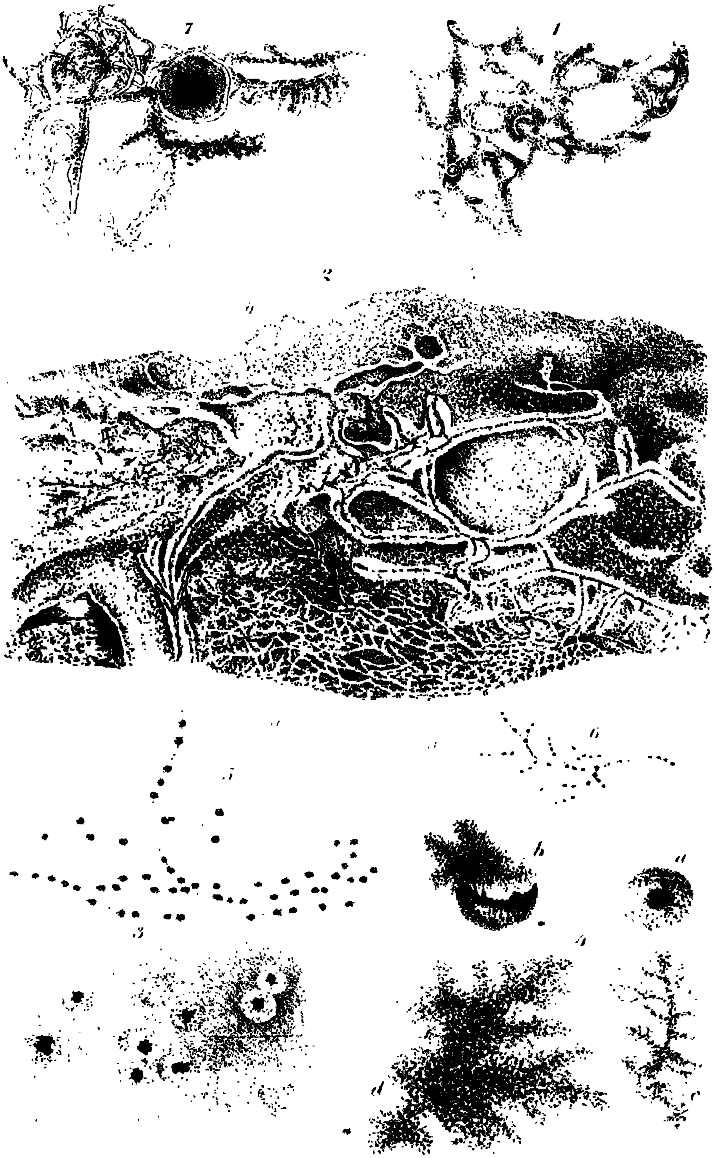
| Days of Month. 1812. July. | London: Roy. Soc. 9 a.m. | Chiswick. Max. | Chiswick. Min. | Boston 8½ a.m. | Dumfries-shire. 9 a.m. | Dumfries-shire. 9 p.m. | Orkney, Sandwick. 9¼ a.m. | Orkney, Sandwick. 8½ p.m. |
|---|---|---|---|---|---|---|---|---|
| 1. | 29·811 | 29·849 | 29·737 | 29·16 | 29·72 | 29·62 | 29·84 | 29·74 |
| 2. | 29·914 | 29·848 | [illegible] | 29·25 | 29·50 | 29·70 | 29·74 | 29·83 |
| 3. | 30·034 | 29·963 | 29·875 | 29·32 | 29·78 | 29·70 | 29·88 | 29·86 |
| 4. | 29·806 | 29·776 | 29·723 | 29·44 | 29·46 | 29·23 | 29·70 | 29·46 |
| 5. | 29·746 | 29·823 | 29·652 | 29·00 | 29·15 | 29·40 | 29·08 | 29·20 |
| 6. | 30·136 | 30·161 | 30·103 | [illegible] | [illegible] | 29·97 | 29·07 | 29·95 |
| 7. | 30·159 | 30·009 | [illegible] | 29·27 | [illegible] | 29·57 | 29·55 | 29·80 |
| 8. | 29·856 | [illegible] | [illegible] | 29·25 | 29·53 | 29·40 | 29·61 | 29·60 |
| 9. | 29·748 | 29·712 | [illegible] | 29·11 | 29·49 | 29·38 | 29·59 | 29·47 |
| 10. | 29·670 | [illegible] | 29·814 | [illegible] | 29·30 | 29·65 | 29·41 | 29·59 |
| 11. | 29·724 | [illegible] | 29·611 | 29·12 | 29·29 | 29·39 | 29·61 | 29·50 |
| 12. | 29·922 | [illegible] | [illegible] | 29·27 | 29·58 | 29·80 | 29·71 | 29·85 |
| 13. | 30·212 | 30·232 | 30·142 | [illegible] | 29·71 | 29·95 | 29·68 | 29·77 |
| 14. | 30·432 | 30·33[illegible] | 30·300 | 29·71 | [illegible] | 30·20 | 29·89 | 30·03 |
| 15. | 30·168 | 30·358 | 30·27[illegible] | 29·82 | 30·24 | 30·20 | 30·23 | 30·30 |
| 16. | 30·250 | 30·175 | [illegible] | 29·65 | 30·1[illegible] | 29·90 | 30·22 | 30·13 |
| 17. | 29·975 | 29·894 | 29·75[illegible] | [illegible] | 29·87 | 29·80 | 30·08 | 30·00 |
| 18. | 29·856 | 29·993 | 29·822 | 29·28 | 29·80 | 29·80 | 30·11 | 30·11 |
| 19. | 29·88[illegible] | 29·842 | 29·754 | 29·26 | 29·83 | 29·78 | 30·12 | 30·11 |
| 20. | 29·790 | 29·735 | 29·690 | 29·13 | 29·75 | 29·76 | 30·04 | 30·01 |
| 21. | 29·772 | 29·864 | 29·718 | 29·17 | 29·77 | 29·82 | 29·96 | 30·04 |
| 22. | 30·066 | 30·128 | 29·905 | 29·46 | 29·96 | 30·05 | 30·12 | 30·29 |
| 23. | 30·262 | 30·197 | 30·173 | 29·72 | 30·20 | 30·09 | 30·10 | 30·13 |
| 24. | 30·180 | 30·118 | 29·927 | 29·58 | 30·01 | 29·92 | 30·07 | 30·06 |
| 25. | 29·966 | 29·902 | 29·812 | 29·43 | 29·91 | 29·91 | 30·02 | 30·03 |
| 26. | 30·0[illegible]6 | 30·066 | 29·907 | 29·48 | [illegible] | 30·05 | 30·07 | 30·15 |
| 27. | 30·212 | 30·176 | 30·165 | 29·60 | 30·08 | 30·05 | 30·10 | 30·10 |
| 28. | 30·112 | [illegible] | [illegible] | 29·51 | [illegible] | 29·88 | 29·89 | 29·93 |
| 29. | 29·910 | [illegible] | [illegible] | [illegible] | [illegible] | 29·98 | 30·02 | 30·06 |
| 30. | 30·082 | [illegible] | [illegible] | [illegible] | 30·00 | 29·95 | 30·06 | 30·1[illegible] |
| 31. | 30·180 | 30·224 | 30·127 | 29·65 | 30·10 | 30·12 | 30·12 | 30·23 |
| Mean. | 30·016 | 30·0[illegible] | 29·878 | 29·5[illegible] | 29·771 | 29·812 | 29·8[illegible] | 29·910 |

**Thermometer.**

| Days of Month. 1812. July. | London: R.S. Fahr. 9 a.m. | London: R.S. Self-reg. Mx. | London: R.S. Self-reg. Mn. | Chiswick. Max. | Chiswick. Min. | Boston 8½ a.m. | Dumf.-shire. Max. | Dumf.-shire. Min. | Orkney, Sandwick. 9¾ a.m. | Orkney, Sandwick. 8½ p.m. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 61·3 | 70·0 | 52·3 | 70 | 50 | 53 | 65½ | 47 | 56 | 52 |
| 2. | 63·0 | 76·6 | 52·2 | 69 | 46 | 60 | 60 | 47 | 54 | 51 |
| 3. | 62·8 | 77·6 | 52·0 | 75 | 55 | 59 | 60 | 46½ | [illegible] | 50 |
| 4. | 64·7 | 71·4 | 59·8 | 76 | 59 | 68 | 60 | 49 | [illegible] | 48 |
| 5. | 66·7 | 75·7 | 61·4 | 70 | 46 | 65 | 58 | 54 | 60 | 54 |
| 6. | 62·3 | 79·4 | 52·4 | 72 | 40 | 60 | 61 | 46 | 50 | 50 |
| 7. | 63·2 | 72·7 | 52·3 | 62 | 50 | 62 | [illegible] | 41 | 54 | 52 |
| 8. | 61·8 | 66·6 | 54·[illegible] | 66 | 48 | 61·5 | 59 | 45 | 53 | 52 |
| 9. | 62·8 | 73·3 | 54·3 | 72 | 44 | 61 | [illegible] | 41 | 57 | 53 |
| 10. | 62·2 | 77·8 | 53·2 | 73 | 50 | 62 | 60 | 50 | 55 | 53 |
| 11. | 67·2 | 82·7 | 56·3 | 78 | 53 | 67 | 62 | 50 | 58 | 53 |
| 12. | 65·0 | 75·2 | [illegible] | 75 | 49 | 63 | 65 | 49 | 56 | 55 |
| 13. | 66·5 | 76·2 | 57·3 | 73 | 48 | 6[illegible] | 65 | 5[illegible] | 57 | 56 |
| 14. | 64·[illegible] | 76·3 | 55·6 | 76 | 45 | 65 | 60 | 50 | 56 | 53 |
| 15. | 65·5 | 76·3 | 56·0 | 74 | 46 | 6[illegible] | 68 | 45 | [illegible] | 51½ |
| 16. | 62·8 | 73·2 | 54·6 | 75 | 55 | 63·5 | 72 | 4[illegible] | 62 | 55 |
| 17. | 64·0 | 74·6 | 57·3 | 75 | 52 | 62 | 61 | 5[illegible] | 61 | 53 |
| 18. | 67·2 | 75·[illegible] | 57·7 | 81 | 57 | 6[illegible] | 62 | 5[illegible] | [illegible] | 55 |
| 19. | 64·5 | 77·8 | 62·0 | 73 | 52 | 69 | 64 | 5[illegible] | 58 | 54 |
| 20. | 64·7 | 74·0 | 57·3 | 73 | 46 | 66 | 60 | 56 | 56 | 51 |
| 21. | 60·8 | 72·4 | 56·8 | 65 | 57 | 58·5 | 70 | 49 | 54 | 51 |
| 22. | 59·8 | 72·2 | 52·6 | 66 | 46 | 55 | 60 | 45 | 55 | 51 |
| 23. | 58·4 | 61·4 | 55·0 | 70 | 42 | 56 | 73 | 43 | 54 | 51 |
| 24. | 64·[illegible] | 78·7 | 53·7 | 81 | 49 | 60 | 73 | 41 | 56 | 51½ |
| 25. | 64·7 | 79·7 | 57·6 | 77 | 44 | 63 | 68 | 5[illegible] | 58 | 54 |
| 26. | 67·7 | 72·3 | 52·4 | 71 | 48 | 6[illegible] | 6[illegible] | 52 | 56 | 54½ |
| 27. | 57·4 | 71·4 | 58·8 | 75 | 55 | 67 | 68 | 52 | 56 | 5[illegible] |
| 28. | 65·3 | 70·3 | 56·5 | 75 | [illegible] | 6[illegible] | 64 | 48 | 56 | 51 |
| 29. | 55·0 | 72·6 | 55·2 | 65 | 45 | 60 | 66 | 47 | 52 | 50 |
| 30. | 57·3 | 61·4 | 50·4 | 65 | 52 | 56 | 65 | 53½ | 54½ | 51 |
| 31. | 57·8 | 61·5 | 55·7 | 68 | 47 | 5[illegible] | 61 | 55 | 57 | 54 |
| Mean. | 62·1 | 73·5 | 55·5 | 72·20 | 49·32 | 61·[illegible] | 64·7 | 4[illegible] | 55·[illegible] | 52·77 |

**Wind. — Rain. — Dew-point.**

| Days of Month. 1812. July. | Wind. London: R.S. 9 a.m. | Wind. Chiswick. 1 p.m. | Wind. Boston | Wind. Dumfries-shire. | Wind. Orkney, Sandwick. | Rain. London: R.S. 9 a.m. | Rain. Chiswick. | Rain. Boston. | Rain. Dumfries-shire. | Rain. Orkney, Sandwick. | Dew-point. Lond. R.S. 9 a.m. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | w. | w. | n. | wsw. | e. | ·111 | ·05 | 1·38 | ...... | ...... | 57 |
| 2. | w. | w. | w. | w. | ne. | ·310 | ...... | ·07 | ...... | ·11 | 55 |
| 3. | w. | w. | w. | w. | ne. | ·213 | ·01 | ·36 | ...... | ...... | 57 |
| 4. | s. | sw. | w. | wsw. | e. | ·109 | ...... | ·06 | ...... | ...... | 60 |
| 5. | sw. var. | w. | w. | wnw. | se. | ·055 | ·11 | ...... | ...... | ·24 | 59 |
| 6. | w. | w. | w. | w. | nw. | ·033 | ...... | ...... | ...... | ·25 | 52 |
| 7. | sw. | s. | calm | w. | e. | ·022 | ·0[illegible] | ...... | ...... | ...... | 55 |
| 8. | s. | sw. | calm | w. | e. | ·041 | ·45 | ...... | 1·75 | ·36 | 56 |
| 9. | w. | w. | calm | s. | se. | ·102 | ·03 | ·21 | ...... | ·18 | 58 |
| 10. | s. | sw. | w. | w. | s. | ·116 | ...... | ...... | ...... | ...... | 57 |
| 11. | s. | sw. | sw. | se. | se. | ·072 | ·02 | ...... | ...... | ...... | 61 |
| 12. | wsw. | sw. | calm | s. | w. | ·038 | ...... | ...... | ...... | ·09 | 59 |
| 13. | w. var. | sw. | w. | sw. | s. | ...... | ...... | ...... | ...... | ·03 | 60 |
| 14. | w. | w. | w. | w. | sw. | ...... | ...... | ...... | ...... | ·13 | 60 |
| 15. | n. | ne. | w. | s. | w. | ...... | ...... | ...... | 1·70 | ·13 | 54 |
| 16. | e. | e. | e. | e. | s. | ...... | ...... | ...... | ...... | ·06 | 59 |
| 17. | e. | e. | e. | e. | se. | ...... | ...... | ...... | ...... | ...... | 63 |
| 18. | nw. | sw. | calm | e. | e. | ·036 | ·02 | ...... | ...... | ...... | 62 |
| 19. | e. | se. | calm | e. | ne. | ...... | ·01 | ...... | ...... | ...... | 61 |
| 20. | s. | s. | calm | nne. | e. | ·033 | ·12 | ·32 | ...... | ...... | 60 |
| 21. | w. | n. | calm | ne. | n. | ·038 | ...... | ·25 | ...... | ...... | 61 |
| 22. | nw. | n. | w. | s. | nw. | ·025 | ·02 | ...... | 0·05 | ...... | 54 |
| 23. | nnw. | n. | calm | sse. | w. | ...... | ...... | ·04 | ...... | ...... | 52 |
| 24. | nnw. | n. | calm | nnw. | nw. | ...... | ...... | ...... | ...... | ...... | 58 |
| 25. | e. | e. | calm | nw. | w. | ...... | ...... | ...... | ...... | ...... | 63 |
| 26. | n. | e. | calm | nw. | nw. | ...... | ·02 | ...... | ...... | ...... | 58 |
| 27. | e. | se. | calm | nw. | nw. | ·050 | ·06 | ...... | ...... | ...... | 58 |
| 28. | w. | nw. | calm | nnw. | nw. | ·091 | ·03 | ·22 | ...... | ·23 | 60 |
| 29. | n. | n. | n. | ne. | n. | ·205 | ...... | ·06 | ...... | ...... | 53 |
| 30. | nw. | n. | n. | w. | nw. | ·150 | ...... | ...... | 0·05 | ·07 | 52 |
| 31. | nw. | n. | calm | w. | w. | ...... | ...... | ...... | ...... | ...... | 53 |
| | | | | | | Sum. 1·8[illegible]7 | 1·52 | 3·57 | 3·55 | 1·88 | Mean. 58 |


7
1
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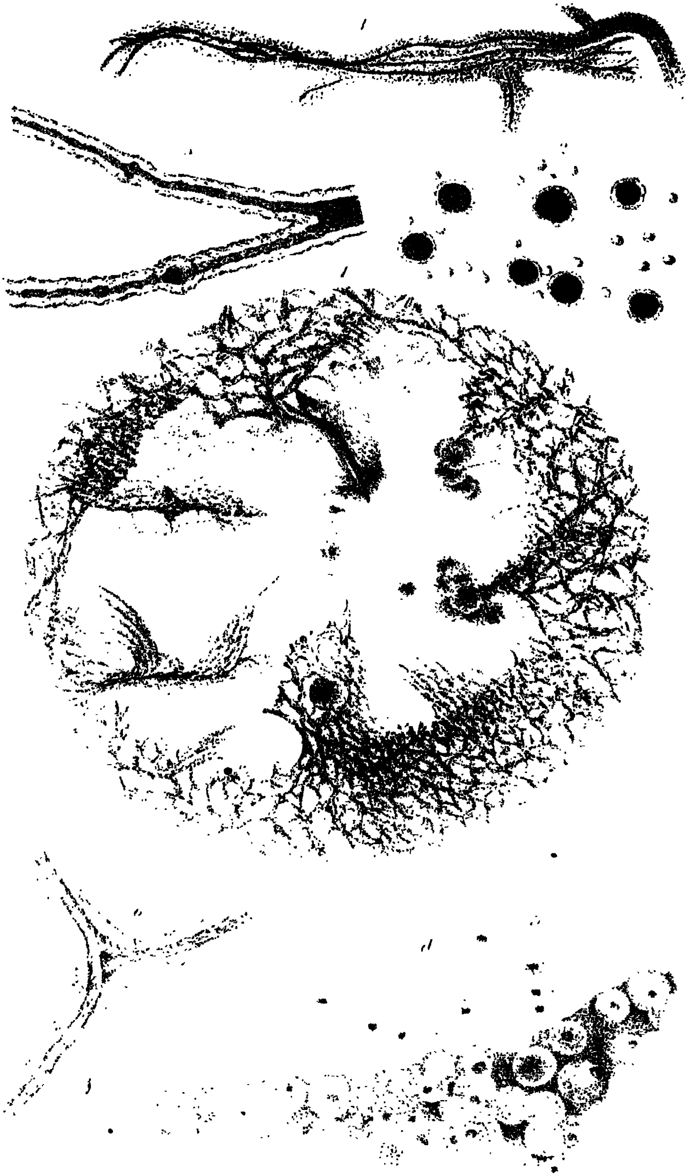

# THE ANNALS

AND

# MAGAZINE OF NATURAL HISTORY.

No. 63. OCTOBER 1842.

## XIII.—*Descriptions of new Shells.* By Richard Brinsley Hinds, Esq., Surgeon R.N.

[With a Plate.]

*Psammobia decora.* Testa oblonga, tenui, cinnamomeo-brunnea; striis concentricis; valva dextra planiuscula, sinistra ventricosa; pallide violacea radiata; intus violacea. Pl. VI. fig. 1.
Long. unc. 1·9, lat. unc. 2·8.
*Hab.* San Diego, California.

This is a shell with a fine cinnamon-brown epidermis, and four pale violet rays showing through. One of these traverses nearly the centre of the valve, and the other three are clustered towards the slope on its posterior margin. The right valve is nearly plane, but the other is somewhat ventricose.

1. *Cyrena obesa.* Testa ovata, turgida, flavo-virente, transversim striata; natibus integris; dentibus lateralibus serrulatis; latere antico convexo acuto; intus pallide violacea.
Long. unc. 1·9, lat. unc. 2·5.
*Hab.* Rivers, Feejee Islands.

The umbones of this shell are so perfect as to be nearly entire, and only sufficiently erose to bear out one of the features which forms a portion of the character of the genus. Towards the slope the epidermis is thrown into several small angular waves, and is everywhere of a fine yellowish green colour.

2. *Cyrena tenebrosa.* Testa ovata, fusco-virente, transversim striata; natibus valde erosis, dentibus lateralibus serrulatis; latere antico rectiusculo; intus violacea.
Long. unc. 1·8, lat. unc. 2·4.
*Hab.* Rivers, Feejee Islands.

Both these species are from the same locality, and were for some time placed together in my collection, but a very slight examination is sufficient to establish their distinctness. This is a flatter shell, of a darker colour, with some disposition to send an angle from the umbones, which again are much erose. Within, on the broad extremity of the valves and towards the hinge, it is of a deep violet colour.

*Neritina Armstrongiana.* Testa subglobosa, striata, nigra, aureo-guttata; anfractu ultimo spinis coronato; apice eroso; labio interno unico dente obtuso munito; apertura cærulescente. Pl. VI. fig. 2.

*Hab.* Streams, Marquesas Islands.

This pretty species I have much pleasure in naming after my esteemed friend Dr. Armstrong, the Deputy Inspector of the Naval Hospital at Plymouth. The spines are much in the same state as in *N. brevispinosa*, and the exterior is covered with a number of small spots of a golden colour. I never saw it in any other group of the Pacific Islands, so that it is most probably confined to the Marquesas, which generally have very little of novelty either for the botanist or zoologist.

*Patella insessa.* Testa conica, ovali, fusca, tenue transversim striata, intus alba; apice maculis albis ornato. Plate VI. fig. 3.

*Hab.* On sea-weed, San Diego, California.

A small horny brown shell, remarkable for the white markings on the apex, usually three, but sometimes four in number, the central being rather the larger. It was always found imbedded in the fronds of a *Laminaria*, which it was often necessary to cut with a knife before the shell could be liberated.

*Patelloida depicta.* Testa minima, lineari, diaphana, alba, lineis rufis apice radiantibus; lateribus compressis, longa quadruplo quoad longitudinem. Pl. VI. fig. 4.

*Hab.* On sea-weed, San Diego, California.

This is a small delicate shell, white, with irregular brown rays diverging from the apex, about eight in number on each side, sometimes disposed to fork; clouded with a dark spot anteriorly; and the sides much compressed, so as to make the shell four times longer than broad. My largest specimen is only four-tenths of an inch long. They were found abundant on the surface of *Zostera*. The British Museum, Messrs. Cuming, S. Hanley, and Lovell Reeve have specimens from me, which I mention that they may at once identify them.

In some respects a similar shell has been described by Conrad from the coast of Massachussetts, under the name of *Patella alveus*, in the 'Journ. Acad. Nat. Sciences,' vol. vi. p. 267. t. 11. f. 20; and as *Patelloida alveus* by Couthouy in the Boston 'Journ. Nat. Hist.,' vol. ii. p. 177. But this shell is only twice as long as broad, and is described with "finely radiating striæ," and some other characters not found in our shell.

*Scarabus pollex.* Testa ovata, compressa, fusco-castanea, longitudinaliter valde striata; striis subarcuatis; anfractu ultimo confuse fasciato. Pl. VI. fig. 5.

*Hab.* Feejee Islands.

In size this shell approaches *S. Lessoni*, but is distinguished from it by its coarsely striated surface, and by its different markings. It is larger than *S. castaneus*, of a much darker colour, more striated, and further distinguished by the two dark yellowish bands on the upper part of the last whorl. Some difference of opinion exists as to the propriety of considering some of these shells as distinct species, but I think the specimens in my possession are sufficient to remove any doubts on the subject. The locality of this species is the most eastern of the genus; and it may be as well to mention that *S. imbrium* and *S. castaneus* are found in New Ireland, and *S. Lessoni* in New Guinea.

1. *Pupina aurea.* Testa ovali, nitida, aurea; suturis obsoletis; apertura infra incisa, supra emarginata et dentata; fissura sursum ascendente. Pl. VI. fig. 6.

*Hab.* In the soil, New Guinea.

This and the following species belong to the section of *Pupina*, with two notches in the margin of the aperture. The inferior one is in all cases a notch of more or less depth, but the upper is not correctly either notch, fissure, or incision. On the last whorl, near the outer lip, is a tooth, which together form a channel or sinus, and here there is a slight degree of emargination on the lip itself, so that at first appearance there would seem to be much more of a notch than there really is. This is a fine golden-coloured species: the notch is so deep as to become a fissure, and takes an upward and backward direction.

2. *Pupina mitis.* Testa ovali, parva, nitida, brunnea; suturis obsoletis linea rubra monstratis; apertura infra incisa, supra emarginata et dentata; fissura recta. Pl. VI. fig. 7.

*Hab.* In dead wood, New Ireland.

The appearance of my specimens is different as they are living or dead shells; the latter are as transparent as glass, but the others are of a reddish brown or even of a grayish colour. But after attentive examination I cannot doubt that they are all one species. Nor is the reddish line which traces the course of the sutures always very decided in the living shells, and in the dead the colour of it has entirely disappeared. The descriptive character of these two species is somewhat similar, but when together they are very different. This is much smaller, wants the fine golden colour of *P. aurea*, and has only a straight notch, for here it is no more. Mr. Cuming has specimens of both from me.

*Paludina seminalis**. Testa obtuse turrita, solidula, cornea, lævi;

* I have thought it expedient to publish descriptions of the above shells; but they are not to be regarded as a portion of the extensive collection of Captain Belcher, C.B., about which I am now occupied.

apice erosa; anfractibus quatuor, apertura cærulescente, effusa. Pl. VI. fig. 8.

*Hab.* Rio Sacramento, California.

Distinguished from *P. nuclea* of Mr. Isaac Lea, which is from a neighbouring locality, by its somewhat smaller size, bluish instead of white mouth, having one whorl less, the aperture more expanded, and being without the black line round the mouth, which, when present, is so good a character in his shell, but which, in my numerous specimens of it, I do not find at all constant, and usually only to be seen in those better developed.

August 1, 1842.

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## XIV.—*On the spongeous origin of Moss Agates and other siliceous bodies.* By J. S. Bowerbank, Esq., F.G.S.

[Concluded from p. 18.]

In the green jaspers the organic structure of the tissue is often preserved in the most extraordinary manner. The whole of the sponges that are found in this substance that I have examined are referable to that division, which I have proposed in the paper "On the structure of the keratose sponges of commerce," to designate *Fistularia*, from the fibre being furnished with a central cavity like that seen in *Spongia fistularis* of Lamarck. In one case, especially, which is represented by Pl. II. fig. 5, the dimensions of the fibre and of its central tubes, the size of the interstices, of the network and its mode of arrangement, are, as far as can be ascertained from the small specimen in which they are imbedded, so exactly similar to those of *Spongia fistularis*, Pl. II. fig. 6, as to render it exceedingly difficult to believe them not to be the remains of the identical species in a fossilized state. In the paper on the keratose sponges of commerce read before the Microscopical Society*, I have described one species of the Turkey sponges, and some of the Australian ones as having their solid fibres surrounded by a horny sheath, in which a system of minute anastomosing vessels were imbedded; and as before stated, we find in *Spongia fistularis* the fibre furnished with a continuous central cavity; but I could not detect in either of the two specimens of this sponge that I have had the opportunity of examining any traces of a vascular sheath on the external surface of the fibre. The existence of the combination of these two interesting forms of structure in the

* Trans. Microscopical Society of London, vol. i. p. 37. pl. 3. figs. 11, 12 and 13.

same species remains to be demonstrated from the fossil species found in the green jaspers of India.

On examining a thin polished slice of one of the series of seventy before mentioned, I found a portion of the structure in an exceedingly fine state of preservation. The greater part of the tissue is composed of minute pellucid sponge-tubes, but among these there are occasionally others of much larger dimensions. The central tubular cavities in these are large and exceedingly distinct, and their external surface is furnished with a sheath or coat of a darker green than the other parts of the fibre, in the manner represented in Pl. III. fig. 1, seen with a power of sixty linear as a transparent object. This green coat to the fibre is evidently analogous to the vascular sheath, described in my paper "On the keratose sponges of commerce," as portions of a reticulated structure; is occasionally to be indistinctly observed even with this low power; and when the same parts are examined with a power of 120 linear, the presence of the reticulated structure can be proved beyond a doubt to an observer conversant with the similar tissue in the recent sponges; but fortunately there is one piece of the tissue which demonstrates its existence in the most satisfactory manner. In this piece, which is represented by Pl. III. fig. 2, as seen with a microscopic power of 120 linear, a portion of the fibre has undergone a slight degree of decomposition sufficient to remove the horny or fleshy part of the sheath, but leaving the reticulated vascular structure in a state of preservation almost as perfect as the similar tissues that occur in the recent sponges; for the vessels are as beautifully distinct when viewed with a microscopic power of 500 linear, as represented in Pl. III. fig. 3, as they are in the Australian and Mediterranean sponges.

There are two other specimens in which the reticulated vascular coat of the sponge fibre is preserved, for which I am indebted to my friend Mr. Chas. G. White of Poplar, who found them in two fragments broken out of a diluvial flint. In this case, it is evident that the two small pieces of fibre upon which it is seen are extraneous parts of another sponge, which were imbedded in the one that originally gave form to the mass in which they were found. The vascular structure in the smallest piece represented by Pl. III. fig. 4, as seen with a microscopic power of 120 linear, is very like that coating the fibre of one species of the sponges of commerce from the Mediterranean; it possesses the same bold and distinct character, and, like it, throws off short branches, which terminate abruptly in *cæca*; but in the second piece, represented by Pl. III. fig. 5, the character varies somewhat, and resembles the more complex mode of disposition of the analogous tissues in one of the

Australian species, although it differs from it in having a bolder form of vessel. The occurrence of this minute and beautiful tissue in the fossil state, and its perfect accordance in structural character with the recent types, afford the most indisputable evidence of the animal origin of the fibrous structures inclosed within the bodies that are under consideration. The tissues which we have just described are not the only vascular structures that are to be found in these interesting remains. Upon examining the great central cavity of the sponge-fibre represented by Pl. III. fig. 2, at the point *a*, with a power of 120 linear, there is a dark spiral thread or line seen passing down the surface of the cavity for a considerable distance; and when this is examined with a power of 500 linear, it assumes the appearance of a spiral tubular thread, frequently obscured by irregular patches of what appears to have been a glutinous animal matter. In another specimen of green jasper in which this curious tissue occurs, and which is represented by Pl. III. fig. 6, its spiral course is much less obscure, and when examined with a microscopic power of 800 linear its tubular nature is evident. The same structure is also seen lining the cavity of almost every fibre of the sponge in the specimen of green jasper that I have before described as having its structure arranged in foliaceous plates, like the skeletons of the leaves of some endogenous plants.

Another exceedingly remarkable tissue occurs in a moss agate which is probably from Oberstein. In this specimen the sponge-fibre differs materially from any other that I have met with in the fossil state. It is arranged in the same complex mode that we observe in the sponges of commerce; but the fibre is exceedingly large, and appears to have been surrounded by a villous coat. It has either been furnished with a cavity whose size has been but very little less than its external diameter, or it has had a solid fibre like the greater number of the recent keratose sponges; but it is exceedingly difficult to decide under the present circumstances which form of structure it was that prevailed previous to its becoming fossilized. In cutting and polishing the specimen, half or a third of the substance of some of the fibres have been removed, so as to afford clear sections of them in a longitudinal direction; and wherever this has occurred, there are one or two minute vessels to be seen nearly in the centre of the fibre, running in the direction of its axis. These vessels are uniform in diameter and simple in their structure, and but very rarely dividing or sending off a branch. Within these vessels, at intervals, there are pellucid round globules, which entirely fill, or very nearly so, their internal diameters, as seen in Pl. III. fig. 7. The vessels represented in this case are from the

1000th to the 2000th of an inch in diameter, and the globules vary from the 1000th to the 2380th of an inch. In other parts of the interior of the fibre which are exposed by these sections, there are globular bodies occasionally to be seen of a much larger diameter, some of them measuring the 300th of an inch: these are frequently quite opake; but occasionally they are somewhat semipellucid at their margins, and possess all the characters which are usually observed in the young gemmules in a very early stage of their development, as they are seen in other similar fossil specimens. Upon examining other parts of the agate, there are large round opake bodies seen imbedded in considerable numbers amid the fibres of the sponge, which present all the characters both of structure and situation that are observed in the numerous cases of the occurrence of the gemmules in the fossil state which I have before described. From the whole of these circumstances it appears exceedingly probable that these minute vessels are true ovarian ducts: the situation in which they are found, the simplicity of their structure, and the nature of their contents strongly favour this supposition. That they are not vessels of circulation may be inferred by the existence of another vascular system which I have described as occurring in both the recent and the fossil species on the external surface of the fibre, and within which vessels in the recent state numerous very minute particles were observed, that have all the characters which the true molecules of circulation in animals so low in the organic scale might be expected to possess. In another agate, that we have had occasion to refer to before, and from which a few fibres are figured to prove the existence of the gemmules in the fossil state, there are some appearances of a curious nature that seem to illustrate the idea of the vessels I have just described being ovarian ducts. In this agate to which I allude, there are no appearances of well-defined anastomosing fibres, but in place of these we have numerous long and simple thread-like fibres (Pl. I. figs. 5 and 6.), which appear to have suffered very much by decomposition, as their substance consists not of a regular tube or of a solid fibre, but of a congeries of minute separate particles of matter, as if resulting from the undisturbed decomposition of a vessel *in situ*. Sometimes even the indication of the former vessel is not present, but its original situation is pointed out by the existence of lines of minute black bodies arranged in straight or curved lines, such as they would assume if they were inclosed within vessels which had taken such directions. In other cases, these strings of incipient gemmules are seen as represented in some parts of Pl. I. figs. 5 and 6, contained within the boundaries of the tubes. In this state there are rarely more than single gemmules following each other in succession, but sometimes, although not often, the vessels appear to have been much enlarged in diameter, and the gemmules are then indiscriminately dispersed within its cavity. In other cases they are considerably larger in size than those we have just described, and exceed in their diameter the vessel or its remains which accompany them, as if they had outgrown and burst their natural boundaries, or that the partial decomposition of the walls of the vessel had reduced its size beneath that of the globular bodies contained within it. From the structure of this series of vessels and their contents, and their close resemblance in every respect to those which I have described as being contained within the large sponge-fibres in the former case, there can be but little doubt, that whatever may have been their nature and purpose in the living animal, they are at any rate the same tissue, but under somewhat different circumstances.

I have examined a considerable number of cut and polished specimens of Egyptian jaspers: they consist of numerous layers of various colours, which are generally concentric, but not always so; for it is frequently evident that the manner in which the material forming the layers was disposed has been suddenly changed, and the stratification has assumed a direction which is nearly at right angles to other lines of the deposit, as if the finely comminuted material had been washed by small quantities at a time, and from different directions, into the cavity which may have formed the mould which had given the external shape to the mass. Upon examining polished specimens of these pebbles with a microscopic power of 150 linear, as opake objects by direct light, they are seen to consist of finely comminuted granules cemented together by a semi-transparent siliceous matter, very much resembling in its appearance that state in which the silex exists in the flints of the chalk and the cherts of the greensand formations. These granules are usually of a light buff or brown colour, irregular in their form, but varying very little in size; and the colouring matter with which we find the various strata of the pebble tinted appears to exist in the cementing matter, and not in the granules; for there is always a considerable mixture of light granules even in the darkest coloured bands of the stone, and this form and mode of disposition in no case appears to have been influenced by the varieties of colour.

Amid this mass of agglutinated matter, in many cases there are to be found imbedded hundreds of beautiful little foraminated shells of about the same size, and closely resembling in form those which are found imbedded in the chalk flints; and some of the species so closely resemble those found in the Grignon sand of the calcaire grossier, as to render it very difficult, if not impossible, to decide whether they are or are not absolutely the same species. These organic remains are frequently found in much greater quantities in some of the strata of the pebbles than in others, which would seem to indicate that they had been accidentally cast in and there imbedded; and it often occurs that in the very next stratum to the one in which they abound few or none are to be seen.

I have examined a considerable number of specimens of Mocha stones, but have in no case observed any indication of organic remains in them; the moss-like appearance in many of them being evidently of dendritical origin. Occasionally there are appearances, as if beautiful thin organic tissues, somewhat similar to the reticulated cuticles of plants, had been imbedded in the mass. Sometimes they assume a nearly regularly reticulated form, while at others they present a series of irregularly shaped rings and spots much like those in the skin of the leopard; but in almost all such cases these appearances are accompanied by an evident fracture in the mass; and upon a careful examination of many specimens of this description, I am convinced that these appearances of organic structure are but some of the many curious results that arise from the infiltration between two closely approximating surfaces of fluids containing solutions of metallic substances. A mass of Hertfordshire pudding-stone which I examined appeared to consist entirely of large and small rolled pieces and fragments of chalk flints cemented together by crystalline quartz. The larger of the imbedded masses, especially, presented all the characteristic spongeous structure, spicula, and *Foraminiferæ* which are to be observed in almost every true chalk flint.

In all the specimens of agates and jaspers which I have examined, there are very frequently considerable spaces in which no remains of spongeous texture is to be seen; and these are filled up with silex, which in some cases assumes the form of chalcedony, while in others it has the banded appearance of the Scotch pebbles or agates, being arranged in a series of layers, which are more or less conformable to the shape of the surface presented by the surrounding spongeous mass. When the silex has a predisposition to the latter mode of arrangement, it frequently happens that we find the decomposed and free particles of the animal matter have assumed a form in accordance with the law which affects the disposition of the silex; but when the arrangement assumed is that of chalcedony, the effect is different; the radiating crystals of the chalcedony are then frequently found to have their terminations surrounded by a mass of molecules of the decomposed spongeous matter which has been driven before them during the process of crystallization, in the same manner that the decomposed cellular structure of fossil wood is frequently observed to be driven before the radiating crystals either of silex or carbonate of lime, whichever may form the fossilizing medium; and it not unfrequently happens, that both modes of arrangement of the siliceous matter may be observed in the same specimen, the radiating or chalcedonic arrangement of crystals being often based upon the agatized portion of the specimen.

In conclusion, I may be allowed to observe, that there are circumstances attending the elucidation of the subjects treated of in this paper, which envelopes them in a greater degree of difficulty than that which attends the investigation of other organic remains, inasmuch as the structure of recent sponges has been very little studied by modern naturalists, and then, excepting in very few instances, only in such a state and manner, as to throw, comparatively speaking, but very little light on their structure, either in the recent or fossil condition. The aspect of a spongeous body, when viewed without the assistance of a high magnifying power, is so widely different from its appearance beneath the microscope, as to render it highly probable that it would never be identified in the fossil state, unless the eye of the observer had been previously well practised in the investigation of the structure of the recent sponges, as well as of the fossil ones; and even then it must be remembered that we are viewing but the skeleton of the sponge. In the recent keratose species, the horny fibres, when alive, are surrounded by a mucous coat, and imbedded in fleshy matter, very little of which can be expected to remain *in situ* in the fossils; and we can only hope to find but obscure indications of its remains in the form of a turbid semi-decomposed mass, in which the more durable parts of the animal are imbedded, preserving, in some instances, their pristine form and beauty; more frequently in such a disorganized and confused state, as to surround their identification with many doubts and difficulties, and to require much patient investigation, and an acquaintance with their recent types, both in a state of perfect preservation and of nearly entire decomposition.

That the remains of sponges thus found in such abundance should almost in every case prove to be those of the keratose tribe, is what we might naturally expect to be the case; as in the genus *Halichondria*, where the spicula form the skeleton in place of the horny fibre, the rapid decay of the fleshy matter which cemented them together would naturally lead to so quick a decomposition as to render their preservation in a fossilized state extremely improbable, when compared with those of the keratose tribe.

The results arising out of the investigation of these siliceous bodies, will not, I trust, be deemed unimportant to the science of geology. We find the layers of cherty nodules in the greensands of the Isle of Wight and other localities comprising nearly a third or a fourth of the whole mass of them: the numerous layers of flints in the chalk form also a most important portion of the deposit, and in other strata we find similar siliceous deposits prevail to a great extent; so that in reality, the sponges, by their continued attraction and solidification of the silex in solution in the water of the ancient ocean, have performed even a more important part in the gradual elevation of the land than the corals have accomplished during the countless ages of the past period.

## XV.—*On some new Insects from Western Africa.* By the Rev. F. W. Hope, F.R.S., F.L.S.

[Continued from vol. ix. p. 496.]

Sp. 14. *Calochroa Strachani*, Hope. Long. lin. 9; lat. lin. 2½. Nigra, elytris lateribus elytrorum flavo-vittatis interneque irregulariter lineatis, macula aurantia ad humeros posita, lineaque longitudinali suturali flava, ante apicem terminata. Corpus infra violaceum, lateribus abdominis utrinque albidis capillis obsitis, pedibus concoloribus.

The above insect I received from Mr. Strachan of Sierra Leone: it seems closely allied to one received from Cape Palmas, which is much broken; as it is a remarkably fine species, it is here introduced. The following species are also from Cape Palmas: *Cicindela regalis*, *concinna*, *interrupta*, and *vittata*, all of Fabricius.

Sp. 15. *Desera viridipennis*, Hope. Long. lin. 3¾; lat. lin. 1¼. Viridis, antennis articulis binis primis atro-piceis, reliquis fusco-flavis et pilosis. Caput cyaneum, punctatum, mandibulis obscure ferrugineis. Thorax elongatus et cyaneus. Elytra viridia. Corpus infra concolor, femoribus flavis apicibusque atris. Tibiæ fusco-piceæ tarsis concoloribus.

This elegant insect inhabits Cape Palmas, and there are also other species in my collection from Sierra Leone and Equinoctial Africa, namely, *ruficollis* of De Jean, and *tropica* and *ioptera* of Hope.

Sp. 16. *Galerita anthracina*, Hope. Long. lin. 8; lat. lin. 2¼. Nigra, antennarum quatuor articulis primis atris et pilosis reliquis fusco-atris. Caput fere ovale, oculis nigris. Thorax elongatus et subcordiformis, angulis anticis rotundatis, disco eroso subvarioloso. Elytra sulcata nigra, lineis elevatis, conspicuis, interstitiis striarum subtilissime punctulatis. Corpus infra nigrum quarto annulo abdominis postice flavo-marginato. Femora tibiis atris et pilosis, tarsisque infra piceo-comatis.

This is the third species only which has yet been described I believe as really African; it cannot be confounded with the Baron De Jean's *africana* or Schönherr's *interstitialis*.

Sp. 17. *Calleida nigriventris*, Hope. Long. lin. $4\frac{1}{2}$; lat. lin. $1\frac{1}{4}$. Cyanea, duobus primis articulis antennarum rubris reliquis atro-piceis. Caput atrum et punctatum. Thorax elongato-ovalis, antice et postice abrupte truncatus. Elytra viridia striato-punctata. Corpus infra pectore rufo, quatuor ultimis segmentis abdominis nigris. Femora rubra, geniculis nigris tibiis pallide flavis, tarsis supra piceis infraque flavo-pilosis.

Sp. 18. *Eurydera 2-fasciata*. Long. lin. 6; lat. lin. 3. Nigra, antennis marginibusque thoracis brunneis, elytris atris, binisque flavis oblique irregularibus fasciis ornatis. Corpus infra brunneum femoribus tibiisque nigris, tarsis brunneo-piceis.

This species was captured at Cape Palmas.

Sp. 19. *Orthogonius latus*, Hope. Long. lin. 10; lat. lin. 5. Niger nitidus, antennis fusco-pilosis. Thorace convexo, marginibus lateralibus depressis. Elytra marginata et sulcata, sulcis fortissime punctatis. Corpus infra nigrum femoribus tibiis concoloribus, tarsisque infra auri-comatis.

*Hab.* In Sierra Leona.

This insect was given to me by Lieut. Sayers with other insects collected in that colony.

Sp. 20. *Orthogonius longipennis*, Hope. Long. lin. 8; lat. lin. $3\frac{1}{2}$. Praecedenti affinis, at minor. Nigra, antennis obscure atris, thorace concolori, disco crebris rugis insignito, marginibus depressis. Elytra thorace fere quadruplo longiora, sulcata, sulcis haud fortiter punctatis. Corpus infra atrum tarsisque infra nigro-piceis.

*Hab.* In Sierra Leona.

A peculiarity of this insect is worthy of notice: the second elevated ridge on each side of the suture, nearly about the middle of the elytra, is abruptly traversed by a transverse ridge, thereby dividing the stria in two parts; all the rest are entire. It is probably only a sport of nature.

Sp. 21. *Orthogonius Strachani*. Long. lin. 6; lat. lin. 3. Niger, antennis articulo primo rubro, reliquis fusco-piceis et pilosis. Thorax convexus, in medio ater, marginibus externis depressis et brunneis. Elytra sulcata, nigra, nitida, interstitiis punctulatis. Corpus infra atrum tarsis solummodo piceis.

*Hab.* In Sierra Leona.

Sp. 22. *Orthogonius dubius*. Long. lin. $4\frac{1}{2}$; lat. lin. 2. Ater, antennis submoniliformibus testaceis, thorace angulis anticis rotundatis, lateribus, marginibusque elevatis insignito. Elytra sulcato-punctata sulcis fortiter impressis. Corpus infra flavum femoribus tibiisque luteis palpis tarsisque obscurioribus.

This species inhabits Cape Palmas as well as Sierra Leone: as it verges from the type of *Orthogonius* chiefly in the antennæ, I have not regarded it, as some entomologists would, as a subgenus; the leading characters pertain to *Orthogonius*.

Sp. 23. *Catascopus Savagei.* Long. lin. $6\frac{1}{2}$; lat. lin. $2\frac{1}{4}$. Viridis, capite cyaneo, thorace læte virescenti, elytris striato-punctatis, colore saturatiori. Corpus infra violaceum femoribus in medio rubris, tibiis nigris tarsisque fusco-piceis.

The above species was taken in the vicinity of Cape Palmas.

Sp. 24. *Catascopus jucundus*, Hope. Long. lin. $4\frac{1}{4}$; lat. lin. $1\frac{3}{4}$. Viridis, capite aureo-virescenti, thorace concolori. Elytra cyanea, lateribus læte viridibus et punctatis. Corpus infra piceum antennis pedibusque obscurioribus.

This insect I received from Mr. Strachan, who took it at Sierra Leona; and as it is allied to the foregoing species, it is here introduced.

Sp. 25. *Ozæna lutea*, Hope. Long. lin. 4; lat. lin. $1\frac{1}{2}$. Pallide flava, capite nigricanti antennisque brunneis. Thorax testaceus elytris concoloribus. Corpus infra flaveolum pedibus luteis geniculisque fuscis.

*Hab.* Circa Palmas.

Sp. 26. *Scarites Savagei.* Long. lin. 16; lat. lin. 5. Niger, capite antice foveis binis fortiter impressis. Thorace fere lunæformi linea longitudinali in medio impresso. Elytra lineato-punctata punctis leviter impressis. Corpus infra concolor. In honorem Savagei denominatus.

*Hab.* Circa Palmas.

Sp. 27. *Panagæus Savagei*, Hope. Long. lin. $11\frac{1}{2}$; lat. lin. 5. Niger, antennis pilosis elytris oblongo-ovatis, convexis sulcato-punctatis maculis duabus magnis flavis, altera antica transversa, irregulari, altera postica, fere rotundata. Thorax hexagonus concavo-excavatus et varioloso-punctatus. Corpore infra nigro, pedibus concoloribus.

*Hab.* Circa Palmas.

By carefully examining the yellow spots on the elytra, the species of *Panagæus* may readily be determined. In the present insect the spot covers five interstitial spaces, and all are united.

Sp. 28. *Panagæus Raddoni*, Hope. Long. lin. 11; lat. lin. $4\frac{3}{4}$. Niger, antennis atro-pilosis, thorace fere hexagono concavo excavato et varioloso-punctato, elytris sulcato-punctatis, quatuor maculis flavis insignitis pedibusque nigris. In honorem Raddoni denominatus.

*Hab.* Circa Palmas.

The two anterior yellow spots in this species cover five interstitial spaces and half of a sixth, and the two posterior only four similar spaces.

Sp. 29. *Panagæus Sayersii*, Hope. Long. lin. 10½; lat. lin. 4¼. Niger, antennis valde pilosis, thorace hexagono, haud fortiter excavato, at varioloso-punctato, elytris sulcato-punctatis quatuor maculis flavis insignitis pedibusque atris.

*Hab.* Circa Palmas.

It is named in honour of Lieut. Sayers, an assiduous collector of insects when resident at Sierra Leone. The two yellow anterior spots, as well as the posterior, cover five interstitial spaces and a part of a sixth.

Sp. 30. *Panagæus Klugii*, Hope. Long. lin. 9¼; lat. lin. 4. Niger, antennis tribus primis articulis atris, reliquis fusco-rubris et pilosis, thorace hexagono concavo excavato et subtilissime punctulato. Elytris sulcatis, quatuor maculis flavis insignitis pedibusque nigris.

*Hab.* Circa Palmas. In honorem celeberrimi Klugii denominatus.

In this species the two anterior spots cover five interstitial spaces, and these are in shape nearly triangular, the base being situated nearly at the outer margin of the elytra with the apex directed towards the suture. The two posterior markings are more rounded, and cover only four interstitial spaces.

Sp. 31. *Panagæus tropicus*, Hope. Long. lin. 8; lat. lin. 3½. Niger, antennis atris, thorace semicirculari haud excavato, subdepresso et crebrissime punctulato. Elytris sulcato-punctatis quatuor maculis subquadrato-flavis pedibusque nigris.

*Hab.* In Sierra Leona.

This species has the two anterior spots covering six interstitial spaces, whilst the posterior cover only five.

Sp. 32. *Panagæus Erichsoni*, Hope. Long. lin. 8; lat. lin. 3. Niger, tribus primis articulis atris nitidis, reliquis fusco-pilosis, thorace semilunari, angulis anticis rotundatis, posticis abrupte truncatis, disco varioloso-punctato. Elytris sulcato-punctatis quatuor irregularibus maculis insignitis, corpore infra pedibusque nigris.

*Hab.* Circa Palmas.

This elegant species is named in honour of Dr. Erichson of Berlin, the author of a valuable work on the Brachelytra or Rove Beetles. In the above insect only four interstitial spaces are covered with the yellow spots, and all of them are irregularly shaped.

Sp. 33. *Panagæus Strachani*, Hope. Long. lin. 9½; lat. lin. 3½. Niger, antennis nigro-pilosis. Thorace fere hexagono angulis anticis rotundatis posticis abrupte truncatis, disco fortiter excavato et punctulato, elytris parum elongatis sulcato-punctatis, maculisque quatuor flavis irregulariter insignitis corpore pedibusque atris.

*Hab.* In Sierra Leona.

This remarkable species is named after my friend Strachan, some years a resident in the above colony. To his exertions zoologists are much indebted for many valuable additions to their museums and cabinets. In the above species each of the four spots cover five interstitial spaces.

Sp. 34. *Panagæus grossus*, Hope. Long. lin. 11; lat. lin. 4½. Niger, antennis atris, thorace fere hexagono angulis anticis rotundatis, posticis abrupte truncatis, disco subconvexo punctato, lateribus parum depressis et marginatis, elytris sulcato-punctatis, quatuor maculis rubro-miniatis insignitis corpore pedibusque nigris.

The above insect was lately received from the Ashantee country, and was sent to me by Capt. Parry of Cheltenham for description.

From the number of rare species already described, some faint idea may be formed of the richness of African entomology. I regret to add that several others of equal rarity are passed by, as being too mutilated for description. Various new types of form have also lately reached me from the country of the Ashantees as well as the Gold Coast; the most remarkable of them at a future time I propose to publish.

August 25, 1842.

## XVI.—*A brief Account of two Peruvian Mummies in the Museum of the Devon and Cornwall Natural History Society.* By P. F. Bellamy, Surgeon, of Plymouth*.

[With a Plate.]

These interesting relics were brought to England by Captain Blanckley of the Royal Navy, who in the year 1838 presented them to the Society under the incorrect denomination of Peruvian Mummies. Of the exact locality whence they were procured I am at present unable to furnish information; but on presenting them, Capt. Blanckley stated to me in conversation, that he exhumed them himself from an elevated tract of land in the mountainous district of Peru, but at a considerable distance from the lake Titicaca. He also informed me that such remains were very abundant there, that they were found very near the surface, the light sandy soil having been removed by the wind, so as to expose many of them (a circumstance which led to their discovery), and that each was observed to have an upright posture in the soil, and to have under it a piece of matting†.

Each mummy (for so, in order to avoid a confusion of terms, I will continue to call them,) presented the appearance of a rudely shaped oval bundle, secured by numerous lashings of a coarse rope, made of a kind of flag or rush, passed two or three

* Read to the Zoological Section of the British Association, Aug. 3, 1841.

† One of the specimens was packed in a tin case with some of the sand taken from the spot; it is impregnated with marine salts to such an extent as to impart to the whole a strong smell somewhat resembling iodine; so that there is reason to believe that the preservation of the remains is accidental, and principally attributable to the presence of these extraneous antiputrescents.

times round the neck, and then in a variety of directions over the trunk, and knotted together at each intersection so as to form a network with broad interspaces; every part but the head being thus firmly compressed. The first and principal envelope proved to be an article of dress, made of a scarlet-coloured stout cloth, consisting of a single piece, sewn together up the sides, and with a hole for the head and each arm; thus resembling a loose frock without sleeves, and not much unlike a ponsha or mantle. The one preserved is of capacious size, and was no doubt at one time worn by an adult, perhaps the father of the deceased. As a wrapper for the dead, a portion of it was drawn smooth over the head and face, then allowed to fall in large irregular folds over the body, and the superfluous portion folded up at the feet. The second and innermost envelope consisted in one of a thin coarse cotton, and in the other of a piece of woollen cloth wrapped rudely round the body, but, like the former, drawn smooth over the head and face. Between the two wrappers were found the model of a raft or catamaran, two small bags made of a neatly striped cloth, filled with ears of an undescribed variety of Indian corn, and two small earthen pots, one of which probably at the time of deposit contained a little water, and the other it is not unlikely was intended for a cooking utensil. Such were the models found in conjunction with these remains; but with others which Captain Blanckley examined on the spot, they were of various descriptions, and the earthen vessels of different patterns: thus we have presented by him three flat dishes or baskets of neat wicker-work; a fishing line with a float made of reeds matted together, and with a small black oval-shaped pebble for a weight; a very rudely made fishing basket; the half of a small gourd, probably intended for a lamp; and as many as nine sorts of earthen vessels, some of which are neatly painted.

Here we may remark, that two of the pots and two of the bags contain leaves of one of the *Musaceæ*; and that in two or three others Capt. Blanckley found a quantity of a blackish powder, and lying loosely not far from one of the mummies he presented, a piece of sugar-cane about 18 inches long.

By a coincidence, the mummies under our immediate notice are the remains of children, one of which was not more than a few months old, and the other could not be much more than one year; and judging from their relative size and figure, male and female. Pl. IV. figs. 1 and 3.

Of the first examined all the soft parts had mouldered into dust, and nothing but the bones and a small portion of hair remained. In the other the skin was hard and shriveled, the hair black and silky, but both much discoloured by the putrefactive process, and the soft tissues melted down to a brown-coloured unctuous kind of matter, by which means the face was so distorted that not a feature was discoverable. This one however displayed the manner in which the body was arranged for interment.

The principal object appears to have been to give to it a sitting or crouching attitude; for this purpose the thighs were pressed up against the abdomen and the legs flexed upon them, and then secured by a bandage made to encircle the trunk and the bent limbs two or three times. In addition to this, the arms were brought across the body and tied together at the wrists by a piece of cord, and the head was pressed down upon the chest so as to throw the occiput uppermost.

From each mummy I selected the bones of the skull, and by a little mechanical contrivance restored them to their natural position.

On examining these skulls it will be found that the face is short and projecting, the chin square and protruding, the malar bones large and prominent, the nostrils large and open, the orbits large and squared, and the orbital margins thick and rounded; but the crania, from the singularity of their form, deserve the most marked attention: the frontal bone is narrow, recedes at once from the superciliary ridges, and presents a flattened aspect as far as the coronal suture; the parietal bones rise for about two-thirds of their length till they reach the vertex, at which point they suddenly round off to form the occiput; and the occipital bone, which is irregularly flattened, forms principally the under part of the skull, only a small portion of it occupying the back of the head, and that being turned up rather suddenly to meet the parietal bones. Thus it will be observed that the whole skull is thrown back, has a remarkably large posterior development, and is of an ovoid form, with its long axis from before to behind.

Corresponding with this configuration, all the large bones of the skull are considerably elongated; and this will be better displayed by contrasting them with those of an infant of the Caucasian variety, whose cranium is of the ordinary globular figure; thus the frontal bone, measured from its junction with the nasal to its line of junction with the parietal, is in the Caucasian 4 inches, in the Peruvian $4^1$ inches; the parietal, from the extremity of the angle in the temporal fossa to the postero-superior angle in the Caucasian, is $5\frac{1}{2}$ inches, whilst in the Peruvian it is $6\frac{1}{4}$ inches; and the occipital, from its junction with the sphenoid to the apex of the lambdoidal suture in the Caucasian, measures 5 inches, and in the Peruvian $5\frac{3}{4}$

inches. In making these measurements I have chosen the skull of the elder mummy, because its form is not so exaggerated as in the younger, in which the bones, from the greater projection of the occiput, are comparatively longer.

It will also be found, that even if the circumference of the two skulls be the same by measurement in a transverse direction over the vertex from one occipital condyle to the other, the Peruvian through its long axis is $5\frac{3}{4}$ inches, whilst that of the Caucasian is but $4\frac{3}{4}$ inches. The position of the foramen magnum too is remarkable, for it will be found to be considerably anterior to the centre of gravity; thus, from the centre of the condyle of the occipital bone to the alveoli of the front incisors, the distance is but 3 inches, whilst from the same point to the line described by the greatest posterior projection it is $3\frac{5}{8}$ inches; nor is the facial angle less remarkable: in one it does not exceed 85°, and in the other it is as little as 82°; being in the former 5°, and in the latter 8° less than in the Caucasian of the same age.

Here I will venture to call the attention of the Section to the formation of the occipital bone, for in each skull the same peculiarity exists; that is, in the addition of a fifth rudimentary portion of the same figure, and occupying the same position in both, viz. between the occipital portion of the bone commonly so called, and the parietal bones, but below the lambdoidal suture; in this particular differing essentially from the adventitious os triquetrum sometimes found. In the younger of the two individuals it is, like the other rudiments, distinct and separate (Pl. IV. fig. 2.); whilst in the elder, in which the ossific process is more advanced, the junction of it with the occipital portion is nearly complete, the suture only remaining open at either extremity for little more than an inch, but traceable through its entire length. Does this exist by a strange coincidence as an anomaly of structure, or is it to be considered as a normal formation peculiar to this race of beings?

It will be manifest from the general contour of these skulls that they are allied to those in the Museum of the College of Surgeons in London, denominated Titicacans. Those adult skulls are very generally considered to be distorted by the effects of pressure; but in opposition to this opinion Dr. Graves has stated*, that "a careful examination of them has convinced him that their peculiar shape cannot be owing to artificial pressure;" and to corroborate this view, we may remark that the peculiarities are as great in the child as in the adult, and indeed more in the younger than in the elder

* Dublin Journal of Med. and Chem. Sciences, No. 15.

of the two specimens now produced: and the position is considerably strengthened by the great relative length of the large bones of the cranium; by the direction of the plane of the occipital bone, which is not forced upwards, but occupies a place in the under part of the skull; by the further absence of marks of pressure, there being no elevation of the vertex nor projection of either side; and by the fact of there being no instrument nor mechanical contrivance suited to produce such an alteration of form (as these skulls present) found in connexion with them *.

The remarkably flattened forehead, indicative of the very small size of the anterior lobes of the brain, is worthy of remark; and it will be for phrenologists to reconcile this fact with those now recorded, which bespeak for this people a tolerably advanced state of civilization: they were manufacturers and agriculturists; bestowed their dead with peculiar care, paying particular attention to their imaginary wants, and had certain superstitious notions connected with their departure to some distant region. Are these marks of intellect the result of original powers of invention, or are they the result of intercourse with other and more civilized people?

This peculiar race were in all probability the aborigines of the country; and it is possible that these mummies may be the relics of some of the last of the Titicacans, deposited after the invasion of the country by those enlightened conquerors, who subdued them, not by the sword, but by moral agencies, and imparted to them a knowledge of their arts and rites and superstitions. But it will be for the ethnologist to show how far the facts now stated are found to accord with the manners, customs and attainments of eastern nations; and to say to what people the first emigrants to this part of the western shores of America belonged. Failing in this however, it will, I think, be fair to attribute to the indigenæ a mental capacity equal to originate such inventions, and to arrive at such attainments as the specimens before us manfest.

It is probable that the extinction of this once typical variety of the human family was produced gradually by an intermixture of blood with those who afterwards became the lords of the soil, and whose line of princes, untainted by such intercourse, formed the Incas dynasty so remarkable in the history of Peru.

Lastly, I would suggest that the adult skulls of Titicacans before alluded to are of two kinds, the one possessing all the peculiarities of the race in its unalloyed form—the true Titicacan; and the other being of a spurious character, resulting

* See the note at the end of this communication.

from the union of the indigenæ with the settlers of Asiatic origin, the companions of Manco Capac of traditionary fame. Accordingly in the former we observe the receding forehead, the elongated cranium, and the horizontally-placed occipital bone; and in the latter a modified form, in which, combined with the receding forehead and elongated cranium, there is an elevated vertex and flattened occiput, formed principally by an altered position of the occipital bone; which, instead of lying on a plane with the horizon, rises in a sloping direction upwards and backwards to meet the parietal bones.

*Note.*—After the reading of this paper, Prof. Owen stated that he entertained an opinion that their peculiar form was given to them by pressure, such as might be applied by a bandage passed round the head; and he suggested that a short fillet (about 16 inches long) found with the younger of the two mummies might have been employed for this purpose. This bandage, however, I consider was used to secure the lower extremities to the trunk, and on consideration I am disposed to maintain the same opinion as I have stated above: 1st, because this fillet is but $1\frac{1}{2}$ inch wide, whereas the flattened portion of the skull is more than 3 inches, extending over the os frontis from immediately above the superciliary ridges to an inch beyond the coronal suture, so as to involve the anterior portion of the parietal bones; 2nd, the line of depression in these skulls has a direction over the middle of the os occipitis, and then over the anterior third of the parietal bones, first where the angle dips down between the frontal temporal bones, and then immediately behind the coronal suture, and not at all over the os frontis; 3rd, because, if pressure had been used in this direction, it would have contracted the great fontanelle, of which there is no mark whatever; indeed in the elder of the two, in which the depressed line is most visible, the fontanelle is most open; and lastly, if a circular bandage had been applied, it would have given a circular form to that portion at least compressed by it; whereas however a transverse section, taken by measurement, shows that the skulls have a compressed pyriform figure, the larger extremity representing the flattened and upper surface, and the smaller corresponding with the contracted aspect of the occipital bone.

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## XVII.—*On the characters of the British Violets.* By Charles C. Babington, M.A., F.L.S., F.G.S., &c.

[With a Plate.]

The remarkable difference which exists between the value of characters in different orders of plants, and sometimes even in genera,—the form or structure of any particular organ being of generic value in one order, specific in another, and sometimes not even sufficiently constant to distinguish varieties in a third,—must always give considerable interest to an investigation of minute external differences, the examination of which would probably appear to be little better than a waste of time to a superficial observer; more particularly when, as is often the case, they are so minute as to escape the notice of all except the practised descriptive botanist. It is scarcely necessary to mention instances in proof of so well-known a fact, but still it may be perhaps as well to produce a single example, before entering upon the peculiar subject of this communication. The form and sculpture of the external coat (*testa*) of the seed is found to distinguish some few *orders* amongst the Monocotyledons; it is occasionally of *generic* value; in the *Chenopodiaceæ* and *Polygoneæ* it distinguishes *species*, but amongst the *Caryophyllaceæ* it does not appear to possess sufficient constancy to point out even varieties.

But to proceed to the subject more particularly before us. In a communication to the Botanical Society at Edinburgh, my friend Mr. Edward Forbes has directed attention to the form of certain curious spurs or appendages attached to the base of two of the stamens and extending into the spur of the corolla, as affording excellent characters for the formation of sections in the genus *Viola**, but he has not applied them in the distinction of species. He finds three different forms to pervade all the Violets that have come under his notice, namely, 1st, a rounded spur, such as is found in *V. palustris*; 2ndly, a lancet-shaped spur, which occurs in *V. odorata*, *V. canina*, and *V. hirta*; and 3rdly, a filiform spur, as in *V. tricolor* and *V. lutea*. In the course of a series of observations which had for their object the application of these characters to the British Violets, I soon found that the direction of the cells of the anthers differed considerably in the several species, and I have been led to the conclusion that they also may be employed with great advantage in the discrimination of nearly allied species. I have found the cells of the anthers to be always nearly parallel to each other in *V. palustris*, *V. canina*, and *V. lutea*; and constantly distant below, but converging upwards, until their apices nearly, if not quite, touch each other in *V. odorata*, *V. hirta*, and *V. tricolor*. If now we look to the form of the stipules and the presence or absence of an elongated stem, we shall have four sets of characters by which six species may be satisfactorily distinguished in Britain, nor does it appear to me to be advisable to divide our native Violets into a greater number of species.

I shall now endeavour to point out the characters of these plants, and hope, by the help of the accompanying illustration,

* See Ann. Nat. Hist. vol. vii. p. 157.

to make the subject easily understood. In *Viola palustris* we have a stemless plant with ovate acute stipules, a short rounded spur, and the cells of the anther nearly parallel. Its want of stem and short spur distinguish it from *V. canina* and *V. lutea*, as do also its stipules; the parallel cells and the spur separate it from *V. odorata* and *V. hirta*; and all these characters from *V. tricolor*. In *V. odorata* and *V. hirta* we have stemless plants with lanceolate stipules and diverging cells to the anthers, their antherine spurs also belonging to the lancet-shaped section; but the spur of *V. hirta*, by its near approach to a linear form, satisfactorily distinguishes that plant from *V. odorata*, in which it is truly lancet-shaped. We now come to *V. canina*, under which I include the *V. flavicornis* and *V. lactea* of Smith; here we find lanceolate inciso-dentate stipules combined with a decided stem, parallel antherine cells, and a lancet-shaped spur. This combination of characters clearly separates it from any of the foregoing. The two remaining species, *V. tricolor* and *V. lutea*, are distinguished from all the others by their filiform spurs and palmate-pinnatifid stipules, and are severally characterized by the parallel cells and almost palmate-pinnatifid stipules, of which the terminal lobe is linear-lanceolate, or lanceolate and quite entire, of *V. lutea*; and the diverging cells and lyrate-pinnatifid stipules with a more or less dentate or crenate terminal lobe of *V. tricolor*. Under *V. lutea* I include the *V. Curtisii* of the 'Supplement to English Botany,' as its differences are, according to my views, of but slight value; and I also consider *V. arvensis* as only a variety of *V. tricolor*.

The following is the manner in which I consider that the British species should be characterized and arranged:—

Genus Viola, *Linn.*

A. *Antherine spur rounded, stipules ovate-acute, stems scarcely apparent.*

1. *V. palustris* (Linn.). Cells of the anthers nearly parallel; spurs short, thick, rounded; spur of the corolla very short, obtuse; leaves reniform-cordate, glabrous. Pl. VII. fig. 1.—*Eng. Bot.* 444. *Reich. Icon. Fl. Germ.* f. 4491.

Antherine spurs concave below, convex above. Cells of the anthers slightly separated below. Fl. pale lilac, with purple streaks. Sometimes the petioles are slightly hairy, but usually they are glabrous.—♃. June, July, bogs and marshes in mountainous districts.

B. *Antherine spurs lancet-shaped, stipules lanceolate, stems scarcely apparent, leaves cordate.*

2. *V. odorata* (Linn.). Cells of the anthers diverging below; spurs lancet-shaped, blunt; spurs of the corolla obtuse, straight; lateral

petals entire, lower one emarginate; leaves cordate, scions creeping. Pl. VII. fig. 2.—*Eng. Bot.* 619. *Reich.* f. 4498.

Antherine spur narrowed to an obtuse point; spur of the petals inflated towards the end, slightly channeled above. Flowers purple, often white. Bracteas above the middle of the flower-stalk. Petioles with deflexed hairs. Lateral petals with a hairy line, which is sometimes wanting (*V. imberbis*, Leight.).—♃. March, April, common.

3. *V. hirta* (Linn.). Cells of the anthers diverging below; spurs nearly linear, obtuse; spur of the corolla obtuse, hooked at the point; petals entire or slightly emarginate; leaves cordate, scions wanting. Pl. VII. fig. 3.—*Eng. Bot.* 894. *Reich.* f. 4493.

Antherine spur scarcely broader at the base than the apex; spur of the petals compressed, not channeled; sepals obtuse. Flowers pale blue, sometimes white; lateral petals usually with a hairy line. Bracteas below the middle of the flower-stalk. Petioles with spreading hairs.

Var. *β. calcarea.* Flowers smaller, peduncles much longer than the leaves, sepals oblong-ovate, obtuse.—♃. April, May; common on a limestone soil. *β.* Gogmagog Hills, Cambridgeshire.

C. *Antherine spurs lancet-shaped; stipules lanceolate, an evident stem; leaves cordate or lanceolate.*

4. *V. canina* (Linn.). Cells of the anthers parallel; spurs lancet-shaped, acute, spurs of the corolla obtuse; leaves cordate-ovate or oblong; stipules entire, ciliate or dentate; stems ascending. Pl. VII. fig. 4.—*Eng. Bot.* 620.

Spurs of the petals inflated in their lower half, slightly channeled above. Flowers blue or rarely white.—♃. April to August; common on banks, in woods, &c.

The leaves are cordate-ovate, or somewhat oblong-acute, not acuminate; the stipules usually oblong-lanceolate, and the fruit truncate-obtuse or apiculate in the typical variety; leaves cordate-ovate or subreniform-acuminate; stipules lanceolate-attenuate, and the fruit acuminate in var. *β. sylvatica*; leaves roundish-cordate, rather acute, small; flowers large, base of the stem woody in *γ. pusilla* (*V. flavicornis*, Sm.) 'Eng. Bot.' 2736; similar to the last, but with the leaves cordate-oblong in *δ. montana* (*V. montana*, Linn.?)*; leaves cordate-ovate, subattenuated above, and slightly narrowed into the petiole; stipules large, incised, base of the stems woody in *ε. Ruppii*; leaves ovate-lanceolate, narrowed into the petiole, the lowermost cordate; stipules large, incised; flowers cream-coloured in *ζ. lactea* (*V. lactea*, Sm.) 'Eng. Bot.' 445. Notwithstanding the great difference which exists between the

* The specimens of *V. montana* in the Linnæan Herbarium appear to me to belong to *canina*, being a large upright form of that plant, with immense stipules and cordate-lanceolate leaves.

extreme forms of this plant, I cannot but agree with Bertoloni ('Fl. Ital.' ii. 705) in considering the above as only varieties of one species.

D. *Antherine spurs filiform, stipules* palmate-pinnatifid, stems evident.*

5. *V. lutea* (Huds.). Cells of the anthers nearly parallel; spurs elongated, filiform, spur of the corolla as long or longer than the calycine appendages; sepals acute; leaves crenate-serrate, lower ones ovate-cordate, upper ovate or lanceolate; stipules palmate-pinnatifid, the terminal lobe linear or linear-lanceolate, entire; stems ascending. Pl. VII. fig. 5.—*Eng. Bot.* 721. *Reich.* f. 4519. Flowers wholly yellow, yellow with the two upper petals purple, or wholly purple, varying greatly in size; capsule globose.—♃. June, July; common in mountainous pastures.

Distinguished from *V. tricolor* by its stipules, which have all their lobes of nearly equal size, the lateral ones (usually one, sometimes two on the side next the stem, and three on the other) all springing from near the base of the stipule and the terminal one, which is sometimes considerably larger than the others, narrow, and always quite entire. *V. Curtisii* (Forst.), 'Eng. Bot.' 2693, appears to me to differ from this only in the lower part of the stipules being more elongated, so as to separate the lateral lobes and give them a more pinnatifid form. In *V. grandiflora* (Linn.!), to which this has been sometimes referred, the spur is twice as long, the corolla much larger, and the sepals bluntish, as in *V. calcarata*; and in the specimens contained in Sir J. E. Smith's Herbarium, and called by him *V. grandiflora*, the stipules are remarkably large, with five acute narrow lobes close to the base on the outside, and a single similar one near the top of that side; on the inner side the lower half is without any lobes, but there are two acute lobes in the upper half, the terminal lobe not being larger than the others. One of the specimens has very peculiar stipules, extremely long and narrow, with three small narrow acute lobes externally at the base, and one rather larger at about the middle of the inner side. The late lamented Prof. Don was disposed to consider *V. grandiflora* (Linn.) as a form of *V. calcarata* (Linn.). The *V. grandiflora* (Vill.), of which I possess specimens from the original locality, namely, the Vosges Mountains (gathered and named by Schultz), is identical with the *V. lutea* (Sm.) and *V. grandiflora* (Huds.) from the Clova mountains; and although the Scottish specimens have usually smaller flowers, still in one or two of them the

* The stipules on or about the middle of the stem should always be examined in determining the species of *Viola*.

corolla is nearly as large as in those from France. *V. sudetica* (Willd.) I believe to be the same plant. In a communication to the Botanical Society on the 13th of January, 1842, Mr. A. Seton appears to be of opinion that *V. lutea* is not distinguishable from *V. tricolor*, and most correctly states that the characters usually employed to distinguish these plants are not sufficiently constant. I cannot however agree with him in his conclusion that they are forms of one species, as I believe them to be constantly distinguishable by attending to the characters given above; neither can I agree with him in separating *V. arvensis* (Murr.) from the following species.

6. *V. tricolor* (Linn.). Cells of the anthers diverging below; spurs elongate, subclavate-filiform, spur of the corolla about equal to the calycine appendages; leaves crenate-serrate, lower ones ovate-cordate, upper ovate or ovate-lanceolate; stipules lyrate-pinnatifid, the terminal lobe spathulate-crenate; stems ascending. Pl. VII. fig. 6.—*Eng. Bot.* 1287. *Reich.* f. 4517.

Flowers with the upper petals purple, lateral ones bluish, lower one yellow; capsule ovate.

Var. *β. arvensis* (*V. arvensis*, Sibth.), *Eng. Bot.* 2712, has the petals shorter than the calyx and whitish, and the capsules nearly globular.—⊙ ? May, September, common; *β.* in corn-fields.

A very variable plant, both in the colour and size of its corolla, and the size and outline of the terminal lobe of its stipules, which is sometimes copiously crenate, but often with only one or two notches upon each side. I have never seen it quite entire.

The following table will perhaps place in a clearer light those characters to which this paper more particularly refers:

| | | 1. palustris. | 2. odorata. | 3. hirta. | 4. canina. | 5. lutea. | 6. tricolor. |
|---|---|---|---|---|---|---|---|
| Antherine spur | rotund | * | | | | | |
| | lancet-shaped | | * | * | * | | |
| | filiform | | | | | * | * |
| Antherine cells | parallel | * | | | * | * | |
| | diverging | | * | * | | | * |
| Stipules | ovate-acute | * | | | | | |
| | lanceolate | | * | * | * | | |
| | palmate-pinnatifid | | | | | * | * |
| Stems | obscure | * | * | * | | | |
| | apparent | | | | * | * | * |

## XVIII.—*Proposed Arrangement of the* Echinodermata, *particularly as regards the* Crinoidea *and a Subdivision of the Class* Adelostella (Echinidæ). By Thomas Austin, Esq., and Thomas Austin, Jun.

Having been engaged for several years past in investigating the *Crinoidea*, both recent and fossil, as well as the *Echinodermata* generally, we have arrived at the conviction that the existing classification cannot with propriety be applied to fossil species, we therefore purpose to adopt in our proposed monograph on the *Crinoidea* the arrangement as now submitted.

The numerous works which have already appeared, or are in progress, respecting the *Echinodermata*, would, it might be supposed, render further observations on the subject superfluous; but as these works are mostly at variance with each other, and not unfrequently with themselves as regards the extent and limits of the different families belonging to this extensive and highly interesting class of animals, we are induced to offer a few observations on the want of a proper general arrangement of the *Echinodermata*, whereby every attempt at their classification on a sure and solid foundation has in every instance signally failed. Professor Forbes has, it is true, in his very interesting work (History of British Starfishes and other animals of the class *Echinodermata*) thrown them into natural groups, but then the characters he has assigned to the *Crinoidea* and *Echinidæ* would, if followed, exclude our numerous fossil species from their proper station in the animal kingdom.

It is with considerable diffidence we venture to dissent from such justly approved authors as Mr. Forbes and some others who have written on the *Echinodermata*; but as their views, if strictly observed, would place our interesting fossil species "nowhere," we have no choice left but to propose an arrangement of our own, founded on characters which we hope will exclude none that properly belong to the *Echinodermata*; and though we feel diffident as to our abilities in being able to make our proposed classification sufficiently intelligible, we feel none whatever as to our motive, which is, if possible, to place the nomenclature relating to the *Echinodermata* on a solid basis, whereby the views of the zoologist and the palæontologist may be in unison, and not run counter to each other as is too frequently the case; and also to plead in behalf of an interesting and much maligned class of animals, and to demand that they may be allowed to take rank and precedence in the animal kingdom according to strict justice, and that their inalienable natural rights may be preserved intact.

Our objections to Professor Forbes's arrangement chiefly apply to the characters of his divisions, which, however natural they may be as regards the recent animals, are wanting in reference to the calcareous framework of fossil species, by which alone we can study their organization and arrive at satisfactory conclusions respecting their probable manner of growth, propagation, alimentation, in a word their habits, and the structure and functions of their numerous organs.

The aquiferous system, with its connexion with the organs of progression, which Mr. Forbes makes the sole distinguishing character of his orders, and which he has shown to be wholly wanting in his sixth order *Vermigrada* (*Sipunculidæ*), would, if adopted, exclude our proposed first order *Cionacineti* (fixed *Crinoidea*) from our class *Pinnastella*, as would the distinguishing characteristics of his fourth order *Cirrhi-Spinigrada* (*Echinidæ*) exclude our order *Columnidæ* or fixed *Echinidæ*, which contains several genera and species of our class *Adelostella*.

In our proposed arrangement of the *Echinodermata*, we have endeavoured to obviate the difficulties referred to, and to establish our divisions on a combination of anatomical and zoological evidence adduced from the comparison of recent and fossil species.

Synopsis of the proposed arrangement:—

Subkingdom Centronlæ, *Pallas*.

Section Echinodermata.

Body more or less protected by a shelly covering, composed of variously shaped calcareous plates imbedded in the substance, or attached to the surface of the skin. These pieces are formed by the deposition of earthy particles round certain central points, so that when fully developed they observe a well-defined arrangement which is easily traceable into certain distinct forms, each peculiar to its kind. This external covering, though formed of numerous pieces, continues firmly united during the animal's life; but after death, in consequence of the liability of the investing membrane to destruction, the bone-like plates become incoherent. By the mode of structure pointed out, the increase of the animal as regards the size and number of the plates is duly provided for, and injuries of the shelly coat from external violence are readily repaired by the renewed deposition of calcareous matter.

All the known Echinodermes are marine, and are sustained by animal food.

## Class 1. PINNASTELLA (*Austin's MS.*) CRINOIDEA. PINNIGRADA, *Forbes.*

Character of the class. Viscera protected by an external skeleton formed of calcareous plates; mouth surrounded by pinnated rays composed of calcareous joints. Sometimes free, but more frequently permanently attached (dorsally) to other bodies by a jointed flexible column.

### Order 1. *Cionacineti,* Austin's MS.

Fixed to extraneous objects by a jointed flexible column.

#### Family 1. APIOCRINOIDEA, *Gray.*

Genus 1. *Eugeniacrinites,* Miller.

Sp. 1. E. caryophyllatus, *Goldfuss.*
2. E. nutans, *Goldf.*
3. E. compressus, *Goldf.*
4. E. pyriformis, *Münster.*
Sp. 5. E. moniliformis, *Münst.*
6. E. Hoferi, *Münst.*
7. E. mespiliformis, *Goldf.*

Genus 2. *Solanocrinites,* Goldf.

Sp. 1. S. costatus, *Goldf.*
" S. scrobiculatus, *Münst.*
Sp. 3. S. Jaegeri, *Goldf.*

Genus 3. *Apiocrinites,* Miller.

Sp. 1. A. rotundus, *Mill.*
2. A. intermedius, *Pearce.*
3. A. elongatus, *Pearce.*
4. A. ellipticus, *Mill.*
Sp. 5. A. rosaceus ? ? ? *Schloth.*
6. A. mespiliformis ? *Goldf.*
7. A. Milleri ? ? *Schloth.*
8. A. flexuosus ? *Goldf.*

Genus 4. *Holopus,* D'Orbigny.

Sp. 1. H. Rangii, *D'Orbigny.*

#### Family 2. POTERIOCRINOIDEA, *Austin's MS.*

Genus 1. *Poteriocrinites,* Miller.

Sp. 1. P. crassus, *Mill.*
2. P. tenuis, *Mill.*
3. P. granulosus, *Phillips.*
4. P. Dudleyensis, *Aust. MS.*
P. minimus, *Aust. MS.*
6. P. radiatus, *Aust. MS.*
Sp. 7. P. rostratus, *Aust. MS.*
8. P. quinquangularis, *Aust. MS.*
9. P. plicatus, *Aust. MS.*
10. P. dactyloides, *Aust. MS.*
11. P. conicus, *Phillips.*

Genus 2. *Isocrinites,* Phillips.

Sp. 1. I. Egertoni, *Phill.*
" I. nobilis, *Phill.*
I. tuberculatus, *Mill.*
I. longidactylus, *A. MS.* n. sp.
Sp. 5. I. brevidactylus, *A. MS.* n. sp.
6. I. quinquangularis, *Aust. MS.* n. sp.
7. I. macrodactylus, *Phill.*

Genus 3. *Synbathocrinites,* Phillips.

Sp. 1. S. conicus, *Phill.*

#### Family 3. ENCRINOIDEA, *Austin's MS.*

Genus 1. *Encrinites,* Miller.

Sp. 1. E. moniliformis, *Mill.*

Genus 2. *Eucalyptocrinites,* Goldf.

Sp. 1. E. rosaceus, *Goldf.*
Sp. 2. E. decorus, *Phill.*

Genus 3. *Cupressocrinites*, Goldf.

| | |
|---|---|
| Sp. 1. C. crassus, *Goldf.* | Sp. 3. C. tesseratus, *Goldf.* |
| 2. C. gracilis, *Goldf.* | |

Genus 4. *Euryocrinites*, Phillips.

Sp. 1. E. concavus, *Phill.*

Family 4. Pentacrinoidea, *Austin's MS.*

Genus 1. *Pentacrinites*, Miller.

| | |
|---|---|
| Sp. 1. P. Caput Medusæ, *Mill.* | Sp. 7. P. moniliferus, *Goldf.* |
| 2. P. Briareus, *Mill.* | 8. P. subsulcatus, *Münst.* |
| 3. P. Johnsonii, *Aust. MS.* | 9. P. subteres, *Münst.* |
| 4. P. basaltiformis, *Mill.* | 10. P. Milleri. |
| 5. P. tuberculatus, *Mill.* | 11. P. lepidotus, *Aust. MS.* |
| 6. P. pentagonalis, *Goldf.* | 12. P. rotundus, *Aust. MS.* |

Family 5. Marsupiocrinoidea, *Austin's MS.*

Genus 1. *Marsupiocrinites*, Phillips.

Sp. 1. M. cælatus, *Phill.*

Genus 2. *Crotalocrinites*, Austin's MS.

Sp. 1. C. rugosus, *Mill.*

Family 6. Platycrinoidea, *Austin's MS.*

Genus 1. *Platycrinites*, Miller.

| | |
|---|---|
| Sp. 1. lævis, *Mill.* | Sp. 8. P. microstylus ? *Phill.* |
| rugosus, *Mill.* | 9. P. laciniatus, *Gilb.* |
| striatus, *Mill.* | 10. P. mucronatus, *Aust. MS.* |
| granulatus, *Mill.* | 11. P. antheliontes, *Aust. MS.* |
| elongatus, *Gilbertson.* | 12. P. spinosus, *Aust. MS.* |
| gigas, *Phill.* | 13. P. trigintidactylus, *Aust. MS.* |
| interscapularis, *Phill.* | 14. P. ellipticus, *Phill.* |

Genus 2. *Cyathocrinites*, Miller.

| | |
|---|---|
| Sp. 1 planus, *Mill.* | Sp. 6. C.? conicus, *Phill.* |
| geometricus, *Goldf.* | 7. C. bursa, *Phill.* |
| distortus ? *Gilb.* | 8. C. ? capillaris, *Phill.* |
| mamillaris, *Phill.* | 9. C. ? goniodactylus, *Phill.* |
| calcaratus, *Phill.* | 10. C. pinnatus, *Goldf.* |

Genus 3. *Caryocrinites*, Say.

| | |
|---|---|
| Sp. 1. C. ornatus, *Say.* | Sp. 2. C. loricatus, *Say.* |

Family 7. Actinocrinoidea, *Austin's MS.*

Genus 1. *Actinocrinites*, Miller.

| | |
|---|---|
| Sp. 1. A. lævis, *Mill.* | Sp. 7. A. cataphractus, *Aust. MS.* |
| A. triacontadactylus, *Mill.* | 8. A. aculeatus, *Aust. MS.* |
| A. polydactylus, *Mill.* | 9. A. crassus, *Aust. MS.* |
| A. Gilbertsoni, *Mill.* | 10. A. granulatus, *Aust. MS.* |
| A. ? retiarius, *Phill.* | 11. A. lævissimus, *Aust. MS.* |
| A. elephantinus, *Aust. MS.* | 12. A. longispinosus, *Aust. MS.* |

Genus 2. *Rhodocrinites*, Miller.

| | |
|---|---|
| Sp. 1. . calcaratus, *Phill.* | Sp. 5. R. costatus, *Aust. MS.* |
| 2. . ? echinatus, *Goldf.* | 6. R. granulatus, *Aust. MS.* |
| 3. . mamillaris, *Phill.* | 7. R. ? mutabilis, *Aust. MS.* |
| 4. . bursa, *Phill.* | |

Genus 3. *Melocrinites* ? Goldf.

Sp. 1. M. ? hieroglyphicus, *Goldf.*
2. M. ? lævis, *Goldf.*
Sp. 3. M. ? gibbosus, *Goldf.*

Genus 4. *Tetracrinites,* Austin's MS.

Sp. 1. T. formosus, *Aust. MS.*

Family 8. Periecocrinoidea, *Austin's MS.*

Genus 1. *Periecocrinites,* Austin's MS.

Sp. 1. P. costatus, *Aust. MS.*
2. P. articulosus, *Aust. MS.*
Sp. 3. P. globosus, *Aust. MS.*

Genus 2. *Sagenocrinites,* Austin's MS.

Sp. 1. S. expansus, *Phill.*
Sp. 2. S. giganteus, *Aust. MS.*

Family 9. Merocrinoidea.

Genus 1. *Dimerocrinites,* Phill.

Sp. 1. D. decadactylus, *Phill.*
Sp. 2. D. icosidactylus, *Phill.*

Genus 2. *Tetramerocrinites,* Austin's MS.

Sp. 1. T. simplex, *Aust. MS.*

There are several other families and genera containing many species under consideration.

Order 2. *Liberidæ,* Austin's MS.

The animals of this order differ but slightly in their general structure from those in the preceding one. They however possess the power of free motion; are either permanently unattached or become so in their mature state. Some species are furnished with a tapering column, which enables the animal to attach itself to extraneous objects, or to detach itself at will, and move freely through the water.

Family 1. Gnathocrinoidea, *Austin's MS.*

Genus 1. *Gnathocrinites,* Austin's MS.

Sp. 1. G. fusiformis, *Aust. MS.*

Family 2. Astracrinoidea, *Austin's MS.*

Genus 1. *Astracrinites,* Austin's MS.

Sp. 1. A. tetragonus, *Aust. MS.*

Genus 2. *Aporocrinites,* Austin's MS.

Sp. 1. A. gyratus, *Aust. MS.*

Family 3. Comastella, *Austin's MS.*

Genus 1. *Comatula,* Lamarck.

Sp. 1. C. pinnata, *Goldf.*
2. C. tenella, *Goldf.*
3. C. pectinata, *Goldf.*
Sp. 4. C. filiformis, *Goldf.*
5. C. rosacea, *Link.*
&c. &c.

Genus 2. *Marsupites,* Mantell.

Sp. 1. M. ornatus, *Miller.*

Class 2. Olenestella, *Aust. MS.* Spinigrada, *Forbes.*

Body covered with calcareous scales or plates; mouth surrounded by simple or dichotomous rays (not pinnate) furnished with spines, which are used as organs of motion.

Class 3. Lobistella, *Austin's MS.* Cirrhigrada, *Forbes.*

Body more or less covered with calcareous scales or plates; mouth not surrounded by arms; body lobed and channeled for cirrhi.

Class 4. Adelostella, *Austin's MS.* Cirrhi-Spinigrada, *Forbes.*

Body covered with closely-jointed calcareous plates, not lobed, and without arms, sometimes furnished with a calcareous flexible jointed column, but most of the class are free.

Order 1. *Echinidæ.*

Animal free, furnished with series of ambulacral pores for the protrusion of cirrhi, which, in connection with spines attached by ligaments to the plated skeleton, constitute the organs of motion.

Order 2. *Columnidæ,* Austin's MS.

Animal attached by a jointed flexible calcareous column to extraneous bodies; ambulacral pores sometimes wanting, in other instances they are scattered irregularly among the plates ?, but they are usually in regular series, as in the order *Echinidæ*; surface mostly covered with spines, though occasionally smooth.

Family 1. Sphæronoideæ, *Gray.*

Genus 1. *Sphæronites.*

Sp. 1. S. tessellatus, *De la Beche.*
2. S. aurantium.
Sp. 3. S. pomum.
&c. &c.

Genus 2. *Sycocrinites,* Austin's MS.

Sp. 1. S. clausus, *Aust. MS.*
2. S. Jacksoni, *Aust. MS.*
Sp. 3. S. anapeptamenus, *Aust. MS.*

Family 2. Echinocrinoidea, *Austin's MS.*

Genus 1. *Echinocrinus,* Agassiz.

Sp. 1. E. pomum, *Agass.*
2. E. spinosus, *Aust. MS.*
Sp. 3. E. anceps, *Aust. MS.*
4. E. cidariformis ? *Aust. MS.*

Genus 2. *Pentremites,* Say.

Sp. 1. P. inflatus.
2. P. pyriformis, *Say.*
3. P. florealis.
4. P. ovalis, *Goldf.*
Sp. 5. P. acutus, *Gilb.*
6. P. ? astraformis, *Aust. MS.*
7. P. pentangularis.

Genus 3. *Orbitremites.*

Sp. 1. O. globosus.
2. O. Derbiensis, *Sow.*
3. O. ellipticus, *Sow.*
Sp. 4. O. angulatus ? *Gilb.*
5. O. oblongus, *Gilb.*

Class 5. Ascidiastella, *Austin's MS.* Cirrhi-Vermigrada, *Forbes.*

The animals of this class deviate considerably from those in the preceding ones. As spines are wanting, motion is effected by rows of cirrhi, aided by the contraction and extension of the animal's body. The tentaculated mouth forms a prominent feature in its organization.

Class 6. VERMISTELLA, *Aust. MS.* VERMIGRADA, *Forbes.*

The cirrhi, which constitute in part the organs of motion in the fifth class, are wholly wanting in this; the alternate contraction and extension of the animal's body alone effecting progression.

It will be seen on reference to the foregoing arrangement of the *Crinoidea* that several genera and species have been suppressed or unacknowledged. This has not been done without due consideration, but as it would extend this paper, already too long, to an unreasonable length to discuss all the facts which have led to the proposed alteration, we shall merely observe, that some writers on the *Crinoidea* have founded genera and species on imperfect evidence, such as minute fragments of columns, seldom to be relied on, while others have taken the shape, into which the particular specimen they described from may have been squeezed into or contorted by violence at its death, or during its subsequent entombment in the strata, as the data on which to found generic and specific distinctions. If such evidence as this is to be admitted as legitimate grounds to proceed on, we could undertake to double the number of species heretofore described without going beyond the limits of our own cabinet for specimens. Others, in their anxiety to correct the errors of preceding writers, have sometimes fallen into mistakes of equal importance when refounding genera. When this has been clearly the case, we have retained the original name whenever it could be done with propriety. In other cases we have retained the specific name only as given by the founder of the species.

Several unnoted genera and many species are still under consideration.

Among the varied forms observable in the *Crinoidea*, we can trace them step by step as it were merging from their ancient prototypes to their existing analogues of the recent seas. The genus *Echinocrinus*, founded by Professor Agassiz, is not the least remarkable among these forms as the precursors of the *Echinites*. Another genus (*Astracrinites* of our MS.) offers so many affinities to the recent and fossil *Echinodermata*, that we consider it the most remarkable of all the known genera. By its being lobed it approaches to the *Lobistella*; its ambulacra, spines and anus mark it as allied to the *Echinites*, while the arrangement of its calcareous plates connect it with the Lilies of the ocean. In short it possesses the lobes of a starfish, the ambulacra and spines of a sea-urchin, and the plates of a Crinoid. It is further remarkable by deviating from the quinary type so prevalent in the *Echinodermata*: the lobes and ambulacra of this new genus are each four in number.

We have taken the number and arrangement of the plates surrounding the body as the leading characters on which to found our genera, as we have the variations in their form and other observable peculiarities, together with the number of rays or arms to distinguish the different species. Though the mouth of some of our species is central and but slightly protrusive, and in others it assumes the form of an elongated proboscis, yet we have not at present deemed this difference sufficient to found new genera on, when the plates surrounding the body agree in number, shape and general arrangement; nor have we separated those with the mouths placed laterally, if the other points coincide generally. Had these characters been acted on, we must have divided some long-established genera into no less than three, each differing in this particular. The question is however under consideration as to the propriety of continuing the present arrangement in the cases alluded to.

## XIX.—*Descriptions of* Chalcidites *discovered by* C. Darwin, Esq., *near Valparaiso.* By Francis Walker, F.L.S.

Torymus Phormio, Fem. *Viridi-æneus, antennæ nigræ, pedes rufi, femora viridia, alæ sublimpidæ.*

Corpus viridi-æneum, convexum, nitens, scite squameum, parce pubescens: caput transversum, breve, thorace vix latius; vertex sat latus; frons abrupte declivis, excavata: oculi rufi, mediocres, non extantes: antennæ nigræ, subclavatæ, pubescentes, thorace paullo breviores; articuli approximati: thorax longi-ovatus: prothorax transversus, mediocris, antice non angustior: mesothoracis scutum latitudine paullo longius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum subovatum: metathorax mediocris, declivis, obconicus: petiolus brevissimus: abdomen longi-ovatum, subcompressum, subtus carinatum, thorace paullo brevius: oviductus exertus, rufus; vaginæ nigræ, abdomine six breviores: pedes pallide rufi; coxæ virides; femora viridia; ungues et pulvilli fusci; metafemora subtus unidentata, metatibiæ pallide fuscæ, apice spina longa arcuata armatæ: alæ sublimpidæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari fere duplo longior; radialis ulnari brevior, cubitalis brevissimus; stigma minutum. (Corp. long. lin. $1\frac{1}{2}$; alar. lin. $2\frac{1}{4}$.)

Callimome Nonacris, Fem. *Viridi-cyaneus, antennæ nigræ, pedes fusci, femora viridia, alæ sublimpidæ.*

Corpus viridi-cyaneum æneo-varium, convexum, scite squameum, parum nitens, parce pubescens: caput transversum, breve, thoracis latitudine; vertex sat latus; frons abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigræ, validæ, clavatæ, pubescentes, thorace non longiores: thorax longi-ovatus: prothorax sat magnus longitudine paullo latius, antice angustior: mesothoracis scutum latitudine paullo longius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum subovatum: metathorax mediocris, declivis, obconicus: petiolus brevissimus: abdomen ovatum, subcompressum, nitens, subtus carinatum, thorace paullo brevius et angustius: oviductus rufus; vaginæ nigræ, abdominis longitudine: pedes fusci; coxæ virides; femora viridia; tarsi pallide fusci: alæ sublimpidæ; squamulæ virides; nervi picei; nervus humeralis ulnari longior, radialis ulnari multo brevior, cubitalis brevissimus; stigma minimum. (Corp. long. lin. 1; alar. lin. 1$\frac{3}{4}$.)

Callimome Eumelis, Mas. *Viridi-cyaneus, antennæ nigræ, pedes nigro-fusci, femora viridia, alæ sublimpidæ.*

Corpus sublineare, convexum, viridi-cyaneum, scitissime squameum, parum nitens, parce pubescens: caput transversum, breve, thorace paullo latius; vertex sat latus; frons abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigræ, crassæ, thorace vix longiores: thorax longi-ovatus: prothorax transversus, brevis: mesothoracis scutum longitudine vix latius; parapsidum suturæ sat bene determinatæ; scutellum subovatum: metathorax obconicus, mediocris, declivis: petiolus brevissimus: abdomen sublineare, supra planum, thorace brevius: pedes simplices, subæquales, virides; trochanteres picei; genua fusca; tibiæ nigræ; tarsi fusci: alæ sublimpidæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari multo longior, radialis ulnari multo brevior, cubitalis brevissimus; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1$\frac{1}{3}$.)

Asaphes vulgaris? Fem. *Æneus, abdomen atrum, antennæ nigræ, pedes fusco-flavi, femora nigro-cincta, alæ limpidæ.*

*Asaphes vulgaris*, Ent. Mag.

Corpus convexum, æneum, nitens, fere læve, parce pubescens: caput transversum, breve, thorace paullo latius; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigræ: thorax longi-obconicus: prothorax transversus, mediocris: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatæ fere conniventes; scutellum subconicum: metathorax obconicus, declivis, mediocris: petiolus gracilis: abdomen longi-ovatum, atrum, læve, glabrum, subtus carinatum, apice acuminatum, thoracis longitudine: pedes simplices, subæquales, flavi; coxæ æneæ, femora nigro-cincta; tarsi apice fusci; mesotibiæ et metatibiæ pallide fuscæ: alæ limpidæ; squamulæ piceæ; nervi fulvi; nervus humeralis ulnari multo longior, radialis ulnari brevior, cubitali longior; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1$\frac{1}{4}$.)

Lamprotatus Cæcina, Fem. *Cyaneus, antennæ nigræ, pedes flavi, femora fusco-cincta, alæ limpidæ.*

Corpus convexum, cyaneum, scitissime squameum, parum nitens, parce pubescens: caput transversum, breve, thoracis latitudine; vertex sat latus; frons impressa, abrupte declivis: oculi mediocres, non extantes: antennæ nigræ: thorax ovatus: prothorax brevis, antice angustior: mesothoracis scutum transversum; parapsidum suturæ sat bene determinatæ; scutellum obconicum: metathorax declivis, mediocris, obconicus: petiolus sat longus: abdomen ovatum, nitens, læve, fere glabrum, supra convexum, subtus carinatum, thorace brevius: pedes simplices, subæquales, flavi; coxæ virides; femora fusco-cincta; tarsi apice fusci: alæ limpidæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari multo longior, radialis ulnari brevior, cubitali longior; stigma parvum. (Corp. long. lin. 1; alar. lin. 1$\frac{1}{4}$.)

Lyrcus (n. g.) Origo, Fem. *Nigro-cyaneus, antennæ nigræ, pedes fusci fulvo-cincti, alæ sublimpidæ.*

Corpus breve, crassum, convexum, nigro-cyaneum, scitissime squameum, parum nitens, parce pubescens: caput transversum, breve, thoracis latitudine; vertex latus; frons abrupte declivis, vix impressa: oculi rufi, mediocres, non extantes: antennæ subclavatæ, graciles, 9-articulatæ? nigræ, thorace paullo longiores; articulus $1^{us}$ longus, gracilis; $2^{us}$ longi-cyathiformis; $3^{us}$ et sequentes breves; clava fusiformis: thorax brevi-ovatus: prothorax transversus, brevissimus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ, postice approximatæ; scutellum obconicum: metathorax longi-obconicus, declivis: petiolus brevissimus: abdomen ovatum, nitens, breve, supra planum, subtus carinatum, apice acuminatum; thorace paullo angustius, vix longius: pedes graciles, simplices, alæ qu [illegible] fulv [illegible] api [illegible] ba iqu [illegible] fulv [illegible] tarsi fulvi apice fusci, articulus $1^{us}$ longus, $2^{us}$ multo brevior, $3^{us}$ adhuc brevior, $4^{us}$ 3° longior; ungues et pulvilli minuti: alæ sublimpidæ, mediocres; coxæ piceæ; nervi fulvi; nervus humeralis ulnari multo longior, radialis ulnari longior, cubitalis longissimus ulnari vix brevior. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Pteromalus Gryneus, Fem. *Cupreus, antennæ piceæ, pedes flavi, alæ limpidæ.*

Corpus cupreum, convexum, scitissime squameum, parum nitens: caput thorace vix latius, subtus æneo-viride; vertex sat latus; frons abrupte declivis, excavata: oculi picei, mediocres, non extantes: antennæ piceæ, subclavatæ, thorace non longiores: thorax ovatus: prothorax brevissimus, supra vix conspicuus: mesothoracis scutum transversum; parapsidum suturæ vix conspicuæ; scutellum sat magnum, subrotundum: metathorax brevis, declivis, postice angustus: petiolus brevissimus: abdomen ovatum, nitens, læve, fere glabrum, supra planum, subtus carinatum, apice acuminatum, thorace paullo angustius, vix longius: pedes flavi; coxæ virides; tarsi apice fusci: alæ limpidæ; squamulæ fulvæ; nervi flavi; nervus humeralis ulnari multo longior; radialis cubitali multo longior, ulnari non brevior; stigma minutum. (Corp. long. lin. 1; alar. lin. $1\frac{1}{2}$.)

Entedon Bedius, Mas. *Æneo-viride, abdomen basi viridi-cyaneum, antennæ nigræ, pedes flavi, alæ flavescentes.*

Corpus convexum, læte viride, æneo-varium, nitens, scitissime squameum, parce pubescens: caput transversum, breve, thorace paullo latius; vertex sat latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigræ, hirtæ, setaceæ, thorace non longiores; articulus $1^{us}$ longus, gracilis; $2^{us}$ et sequentes breviores, lineares: thorax ovatus: prothorax brevissimus, supra vix conspicuus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatæ; scutellum magnum, subovatum: metathorax magnus, obconicus, declivis: petiolus longus, cylindricus: abdomen brevi-ovatum læve, glabrum, quasi contractum, basi viridi-cyaneum, subtus convexum, thorace brevius; segmentum $1^{um}$ maximum, $2^{um}$ et sequentia brevia: pedes graciles, simplices, subæquales, pallide flavi; coxæ virides; tarsi apice fusci: alæ flavo-tinctæ, sat latæ; squamula fuscæ; nervi fulvi; nervus ulnaris humerali fere duplo longior, radialis humerali brevior, cubitalis brevissimus; stigma minutum. (Corp. long. lin. 1; alar. lin. 2.)

Entedon Flacilla, Mas. *Viride, cyaneo aut cupreo varium, antennæ nigræ, pedes flavi, alæ flavo-limpidæ.*

Corpus convexum, læte viride, nitens, scitissime squameum, parce pubescens: caput transversum, breve, viridi-æneum, thorax paullo latius; vertex sat latus; frons abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigræ, graciles, subfiliformes, thorace paullo breviores; articulus $1^{us}$ gracilis, sublinearis; $2^{us}$ et sequentes ad $5^{um}$ breviores, subæquales; clava fusiformis, acuminata, articulo 5° multo longior: thorax ovatus: prothorax brevissimus, supra vix conspicuus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ; scutellum viridi-æneum, subovatum:

metathorax magnus, declivis, obconicus: petiolus sat longus: abdomen brevi-ovatum, læve, fere glabrum, subtus convexum, basi viridi-cyaneum, thorace brevius: pedes pallide flavi, graciles, simplices, subæquales; coxæ virides; tarsi apice fusci: alæ flavo vix tinctæ; squamulæ fuscæ; nervi fulvi; nervus ulnaris humerali multo longior, radialis brevis, cubitalis brevissimus; stigma minutum. (Corp. long. lin. $\frac{1}{2}$; alar. lin. 1.)

*Var.* β.—Antennis articulus $1^{us}$ basi flavus: alæ flavescentes.

*Var.* γ.—Corpus cupreo-varium.

Found also in Valdivia.

Eulophus Rhianus, Fem. *Nigro-æneus, pedes fusci, alæ sublimpidæ.*

Corpus sublineare, convexum, nigro-æneum, nitens, scite squameum, parce pubescens: caput transversum, breve, thoracis latitudine; vertex sat latus; frons impressa: oculi rufi, mediocres, non extantes: antennæ ademptæ: thorax longi-ovatus: prothorax transversus, mesothorace angustior: mesothoracis scutum longitudine latius; parapsidum suturæ sat bene determinatæ; scutellum magnum, subquadratum, postice latius: metathorax declivis, obconicus, mediocris: petiolus brevissimus: abdomen longi-ovatum, læve, supra planum, subtus carinatum, apice acuminatum, thorace vix longius: pedes simplices, subæquales, fusci; coxæ nigræ; genua fulva: alæ sublimpidæ, squamulæ piceæ; nervi fulvi; nervus ulnaris humerali longior, radialis humerali brevior, cubitali longior; stigma parvum. (Corp. long. lin. 1; alar. lin. $1\frac{2}{3}$.)

Genus Tetrastichus, *Haliday.*

A genus formed of *Cirrospilus Lycidas* (Mon. Chal. i. 295.) and other species.

Tetrastichus Polybæa, Mas et Fem. *Ater, antennæ nigræ, pedes nigro-fusci flavo-cincti, alæ limpidæ.*

Corpus sublineare, convexum, atrum, nitens, læve, fere glabrum: caput transversum, brevissimum, thorace paullo latius; vertex latus; frons impressa, abrupte declivis: oculi mediocres, non extantes: antennæ filiformes, pilosæ, nigræ, graciles, thorace longiores: thorax ovatus: prothorax brevissimus, supra non conspicuus: mesothoracis scutum latum; parapsidum suturæ remotæ, bene determinatæ, postice approximatæ; scutellum obconicum, mediocre, bisulcatum. metathorax declivis, obconicus: petiolus brevissimus: abdomen sublineare, depressum, thorace angustius, non longius: pedes graciles, subæquales, nigræ; tibiæ fuscæ; tarsi flavi, apice fusci; protibiæ flavæ: alæ limpidæ, latæ, ciliatæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari multo brevior, radialis nullus, cubitalis sat longus, stigma minimum.

*Fem.* Caput thoracis latitudine; abdomen longi-ovatum, subtus carinatum, apice acuminatum, thorace longius. (Corp. long. lin. $\frac{1}{2}$—$\frac{2}{3}$; alar. lin. $\frac{3}{4}$—1.)

Tetrastichus Scadius, Fem. *Viridis, antennæ piceæ, pedes flavi, femora viridia, alæ limpidæ.*

Corpus crassum, convexum, obscure viride, subtilissime squameum, parum nitens, parce pubescens: caput transversum, breve, thoracis latitudine; vertex sat latus; frons abrupte declivis: oculi rufi, mediocres, non extantes: antennæ piceæ, clavatæ, pubescentes, thorace paullo breviores; clava triarticulata. ovata, acuminata, articulo præcedente latior et plus duplo longior: thorax ovatus: prothorax transversus, mediocris: mesothoracis scutum latum; parapsidum suturæ bene determinatæ; scutellum subconicum, bisulcatum: metathorax brevis, obconicus, declivis: petiolus brevissimus: abdomen longi-ovatum, nitens, supra convexum, subtus carinatum, apice acuminatum, thorace paullo longius et angustius; segmenta transversa, subæqualia: pedes flavi; coxæ virides; trochanteres picei; femora viridia, apice flava; tarsi apice fusci: alæ limpidæ; squamulæ piceæ; nervi fulvi; nervus ulnaris humerali multo longior, radialis nullus, cubitalis sat longus; stigma minimum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{3}$.)

## XX.—*Short notice of a Botanical Trip to the Highlands of Scotland.* By Professor J. H. Balfour, M.D.

This trip was made in August last, along with my friend Mr. Babington and several of my pupils. We first visited the Clova district, and collected most of the rare alpine plants which are known to exist in that part of the Grampian range. *Sonchus alpinus* was found in a new locality in Glen Dole. The cliff on which *Astragalus alpinus* used to be found abundantly was examined with care, but only two or three specimens of the plant were seen.

From Clova we proceeded by Glen Callatea to Braemar, and made several botanical excursions in the neighbourhood of Castleton.

In our ascent of Ben Aven, one of the lofty mountains in the Braemar district, we examined a hill called Little Craigindal, which deserves notice on account of the number of good alpine plants which it furnished. The hill has a rounded contour, is readily accessible, and is composed of loose dry granitic and micaceous rocks. We were delighted to find upon it *Astragalus alpinus* in great abundance, both in flower and fruit. In some places the turf was actually composed of this plant. *Carex rupestris* was also growing beside it in large quantity. The other plants seen on this hill were, *Thalictrum alpinum*, *Viola palustris*, *Silene acaulis*, *Dryas octopetala*, *Potentilla alpestris*, *Rubus chamæmorus*, *Alchemilla vulgaris*, β. *subsericea*, *Epilobium alpinum* and *alsinefolium*, *Sedum Rhodiola*, *Saxifraga oppositifolia*, *aizoides* and *stellaris*, *Cornus suecica*, *Hieracium alpinum* and *murorum*, β. *pulmonarium*, γ. *Lawsoni*, *Saussurea alpina*, *Gnaphalium supinum*, *Vaccinium uliginosum*, *Arctostaphylos Uva-ursi*, *Azalea procumbens*, *Pyrola media* and *secunda*, *Veronica Chamædrys*, var. *hirsuta*, and *V. serpyllifolia*, β. *humifusa*, *Trientalis europæa*, *Armeria maritima*, β. *alpina*, *Oxyria reniformis*, *Salix herbacea* and *myrsinites*, β. *arbutifolia*, *Betula nana*, *Listera cordata*, *Tofieldia palustris*, *Juncus trifidus* and *triglumis*, *Luzula spicata*, *Carex rigida*, *capillaris* and *pauciflora*, *Aira alpina*, *Lycopodium alpinum*. The hill at first sight appeared to be very unpromising in a botanical point of view, not presenting any of those wet, disintegrating, micaceous cliffs, on which the best alpine plants in Scotland are found; and I have therefore detailed fully all the plants which were observed, with the view of calling the attention of botanists to many hills of a similar nature which occur in the Braemar district, and which I fear have been overlooked. Much still remains to be done in that part of Scotland, and I have no doubt that many of the plants hitherto considered as confined to the Clova range will, on careful examination, be detected on the Braemar hills. On reaching the summit of Ben Aven we gathered *Luzula arcuata* in considerable quantity.

In all the alpine districts which we visited, we met with numerous varieties of *Hieracium alpinum, Halleri* and *Lawsoni*. These require to be carefully studied, and I trust that ere long Mr. Babington will give us the result of his examination.

On leaving Braemar Mr. Babington and I proceeded to Dingwall, with the view of botanizing on some of the Ross-shire mountains. On Ben Wyvis we saw luxuriant specimens of *Arctostaphylos alpina*, growing in a damp situation more than 1000 feet below the summit. In the other districts of Scotland in which I have picked this plant, I have generally found it on the dry stony summits of the mountains. The other plants found on Ben Wyvis are not of such importance as to deserve notice. The mountain is not rich in alpine species, a character which it appears to possess in common with most of the other hills in Ross-shire.

We returned to Glasgow by the Caledonian Canal and Inverary, and picked *Potamogeton plantagineus* in several localities near Oban, and a variety of *Hieracium prenanthoides*, without a ray on the shores of Loch Long near Arrochar.

## XXI.—Excerpta Zoologica: *On Metamorphoses among Intestinal Worms.* Communicated by W. Francis, Ph. D., A.L.S.*

M. Miescher found *Filaria piscium* especially frequent in the following fish exposed for sale in the Paris market: in *Triglæ Gurnardus, Lyra, Cuculus*, and *lineata*, in *Trachinus Draco* and *Gadus Merlangus*. The *Filariæ* were partly free in the ventral cavity; some lie beneath the peritoneal coverings of the different intestines, between the layers of the mesentery beneath the peritoneum of the ventral walls,

* The present notice, which was alluded to in the last Number of this Journal, p. 48, is taken from Dr. Th. von Siebold's valuable report on the investigations in Helminthology during 1840, and published in Wiegmann's 'Archiv,' parts 4 and 5 for 1841. It not only furnishes the results of Miescher's interesting discoveries, but also draws attention to similar vestigations by Leblond and Dr. Siebold. Miescher's paper is published in the Reports of the Proceedings of the Naturalists' Society in Bâle.

in the muscles of the latter mostly singly, sometimes several lying together in nests, and inclosed in a common pseudo-membranous cyst. I (adds Dr. Siebold) am somewhat surprised at the latter part of this statement, as I have never met with more than one individual of *Fil. piscium* inclosed in a cyst in *Gadus Callarias*. (Wiegmann's 'Archiv,' vol. i. p. 306, 1838.) Miescher's description of the worm agrees with the one I have there given, with the exception that Miescher does not notice the peculiar band-like organ, which, according to my own researches, extends through the entire cavity of the body of the *Filaria*; on the other hand, Miescher succeeded, in the further course of his inquiries, in detecting the sexual parts, which at first appeared to be entirely missing. He found the female sexual organs arranged in the usual manner, but so minute and delicate that they were easily overlooked. The two oviducts even in the largest specimens did not contain any trace of eggs, but their contents seemed to consist merely of a limpid fluid mixed with a few very minute granules. The sheath reached the muscular membrane at the end of the first third of the worm, but no external aperture could be perceived. These *Filaria* seem to be subject to a changing of skin, as Miescher not only met with a number of shrivelled empty sacs, but frequently found *Filaria* still situated in these sacs and crawling about with them; such a sac surrounded accurately the body of the *Filaria*, but projected somewhat beyond the anterior and hind part of the worm, and contained in its cavity a clear fluid, sometimes rendered opake by granules.

In company with these *Filaria*, Miescher always found, in considerable number, peculiar chrysaloid bodies, but stiff and without motion, lying free in the ventral cavity, or buried in the muscles of the ventral walls; sometimes they lay in one and the same fold, and were inclosed by similar pseudo-membranous cysts. These chrysaloid bodies consist of two parts, of a globular or ovate body (resembling in form a Florence oil-flask), and of a cylindrical tail proceeding from it. The head is about $\frac{2}{3}$ to $\frac{3}{4}$ lin. in diameter and 1 to $\frac{5}{4}$ in length, and is drawn out at its free end into a short truncate umbilicus. The tail is from 4 to 6 lines long, separated by a distinct constriction from the head, rounded at its extremity, and generally curved in the form of a crozier. I conceive these chrysaloid bodies to be perfectly identical with those described and figured by Leblond (Ann. des Sciences Nat., 1836, p. 290. pl. 16. fig. 2, 3.), from *Muræna Conger*. With regard to the changes which these bodies gradually undergo, Miescher observed that the tail not only decreased in length but entirely shrivelled up, so that at last only the head remained; in the mean time this expanded into double or thrice its volume, and appeared at last as a simple elongate rounded sac. This sac, whether it still possessed a caudal extremity or not, always consisted of an external thicker brownish-coloured covering, beneath which was a second always more delicate, transparent covering, inclosing a cavity corresponding to the external form of the sac; this cavity was quite filled by a new worm, the form of which was according to that of the cavity; so long, for instance, as the chrysaloid body still consisted of head and tail, the more or less prolonged neck of the worm extended into the cavity of the tail. At the end of the neck there is an incurvation which might be regarded as the mouth. I perceive in the drawing of Leblond a distinct aperture at the same place. Of the great sucking head which Leblond asserts his having seen on the body of this worm, to which he has applied the name of *Amphistoma ropaloides*, there is no mention in Miescher's description. Miescher further observed, on the redevelopment of the tail, that the neck of the worm withdrew itself within the expanded head and gradually disappeared entirely; in the simple oval cysts he then found an oval, somewhat flattened trematodoid worm, at the front margin of which the incurvation suspected to be the mouth was more distinct. This worm consisted of a transparent homogeneous substance, with round large and small granules scattered in it, without the slightest trace of any distinct internal organs: its vermoid motions, even though sluggish, did not allow of the least doubt being entertained as to the independent animality of this worm. Miescher did not hesitate to suspect that the chrysaloid bodies were derived from the *Filaria*, although he did not observe directly the metamorphosis of a *Filaria* into a clavate body. Miescher adduces the following reasons in support of his supposition: the rudimentary organs of generation of the *Filaria* indicate that these animals have not yet reached their full development; the clavate bodies occurred with the *Filaria* in the very same place; Miescher saw whole nests of clavate bodies and *Filaria* inclosed by a common cyst, in which large and small *Filaria*, with and without tails, occurred. In the three different genera of fish on which these inquiries were made, in *Trachinus*, *Gadus* and *Trigla*, the *Filaria*, and also the clavate bodies, presented complete specific differences.

The trematodoid worm appeared now to develope anew, while the substance of the *Filaria*, with the exception of the epidermis, dissolved into nutriment for the new creature. Miescher found the posterior extremity of the *Filaria* to be the point of development of the new worm. A *Tetrarrhynchus* gradually formed in the hinder portion of the body of the trematodoid worm, while the first worm still continued to live and did not quit its envelope. The *Tetrarrhynchus*, which was in no way in organic connexion with the trematodoid worm, lay bent spirally together in its cavity, and showed by its retraction and exsertion of the four snouts, and by the rotation of its body, signs of its independent existence. Leblond likewise observed in the tailed bodies a similar *Tetrarrhynchus*, which he considered to be the *Tet. appendiculatus*, Rud. Miescher makes no mention of the appendage which Leblond observed on this worm. Miescher found in a *Trigla Gurnardus*, in the month of March, together with living *Filaria* and clavate sacs, tailless sacs, most of which were empty and only contained a mucous granular substance. On further examination he detected in the ventral cavity some *Tetrarrhynchi* which had just escaped; but was greatly surprised, on opening the pericardial cavity, to find this swarming with *Tetrarrhynchi*, and the heart full of them, which was the more remarkable, as Miescher had never met with *Filaria* or clavate bodies in this cavity. The *Tetrarrhynchi* of this place were characterized by a short appendage to the extremity of the body, somewhat smaller than the rest of the body, and inserted as it were within it. Miescher was able to observe on these worms the ease with which, by means of their hooked proboscis, they pierce into and bury themselves in the different intestines of the fish without the least injury to them; he was therefore justified in concluding that the *Tetrarrhynchi* met with in the pericardial cavity had got into it from the ventral cavity. Miescher suspects that the *Tetrarrhynchi* were on their way to quit the fish through the membranaceous hind wall of the gill-cavity, behind which they had already collected in considerable number. Miescher further suspects that these *Tetrarrhynchi*, having got into the sea-water, search for other animals as an abode; this seemed to him very probable, as he subsequently often met with similar *Tetrarrhynchi* at Nice, in the mantles of *Loligo sagittata*, which were filled with water. I likewise found at Pola quite similar sexless *Tetrarrhynchi*, provided with an appendage inserted into the body between the ventral folds of *Sepia officinalis*, as if they had bored their way from without in order to find a new habitat. Miescher lastly questions whether the sexless *Tetrarrhynchi* might not subsequently change into *Bothriocephali* of the group furnished with hooks, as the *Bothriocephali* belonging to this group perfectly resemble in head and neck a *Tetrarrhynchus*. In favour of the probability of this metamorphosis, Miescher adduces the following observation: a *Notidanus griseus*, just killed at Nice, contained in the cavity of the spiral intestine a great number of *Bothriocephalus corollatus*, Rud.: in the articulations of this tape-worm the male and female genitalia were distinctly developed; beneath the membranes of the same intestine there was found, inclosed in a thick-walled cyst of the size of a pea, a worm, to the *Tetrarrhynchus* head of which two *Tænia* joints, without developed genitalia, were affixed: without doubt this undeveloped worm was connected with the *Bothriocephalus corollatus* of the intestinal cavity.

Creplin* found, like Miescher, similar bodies provided with a tail: on the peritoneum of *Esox Belone*, he states his having seen a pore at its thick end, agreeing in this respect with Leblond, but he did not any more than myself notice a worm, but only a white granular mass in these sacs. Creplin's observation, that *Esox Belone* contains in the cavity of its body a remarkable parasite, resembling *Tetr. attenuatus*, two inches in length, is however interesting.

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## XXII.—*Description of a new Species of* Poa. By Richard Parnell, M.D., F.R.S.E., &c.†

[With a Plate.]

The *Poa* about to be described was gathered by Dr. Balfour, Professor of Botany in the University of Glasgow, on a mountain called Ben Voirlich, near the head of Loch Lomond, during

* Encyclopädie von Ersch und Gruber, p. 294.

† The description and drawings are taken from a work on Scottish Grasses about to be published by Dr. Parnell.—Edit.

an excursion with his pupils in July last. Specimens of it were also collected by him in August last, on the mountains of Clova in Forfarshire. The plant grows on micaceous soil, at an elevation varying from 2000 to 2500 feet above the level of the sea. It has been named in honour of its discoverer, and the following are the characters by which it is distinguished:—

Poa Balfouri, *Parnell.* St. John's Meadow-grass.

*Specific Characters.*—Florets slightly webbed. Ligule prominent, obtuse. Upper leaf nearly as long as its sheath. Outer palea five-ribbed. Stem compressed.

*Description.*—It grows from three to fifteen inches high: the root is perennial, creeping. *Stem* erect, compressed, furnished with a few minute spiculæ, with their points directed upwards, producing a slight roughness to the touch; bearing three or four leaves, with scarcely smooth sheaths; the upper sheath a very little longer than its leaf, crowned with a prominent obtuse ligule (Pl. V. fig. 4.); second sheath shorter than its leaf, covering the upper joint. *Joints* three, situated on the lowest third of the stem. *Leaves* confined to the lower part, leaving nearly two-thirds of the stem naked; all the leaves of about equal length, short, lanceolate, roughest on the upper surface and edges, smooth below. *Inflorescence*, a simple or compound panicle. *Panicle* erect, from one to three inches long, spreading when luxuriant; branches slender, rough, the lower ones mostly in pairs. *Spikelets* erect, ovate, of three awnless florets, the summit of the lowermost floret on a level with the apex of the large glume of the calyx; the three or four uppermost spikelets arising from the rachis, the lower ones on lateral branches. *Calyx* of two unequal-acute glumes (fig. 1.), three-ribbed, the dorsal rib minutely toothed on the upper third, margins membranous. *Florets* of two paleæ (fig. 2.). The *outer palea* of lowermost floret equal in length to the large glume of the calyx, five-ribbed; the rib on each side of the dorsal rib not hairy, and rather indistinct (unless the palea be held between the lens and light); lower half of the dorsal and marginal ribs hairy; base of the two lowermost florets furnished with three or four long, silky, convoluted hairs, which seem but slightly attached to the calyx. *Inner palea* about equal in length to the outer palea, with two green marginal ribs minutely fringed. *Pedicel* of second floret slightly hairy. *Filaments* three. *Anthers* notched at each extremity. *Ovary* obovate. *Styles* two, distinct. *Stipules* feathery. *Scales* acute, notched (Pl. V. fig. 5.).

Dr. Balfour collected two varieties of the grass, one, *var. rigida*, short and stout, from 3 to 5 inches high, with a short simple panicle of few spikelets; and the other, *var. extensa*, tall and slender, from 8 to 12 inches in height, with a simple panicle of few spikelets.

This grass is closely allied to *Poa nemoralis*, but differs from it in the *ligule* of the upper sheath being prominent; *upper leaf* scarcely as long as its sheath; all the *joints* situated on the lower third of the stem, and covered by the sheaths; *stem* slightly roughish: whereas in *P. nemoralis* the *ligule* is very short; *upper leaf* as long, often longer than its sheath; *upper joint* situated not below the middle of the stem, and not covered by the second sheath; *stem* smooth.

From *Poa montana** it differs in the *florets* being webbed; *upper joint* situated on the lower third of the stem; *lower floret* equal in length to the large glume of the calyx: whereas in *P. montana* the florets are not in the slightest degree webbed; *upper joint* situated about half-way up the stem; *lower floret* shorter than the large glume; *panicle* longer, more slender, of fewer spikelets on longer foot-stalks; *leaves* more taper-pointed.

From *Poa polynoda*†, Parn., it differs in the *florets* being webbed; *joints* not exceeding three in number, situated on the lower third of the stem; *upper joint* covered by the second sheath: whereas in *P. polynoda* the *florets* are not webbed; *joints* six or seven in number; *upper joint* situated above the middle of the stem, not covered by the second sheath.

From *Poa cæsia* it differs in the *florets* being webbed; *lower floret* equal in length to the large glume of the calyx: whereas in *P. cæsia* the *florets* are not webbed, and the *lower floret* is longer than the large glume of the calyx; the *spikelets* are larger, and the glumes of the calyx nearly equal.

From *Poa compressa* it differs in the *outer palea* being five-ribbed; *spikelets* of three florets; *joints* three, confined to the lower third of the stem: whereas in *P. compressa* the outer palea is three-ribbed; *spikelets* of five to seven florets; *joints* usually five, the upper one situated about the middle of the stem.

From *Poa pratensis* it differs in the *florets* being but slightly webbed; *stem* very much compressed and slightly roughish to the touch; *upper leaf* a very little shorter than its sheath; *spikelets* of three florets; whereas in *P. pratensis* the *florets* are copiously webbed, suspending the calyx by their silky hairs; stem smooth and round (except in the var. *planiculmis*, in which the stem is slightly compressed); *upper leaf* much shorter than its sheath; *spikelets* usually of five florets.

* This species was found on Ben Lawers by Dr. Greville.

† This species is described in Dr. Parnell's work on Scottish Grasses.

The Plate represents *Poa Balfouri*, Parnell, with its variety *rigida*.

PLATE V.

Fig. 1. Glumes of calyx, } magnified.
— 2. Paleæ of a floret, }
— 3. Spikelet, } natural size.
— 4. Ligule with leaf and part of sheath, }
— 5. Stamens, styles, ovary and scales, }

## XXIII.—*Information respecting Scientific Travellers.*

MR. FORBES.

A letter from Mr. Spratt, published in Woolmer's Exeter Gazette, will interest our readers, as giving some particulars relative to our much-esteemed friend Mr. Forbes :—

" I am happy in being able to announce my arrival at the ship, after an absence of nearly four months, most of which was spent in making a tour through ancient Lycia. Mr. Forbes and self parted from our fellow-traveller, the Rev. Mr. Daniell, at Rhodes, who proceeded on to Athens, by way of Smyrna. We had a tedious passage, in a small country-boat, from Rhodes to Syra, of nine days. Poor Forbes, the naturalist, was taken ill on the way, which I soon perceived was the country fever, and he daily got worse until our arrival at Syra, being without medicine or medical advice. His condition was very miserable, and mine, from mental suffering on his account, was nearly as bad. We at length arrived at Syra, in which port I found one of our little tenders, and, through the Consul's exertions, obtained leave from the quarantine department to spend our time in quarantine on board of her. I set sail immediately for our ship, the Beacon, at this place—Paros ; our assistant-surgeon, Mr. Harvey, has joined us to take care of poor Forbes, who is now in an improving condition, but has not taken food for thirteen days. I am myself, thank God, in most excellent health, and am much pleased with our tour. This is certainly the most picturesque country I ever saw, and my companions,—who are better judges, from having travelled over the continent,—say that it is not equalled anywhere in Europe. Its highest mountains are 10,000 feet high—the country fertile in parts, and capable of being made a paradise if sufficiently populous. It may be thus described to you for a general idea of its geographical features. Three large maritime valleys forming its south, east and west districts, the largest of which is Xanthus ; and in its central and northern divisions extensive and fertile plains and valleys, which are from 400 to 500 feet above the sea. These are all delightfully watered with numerous streams and rivulets, and studded with small villages and towns. Its climate is that of England, though less humid, and its inhabitants Turks, who treat strangers with the greatest civilities and kindness. We have lived in their homes, and travelled under their guidance, and found ourselves at all times kindly and honestly dealt with. During the depth of winter these uplands are shut up by snow, when the greater part of the inhabitants retire to the low valleys. On the 24th of May the snow capped the mountains above 700 feet, but was fast melting on that day. I visited one, in height a few hundred feet less—Mount Cragus: large patches of snow were on its sides, and we plucked tulips from the parts uncovered, also crocuses. We ascended from the valley of the Xanthus in the morning, when all appeared advancing summer—the corn was ripe and the heat intense; but at noon we descended into a climate where the vegetation showed a dawning spring. These changes are very curious, and one of the sources of interest to the traveller. Our labours in Lycia have been crowned with success; we have discovered several ancient cities by examining others which were before known; have identified their names from inscriptions found amongst their ruins, and shall thus correct many errors of our predecessors, Mr. Fellows, &c., who opened the interests of this unknown part of Asia Minor to the world by two journeys through it. He won the laurels of his fame by first discovering, and by his most praiseworthy perseverance and exertions in endeavours to procure for his country its riches. All the results of our digging during the last winter are now on their way to England by the Monarch and Medea. The ships' companies had tough work in the removal of them. When we passed through the ruins on our return we found them hard at it with bullock-carts and hand-trucks, with flat-bottomed boats conveying the heavy blocks down to the sea. The officers and men suffered very much from mosquitoes and fever. Termessus was our greatest discovery, which we found about eight miles N.W. of Adela, and Cibyra, the next, both of which are identified by inscriptions cut in them. The ruins of the former are so extensive that we had not time to examine it minutely."

We are happy to have received much later intelligence from a gentleman just arrived in England, who states that on his passing through Syra he heard that Mr. Forbes had quite recovered. We learn also from the Prospectus of the Summer Course at King's College, London, that he has been appointed to succeed Mr. Don in the Botanical Professorship.

*The Antarctic Expedition.*

The Alarm, Capt. T. L. Stewart, left Guernsey last year for the Falkland Islands, and departed from thence at the end of May last for Buenos Ayres. A gentleman of this island (Guernsey) having received a letter by her, giving some account of Capt. Ross and the vessels under him, engaged on a scientific voyage of discovery towards the Antarctic Pole, has favoured us with the following extract:—

"Captain Ross and the Antarctic expedition are now here. The Erebus and Terror came in contact, on endeavouring to escape an iceberg, in the seas of the Southern Pole. The expedition will positively be here for five or six months to repair the vessels and to make observations.

"Captain Ross has been so kind, at my request, to ascertain the rate of evaporation in these islands; and Hooker, the botanist, is also so good as to draw up a report on the Grasses, the prevailing *Gra-*

*mineæ* being considered as unknown in Europe. The splendid tussack grass is the gold and glory of these islands. It will, I hope, yet make the fortune of Orkney and Irish landowners of peat bogs. Every animal here feeds upon it with avidity, and fattens in a short time. It may be planted and cut like the guinea grass of the West Indies. The blades are about six feet long, and from 200 to 300 shoots spring from one plant. I have proved, by several experiments, that one man can cut 100 bundles in a day; and that a horse will greedily devour five of these in the same time. Indeed, so fond of it are both horses and cows, that they will eat the dry tussack thatch from the roofs of the houses in preference to good grass. About four inches of the root eats like the mountain-cabbage. It loves a rank wet peat bog, with the sea-spray over it. Indeed, when the sea beats with the greatest violence, and the sea-spray is carried furthest, then the tussack grass thrives the best on the soil it loves. All the smaller islands here, though some of them are as large as Guernsey, are covered with tussack, which is nutritious all the year.

"The whole of the gentlemen on the expedition are delighted with the Falkland Islands, and express themselves as being more pleased with them than even with New Zealand. Some think them in every way better for colonization, even with the drawback of wanting timber-trees there. When the observations made during their voyage are published, you will be surprised at their favourable account of the climate.

"In addition to all these scientific observations, the surveying department is exploring and examining different harbours, sites for different objects in a new settlement, &c.

"The botanist and I started from Port William, where I had been eight days, at seven o'clock in this winter morning, and on foot; arrived at Government House by four o'clock in the afternoon, examining the country we travelled over, where there is a good deal of mossy bog. No one had done this before in one day during the winter, yet the distance as the crow flies is not far.

"I have tamed a Guanaco from Patagonia. He lies down before the fire, with his head on my knee, like a dog, though he is now as tall as a donkey. I hope to get more in the Falkland Islands. They browse on the poorest land, and their flesh is like venison. Their wool is thick, but I fear not so valuable as that of the Alpaca. The monkey from the Cape de Verds has hitherto kept his health, and is quite lively. I hope soon to give a favourable account of my adding to our domestic breed of animals the valuable fur seal.

"In going from Fort Sussex to Mount Osborne I passed several herds of wild cattle. The day was most beautiful, and so clear that I saw from Cape Dolphin to Cape Carysford, all over Berkley Sound. Lively Island appeared at our feet."—*From the Guernsey Star.*

### LETTER FROM MR. FRASER, ZOOLOGIST TO THE NIGER EXPEDITION.

*To Richard Taylor, Esq.*

My dear Sir,—I arrived here on the 15th of May, after a cruise of six weeks in the Bights, in H.M.S. Iris, Termagant and Persian.

Notwithstanding the rainy season has set in, I have collected upwards of 100 skins, besides specimens in spirits. Amongst my mammalia I may mention a specimen of Mr. Waterhouse's *Colobus satanus*, which I intend sending entire for Mr. Owen's examination; a specimen of *Antilope Ogilbyi*, Waterh.; six species of *Sciurus*, and a Flying Squirrel, which I trust will prove a new form: also an animal called by the colonists the "Ground Pig," which appears nearly allied to Mr. Waterhouse's *Cricetomys*, which I think will also prove new; a species of *Sorex* and a *Manis*, the latter of which I had alive for some days. I wish to stay here for at least twelve months should my health permit. I have requested Mr. Ogilby to describe some of my specimens which I have enumerated.

Louis Fraser.

P.S.—Here lie the remains of that most enthusiastic traveller Lander, without a mark or memorandum to distinguish his grave from those of his coloured neighbours. Upon this I will make no remark; having stated the fact, I shall leave it to your own reflections.

Fernando Po, Clarence, June 19, 1842.

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## BIBLIOGRAPHICAL NOTICES.

*Iconografia della Fauna Italica.* By C. L. Bonaparte, Prince of Canino. Rome, 1832–1842. London, Gould.

It is satisfactory to find that Italy, so long pre-eminent in literature and art, is at the present time displaying considerable energy in the cultivation of natural history. The museums of Turin and Florence have attained a very high degree of excellence, and respectable public collections also exist in Rome, Padua, Parma, Bologna, and other large towns. Nor do the naturalists of that country confine themselves to the formation of museums alone. Much has been done of late in Italy for the advancement of zoological and botanical science by the publication of original memoirs in the Transactions of the Academies of Turin, Florence and Bologna, as well as by the production of independent works. Unfortunately these publications are but too little known in this country, from the present very imperfect system of communication between the English and Italian booksellers.

Among the zoological works which have recently issued from the presses of Italy, there is none which has a higher claim to our attention than the 'Fauna Italica' of the Prince of Canino. For the last ten years this work has absorbed a large portion of the time and energies of its indefatigable and truly philosophic author, and as the publication is now complete, it is deserving of some notice in this journal.

The object of the present work is to illustrate the Vertebrate Animals of Italy, by giving accurate coloured plates and descriptions of all the new or imperfectly known species. Of the Reptiles of Italy it contains an entire monograph, but of the other classes of Vertebrata it necessarily includes a selection only, though its illustrious author holds out a hope, if his life be spared, of hereafter completing the entire Fauna of Italy. In the meantime he has given in the introduction to this work an admirably lucid summary of our present state of knowledge of the Italian Vertebrata, which, if translated into the English language, would have considerable interest for British zoologists. From this essay we extract the following tabular result:

| | Total of known species. | European species. | Italian species. | Figured in the present work. |
|---|---|---|---|---|
| Mammalia.... | 1260 | 180 | 90 | 45 |
| Aves ........ | 6000 | 540 | 390 | 35 |
| Reptilia .... | 1300 | 92 | 60 | 60 |
| Pisces ...... | 7000 | 763 | 470 | 181 |

Among the animals illustrated in this work, many are new species, whose existence is now for the first time announced to the world. Some of them had indeed been known to previous naturalists, but, from the superficial methods of observation formerly in use, had been referred to analogous species of the North of Europe. It remained for the acute and discriminating eye of the Prince of Canino to detect the characters of these species, and to raise them to their true rank, and his work becomes in consequence an important contribution, not to the Italian only, but to the European Fauna.

It is indeed an interesting fact to find that Italy, separated as it is from the rest of Europe by a barrier of mountains and of seas, and enjoying a climate which excites the envy of the Teutonic race, possesses a fauna which is in a considerable degree peculiar to itself, or is shared only with its sister peninsulas of Spain and Greece. The present work will consequently possess an interest for the scholar as well as the zoologist, as tending to clear up many doubts respecting the specific identity of the animals alluded to by the poets and naturalists of ancient Italy.

In conclusion we will only add, that the plates of this work, as regards both drawing and colouring, are highly creditable to the Roman artists. The lithographic plates of birds in the earlier numbers are indeed printed rather too black, but the later ones are much improved, and are scarcely, if at all, inferior to the best ornithological works which have been produced in Britain.

*Algæ maris Mediterranei et Adriatici, observationes in diagnosin specierum et dispositionem generum.* Auctore J. G. Agardh. Paris, 1842.

By the kindness of the author we have received this important work, to which we take the earliest opportunity of calling the attention of our readers. Its interest is not merely confined to the geographical details or the elucidation of species and genera, but it contains many new and instructive systematic views, the result of the labours so successfully prosecuted by the author for some years, relative to the structure and germination of Algæ, which bid fair to take off the opprobrium long attached to all attempts at the systematic arrangement of these beautiful but puzzling productions, and which perhaps have been instrumental in calling forth one of the first botanists of the day to their further illustration. It is a curious but happy coincidence, that two botanists, Decaisne and Agardh, deeply imbued with philosophic views, though occasionally differing on important points, should almost at the same time have published an account of the Algæ of two neighbouring seas approaching so near to each other in point of distance, though differing so much in many essential points, as the Red Sea and the Mediterranean.

The following passage from Agardh's preface gives a very interesting general view of the nature of the marine vegetation of the Mediterranean.

The vegetation of the Mediterranean compared with that of neighbouring seas presents a somewhat peculiar aspect. Species which inhabit the Red Sea scarcely occur in the Mediterranean, with the exception of certain cosmopolites which are almost universally distributed; the genera which are most characteristic of the former and most numerous in species, *Sargassum* and *Caulerpa*, are represented in the Mediterranean by very few, and those distinct species. Nor is the difference much less between the vegetation of the Mediterranean and Atlantic; the genus *Fucus*, which abounds in the Atlantic, is altogether wanting in the Mediterranean, or represented by mere floating specimens, which assume however a peculiar form in the Adriatic; many species of *Florideæ* (*Chondrus crispus* and *Ch. mamillosus*, *Rhodomenia laciniata*, *Rh. palmetta*, *Rh. ciliata*, *Delesseria sanguinea*, *D. sinuosa*, *D. alata*, &c.) of the tribes *Sphærococcoideæ* and *Delesseriæ*, which abound in more open seas, do not adorn the rocks of the Mediterranean; *Callithamnia* and *Ceramia* become scarce. On the contrary, the genera *Bryopsis*, *Valonia*, *Griffithsia* and *Polysiphonia* are more numerous in the Mediterranean, and the vegetation of rocks exposed to the sun (embracing very many *Zoospermeæ*, *Laurenciæ*, &c., which are more generally cosmopolites) boasts of perhaps an equal number in either sea. The degree of exposure to light, and the greater or less motion of the waves, are important momenta in the distribution of species.

In the larger and more tranquil and sunny bays, especially those which are shallow and sandy, *Zoospermeæ* principally occur, which are generally adorned with a brighter green in consequence of the greater intensity of the light. *Rivulariæ*, *Lyngbyæ* and many *Confervæ* flourish on the stones scattered about high-water mark; *Bryopsis myura*, *Anadyomene*, *Dasycladus* and many *Laurenciæ* grow on the larger rocks. On stones which are more submerged and consequently less exposed to light, are found *Cystoseira barbata*, *C. crinita*, *C. selaginoides*, &c., *Sargassa*, *Codium Bursa*, *Padina pavonia*, *Liagoreæ*, &c.

In deep and very tranquil bays, which are less exposed to light, we may expect *Siphoneæ* and *Dictyoteæ*; most of the species of *Bryopsis*, *Valonia intricata*, *Codium tomentosum*, *Asperococcus bullosus*, *Stilophoræ*, *Striaria*, *Cutleria*, *Zonariæ*, *Halyseris* and *Dictyota* adorn the stones and rocks with many species. The *Florideæ* love the open sea, choosing however rocks concealed from light and not exposed to very strong currents: *Catenella, Polysiphonia obscura, Chondrus, Griffithsiæ* and *Gelidium ustulatum* inhabit spots almost emersed or sprinkled only with the spray; *Rhytiphlæa tinctoria*, in company with a variety of *Cystoseira abrotanifolia*, is found in ditches; *Nemalion*, many forms of *Gelidium corneum, Hypnæa musciformis, Gigartina acicularis*, &c. prefer such parts of high-water level as are exposed to waves; *Cystoseira amentacea* covers in profusion the more submerged rocks; most of the *Callithamnia, Griffithsiæ, Rhodomenia palmetta, Peyssonellia, Chondrus norvegicus*, and forms of *Gelidium corneum* inhabit the higher but more hidden rocks; *Phyllophora nervosa* and *Ph. Heredia*, with *Ph. coronopifolius*, adorn those which are concealed but more deeply covered. *Sphær. Lactuca* and *Chondria uvaria*, with *Valonia utricularis*, are often found in little hollows amongst sponges.

Agardh considers the Algæ as constituting a distinct class, which he divides into *Zoospermeæ, Florideæ* and *Fucoideæ*, which answer nearly to *Chlorospermei, Rhodospermei* and *Melanospermei* of Harvey. To these must be added *Diatomaceæ*, which however are not included in the present enumeration; nor are the Corallines and *Halimedeæ*, of which Decaisne proposes shortly to give a monograph, than which there are few greater desiderata in cryptogamic botany.

Decaisne's main divisions in his 'Plantes Arab.,' published in the second volume of the 'Archives du Muséum d'Histoire Naturelle,' and in the numbers for May and June of the present year of 'Annales des Sciences Naturelles,' correspond closely with those of Agardh, though he makes one more division, *Synsporeæ*, to include *Zygnema* and its allies, which are classed by Agardh with the *Zoospermeæ*. His *Zoosporeæ, Aplosporeæ* and *Choristosporeæ* accord closely with Agardh's *Zoospermeæ, Fucoideæ* and *Florideæ*. Some genera, however, included by Agardh in his first division, as *Vaucheria, Codium* and *Spongodium*, are classed by Decaisne in his *Aplosporeæ*.

It is scarcely possible, without entering into the subject at great length, to give a sketch of their respective views and systems, especially as, notwithstanding the great similarity in the general result, there are many points of controversy between the authors which at present can scarcely be regarded as settled on firm grounds, and anomalies of structure unsatisfactorily explained or unnoticed*. We must therefore content ourselves with very strongly recommending all who take an interest in Algology to study the memoirs themselves, which will afford ample matter for reflection†. *Palmelleæ* and

* In *Sphæroplea crispa*, which is perhaps better referred to the genus *Lyngbya*, there being no other essential difference than the ultimate globular form of the concentrated masses of the green matter with which the joints are filled, a very curious phænomenon occurs. The masses, which appear to be as truly a form of fructification as the conyocysta of *Aplosporeæ*, being surrounded by their own especial hyaline coat, as is also the case in *Lyngbya speciosa* and *Lyngbya Carmichaeliana*, after a certain time break up again into Zoosperms endowed with the most lively motion. Other equally anomalous facts occur which can scarcely be at present referred with certainty to given types.

† Decaisne, who has very deeply studied the subject, has referred with great ingenuity the different forms of fructification to distinct types. He

*Ulvaceæ* are by both referred to *Zoospermeæ*; but it is to be observed, that in *Tetraspora lubrica* the four spores originate from a single globose body, precisely as in *Delesseria* and other genera with *Tetraspores*, and the quaternary arrangement in *Porphyra* appears to be of a very similar nature. We have, at least, in *Porphyra vulgaris* witnessed the division of cells into four distinct spores, each furnished with its proper envelope. *Palmella rupestris* presents also an analogous structure. We are inclined then to think, when the matter has been further studied, that they may be safely removed from their present very anomalous position. *Chætophora*, again, if Decaisne's principles be fully carried out, must be removed to his *Aplosporeæ*, for the simple spores are as fully developed in the only species in which they have been at present observed as in any genus whatever.

One of the most useful points as regards species is the settling the true position of *Zonaria squamaria*, which is raised to the rank of a genus under the name of *Peyssonellia*, and it appears clearly to be allied to *Sphærococcus*. The genus *Ralfsia* (= *Zonaria deusta*), which appears not to have been known either to Decaisne or Agardh, as clearly belongs to the Aplosporic group.

In conclusion we beg leave to direct attention to a very interesting work by Meneghini* on the Algæ of Italy and Dalmatia, of which we have received the first fasciculus from the author, and we understand that another has appeared. It will consist of about ten fasciculi.

## PROCEEDINGS OF LEARNED SOCIETIES.

### ZOOLOGICAL SOCIETY.

Dec. 14, 1841.—Richard Owen, Esq., Vice-President, in the Chair.

Mr. Waterhouse laid before the Meeting his descriptions of numerous species of Coleopterous insects from the southern parts of South America, which had been placed in his hands for that purpose by H. Cuming, Esq. and C. Darwin, Esq. Those from Mr. Cuming formed part of a collection made by Mr. Thomas Bridges, who expressed a wish that the specimens should be laid before the Zoological Society. Unfortunately, the exact localities of the insects are not mentioned in Mr. Bridges's notes, but there is reason to believe

seems inclined to deny two modes of fructification altogether, and it must be confessed that his views, especially in *Choristosporeæ* (= [illegible]), are maintained with great ingenuity, though such generally received opinions as that of the diœcious character of these Algæ cannot very easily be set aside. The typical form of fructification he considers to be the quadripartite granules, whether more or less superficial or arranged in podlike processes, and the so-called capsules he considers as mere modifications of these granules. This is one of the main points of difference between Decaisne and Agardh, and somewhat analogous points of difference exist in the other orders. His explanation of the structure of *Ulvaceæ* appears to us less clear than other points.

* Alghe Italiane e Dalmatiche, illustrate Dal Prof. G. Meneghini. Padova, Marzo 1812.

they were collected in the neighbourhood of Petorca. The species described belong to the genera *Nyctelia* and *Listroderes*, or are nearly allied to those two groups.

## Section HETEROMERA.

### Family NYCTELIIDÆ.

### Genus NYCTELIA.

Species from the collection of Thomas Bridges, Esq.

NYCTELIA LÆVIS. *Nyct. atra, nitida; capite anticè punctis sparsis notato; thorace mediocritèr convexo, latiore plusquàm longo, parte anticâ angustiore, ad latera modicè rotundato, margine anteriore, pilis brevibus flavescentibus fimbriato, angulis et anticis et posticis productis et subacutis, dorso punctis parvulis dispersis: elytris lævibus convexis, brevibus, ovatis, apice producto et subacuto; carinâ laterali crenulatâ; segmentis abdominalibus rugis irregularibus longitudinalitèr impressis.*

Long. corp. $11\frac{1}{2}$ lin.; lat. $6\frac{3}{4}$; lat. thoracis, $4\frac{2}{3}$; long. ib. $2\frac{3}{4}$.

Black and glossy; general form ovate; thorax and elytra convex above, and presenting no distinct sculpturing. Head with scattered punctures in front, smooth behind. Thorax with very fine scattered punctures, and these most numerous on the fore part: parallel with, and at a short distance from the lateral margins of the thorax is an indistinct line on each side, formed by the somewhat abrupt termination of the convex discoidal portion at this part; the space between this line and the outer margin is nearly plane, and presents a few indistinct irregular rugæ, having a tendency to a transverse disposition. The thorax is broader than long, the width to the length bearing very nearly the proportion of 8 to 5; the middle of the thorax and hindermost part are about equal in width, but from the middle to the front the width gradually decreases; in front it is emarginated, and the anterior margin is furnished with a fringe of short, dense, yellowish hairs; the posterior margin presents an undulating line, encroaching on the body of the thorax on each side about midway between the mesial line and the posterior angle, which is produced. The elytra are very convex, and nearly of an ovate form; they are widest in the middle, and the apical portion is produced; the lateral keel (which forms the outer boundary of each elytron, viewing the insect from above) is not very prominent, and is indistinctly crenulated: this ridge does not extend to the apex of the elytron, but terminates about two and a half lines from that point: between the apex and the terminal point of the keel is an oblique ridge: the sutural portion of the elytra is distinctly indented near the scutellum, and less distinctly so at other parts. The mentum is coarsely punctured: the prosternum and mesosternum are coarsely punctured in the middle, and the punctures are confluent: the metasternum has small and somewhat irregular longitudinal rugæ in the middle, and similar rugæ are observable on the first, second, and anterior half of the third abdominal segments. The legs are black, but the tip of the femora and base of the tibiæ are pitchy.

Very many specimens of this species were sent to this country by

Mr. Bridges, and as I have reason to believe they will be distributed in most of the public and private entomological collections, I shall regard it as a type for comparison in describing some other species of the same genus.

Nyctelia lævis, var. rufipes. Many specimens of a *Nyctelia* agreeing with the *N. lævis*, but differing in having the legs and antennæ of a pitchy red colour, were contained in Mr. Bridges's collection. Of these red-legged specimens, as well as of those having the legs concolorous with the body, there are males and females; but the red-legged specimens are generally rather narrower, and often have a slight trace of transverse depressions on the outer side of the elytra; the difference of form and sculpturing, however, is not constantly combined with the red colouring of the legs and antennæ, and as in some other species of *Nyctelia* and *Epipedonota* I have found a similar difference in the colouring of the legs, &c., I cannot regard that character as specific.

Nyctelia transverso-sulcata. *Nyct. atra, nitida; capite anticè sparsim punctato: elytris vix duplò latioribus quàm longis, anticè potiusquàm posticè angustioribus, angulis productis, subacutis: elytris mediocritèr convexis, brevibus, ovatis, apice producto, sulcis haud ad medium attingentibus, profundis et levitèr undulatis, transversìm insculptis; segmentis abdominalibus ferè lævibus.*

Long. corp. 9 lin.; lat. $5\frac{1}{4}$.

This species is smaller than the *N. lævis*, and the thorax and elytra are less convex. The head has a few scattered punctures in front, and numerous very fine punctures on the hinder part, near the eyes; the remaining portions are smooth. The thorax is impunctate, but little convex above, and has two indistinct foveæ on each side near the posterior angles, and joining the hinder margin. The elytra are ovate and slightly convex; the apical portion is produced, and has the outer margin slightly reflected: the lateral keel of the elytra is very prominent, and distinctly crenulated: extending inwards from this keel, to about the middle of the elytron, are a series of transverse and slightly irregular grooves, about fourteen in number, on each elytron; the length of these grooves (the interstices of which are convex) varies so, that they all terminate nearly at the same distance from the suture. On the space between these transverse *sulci* and the suture are two longitudinal striæ, which are somewhat indistinct, and interrupted in parts, excepting on the apical portion of the elytron, where the innermost of the two striæ is well marked, and the suture of the elytra is at this part somewhat elevated. Numerous oblique furrows are observable on the produced apical portion of the elytra. The portion of the elytra which lies below the keel presents no distinct sculpturing. The abdominal segment presents scarcely any trace of longitudinal rugæ. The legs are black, but have a slightly pitchy hue.

Species of *Nyctelia* from the collection formed by C. Darwin, Esq., during the voyage of H.M.S. Beagle.

Nyctelia plicata. *Nyct. ovata, nigra, nitida; capite anteriore crebrè punctato, posteriore ferè lævi; thorace transverso, elytris* *angustiore; angulis posticis productis, obtusis, suprà ad medium paulò convexo, et crebrè punctato; elytris latis, subovatis, convexis, sulcis profundis transversalibus, a margine externo ferè ad suturam ductis, plagâ suturali profundè indentatâ.*

Long. corp. (♂) 13 lin.; lat. $7\frac{1}{2}$; vel, long. $11\frac{1}{2}$ lin., lat. $6\frac{1}{2}$ lin.

Long. corp. (♀) $12\frac{2}{3}$ lin., lat. $7\frac{1}{2}$ lin.

*Hab.* Port Desire.

This species is considerably larger than *N. lævis*; the thorax is proportionately broader and shorter, and the produced apical portion of the elytra is dilated and depressed. The head is thickly punctured in front, and there are numerous punctures at the sides above and behind the eyes. The thorax is about twice as broad as long; the broadest part is behind, but till anterior to the middle it scarcely decreases in width; from the middle to the fore-part the transverse diameter is gradually lessened, so that the lateral margins form a gentle curve; the anterior portion is emarginated, and the posterior margin is rather strongly sinuated; the anterior angles are acute, and the posterior angles are rounded. The upper surface of the thorax is convex in the middle, but towards the sides it is slightly concave; it is thickly punctured, and the punctures are many of them confluent; on the disc the punctures are much less numerous. The elytra are about one-fourth broader than the thorax (rather less in the male sex), and about one-fourth longer than broad; they are very convex, indented at the suture, and furnished with a series of nearly transverse indentations, about eighteen or twenty in number, which commence at the lateral keel and terminate about one-eighth of an inch short of the suture; the space between these transverse folds and the suture is apparently smooth; but with a moderately strong lens some very minute tubercles may be observed scattered on this part, as well as on the interspaces of the transverse indentations, which are about equal in width to the grooves: the apical portion of the elytra is considerably produced, and the produced part is broad and somewhat depressed, and has the upper surface rugose. The mentum is coarsely punctured, and the under side of the head is thickly punctured: the prosternum is coarsely punctured in the middle, and has some irregular rugæ at the sides; at the lateral margin is a series of small transverse rugæ: the mesosternum and metasternum have irregular rugæ in the middle, and the two first and half of the third abdominal segments have small irregular longitudinal rugæ; the remaining two abdominal segments are finely punctured.

Nyctelia Solieri. *Nyct. ovata, nigra, nitida; capite anticè punctato, posticè lævi; thorace transverso, elytris angustiore; angulis posticis productis, suprà apud medium paulò convexo, et lævi; elytris anticè apud plagam suturalem leviter impressis, et sulcis transversis paulo irregularibus a margine laterali ferè ad suturam ductis.*

Long. corp. $11\frac{3}{4}$ lin.; lat. $6\frac{3}{4}$ lin.

*Hab.* Patagonia.

This species resembles the *N. plicata*, but differs in having the thorax smooth; the elytra are rather narrower, and the apical produced part is shorter and broader; they are scarcely indented at the suture, excepting in a slight degree towards the scutellum; the transverse folds are less regular, often dividing into two branches, and approach more near to the suture. A transverse section of the elytra of *N. plicata* would present a convex upper surface near the suture, but at the part where the grooves commence the line would be straight (though sloping downwards to the lateral keel), or even slightly concave; whilst in *N. Solieri* a similar section would present an even convex curve. Scattered punctures are observable on the fore-part of the head, and a shallow transverse depression is situated between the eyes; the thorax is nearly twice as broad as long, convex in the middle, but slightly concave towards the lateral margins: with a moderately strong lens some minute punctures are visible, rather thinly scattered over the surface. The elytra are ovate, the length to the width bearing about the proportion of 7 to 9.

NYCTELIA DARWINII. *Nyct. breviter ovata, convexa, nigra, nitida; capite subpunctato; thorace paulò ad partem anteriorem quàm posticam angustiore, lævi, convexo; elytris subrotundatis, valdè convexis, lævibus, marginibus lateralibus crenulatis.*

Long. corp. $11\frac{2}{3}$ lin.; lat. 8 lin.; vel, long. 11 lin.; lat. $7\frac{1}{4}$ lin.

*Hab.* Port Desire.

This species is remarkable for its broad and very convex form and deficiency of sculpturing, having the upper surface of the thorax and elytra smooth and glossy. The head is finely punctured: the thorax is twice as broad as long, and convex, a groove runs parallel with and close to the lateral margins, and a similar groove is observable on the anterior margin, though here it is less strongly marked. Elytra rather more than one-third broader than the thorax, and the length and breadth are very nearly equal, if we exclude the produced apical portion, which is broad, depressed, and nearly of a semicircular form. The lateral keel is distinctly crenulated, and separated by an adpressed line. The underside of the thoracic segments are rugose in the middle, and the first and second abdominal segments have irregular longitudinal rugæ; the third segment presents a faint trace of similar rugæ at the base; the other segments are smooth.

The spines at the apex of the posterior tibiæ are longer than usual in the genus.

*Nyctelia Darwinii*, var.? minor (long. corp. $8\frac{2}{3}$; lat. $6\frac{1}{3}$); elytris rotundatis apice paulò producto et angustiore.

*Hab.* Port Desire.

NYCTELIA FITZROYI, Curtis, MSS. *Nyct. subrotunda, convexa, nigra, nitida; capite utrinque punctis paucis adsperso; thorace lævi, convexo, anticè latiore, angulis posticis acutis; elytris rotundatis, ad apicem productis, convexis, lævibus, margine externo crenulato; antennis pedibusque piceo-rubris.*

Long. corp. $10\frac{1}{2}$ lin.; lat. 8 lin.

*Hab.* Port Desire.

This species was first discovered by Capt. King, and will be hereafter described in detail by Mr. Curtis, whose MS. name I have adopted. Two specimens were found by Mr. Darwin at Port Desire: it approaches very near in size and general characters to *N. Darwinii*, but differs in having red legs and antennæ, in being of a broader form, in having the legs less rough, the lateral keel of the elytra less prominent, and not so distinctly crenulated, and the spurs or spines at the apex of the posterior tibiæ are much smaller. The length of the elytra is rather less than the width, if the produced apical portion be omitted; and if included in the measurement, the length very slightly exceeds the width; they are very convex and smooth, and so is the thorax, which is twice as broad as long, and considerably narrower before than behind. The head is sparingly punctured.

Nyctelia granulata, Curtis, MSS. *Nyct. atra, nitida, subrotundata; capite transversìm impresso, anticè punctato; thorace subquadrato, ad latera crenulato, suprà convexo, lævi; elytris rotundatis, apice paulò productis, suprà convexis, ad suturam depressis, rugis validis et irregularibus obsitis, his in dorso plerumque longitudinalibus et prope latera obliquè dispositis.*

Long. corp. $8\frac{1}{4}$ lin.; lat. 6 lin.

*Hab.* Cape Negro.

This, together with several nearly allied and very remarkable species of *Nyctelia*, occurs in Capt. King's collection, and will be hereafter characterized in detail by Mr. Curtis. The specimen from which the above short description is taken forms part of Mr. Darwin's collection, and was found at Cape Negro. The legs are very rough, being thickly covered with tubercles, and they are shorter than in most of the species of *Nyctelia*. The whole upper surface of the elytra is covered with rugæ, and these are very strongly marked, and though very irregular, they have a general longitudinal direction on the depressed space on the middle of the elytra. This sutural depression, which is about two lines in width, is bounded on each side by a broad and slightly elevated ridge; between this ridge and the outer margin the rugæ have a tendency to form oblique lines. A few fine punctures are observable on the fore-part of the thorax, and on the sides are two grooves placed closely together, and parallel with and near the lateral margin; the narrow ridge between the two grooves, as well as the marginal ridge, is crenulated.

Nyctelia puncticollis. *Nyct. ovata, atra, nitida; thorace distinctè et crebrè punctato; elytris tuberculis minutis, et ad latera rugis transversis irregulariter impressis, his non forte distinctis.*

Long. corp. $9\frac{3}{4}$ lin.; lat. 6 lin.

*Hab.* Bahia Blanca.

This species is rather smaller than the *N. lævis*, and has the thorax and elytra less convex. The head is rather thickly and coarsely punctured, excepting on the vertex. The thorax is thickly and coarsely punctured, and the punctures are for the most part confluent; a distinctly impressed line runs parallel with and close to the margins; the lateral margins are obscurely crenulated. The elytra are of a broad ovate form, and the apical produced portion is convex and rounded at the apex. The lateral keel of the elytra is distinctly crenulated, and transverse shallow furrows run inwards from this margin, leaving interspaces rather broader than the furrows, which, for the most part, are about a line, or rather less, in length. On the interspaces between the furrows, and the whole upper surface of the elytra, are very minute scattered tubercles; these are very indistinct towards the suture, near which are one or two very faint striæ. The labrum is coarsely punctured, and the underside of the head is also punctured. The under surface of the prothorax is covered with small tubercles, from each of which springs a hair; between the legs, the under side of the prothorax and mesothorax is coarsely punctured. The first, second and third of the abdominal segments are covered with distinct longitudinal rugæ, and the apical segments are punctured beneath.

Several specimens of this species were collected at Bahia Blanca by Mr. Darwin, who says they are 'tolerably abundant on sand-hillocks.' A *Nyctelia* in Mr. Darwin's collection, from Rio Negro, resembles the present species, excepting that it has pitchy red legs and antennæ.

NYCTELIA SUBSULCATA. *Nyct. ovata, atra; thorace transverso distinctè punctato; elytris rugis tuberculisque minutissimis; sulcis transversis aliquanto irregularibus ad latera insculptis.*

Long. thoracis elytrorumque, $9\frac{1}{3}$ lin.; lat. $5\frac{2}{3}$ lin.

*Hab.* Mendoza.

This species is very closely allied to the *N. puncticollis*, and it is with considerable hesitation that I venture to describe it as distinct, more especially as Mr. Darwin's collection contains but one specimen, and that has lost its head and legs; this specimen, however, differs considerably in form from any of the numerous examples of *N. puncticollis* which I have before me. The thorax is narrower and less thickly punctured; the elytra are more elongated, and the lateral transverse grooves are more distinct and regular.

The thorax is transverse, and the length is equal to rather more than half the width; the middle and hinder parts are very nearly equal in width, and the anterior portion is contracted; the surface is distinctly punctured, and there are two irregular foveæ on each side of the middle, rather nearer to the mesial line than the outer margin. The elytra are one-fourth longer than broad; the apical portion is moderately produced and somewhat pointed: the whole upper surface of the elytra is covered with very minute rugæ, and there are moreover some minute tubercles; on the outer half of each elytron is a series of transverse furrows, with convex interspaces equal in width to the furrows.

NYCTELIA SAUNDERSII. *Nyct. atra, oblongo-ovata, nitida; thorace punctato; elytris sulcis transversis paulò irregularibus a margine laterali usque ad medium ductis.*

Long. corp. $7\frac{1}{2}$ lin.; lat. 4 lin.

*Hab.* Bahia Blanca.

Head distinctly punctured in front. Thorax rather coarsely punctured, excepting on the disc, which is almost impunctate; emarginated in front, the emarginated portion in the form of a segment of a circle; the lateral margin slightly rounded. The hinder part of the thorax and the middle are equal in width; the fore-part is slightly contracted. The elytra are ovate, and but little convex; they are depressed at the suture, most distinctly so near the scutellum. The lateral keel is very prominent, and extending from this keel to the middle of the elytron are distinct transverse furrows, the interspaces of which are convex, and about equal in width to the grooves. The apical portion of the elytra is moderately produced. The three basal segments of the abdomen, as well as the metasternum, are covered with slightly irregular longitudinal rugæ: the terminal segment is punctured. The prosternum and mesosternum are coarsely punctured, and the punctures are confluent.

This is a small species compared with *N. lævis* (being about the size of *N. nodosa*): its form is more elongated and much less convex. The lateral margins of the thorax form an even curve from the front to the back.

The specimens from which the above description is drawn up were found by Mr. Darwin in the month of September, on the sandy plains of Bahia Blanca.

NYCTELIA RUGOSA. *Nyct. nigra, opaca, ovata; thorace distincte punctato; elytris valde rugosis, sulcis duobus, suturam prope, longitudinalibus et interruptis, impressis.*

Long. corp. $7\frac{3}{4}$; lat. $4\frac{2}{3}$.

*Hab.* San Blas (near Rio Negro) and Bahia Blanca.

This, which is a small species compared with *N. lævis*, approaches that species in general form, but the thorax and elytra are less convex. The head is coarsely punctured in front. The thorax is coarsely punctured, and the punctures are numerous, excepting on the disc: a groove runs parallel with and close to the margins, but at the posterior margin it is interrupted in the middle. The elytra are convex, and of a short ovate form, and the apical portion is but little produced; their width is about one-fifth less than the length: the whole upper surface is covered with coarse and very irregular rugæ. Four somewhat interrupted and irregular striæ run parallel with and near the suture, and there are two abbreviated oblique striæ near the scutellum. Besides the ordinary rugæ of the elytra, there are more marked rugæ, which, though very irregular, have a tendency to a transverse disposition, and these cover the outer half of each elytron. The prothorax is punctured beneath and rugose between the legs, as well as the mesosternum and metasternum. The three basal segments of the abdomen are covered with fine but distinct rugæ, and though these rugæ, for the most part, have a longitudinal direction, they are much more irregular than in most species of the genus. The two terminal segments are punctured, but in the penultimate segment the punctures are very few in number, and confined to the sides. The spines at the apex of the anterior tibiæ are more slender and proportionately longer than in *N. lævis.*

Besides the two specimens, one from Bahia Blanca and the other rather further south (San Blas), Mr. Darwin's collection contains a specimen from Tierra del Fuego which is smaller (length $6\frac{2}{3}$ lin., width $3\frac{3}{4}$ lines) and proportionately narrower; but these differences are combined with a greater length of tarsus, and are precisely such differences as exist between the sexes of other species; in fact, it is no doubt the male of the insect from which the above description is taken.

NYCTELIA WESTWOODII. *Nyct. breviter ovata, nitida, atra; capite subpunctato; thorace transverso, posticè paulò latiore quam anticè, leviter convexo, lævi, margine laterali imperspicuè crenulato; elytris ovatis, profundè striatis, interstitiis convexis, striis utrinque ad suturam duabus longitudinalibus, striis reliquis obliquis.*

Long. corp. $7\frac{1}{2}$ lin.; lat. $4\frac{3}{4}$ lin.

*Hab.* Port Desire.

Head with a few punctures in front. Thorax convex, about twice as broad as long, with the middle and hinder parts about equal in width, and the fore-part contracted; the anterior part emarginated, the emarginated portion in the form of a segment of a circle; the hinder margin but slightly waved; a distinct groove runs close to the anterior and lateral margins, which latter are crenulated. Elytra short and rounded; the length and width equal, if the produced apical portion be omitted in the measurement; the apex is moderately produced: the whole surface of the elytra is covered with deep striæ, leaving convex interspaces which are scarcely broader than the grooves; on each side of, and parallel with the suture, are two of these striæ; the remaining grooves are oblique, and for the most part converge towards the apical portion of the elytra: on the sides of the elytra, and more especially towards the apex, the grooves have a tendency to a transverse disposition. The mentum is very coarsely punctured, and there are some distinct punctures on the sides of the head beneath. The prothorax presents a few large scattered punctures beneath, some short irregular (but for the most part transverse) rugæ at the lateral margin, and some longitudinal rugæ near the base of the legs; between the legs the prosternum has some confluent punctures; the mesosternum and metasternum have irregular rugæ, and the three first abdominal segments have minute longitudinal furrows; the penultimate segment is smooth, and the apical one is finely punctured, but the punctures are by no means numerous. The legs and antennæ are rather shorter than usual in the genus.

NYCTELIA STEPHENSII. *Nyct. atra, nitida, lævis: thorace subquadrato; elytris rotundato-ovatis, convexis, carinâ laterali prominenti et crenulatâ; elytrorum apicibus productis latis et subcomplanatis.*

Long. corp. 7 lin.; lat. $4\frac{1}{3}$ lin.

*Hab.* St. Cruz.

Head with scattered punctures in front. Thorax transverse, the width being rather less than double the length; the upper surface is but little convex; the anterior and posterior margins are nearly straight, but the anterior angles are produced and the posterior angles are slightly produced. The width of the fore and hind parts of the thorax is nearly equal, it being but slightly narrower in front, and the sides deviate but little from a straight line; a faint dorsal channel is observable, and a groove runs parallel with and close to the lateral and anterior margins. With the assistance of a strong lens, minute punctures may be observed scattered over the upper surface of the thorax, and some minute tubercles on the under. The elytra are convex, and of a short rounded form, the width and length being very nearly equal, if we do not include the produced apical portion, which is more dilated than in most of the genus, and is nearly flat. A groove runs close to and parallel with the lateral keel, both above and below, and this keel is distinctly crenulated. The upper surface of the elytra presents numerous indistinct and very shallow foveæ. The abdominal segments are almost smooth. The legs are proportionately rather longer than in *N. lævis*.

Mr. Darwin found this species at St. Cruz in the month of April.

Nyctelia Newportii. *Nyct. elongato-ovata, nigra, nitida; capite transversè impresso; thorace lato plus quàm longo, lateribus rotundatis; anticè et posticè latitudine compari; supernè minimè convexo, impunctato, ad latera rugis parvulis obliquis; elytris ovatis, lævibus, plagâ suturali valdè impressis, marginibus lateralibus crenulatis.*

*Hab.* Patagonia.

Long. corp. 10 lin.; lat. 6 lin.

This species is rather smaller than *N. lævis*, and differs moreover in being of a more elongated form, and most especially in the form of the thorax, which is narrower and nearly equal in width, in front and behind: the apical portion of the elytra is much less produced, and the produced portion is broader. The head is sparingly punctured at the sides, and has a curved impression, the chord of which is rather in front of the insertion of the antennæ. The thorax nearly one-third broader than long (taking the length from the anterior and posterior angles); it is broadest in the middle, and a trifle narrower in front than behind; the lateral margins form an even curve; the anterior part is emarginated, the emarginated portion being in the form of a segment of a circle, and a little less than a semicircle: the anterior angles acute, and the posterior angles form very nearly right angles: the hinder margin of the thorax is nearly straight, but the line descends slightly towards the angles. The surface of the thorax is very little convex, and almost impunctate, there being but a few scattered very minute punctures; on the sides, running inwards and upwards, are a series of minute grooves, like scratches, and on the hinder margin a faint trace of very short longitudinal grooves is visible. The elytra are ovate, convex, smooth, and glossy; the region of the suture is broadly and rather deeply depressed; the lateral keel is prominent and distinctly crenulated, and joining this keel are a series of shortish transverse furrows. The under surface of the body and thoracic segments is remarkable for the almost total want of sculpturing, if we except some longitudinal furrows on the under side of the prothorax at the sides.

The exact habitat of the specimen from which the above description is taken is not known, but in Mr. Darwin's collection is a specimen which I am inclined to regard as specifically identical, and which is from St. Julian. It has the elytra proportionately rather broader and the thorax narrower, and the short longitudinal furrows on the hinder margin of the thorax are distinct; the sutural portion of the elytra is less depressed.

NYCTELIA GUERINII. *Nyct. atra, nitida, ovata; capite transversìm impresso; thorace subquadrato in medio paulò dilatato, anticè emarginato, posticè ferè recto; ad marginem lateralem sulcis minutis valdè obliquis insculpto; elytris ovatis, convexis, ad apicem paulò productis, ad latera rugis transversis in seriebus tribus dispositis.*

Long. corp. $9\frac{1}{2}$ lin.; lat. $5\frac{3}{4}$ lin.

*Hab.* St. Cruz.

Rather smaller than *N. lævis*. Head with small punctures very thinly scattered over the upper surface, and with a transverse impression rather in front of the line of the eyes. Thorax subquadrate, the breadth not quite equal to twice the length; the emarginated portion in front in the form of a segment of a circle; the hinder margin nearly straight; the posterior angles scarcely produced, and forming nearly right angles; the anterior angles acute. The thorax is contracted in front, broadest in the middle, and the lateral margin from the middle to the posterior angles forms nearly a straight line: on the hinder part of the upper surface are some extremely minute punctures, and at the sides are some small oblique grooves. The elytra are ovate and moderately convex, and the apical portion is but little produced; the region of the suture is very slightly indented: the sides of the elytra are covered with transverse grooves having narrow convex interspaces; these grooves extend inwards to about the middle of each elytron, and are arranged in three series, being divided by two longitudinal lines; the innermost series is indistinct: the lateral keel is distinctly crenulated. The mentum is distinctly punctured; the prosternum, as well as the other thoracic segments, and the abdominal segments, have the usual sculpturing, but it is less strong than usual.

It is with some hesitation that I name this insect, since it approaches very near to the *N. Newportii*; it differs; however, in having the thorax smaller and proportionately narrower, the elytra less convex, and furnished at the sides with three rows of transverse impressions instead of one; the region of the suture is less depressed.

NYCTELIA SULCICOLLIS. *Nyct. ovata, atra; thorace transverso, ad latera rotundato, anticè angustiore, sulcis minutis longitudinaliter impresso; elytris crebrè punctatis (punctis confluentibus), tuberculisque minutis instructis: capite, thorace elytrorumque lateribus pilis vestitis, pedibusque etiam pilis instructis.*

Long. corp. $8\frac{1}{4}$ lin.; lat. $5\frac{1}{2}$ lin.

*Hab.* St. Cruz.

Much smaller than *N. lævis*, and of a shorter and more rounded form. The upper surface of the head is very thickly punctured throughout, and the punctures run into each other so as to form irregular rugæ. The thorax is twice as broad as long, and has a deep and almost semicircular emargination in front; the anterior angles are acute, and the posterior angles are obtuse, and not produced as in many species of the genus, the hinder margin of the thorax presenting a nearly straight, or but very slightly waved line: the broadest part of the thorax is near the posterior angles, the narrowest part is in front, and the lateral margins are rounded in such a manner that the thorax might almost be described as semicircular, and having the fore-part emarginated. The whole upper surface of the thorax is covered with small but distinct grooves, leaving convex ridges between them about equal in width to the grooves; these furrows are longitudinal in their direction, or very nearly so, excepting in the fore-part, where they diverge from the mesial line and run up to the anterior margin, and at the sides of the thorax, where the grooves are irregular, but have a tendency to a transverse disposition. The under side of the thorax presents similar longitudinal grooves, excepting in the middle, where it is rugosely punctured; scattered hairs cover this under surface of the thorax; and towards the lateral margin the hairs, which are moderately long, are much more numerous and form a projecting fringe, which is visible when the insect is viewed from above. The elytra are of a short ovate form, about one-fourth broader than the thorax, and scarcely one-fifth longer than broad; the apical portion is but little produced: the upper surface is convex, and is thickly covered with small confluent punctures, amongst which minute tubercles are scattered; towards the lateral keel, which is very little prominent, the tubercles are distinct. The sculpturing of the portion of the elytra beneath the keel resembles that above it, but here the tubercles give origin to small hairs*. The meso- and metasternum present irregular rugæ. On the first and basal half of the second abdominal segments are distinct longitudinal rugæ, and a slight trace of similar rugæ is observed at the base of the third segment; on other parts of these segments are some minute scattered punctures. The terminal segment is rather thickly though finely punctured. The legs are clothed with longish ash-coloured hairs.

*Nyctelia nodosa*, Latr. *Zophosis nodosa*, Germar?

Five specimens of this species are contained in the collection of Mr. Darwin, and these are from three different localities, viz. Maldonado (La Plata), Bahia Blanca, and Mendoza.

Nyctelia angustata. *Nyct. atra, elongata, nitida; capite distinctè punctato et tranversìm impresso; antennis piceis; thorace subquadrato, lateribus ferè rectis, anticè emarginato, suprà punctis minutissimis; elytris subelongatis, et cum thorace quoad latitudinem ferè coæqualibus, costis aliquantò irregularibus subelevatis interstitiis rugulosis, ad latera plicis transversalibus.*

* Probably similar hairs originally sprang from the tubercles on the upper surface, but have been worn off.

Long. corp. $7\frac{1}{4}$ lin.; lat. $3\frac{2}{3}$ lin.

*Hab.* Patagonia?

The specimen from which the above characters are taken is a male, and by accident its label, containing the habitat, is lost; it is most probably from Patagonia. In general appearance the *N. angustata* greatly resembles the *N. nodosa*, but it differs in being of a narrower form, and in having the terminal joints (the fifth to the tenth inclusive) broader; the anterior tibiæ are also broader and rather shorter, and the thorax is longer in proportion to the width.

The head is distinctly and very thickly punctured in front. The thorax approaches to a quadrate form, but is slightly narrower in front than behind; the lateral margins form a very slight curve, and in fact are nearly straight; in front it is emarginated, and the emarginated portion is in the form of a segment of a circle; the hinder margin is but little waved; the anterior angles are acute, and the posterior angles are slightly produced and rounded at the point; a faint impressed line borders the anterior and lateral margins: the upper surface is but little convex and finely punctured, but on the disc the punctures are scarcely traceable: the length of the thorax is about equal to three-fifths of the width, whereas in *N. nodosa* the length is about equal to half the width. The elytra are very little broader than the thorax, being scarcely dilated in the middle, and are about one-third longer than broad; they have interrupted and somewhat irregular longitudinal grooves or striæ, and the interspaces are convex; the third and fifth most distinctly so: the striæ and interspaces on the lateral half of each elytron have distinct irregular rugæ, the largest of which are for the most part transverse in direction: the legs are long; the claws are of a pitchy colour. The fifth, sixth, seventh and eighth joints of the antennæ are somewhat compressed, broader than long, and produced in front so as to present nearly a triangular form; the ninth and tenth are still broad, but of a somewhat rounded form.

### Genus Epipedonota.

Epipedonota rugosa. *Epip. atra, opaca: capite rugoso; thorace lato plusquàm longo, posticè angustiore, depresso supernè rugis valdè irregularibus, illis apud marginem exteriorem plerùmque longitudinalibus, illis apud discum ferè transversis, et utrinque costâ majore sublongitudinali definitis; elytris subovatis undatìm rugis plerùmque transversis, et utrinque costâ apud discum valdè elevatâ, deindè alterâ minus elevatâ inter illam et carinam lateralem.*

Long. corp. $8\frac{1}{2}$ lin.; lat. $3\frac{3}{4}$ lin.; vel, long. $11\frac{1}{3}$: lat. $5\frac{3}{4}$.

*Hab.* Petorca?

The whole upper surface of this insect is covered with well-marked irregular rugæ; these are for the most part longitudinal in their direction on the clypeus, and there is a transverse indentation marking the posterior boundary of this part: a little behind the line of the eyes is a somewhat irregular transverse ridge, and in the middle, between this ridge and the transverse groove just mentioned, is a short longitudinal ridge. The labrum is rugosely punctured. The thorax is very nearly twice as broad as long; its anterior and posterior margins are nearly straight, excepting near the lateral angles, which are produced. Besides the ordinary rugæ on the thorax, there are two large longitudinal and slightly curved ridges, situated one on each side, nearly midway between the mesial line and the outer margin; and on each elytron is a strongly elevated costa or ridge, extending from the base very nearly to the apex, and running nearly parallel with the lateral keel of the elytron, on the mesial line of which they are placed. The spaces between these costæ is somewhat concave, and so is the interstice of the costa and the lateral keel of the elytron, which is crenulated or irregularly indented. The mentum is very coarsely punctured, and the punctures are confluent. The under side of the head is punctured, and there are numerous coarse punctures on the prosternum between the legs. The basal segments of the abdomen have small longitudinal sulci beneath.

Besides the great difference in size and form indicated by the dimensions, there occurs sometimes a difference in the sculpturing of the thorax and elytra, which I could scarcely have believed to exist in the same species had I not had an opportunity of examining many specimens. In a specimen before me, the rugæ on the head, thorax and elytra are much less distinct than in the individuals from which the above description is taken; and this is combined with a convexity of the elytra (which are almost always concave between the two dorsal costæ and also between these costæ and the lateral keel), giving a very different aspect to the specimen under consideration.

In having the thorax distinctly contracted behind, and in the more truly moniliform structure of the antennæ, the present insect approaches more nearly to *Callyntra* than to *Epipedonota*, but the terminal joint of the antennæ is decidedly smaller than the rest. I have before me specimens of the *Callyntra multicostata* and *Call. vicina* (which I scarcely think a distinct species), and do not find so marked a difference in the size of the terminal joint of the antennæ as compared with the penultimate joint, as that represented by M. Solier's figure—indeed the penultimate joint and terminal appear to me to be equal in size, or *most* nearly so.

EPIPEDONOTA AFFINIS. *Epip. atra, nitida: capite anticè punctis sparsis, et posticè rugis transversis undulatis, notato; thorace latiore quàm longo, ad medium depresso, rugis vel plicis ferè longitudinalibus, ad latera transversis notato; elytris thorace latioribus, propè suturam ferè lævibus, singulorum dimidio externo sulcis transversis, his costâ longitudinali, in duas series divisis; prosterno sulcis distinctis longitudinalibus; segmentis abdominalibus leviter longitudinali-sulcatis.*

Long. corp. $9\frac{1}{2}$ lin.; lat. $5\frac{1}{3}$ lin.

*Hab.* Petorca?

This species is of a shorter and broader form than *Epip. ebenina*, the furrows on the thorax are smaller and more numerous, and the elytra present but one distinct costa besides the lateral keel, the ridge corresponding to that nearest the suture in *E. ebenina*, being here obliterated, or very nearly so.

The head presents some scattered punctures in front, and, generally, there are some waved transverse impressions towards the hinder part, leaving narrow ridges between them. The thorax is twice as broad as long, has the sides distinctly rounded, the fore-part emarginated in the form of a segment of a circle; the anterior angles are acute, and there is a small indentation in the outer margin close to the angle; the posterior margin is nearly straight in the middle, but the angles are produced: the upper part of the thorax presents a slightly concave surface, and is covered with small sulci; those in the middle are oblique, converging to or towards the hinder part of the mesial line; about midway between this line and the outer margin they become longitudinal in their direction, and a space bordering the lateral margin is covered with oblique but nearly transverse narrow grooves and ridges. The width of the elytra, compared with that of the thorax, is nearly as seven to five, and the elytra are about one-fourth longer than broad, or rather less; the dorsal surface is plane and almost destitute of sculpturing; on the sides are two series of transverse furrows, which are separated by a strong costal ridge; the innermost of these two series of transverse grooves is obliterated towards the base and apex of the elytron, but in the middle they are strongly marked; as are also the transverse grooves between the costal ridge and the lateral keel: on the apical half of each elytron a faint trace of the costa, corresponding to the innermost one in *E. ebenina*, is observable.

Numerous specimens of this new species were contained in Mr. Bridges's collection.

*Epipedonota ebenina*, Solier. *Nyctelia ebenina*, Auct.

Four specimens of this species were brought by Mr. Darwin from Mendoza; two of these are females, and present a character I have not before observed in the species, viz. some zigzag white lines at the apex of the elytra; these lines are observable in the grooves between the costæ: in one specimen there are three of the white lines on each elytron, corresponding with the number of interspaces of the costæ; they are interrupted, and form dots as they recede from the apex of the elytron. In the other specimen there are but two of these lines visible.

*Epipedonota erythropus*, Solier. *Nyctelia erythropus*, Auct.

Mr. Darwin also found this species (if it be really distinct from *ebenina*) at Mendoza.

EPIPEDONOTA BONARIENSIS. *Epip. atra, nitida; thorace suprà irregulariter et longitudinaliter multiplicato, ad latera crenato; elytris utrinque costis duabus elevatis, et sulcis transversalibus ordine triplici.*

Long. corp. $11\frac{1}{2}$ lin.; lat. $5\frac{3}{4}$ lin.; vel, long. $9\frac{2}{3}$ lin.; lat. 5 lin.

*Hab.* Monte Video and Bahia Blanca.

The species nearly resembles the *E. ebenina*, but differs in being larger and proportionately broader; as in *E. ebenina*, each elytron has two longitudinal elevated costæ besides the lateral keel; but the interspaces of all the costæ are indented with transverse furrows, whereas in *E. ebenina* only the two outermost interspaces have these furrows, and here they are much less strongly marked. The lateral keel in *E. ebenina* presents a nearly even line, but in *E. Bonariensis* the keel is distinctly indented; the sulci on the thorax are less strongly marked and more numerous.

Seven specimens of this species occur in Mr. Darwin's collection.

EPIPEDONOTA LATA. *Epip. atra, nitida, lata; capite punctis dispersis anticè, apud medium sulco transverso, et posticè sulcis paucis obliquis; thorace sulcis, his obliquis, illis apud medium longitudinalibus, illis margini proximis transversis, insculpto; elytris convexis costis latis paulò elevatis posticè subobliteratis, spatio inter costam secundam et carinam externam, sulcis profundis transversis notato.*

Long. corp. 9¾ lin.; lat. 6 lin.; vel, long. 8⅔ lin.; lat. 5 lin.

*Hab.* Port Desire.

This species is larger and proportionally much broader than *E. ebenina*. The thorax, in proportion to the size of the insect, is much broader than in any other species of *Epipedonota* here described, the width being nearly equal to two-thirds of the length of the elytra; whereas in *E. affinis*, which I have described as a shorter and broader species than *E. ebenina*, the width of the thorax is scarcely more than equal to half the length of the elytra.

The head is punctured in front and has some waved transverse grooves and ridges between the eyes. The thorax is about twice as broad as long, emarginated in front nearly in the form of a segment of a circle; the lateral margins are rounded; it is widest a little behind the middle and narrowest in front; the anterior and posterior angles are acute; the upper surface is nearly flat, but the lateral margins are slightly reflected; the anterior mesial portion is a little convex, and the posterior mesial portion is sometimes slightly concave; the whole surface is covered with narrow grooves and ridges; those on the dorsal part of the thorax are longitudinal but slightly irregular, towards the sides they are oblique, diverging slightly behind, and a broadish space at the sides is covered with sub-transverse grooves, these being directed inwards and slightly upwards from the lateral margin. The width of the elytra, as compared with the length, is as 4 to 5; their upper surface is convex, excepting at the base, where they are somewhat depressed: on each elytron are three longitudinal narrow grooves, these are distinct and wavy at the base of the elytra; the first groove, or that nearest the suture, is obliterated on the hinder half of the elytron; the second is continued nearly to the apex, but from the base it becomes gradually less distinct; the third extends to the apex, and forms as it were the outer boundary to the convex portion of the elytra for the space between the last-mentioned line and the lateral keel, which is nearly equal in width to one-third of that of the elytron, is nearly flat, or even slightly concave in the males; on this space is a series of deep transverse indentations, leaving convex interstices of a width corresponding to that of the grooves. The two interspaces between the first, second and third striæ of each elytron are very broad and slightly convex; and on the second or outermost of these interspaces are a few oblique furrows, which are not very distinct, and for the most part rather widely separated. Besides the longitudinal striæ mentioned, there are some others, but these are short and confined to the base of the elytra; in the males about five or six longitudinal grooves may be seen at the base of each elytron, and all of these grooves are more or less wavy. The sides of the prosternum present distinct longitudinal sulci, and narrow longitudinal sulci are observable on the abdominal segments.

Three specimens of this new species were brought from Port Desire by Mr. Darwin.

Genus Callyntra, Solier.

*Callyntra vicina*, Solier. One specimen of this species was brought from Valparaiso by Mr. Darwin.

Genus Cerostena, Solier.

Cerostena punctulata. *Cer. atra, elongato-ovata; capite crebrè punctato et transversìm impresso; thorace transverso, anticè profundè emarginato, suprà ferè plano, punctato; marginibus lateralibus reflexis, disco foveis duabus impresso; elytris oblongo-ovatis, paulò convexis, suprà punctulatis, singulis costis duabus dorsalibus subobliteratis; carinâ laterali paulò prominente.*

Long. corp. $8\frac{3}{4}$ lin.; lat. $4\frac{3}{4}$ lin.

*Hab.* St. Cruz.

In general appearance the present species resembles the *Blaps obtusa*, but the thorax is much shorter and the body more depressed. On the hinder part and sides of the elytra is an ashy pubescence, and I think it probable that small hairs have originally been scattered over the whole upper part of the elytra and have been rubbed off the most exposed parts. On the under side of the head and body small hairs are also perceptible in the less exposed parts. The prosternum is very rugose beneath on the fore-part, and has distinct longitudinal furrows at the sides, as has also the mesothorax; the abdominal segments are thickly punctured, and there are longitudinal rugæ on the basal segments. The legs and tarsi are moderately well clothed with small yellowish hairs.

Unfortunately the antennæ are not perfect in the only specimen which Mr. Darwin brought home of this species; in the characters afforded by other parts, however, it agrees with M. Solier's genus *Cerostena*: the absence of sulci on the upper surface of the thorax would serve to distinguish it from the species of that genus hitherto described.

*Psectrascelis pilipes*, Solier. *Nyctelia pilipes*, Guerin. Numerous specimens of this species were brought from Coquimbo by Mr. Darwin.

*Entomoderes Erebi*, Solier. Mr. Darwin's collection contains one specimen of this curious insect, and this was found at Mendoza.

## GEOLOGICAL SOCIETY.

Dec. 15, 1841.—A paper was read, "On the occurrence of the Bristol Bone-Bed in the Lower Lias near Tewkesbury," by Hugh Edwin Strickland, Esq., F.G.S.

After alluding to the occurrence of the bone-bed at various places between Westbury and Watchett, also at Golden Cliff and St. Hilary in Glamorganshire, and at Axmouth, Mr. Strickland proceeds to describe its characters at three newly discovered localities, many miles to the north of the points previously known, namely, Coomb Hill, between Tewkesbury and Gloucester, Wainlode Cliff, and Bushley.

1. *Coomb Hill, four miles south of Tewkesbury**.—In lowering the road through the lias escarpment during the summer of 1841 a considerable surface of the bone-bed was exposed, and its contents were rescued from destruction by Mr. Dudfield of Tewkesbury. The following section is given by Mr. Strickland:—

| | Ft. | in. |
|---|---|---|
| 1. Yellow clay | 2 | 0 |
| 2. Lias limestone | 0 | 3 |
| 3. Yellow clay | 5 | 0 |
| 4. Nodules of lias limestone | 0 | 6 |
| 5. Brown clay | 14 | 0 |
| 6. Impure pyritic limestone with Pectens and small bivalves | 0 | 6 |
| 7. Black laminated clay | 8 | 0 |
| 8. Hard, grey pyritic limestone | 0 | 2 |
| 9. Black laminated clay | 1 | 0 |
| 10. Greyish sandstone | 0 | 2 |
| 11. Black laminated clay | 1 | 6 |
| 12. *Bone-bed* | 0 | 1 |
| 13. Black laminated clay | 3 | 6 |
| 14. Compact, angular, greenish marl | 25 | 0 |
| 15. Red marl | 3 | 0 |
| Dip about 12° east. | 64 | 8 |

The bone-bed, No. 12, rarely exceeds one inch in thickness, and frequently thins out to less than a quarter of an inch. It consists in some places chiefly of scales, teeth and bones of fishes, and small coprolites cemented by iron pyrites, but in others the organic remains are rare, and are replaced by a whitish micaceous sandstone. The osseous fragments, Mr. Strickland states, have the appearance of having been washed into the hollows of a rippled surface of clay, and of having been subjected to slight mechanical action. The existence of gentle currents is further proved, he says, by the presence of small rounded pebbles of white quartz, a substance of very rare occurrence in the liassic series. The only shell found in the bed at Coomb Hill is a smooth bivalve, but too imperfect to be generically determined.

2. *Wainlode Cliff, three miles west-south-west from Coomb Hill.*—The section exposed at this locality has been laid open by the action of the Severn, and consists of the following beds:—

* Mr. Murchison has noticed the section formerly exposed in this escarpment, but at the time he examined the district, Mr. Strickland says, the banks were obscured by debris, and the bone-bed did not attract his attention. See Mr. Murchison's Account of the Geology of Cheltenham, p. 24, plate, fig. 1, and Silurian System, pp. 20, 29, pl. 29, fig. 1.

| | | Ft. | in. |
|---|---|---|---|
| 1. | Black laminated clay, inclosing, near the top, a band of lias limestone with Ostreæ | 22 | 0 |
| 2. | Slaty calcareous sandstone, with a peculiar small species of Pecten | 0 | 4 |
| 3. | Black laminated clay | 9 | 0 |
| 4. | *Bone-bed,* passing into white sandstone | 0 | 3 |
| 5. | Black laminated clay | 2 | 0 |
| 6. | Light green angular marl | 23 | 0 |
| 7. | Red marls, with zones of a greenish colour | 42 | 0 |
| | Dip very slight to the south. | 98 | 7 |

The bone-bed is far less rich in organic remains, accumulations of fragments of bones and coprolites occurring at rare intervals; and its prevailing character is that of a fissile, white, micaceous sandstone, sometimes acquiring a flinty hardness. The upper surface of the bed is ripple-marked, and in some cases presents impressions considered by Mr. Strickland to have been probably made by the claws of crustacea. A small bivalve is also the only shell found in the bed. The stratum No. 2, the author says, is evidently a continuation of No. 6. of the Coomb Hill section.

3. *Bushley, two miles and a half west of Tewkesbury.*—The intersection of the lias escarpment by the Ledbury road near Bushley afforded Mr. Strickland the following section:—

| | | Ft. | in. |
|---|---|---|---|
| 1. | Black laminated clay, about | 10 | 0 |
| 2. | Lias limestone | 0 | 4 |
| 3. | Black laminated clay | 6 | 0 |
| 4. | Compact slaty bed with numerous small bivalves, and the Pecten of Wainlode and Coomb Hill | 0 | 3 |
| 5. | Black laminated clay | 9 | 0 |
| 6. | *White micaceous sandstone,* with impressions of two species of bivalve shells | 1 | 0 |
| 7. | Black laminated clay | 2 | 6 |
| 8. | Greenish marl, about | 20 | 0 |
| 9. | Red marl | — | – |
| | Dip about 8° east. | 49 | 1 |

The sandstone bed, No. 6, agreeing precisely with that at Wainlode Cliff, Mr. Strickland does not hesitate to consider it the representative of the bone-bed, though organic remains are wanting; and he points out the identity of the stratum No. 4. with the beds Nos. 2. and 6. of the preceding sections. The author also refers to the railway section near Droitwich, and identifies with the bone-bed the two-feet band of white micaceous sandstone six feet above the top of the green marl, as it contains the same indeterminable small bivalve. He has also examined sections of the lias escarpment at Norton near Kempsey, and Cracombe Hill near Evesham, and has invariably detected, a few feet above the base of the lias clay, a thin band of white sandstone containing the same shell.

The bone-bed at Axmouth, Watchett, Aust, Westbury, and other southern localities, occupies precisely the same geological position, or a few feet above the top of the greenish marls which terminate the New Red system, though much more rich in organic remains; and Mr. Strickland draws attention to this remarkable instance of a very thin stratum ranging over a distance of about 112 miles.

The great abundance of fossils in some parts of this stratum the author considers an indication that a much longer period probably elapsed during its deposition, either on account of the clearness of the water or of a gentle current which prevented the precipitation of muddy particles, than while an equal thickness of the less fossiliferous clays above or below it was accumulated.

The list of organic remains given in the paper includes scales of *Gyrolepis tenuistriatus*? and *Amblyurus*; teeth of *Saurichthys apicalis*, *Acrodus minimus*, *Hybodus minor*, *Pycnodus*?; others bearing an analogy to those of Sargus; portion of a tooth with two finely serrated edges, and considered as probably belonging to a saurian allied to the genus *Palæosaurus*; a tooth of *Hybodus De la Bechei* (*H. medius*, Ag.), a ray of *Nemacanthus monilifer*; small vertebra of a fish; bones of an Ichthyosaurus; coprolites; and the casts of the bivalve before mentioned.

Mr. Strickland next alludes to Sir Philip Egerton's paper on the Ichthyolites of the bone-bed, and he states that the bed cannot be of the age of the muschelkalk, as it overlies the red and green marls, which he considers to have been satisfactorily shown to be equivalent to the Keuper sandstein of Germany; and that the occurrence of muschelkalk fishes associated with lias Ichthyolites only justifies the inference that certain species survived from the period of the muschelkalk to that of the bone-bed. There are yet stronger grounds, Mr. Strickland states, for placing the bone-bed in the liassic series in the remarkable change a few feet below it, from black laminated clay to compact "angular" marl, greenish in the upper part and red below; and he adds, the transition is so sudden that it may be defined within the eighth of an inch; moreover no marl occurs above the line nor black laminated clay below it; and although, in the case of the bone bed, an arenaceous deposit similar to the Keuper sandstein is repeated, accompanied by some triassic organic remains, yet, the author adds, this does not invalidate the evidence of the commencement of a new order of things, or of an interesting passage into the liassic series from the triassic system.

Lastly, Mr. Strickland notices the occurrence of precisely analogous bone-beds in the Upper Ludlow rock, described by Mr. Murchison in the 'Silurian System' (p. 198), and in Caldy Island, near the junction of the carboniferous limestone with the old red sandstone; and he offers some remarks on the bone-beds being found in all the three cases near the passage from one great geological system of rocks to another.

January 5, 1842.—"A Notice on the Fossil Bones found on the surface of a raised Beach at the Hoe near Plymouth," by Edward Moore, M.D., F.L.S., was first read.

At the Meeting of the British Association at Plymouth, Dr. Moore read a paper on the same subject as that which forms part of the present communication*. In this notice he first alludes to the discovery of the beach by the Rev. R. Hennah in 1827†, and to Mr. De la Beche's account of numerous anciently raised beaches in Devon and Cornwall‡; he then briefly describes the characters of the beach, its position in a hollow in the limestone rock, 100 feet wide, 70 feet deep, and, at its base, 35 feet above the present high water mark. He also notices a projecting ledge of limestone stretching several hundred feet southward from this spot, and which sustained a mass of sand, with rolled pebbles and blocks, some of them two or three feet in circumference, and forming a hill twenty to twenty-five feet high, containing patches of loose sand with fragments of *Patella* and *Buccinum*. It was, says the author, easily traced by several patches along the rocks, and proved, by its structure and contents, to be a continuation of the same beach. Dr. Moore likewise briefly describes another deposit 100 yards westward of the beach, and at a greater elevation, being 88 feet above high water, 50 feet in extent, and 10 in thickness, covered irregularly by soil.

The animal remains more particularly enumerated by Dr. Moore consist of a molar and part of the jaw of a young elephant; a femur of a rhinoceros; maxillary bones of a bear, with the malar and palatine processes, and two teeth in each; an entire right lower ramus with teeth and tusks, the latter much worn; four separate tusks; several fragments of long bones; fragments of jaws of the horse containing teeth, numerous loose teeth, portions of long bones, and two caudal vertebræ; likewise portions of a deer's jaw containing teeth. The quantity of the bones which has been found is stated to be equal to several bushels. The vertebræ of a whale, much rounded, were also discovered, with undeterminable portions of ribs. The animals to which the above remains belonged, are considered by Dr. Moore to have coexisted with those which inhabited the caves of Devonshire.

The author then enters upon a defence of the opinions contained in his paper read at Plymouth, respecting the mode of accumulation of the bones. He states that these osseous remains cannot have been derived from the emptying of some cave, because the mass of superincumbent matter which has been removed from above the beach proves that the bones must have been deposited where they were found at a very ancient period, and long before they could have been affected by human agency. There are also no known caves

* Athenæum, No. 721, and the volume of Reports of the British Association for 1841, Trans. of the Sections, p. 62 (published 1842).

† See also "A Succinct Account of the Lime Rocks of Plymouth," by the Rev. R. Hennah, 1822, p. 58.

‡ Manual of Geology, 3rd Edition, p. 173, 1833; also Report on the Geology of Cornwall and Devon, p. 423, 1839.

containing bones sufficiently near. On the contrary, says Dr. Moore, if the sea was at one time at the level indicated by the beach, the Hoe must have been an island accessible by animals at low water, and there appears no obstacle to the supposition that the bears might have selected the beach to devour their prey; and the stranded whale may have added to the banquet. Whether the bones were drifted or not, their occurrence on the top of the beach, and not in it, prevents, the author says, any identity of time in their origin; but that the beach previously existed, and was of marine origin, is proved by the resemblance of the deposit to a modern beach, and its containing sea-shells of the existing period, although few in number.

That the deposit is not the result of glacial action, the author observes, is probable from the want of any indication of such action in the neighbouring district; and though he does not presume to assert that this may not be a cause of drift generally, and even of the upper deposit in the same locality, yet he contends that the dissimilarity in the composition of the lower deposit sustains him in the supposition of its being of different origin, and really a deposit from the sea. Lastly, Dr. Moore, in reference to the present position of the beach far above any point attained by the sea during the greatest storms, states that the deposit must have been elevated by natural causes; and that, however uncertain the exact period of such an event, it seems to have occurred at a time probably more recent than the epoch when the extinct animals disappeared.

Appended to the paper, is a notice of a specimen of perforated limestone taken from the Hoe Lake quarries, eighty-five feet above the present level of high water, and Dr. Moore maintains his belief that the perforations were formed by Pholades, and not by snails.

"Notice on the occurrence of Plants in the Plastic Clay of the Hampshire Coast," by the Rev. P. B. Brodie, F.G.S., was then read.

The cliffs to the east and west of Bournemouth are composed of horizontal strata belonging to the plastic clay formation. East of the town they consist of white and yellow sands, the former containing fragments of wood. Further along the shore the cliffs are higher, and beds of clay full of vegetable remains appear under the sands. About half a mile beyond, a stratum of fine white sand, three or four feet thick, situated near the middle of the cliffs, contains impressions of ferns; and a layer of sand and clay is full of small leaves. The subjacent strata of clay are separated by thin layers of vegetable matter. Somewhat further, beds of white and yellow sand and sandy clay abound with beautiful leaves, and the surface of the strata is in some places covered with a thin layer of iron-sand containing impressions of ferns. In most cases, the various coloured sands are divided by beds of clay, and their fossil contents are distributed in layers at rather distant intervals. Mr. Brodie did not discover any shells. Several of the fossil plants are stated by the author to belong to the *Lauraceæ* and *Amentaceæ*; but he says that these, as well as others which he arranges among the *Characeæ* and Cryptogams, and some of which he has not determined the characters, are all generically distinct from any British plant, and belong to those of a warmer climate. When the sandstone is freshly broken the epidermis of the fossil frequently peels off, leaving the impression of only the fibres. These remains often form masses of some thickness; and, from their state of preservation, must, the author states, have been deposited tranquilly beneath the waters.

## MISCELLANEOUS.

### PLUMATELLA REPENS.

Having this day, in the vicinity of Cheshunt, in a pond whose waters are perennial, met with several fine specimens of the above zoophyte, and these being in a living state, I had an excellent opportunity of comparing its polype with that of *Alcyonidium stagnorum*, which I procured in a pond on Acton Green, Middlesex, some time since and then examined, and I find that the polypi agree in all respects in the two species, the tentacula being arranged upon a crescentic disc in both, and their number corresponding, there being usually about fifty, seldom more than sixty, or less than forty in each polype. The ova too are of the same form in both species.

*Plumatella repens* and *Alcyonella stagnorum* ought therefore without doubt to be regarded as generically identical, for the difference in the mode of branching can scarcely be regarded as affording a character of generic importance: whether they are so specifically or not, has yet to be ascertained, I believe, but I am strongly inclined to think that they are not.

Whenever I have found *Alcyonidium stagnorum*, I have always noticed that it has been attached to pieces of stick, the stems of vegetables, or to some substance which would not necessarily perish and decay in a few weeks, and that some of the specimens were of such a size, being as large as the closed hand, as to lead to the supposition that many months must have elapsed before they could have attained such a development; whereas all the specimens of *Plumatella repens* which I have met with were attached to the decayed leaves of *Typha latifolia*, which in a few short weeks would, as a matter of necessity, be utterly decomposed, involving the zoophyte upon it in its own destruction. In some of my specimens the polypidom has crept over the leaves for several inches, and in all of them without either raising itself from the surface of attachment or exhibiting aggregations of cells, as it might be supposed that it would do were it merely a condition of *Alcyonidium stagnorum*.

September 8th, 1842. A. H. Hassall.

### NOTES ON THE USES OF SOME MADAGASCAR PLANTS TO THE NATIVES.

On looking, in the process of arrangement, through some plants from Madagascar, forwarded to the Herbarium of the Army Medical

Museum, Fort Pitt, Chatham, my attention was directed to some slips of paper attached to a very few specimens, on which were written (evidently by the collector at the time they were undergoing preservation, and whose name is unknown,) the uses of the plants to the natives. Thinking that they may probably furnish some little information, I have subjoined a list of the species with the accompanying remarks:—

*Achyranthes globulifera*, Boj.—The infusion of this plant is used in Madagascar for the cure of syphilis.

*Sizygium terebinthaceum.*—The leaves of this plant are used in Madagascar to give scent to aromatic baths. [Examined under the microscope, both surfaces of the leaves are found to be covered with very minute glandular hairs, having at their apex (which is doubtless the secreting part) a knob of brownish matter, which is most likely to yield the secretion, giving to the plant its aromatic odour.—D. C.]

*Blumea alata.*—Likewise used for a similar purpose as the *Sizygium terebinthaceum.*

*Anthemis dentata*, Boj.—Grows in the province of Emirna: the infusion of the whole plant is used in Madagascar as a sudorific.

*Gnidia daphnoides*, L.—The bark of this plant is manufactured into ropes: met with in the province of Emirna.

*Gentiana lutea*?—Grows on the mountain of Tananarivor, Madagascar. Used by the natives as a bitter, and given in fever and stomachic complaints.

*Dombeya spectabilis*, Boj.—Its bark is made into ropes.

*Amaranthus debilis.*—Used in Madagascar for the cure of syphilitic diseases.

*Dais Madagascariensis*, L.—The bark of this plant is manufactured into paper.

*Croton argyreum.*—Mentioned here on account of its interesting hairs or scales. The under surface of the leaves of this plant present, when viewed with a magnifying power of fifty linear and upwards, a very beautiful appearance. The whole cuticle is closely studded with numerous very small stellate hairs (or scales), in the centre of which a small elevated circular orifice (?) is seen, probably in connexion with the stomata, and from which, as a centre, the radii proceed, giving the hair or scale a conical appearance.* They may indeed be aptly compared, both as to form and apparent structure, to the inverted pappus or seed-down of a compound plant. The numerous brownish spots seen on the under surface of the leaf, are hairs of the same character and structure as those just described, but possessing this difference, viz. that the elevated orifice is of a deep chestnut colour, which tint becomes gradually diffused towards the circumference of the hair, tinging in a slight degree the radii.—Daniel Cooper, Assistant Surgeon to the Forces, Fort Pitt, Chatham.

August 22, 1842.

#### ON THE NUCLEI OF THE BLOOD-CORPUSCLES OF THE VERTEBRATA.

When the corpuscles of the oviparous Vertebrata are mixed with water, or with dilute or strong acetic acid, the nuclei are instantly exposed in the clearest manner, appearing thick, oval, or spherical, and much smaller than their envelopes. Several other vegetable acids and sulphurous acid may be used with the same effect; and the nuclei may also be readily shown by gently moistening with the breath some dry blood on a slip of glass. But when the blood-corpuscles of man and other mammals, not excepting the oval discs of the *Camelidæ* (See Med. Chir. Trans. vol. xxiii., and Lancet, vol. ii. p. 101, 1840–41) are treated by any of the means just specified, and precisely under the same circumstances, no similar nuclei will be observed, unless in very young embryos; for the blood-corpuscles of these enclose a temporary and obvious nucleus which corresponds to the persistent nucleus of the corpuscle of the oviparous Vertebrata. As stated by the author in the Appendix to Gerber's 'Anatomy,' pp. 13 and 30, this does not prove that the corpuscles of mammals have no central matter, although he is induced to infer that these corpuscles have no nucleus like that contained in the corpuscles of the lower vertebrate animals.

The author then gives two figures to show the effect of several reagents, and especially of repeated washing with water till all the colouring matter is removed, on the corpuscles of Mammalia and of the lower Vertebrata. He shows, as he had formerly stated (Phil. Mag. for Feb. 1840, S. 3. vol. xvi. p. 106, 107), that the corpuscles of man, for example, are merely reduced about one-third or one-fourth in size, after completely removing their colouring matter by repeated additions of large quantities of water, when they appear very faint, flat and pellucid, presenting nothing like a nucleus, even when treated with acids and other reagents; nor do these washed blood-discs agree in any respect with the particles which had been commonly described as the nuclei of the blood-corpuscles. Now when all the colouring matter is removed in like manner from the corpuscles of any of the lower Vertebrata, the goose for example, the envelopes and nuclei remain, and are easily distinguishable as distinct parts, both appearing circular, and the nuclei with its component molecules or nucleoli. When exposed by acid the same nuclei present an oval form. Dilute muriatic acid scarcely affects the form of the envelope, but shows the nucleus with an appearance of granular matter around it. The same acid makes the corpuscles of a mammal appear puckered or shrunk, notched at the edges or granulated; some presenting a distinct central spot, irregular at the margin like a granular nucleus; others remaining smooth but misshapen, generally with a dark or brilliant central spot, according to the focus in which they are viewed.—*Abridged from Mr. Gulliver's Contributions to Minute Anatomy, Lond. and Edinb. Phil. Mag. for August.*

### ON THE STRUCTURE OF FIBRINE.

The author, referring to his description and plates in the English version of Gerber's 'Anatomy of the Fibres,' and the organic germs or nucleated nuclei in pale or colourless clots of fibrine, figures similar corpuscles, though of a ruddy colour, in the red parts often found towards the edges of such fibrinous clots. He is disposed to regard all these germs as nearly allied to blood-corpuscles, especially as Dr. Barry has so pertinently asked how many tissues there are that the corpuscles of the blood may not form. It is remarkable, however, that both the ruddy and the pale organic germs of fibrinous clots are irregular in shape, and exhibit nuclei when treated with acetic acid, while precisely the same treatment does not show any nuclei in the free or floating blood-discs. If, therefore, the organic germs of fibrine be blood-corpuscles entangled in the clot, these corpuscles must have undergone changes both in form and in chemical characters. A figure is given in which the germs are exhibited in a mesh of delicate fibrils, together with many very minute circular molecules. The fibrils are also depicted in the fibrine obtained by washing from the blood of the oviparous Vertebrata, which fibrine is further characterized by containing many particles similar to, and probably identical with, the nuclei of the blood-corpuscles.—*Ibid.*

*Discovery of a Chambered Univalve Fossil in the Eocene Tertiary of James River, Virginia.* By M. Tuomey.

Thinking that it may possess sufficient interest, the following notice of the discovery of a *Nautilus* in the Eocene on James River, is communicated.

Mr. Lyell, during his visit to this portion of the tertiary of the United States, directed my attention to the broken link in our great cretaceous formation, presented by Virginia. At his suggestion, I determined to observe any fossils that may come under my notice, with a view to the elucidation of this interesting point. The liberality of Capt. H. H. Cocke, U. S. N., afforded me a good opportunity of examining the fossils of the well-known eocene locality at Evergreen, near City Point, James River. Capt. Cocke, at the instance of Edward Ruffin, Esq., editor of the 'Farmer's Register,' who is engaged in the investigation of the tertiary of Lower Virginia, caused a shaft to be sunk at the base of the escarpment at the locality just mentioned. In this shaft, and at a depth of about twenty feet below the level of tide-water, the fossil referred to was found. It was imbedded in the dark-coloured tenacious clay containing much greensand, common to some of the eocene strata of this region. The exterior of the shell is much decayed, but the pearly surface of the interior is well preserved, and by removing portions parallel to the aperture the concave septa and siphunculus can be seen. It was associated with eocene species of *Turritella*, *Crassatella*, *Pectunculus*, a small *Panopaea*, and a little lower in the same stratum was found a gigantic *Ostrea*, measuring in height eight and a half inches, breadth five and a half inches, and weighing five pounds. The *upper* valve of this *Ostrea* agrees with the description of *O. percrassa*, Conrad, but in the lower valve the cartilage fosset is deep. The muscular impression in each valve exhibits a cavity extending upwards into the substance of the shell about two inches. A person seeing but this huge individual, and the common form of *O. compressirostra*, Say, found in the same stratum, would pronounce them distinct species; but I am in possession of a suite of specimens showing the intermediate forms between the two, and am convinced that this enormous fossil is but a full-grown *O. compressirostra.—From Silliman's American Journal for July* 1842.

EGG OF THE BRAMBLING FINCH.

*To the Editors of the Annals of Natural History.*

GENTLEMEN,—A gentleman of this city has presented me with the egg of a Brambling Finch, laid in his aviary towards the end of last month. There was only one egg laid, which, when taken, appeared to have been sat upon about ten days, and contained a young bird.

The egg is a little larger than that of the goldfinch: the ground colour is a gray-blue like that of the whinchat, but round the shoulder of the egg there is a belt of thickly scattered cloudings and minute spots of a "lie de vin" or light dull puce colour; these are also scattered (but very much more sparingly) over the other parts of the egg, and in some instances they are collected into larger spots of a rust colour, much like those of the chaffinch, except that the spots on the Brambling's egg are smaller, and less exclusively of a rust colour, being clouded with lie de vin about the edges.

The most curious thing about the egg is the smallness of the size, but this may be in consequence of its being laid in confinement.

The nest was of course made of the materials incidentally supplied, and chiefly dry grass on the outside and deer's hair on the inside.

The nest was thick at the bottom and the cavity somewhat shallow, the whole size intermediate between the nests of the chaffinch and greenfinch.

About ten days since I received a specimen of that rare bird the Baillon's Crake, killed near Yarmouth: it is a fine adult male.

I am, respectfully,

Norwich, August 23, 1842. J. H. GURNEY.

LOCUSTA MIGRATORIA.

*To the Editors of the Annals of Natural History.*

I beg to inform you, that on the 3rd instant, a specimen of the migratory locust (*Locusta migratoria*) was captured at Mickleover, near Derby, by a labouring man, who pursued it over several fields, being allured to the chase by its great size and immense leaps; and on the 13th a fine female was taken, near Burton-on-Trent, by a gentleman who was out shooting, and who disturbed it by getting over a hedge near to which it was reposing. This gentleman informs me, that, when first discovered, the insect sprung a distance of at least fourteen yards: he immediately followed it and secured it in his hat.

The first example above mentioned is now in the possession of my friend, R. I. Bell, Esq., of Mickleover; the other was given to me for the use of the Burton-on-Trent Natural History Society, in whose museum it will be placed. I have satisfactorily identified the species, and on dissecting it I discovered a large ovarium, containing from forty to fifty eggs, apparently ready to be deposited.

In the 'Sheffield Mercury' of the 10th inst., there is a description of this same species, from a specimen taken in the town of Sheffield; but the writer, flattering himself that it is the only individual which has been of late years caught in Britain, arrives *very logically* at the conclusion that it cannot be the migratory locust, but that it is some South American species, which has been imported in a cargo of wood or some other product of that country.

I am, Gentlemen, your most obedient servant,

EDWIN BROWN.

P.S.—I beg also to say, that of the entire number of Terns shot in our neighbourhood in May last, and which amounted to many scores, not one was *Sterna hirundo*; they were all, without exception, *S. arctica.*

Burton-on-Trent, 19th Sept., 1842.

LOCUSTA CHRISTII.

Last week, a fine specimen of the *Locusta Christii* was brought to Leeds in a waggon of lead, from the works at Pately Bridge, which fell into my hands. Mr. Curtis, in his 'British Entomology,' plate 608, mentions only two examples as having occurred, one in Ireland, and the other in a garden on the Clapham Road. I suspect three other specimens have been taken in the neighbourhood of Scarborough last week, from a paragraph in the 'Scarborough Herald' announcing their capture, but under a supposition that they were the *Locusta migratoria.* HENRY DENNY.

Philos. Hall, Leeds, 15th Sept., 1842.

A specimen of the locust tribe, an uncommon visitor in this country, was found on Monday in the Town-well-fold. The insect is supposed to have been brought from Birches Barn in a load of clover. It is now caged by the boy who found it, and appears in excellent spirits. We have heard of other specimens of this insect having appeared lately in this country.—*Stafford Examiner.*

CAPTAIN BELCHER'S COLLECTIONS.

Our conchological readers will be gratified to learn that an extensive and valuable collection of shells has recently arrived in England, having been made by Capt. Belcher, C.B., during his protracted voyage of circumnavigation in H.M.S. Sulphur. A large proportion of these have been dredged, and some are from very deep water. Much attention has been paid to the localities and geographical range of the different species, also to the circumstances under which they were found, and to every point interesting in their œconomy. The depth of water in some cases had an apparent influence on their development, but very frequently the effects of this were not discernible. On the contrary, locality was found to control greatly the size and colouring of the shells. At the solicitation of Capt. Belcher, the Admiralty have appointed Mr. Hinds, an officer of the expedition, and who during nearly the whole of the voyage gave his aid towards the formation of the collection, to take charge of it and make it available to science. A number of zoological objects have been preserved in spirits, and in some departments the illustrations are particularly interesting. Among the minerals brought home is a series which will serve to elucidate the hitherto scarcely known mountain range of Lower California.

*Works in the Press.*

Dr. Parnell is printing a work upon the Scottish Grasses, which will contain full descriptions of the species and varieties, and be illustrated by figures and dissections of all of them.

The Rev. J. E. Leefe is about to publish Fasciculi of specimens of British Willows. Mr. Borrer has kindly undertaken the superintendence of the nomenclature, and Mr. Leefe has been promised the assistance of many distinguished botanists. The first Fasciculus is expected shortly.

Mr. Babington has nearly completed the new Flora of Britain, upon which he has been so long engaged. It may be expected in the spring of next year.

## METEOROLOGICAL OBSERVATIONS FOR AUGUST 1842.

*Chiswick.*—August 1. Overcast: very fine. 2. Sultry. 3. Sultry: distant thunder. 4. Sultry: high temperature maintained day and night. 5. Cloudy and fine. 6. Cloudy: rain. 7—9. Clear, hot and dry. 10. Sultry: excessively hot and dry: heavy thunder-storm at night, with rain in torrents. 11. Cloudy: clear and fine. 12. Clear and fine throughout. 13. Overcast: clear and fine. 14. Sultry. 15. Cloudless and hot. 16. Hot and dry. 17. Dry easterly haze: very hot. 18. Excessively hot and sultry: lightning in the evening. 19, 20. Cloudy: fine. 21. Very fine. 22. Hot and dry, with easterly wind: lightning. 23. Cloudless, hot and dry. 24. Hot and dry: lightning, distant thunder, with wind and rain at night. 25. Overcast: heavy thunder-showers in the evening. 26. Hazy: sultry. 27. Cloudy and fine. 28. Rain: cloudy and fine. 29. Heavy thunder-showers early A.M.: violent thunder-storm commenced four P.M., with very heavy rain: clear at night. 30. Hazy. 31. Clear and fine.—Mean temperature of the month 4° above the average.

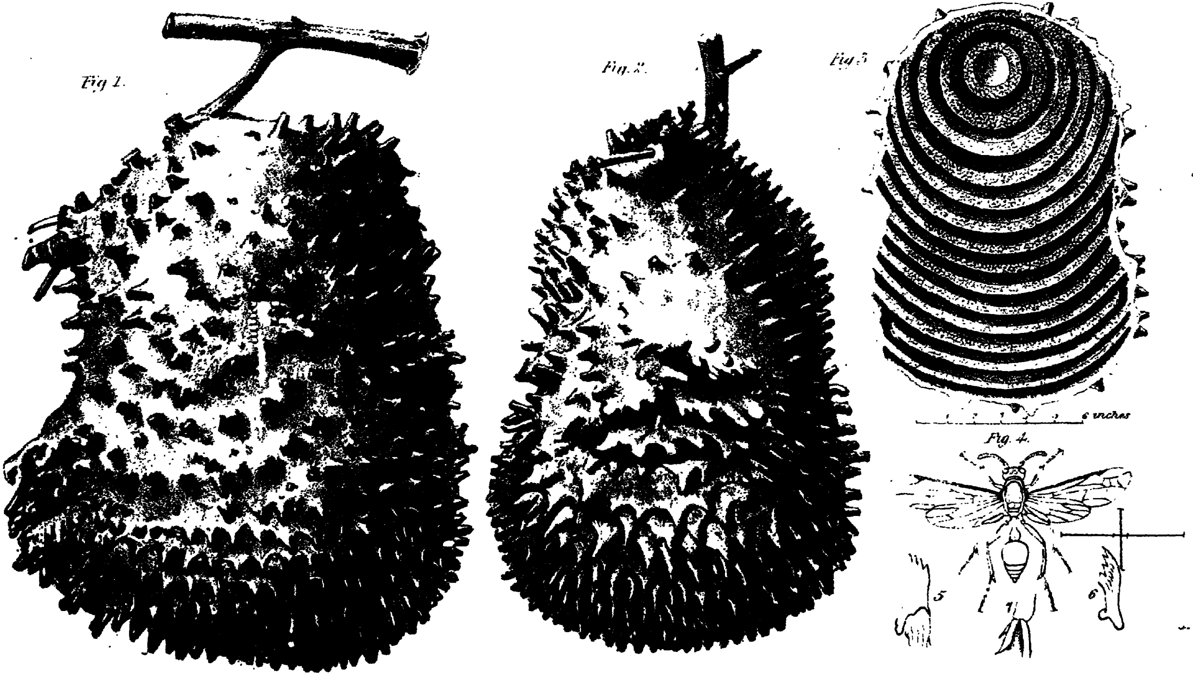
*Boston.*—Aug. 1—3. Cloudy. 4. Fine. 5. Cloudy. 6. Rain. 7—9. Fine. 10. Fine: rain, with thunder and lightning P.M.: thermometer 85° three o'clock. 11. Fine. 12. Cloudy. 13. Cloudy: thermometer 79° two o'clock P.M. 14. Cloudy: thermometer 80° two o'clock P.M. 15. Fine: thermometer 80° eleven o'clock A.M. 16. Foggy. 17. Cloudy. 18. Fine: thermometer 83° two o'clock P.M. 19. Cloudy. 20. Fine. 21, 22. Cloudy. 23. Fine: thermometer 82° two o'clock P.M. 24. Cloudy: rain with thunder and lightning at night. 25—28. Cloudy. 29. Cloudy: rain A.M. 30. Fine: rain P.M. 31. Fine.

*Sandwick Manse, Orkney.*—Aug. 1, 2. Clear. 3. Cloudy: damp. 4. Rain: showers. 5. Showers. 6. Drops: clear. 7. Bright: showers. 8. Clear: rain. 9. Clear: cloudy. 10. Damp: thunder: rain. 11. Showers: rain. 12. Showers: cloudy. 13. Bright: rain. 14. Drizzle: cloudy. 15. Drizzle: rain. 16. Clear. 17, 18. Clear: cloudy. 19. Fog: thunder. 20. Cloudy. 21. Showers: clear. 22. Bright: clear. 23. Rain. 24. Clear. 25. Clear: cloudy. 26—28. Clear. 29. Clear: cloudy. 30. Rain: clear. 31. Clear.

*Applegarth Manse, Dumfries-shire.*—Aug. 1—3. Very fine. 4. Showers. 5. Showery. 6. Fine. 7. Slight showers. 8. Rain P.M. 9. Showers. 10. Heavy rain and thunder. 11. Fair and bracing. 12. Cloudy and drizzly. 13. Fair and fine. 14—16. Very fine. 17, 18. Very fine: very hot. 19. Showers. 20. Heavy showers. 21, 22. Fair and bracing. 23. Fine: one shower: thunder. 24. Wet A.M.: cleared up. 25—27. Fair and fine. 28. Fair and fine, but hazy. 29—31. Slight showers.

*Meteorological Observations made at the Apartments of the Royal Society,* LONDON, *by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at* CHISWICK, *near London; by* Mr. Veall, *at* BOSTON; *by the* Rev. W. Dunbar, *at Applegarth Manse,* DUMFRIES-SHIRE; *and by the* Rev. C. Clouston, *at Sandwick Manse,* ORKNEY.

| Days of Month. | Barometer. | | | | | | | | Thermometer. | | | | | | | | | | Wind. | | | | | Rain. | | | | | Dew-point. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | London: Roy. Soc. 9 a.m. | Chiswick. | | Boston. 8½ a.m. | Dumfries-shire. | | Orkney, Sandwick. | | London: R.S. | | | Chiswick. | | Boston. 8½ a.m. | Dumf.-shire. | | Orkney, Sandwick. | | London: R.S. 9 a.m. | Chiswick. 1 p.m. | Boston. | Dumfries-shire. | Orkney, Sandwick. | London: R.S. 9 a.m. | Chiswick. | Boston. | Dumfries-shire. | Orkney, Sandwick. | Lond. R.S. 9 a.m. |
| 1842. Aug. | | Max. | Min. | | 9 a.m. | 9 p.m. | 9¼ a.m. | 8½ p.m. | Fahr. 9 a.m. | Self-reg. Mx. | Self-reg. Min. | Max. | Min. | | Max. | Min. | 9¼ a.m. | 8½ p.m. | | | | | | | | | | | |
| 1. | 30·340 | 30·277 | 30·218 | 29·77 | 30·15 | 30·14 | 30·23 | 30·10 | 58·0 | 67·0 | 55·5 | 72 | 43 | 61 | 71½ | 50 | 62½ | 56 | n. | ne. | calm | sw. | w. | ...... | ...... | ...... | ...... | ...... | 53 |
| 2. | 30·230 | 30·183 | 29·970 | 29·68 | 30·02 | 29·90 | 29·93 | 29·92 | 60·0 | 69·0 | 55·0 | 79 | 53 | 61 | 70 | 50 | 65 | 58 | sse. | e. | calm | ssw. | s. | ·186 | ...... | ...... | ...... | ...... | 54 |
| 3. | 30·004 | 29·950 | 29·889 | 29·46 | 29·85 | 29·90 | 30·01 | 29·92 | 64·2 | 71·5 | 58·5 | 83 | 52 | 62 | 72 | 54 | 58 | 55 | n. | ne. | calm | ssw. | calm | ·027 | ...... | ...... | ...... | ...... | 62 |
| 4. | 29·916 | 29·962 | 29·828 | 29·26 | 29·08 | 29·68 | 29·50 | 29·54 | 70·0 | 78·5 | 61·0 | 86 | 62 | 68 | 64 | 58 | 57 | 54 | n. | w. | calm | sw. | s. | ...... | ...... | ...... | ...... | ·40 | 60 |
| 5. | 29·908 | 29·930 | 29·904 | 29·25 | 29·60 | 29·65 | 29·57 | 29·58 | 69·4 | 81·5 | 64·5 | 79 | 59 | 67 | 65 | 50½ | 57 | 55 | s. | sw. | w. | se. | w. | ...... | ...... | ...... | ...... | ·16 | 63 |
| ● 6. | 29·968 | 29·937 | 29·841 | 29·28 | 29·75 | 29·76 | 29·66 | 29·72 | 68·2 | 75·5 | 63·2 | 72 | 53 | 64 | 65 | 48 | 57½ | 52 | s. | w. | calm | w. | s. | ...... | ·15 | ...... | ...... | ·04 | 64 |
| 7. | 30·040 | 29·963 | 29·859 | 29·38 | 29·70 | 29·72 | 29·94 | 29·61 | 65·0 | 70·5 | 60·0 | 78 | 48 | 64·5 | 63½ | 52 | 59½ | 51 | se var. | sw. | calm | w. | se. | ·172 | ...... | ·19 | 0·10 | ...... | 56 |
| 8. | 30·110 | 30·029 | 30·025 | 29·41 | 29·80 | 29·75 | 29·85 | 29·76 | 68·0 | 74·5 | 58·0 | 82 | 51 | 64 | 66 | 53 | 57 | 55 | s. | s. | calm | sw. | sw. | ...... | ...... | ...... | ...... | ...... | 60 |
| 9. | 30·092 | 30·029 | 29·844 | 29·39 | 29·78 | 29·77 | 29·68 | 29·70 | 69·8 | 80·0 | 60·2 | 86 | 55 | 67 | 67 | 58½ | 63 | 57 | sse. | s. | w. | sw. | nw. | ...... | ...... | ...... | ...... | ·24 | 59 |
| 10. | 29·794 | 29·772 | 29·621 | 29·11 | 29·68 | 29·52 | 29·74 | 29·67 | 80·0 | 82·5 | 66·0 | 83 | 60 | 76 | 74½ | 60 | 65 | 57 | se. | se. | s. | sw. | se. | ...... | 1·06 | ...... | ...... | ...... | 63 |
| 11. | 29·936 | 30·151 | 29·832 | 29·07 | 29·60 | 29·87 | 29·49 | 29·73 | 67·0 | 87·0 | 62·0 | 71 | 47 | 62 | 64 | 57 | 55 | 53 | e var. | w. | w. | w&sw | w. | ·250 | ...... | ·64 | ...... | ·99 | 57 |
| 12. | 30·370 | 30·257 | 30·200 | 29·60 | 29·92 | 30·02 | 29·86 | 30·00 | 64·4 | 70·0 | 59·5 | 78 | 55 | 64 | 63 | 50 | 57 | 55 | sse. | sw. | w. | s. | sw. | ·138 | ...... | ...... | ...... | ·43 | 58 |
| ☽ 13. | 30·468 | 30·349 | 30·270 | 29·70 | 30·15 | 30·20 | 29·98 | 30·13 | 67·5 | 70·0 | 61·2 | 73 | 56 | 70 | 67 | 50 | 64 | 58 | s. | sw. | calm | sw. | w. | ·172 | ...... | ...... | ...... | ...... | 64 |
| 14. | 30·472 | 30·351 | 30·214 | 29·71 | 30·28 | 30·27 | 30·19 | 30·23 | 72·0 | 75·2 | 65·2 | 85 | 48 | 72 | 69½ | 58 | 63 | 54 | w. | ne. | calm | sw. | w. | ·083 | ...... | ...... | ...... | ·29 | 65 |
| 15. | 30·288 | 30·204 | 30·153 | 29·75 | 30·19 | 30·12 | 30·23 | 30·25 | 79·7 | 80·2 | 61·0 | 92 | 52 | 73 | 65 | 56 | 56 | 50 | ese. | e. | calm | sw. | e. | ...... | ...... | ...... | 0·80 | ·16 | 65 |
| 16. | 30·248 | 30·162 | 30·130 | 29·55 | 30·20 | 30·15 | 30·31 | 30·27 | 72·7 | 84·0 | 63·4 | 89 | 57 | 64·5 | 60 | 48 | 58 | 52 | ene. | e. | e. | e. | sw. | ...... | ...... | ...... | ...... | ·39 | 63 |
| 17. | 30·186 | 30·111 | 30·092 | 29·54 | 30·03 | 29·90 | 30·10 | 29·95 | 67·0 | 82·5 | 61·5 | 80 | 58 | 65 | 79 | 50 | 58 | 56 | e. | e. | calm | s. | se. | ...... | ...... | ...... | ...... | ...... | 62 |
| 18. | 30·012 | 29·939 | 29·830 | 29·35 | 29·87 | 29·82 | 29·66 | 30·00 | 73·3 | 74·5 | 63·0 | 92 | 62 | 71 | 78½ | 54 | 58 | 57 | ese. | e. | s. | w. | w. | ...... | ·01 | ...... | ...... | ...... | 68 |
| 19. | 29·990 | 29·901 | 29·879 | 29·16 | 29·71 | 29·67 | 29·85 | 29·60 | 70·4 | 86·6 | 67·2 | 73 | 61 | 73 | 72 | 62 | 59 | 60 | wsw. | sw. | calm | s. | se. | ...... | ·01 | ...... | ...... | ...... | 65 |
| 20. | 30·058 | 30·038 | 29·981 | 29·27 | 29·70 | 29·72 | 29·71 | 29·66 | 65·8 | 75·5 | 63·0 | 73 | 57 | 66·5 | 65 | 56 | 57 | 56 | wnw. | w. | w. | s. | sw. | ...... | ...... | ...... | ...... | ...... | 60 |
| ○ 21. | 30·058 | 29·981 | 29·913 | 29·38 | 29·84 | 29·94 | 29·77 | 30·02 | 69·8 | 72·2 | 62·0 | 77 | 55 | 62 | 61 | 48 | 57 | 58 | s. | sw. | calm | wnw. | sw. | ...... | ...... | ...... | ...... | ...... | 60 |
| 22. | 30·012 | 29·929 | 29·913 | 29·38 | 29·90 | 29·95 | 30·05 | 29·98 | 70·0 | 74·5 | 60·5 | 83 | 58 | 68 | 69 | 45 | 57 | 55 | nne. | e. | calm | var. | sw. | ...... | ...... | ...... | 0·13 | ·07 | 59 |
| 23. | 29·966 | 29·888 | 29·869 | 29·30 | 29·84 | 29·68 | 29·75 | 29·95 | 72·0 | 79·0 | 65·0 | 85 | 46 | 68 | 72 | 47 | 54 | 57 | s. | s. | e. | var. | s. | ...... | ...... | ...... | ...... | ·42 | 64 |
| 24. | 29·900 | 29·840 | 29·725 | 29·22 | 29·67 | 29·82 | 29·08 | 29·87 | 62·8 | 80·0 | 59·5 | 70 | 55 | 63 | 64 | 51½ | 57 | 54 | sw. | ne. | calm | w. | sw. | ...... | ·22 | ...... | ...... | ·80 | 56 |
| 25. | 29·760 | 29·725 | 29·702 | 29·25 | 29·87 | 29·88 | 30·03 | 30·07 | 61·5 | 74·5 | 57·5 | 71 | 57 | 61 | 65 | 39 | 55 | 54 | ne. | n. | ne. | ne. | calm | ·166 | ·28 | ·03 | ...... | ...... | 61 |
| 26. | 29·890 | 29·916 | 29·818 | 29·27 | 29·90 | 29·93 | 30·11 | 30·15 | 68·0 | 70·5 | 61·0 | 80 | 50 | 65 | 65 | 52½ | 57 | 54 | ene. | e. | calm | n. | calm | ·369 | ...... | ...... | ...... | ...... | 63 |
| 27. | 30·008 | 29·940 | 29·933 | 29·37 | 29·97 | 29·97 | 30·15 | 30·17 | 63·0 | 74·0 | 60·0 | 71 | 57 | 63 | 70 | 52½ | 58 | 53 | n. | ne. | calm | nne. | w. | ...... | ·20 | ...... | ...... | ...... | 61 |
| 28. | 30·046 | 29·977 | 29·976 | 29·42 | 30·00 | 29·99 | 30·21 | 30·16 | 62·0 | 71·5 | 61·0 | 72 | 50 | 65 | 68½ | 50½ | 59 | 55 | n. | ne. | calm | ene. | e. | ·127 | ·14 | ...... | ...... | ...... | 61 |
| ☾ 29. | 30·028 | 29·959 | 29·956 | 29·46 | 29·97 | 29·90 | 30·30 | 29·89 | 65·0 | 70·5 | 60·0 | 74 | 55 | 64 | 70½ | 53½ | 58½ | 57 | nne. | ne. | calm | sw. | se. | ·253 | ·52 | ...... | ...... | ...... | 63 |
| 30. | 30·076 | 30·011 | 30·003 | 29·40 | 29·94 | 29·98 | 30·00 | 30·14 | 63·0 | 72·0 | 60·0 | 70 | 46 | 64 | 63½ | 53½ | 56 | 56 | nw. | w. | calm | nw. | n. | 1·827 | ...... | ·16 | 0·32 | ·30 | 61 |
| 31. | 30·202 | 30·151 | 30·137 | 29·57 | 30·15 | 29·97 | 29·96 | 29·88 | 56·5 | 69·0 | 50·0 | 61 | 50 | 55 | 60 | 38 | 55 | 50 | n. | nw. | n. | w. | w. | ...... | ·22 | ·03 | ...... | ...... | 48 |
| Mean. | 30·079 | 30·025 | 29·957 | 29·40 | 29·856 | 29·858 | 29·890 | 29·909 | 67·0 | 76·0 | 60·8 | 78·58 | 54·22 | 65·6 | 67½ | 52½ | 58·38 | 55·09 | | | | | | Sum. 3·890 | 2·81 | 1·05 | 1·35 | 4·69 | Mean. 60 |




Jos. Imhel. del.t

J. Basire, lith.

MYRAPETRA SCUTELLARIS & NEST FROM S. AMERICA.

The reader being thus put in possession of the general scope of the work, I now proceed to exhibit in full the conclusions to which the author has been led (as indicated under the head of No. 11), to which I shall subjoin further extracts taken from different portions of the Memoir, for the purpose of general illustration.

*Conclusions.*

1. Many, and probably all, *White Chalk Rocks* are the produce of microscopic coral-animalcules, which are mostly quite invisible to the naked eye, possessing calcareous shells of $\frac{1}{24}$ to $\frac{1}{288}$ line in magnitude, and of which much more than one million are well preserved in each cubic inch, that is, much more than ten millions in one pound of chalk *.

2. The *Chalk Marls* of the Mediterranean Basin are the produce of microscopic Infusoria possessing siliceous shells or cases, mostly quite invisible to the naked eye, intermingled with a small proportion of the calcareous animalcules of the chalk.

3. The peculiar state of aggregation in *White Chalk* does not arise from a precipitate of lime previously held in solution in the water of the sea, nor is it the result of the accumulation of the small animalcules, but it proceeds from a disintegration of the assembled microscopic organisms into much minuter inorganic calcareous particles; the reunion of which into regular, elliptical, granular laminæ, is caused by a peculiar crystalloid process, which may be compared to crystallization, but is of a coarser nature, and essentially different from it. The best writing chalk is that in which this process has been developed to the greatest extent.

4. The compact limestone rocks also which bound the Nile in the whole of Upper Egypt and extend far into the Sahara or Desert, being neither white nor of a staining quality, as well as the West Asiatic compact limestone rocks in the north of Arabia, are, in the mass, composed of the coral animalcules of the European chalk. This affords a new insight into the ancient history of the formation of Libya from Syene to the

* It is to be understood that I speak only of such Polythalamia as are well preserved, wholly disregarding their fragments. Of the well-preserved there are contained in one fourth part of a cubic line, or in one twelfth of a grain of chalk, frequently 150 to 200 in number, equal to 600-800 in each cubic line, or 1800-2400 in each grain, and from 1,036,000 to 1,382,400 in each cubic inch; and hence in one pound of chalk the number far exceeds ten millions.

The larger Polythalamia and Bryozoa of the chalk are best obtained from the sediment produced by brushing the chalk under water; the entirely microscopic forms remain long suspended in water.

Atlas, and of Arabia from Sinai to Lebanon, thus opening a large field to organic distribution.

5. Many of the chalk-like formations bordering on the Mediterranean in Sicily, Barbary and Greece, really belong to the period of the European chalk formation, as proved by their organic contents, although commonly held to be different from the chalk, and considered as tertiary *.

6. The chalk beds of the South of Europe, around the basin of the Mediterranean, are distinguished from those of the north and east of Europe by numerous well-preserved chalk animalcules, and less numerous inorganic laminæ; while in the north and east of Europe these relations are reversed †.

7. In the South of Europe the beds of marl which alternate with the chalk consist of siliceous shells of Infusoria, and flints are wanting; while in the North of Europe beds of flint alternate with the chalk, and marls with Infusoria are wanting. This exchange of character tends to explain the peculiar relation of flint to chalk, indicating that the pulverulent siliceous particles of Infusoria have been converted into compact nodules of flint.

8. It has been lately remarked that the chalk which contains flints is deficient in numerous siliceous Infusoria, when compared with the Bilin slaty Tripel or polishing slate (*Polirschiefer*) containing semi-opal; but this deficiency now disappears, and a rich substitute takes its place, the Infusoria in the North of Europe having been employed in the formation of flints; while in the south, remaining unchanged, they are preserved in the Infusoria marls.

9. The chalk animalcules resemble most those of the sea-sand and the Miliolites, which, up to the present day, have been ranged among the Mollusks with the Cephalopods; but neither of these are either Cephalopods or Mollusks, nor even Infusoria (as asserted by a late observer); but they are Bryozoa, animals of Moss-corals, which are most nearly related to Flustra and Eschara.

10. The sea downs of some, and probably of most coasts, are still in course of formation by living Bryozoa, which, though very small, resembling grains of sand, are yet, for the most part, larger than the chalk animalcules, and a large pro-

* In Sicily, however, there occur many breccias of chalk, which have suffered a subsequent change, and may be referred to the tertiary epoch.

† Thus in the white and yellow soft writing chalk of the North of Europe the inorganic crystalloid portions sometimes equal or rather exceed in mass the organic remains; but in the South of Europe, in Sicily, these organisms with their fragments are greatly predominant, consisting, as it appears, exclusively of well-preserved Polythalamia.

portion of the sand of the Libyan Desert has been proved to consist of such grains. It is only in Nubia above Syene that the desert sand becomes a pure detritus of granite *.

11. In the various countries of the earth in which occur white and earthy, as well as coloured and compact rocks, composed of microscopic calcareous animalcules, the genera and species of these animalcules present so striking an agreement with those of the white chalk of Rügen, that they may well be deemed characteristic of one and the same period of geological formation. It cannot be asserted for a certainty that the same forms have been observed any where else †.

12. In the beds subjacent to and more ancient than the chalk, namely, in those of the Oolite or Jura limestone formation, we have also clear evidence of the existence of other microscopic Polythalamia. These, however, are such as have not hitherto been found anywhere in the chalk.

13. The early assertion that *all* limestone was the produce of animals ‡, though resting on no sufficient foundation, and therefore justly held in slight regard by modern geologists, yet now deserves every attention, since it clearly appears that a limestone formation widely extended on the surface of the earth is composed of microscopic animals, visibly converted in a gradual manner into inorganic chalk and compact limestone. If similar phænomena appear also in the Jura limestone formation, and should become still further confirmed, these considerations (combined with the long-known existence of coarser corals and shells in both formations) tend to show how necessary it is, when examining the composition of any considerable portion of the solid mass of the earth, to strengthen our natural senses by artificial means, in order to obtain a distinct knowledge of the extent to which organic life may have contributed to its production.

14. The extreme minuteness of the chalk animalcules is strikingly proved by this, that even in the finest levigated whiting multitudes of them are still present, and may be applied without suffering change to the most varied technical purposes. Thus in the chalk coating given to painted chambers, paper, or even glazed visiting-cards (when not coated with white lead

* On these very interesting and not easily developed relations, I hope, at a future day, to be able to make a more special communication.

† If I have applied the same name in some cases both to animalcules of the chalk and to forms existing in the present sea-sand, or in recent fossil beds, it has arisen partly from my being unacquainted with the original forms of the latter, and partly from my desire not to create unnecessary perplexity by the adoption of new names. It should be observed that they are distinguished by marks of interrogation. All those which I could really compare were different.

‡ By Linnæus in 1745 and 1748, and Buffon in 1749.

alone), may be seen a pretty mosaic of well-preserved, moss-coral animalcules, but which are invisible to the naked eye. And thus our natural vision receives from such a surface the impression of the purest white, little deeming that it contains the bodies of millions of self-existing beings, of varied and beautiful forms, more or less closely crowded together (as in Plate IV., where the subjects are magnified 300 times).

*Explanation of the Plates and Tabular View.*

The Memoir is accompanied by four Plates*, presented with the view of facilitating a comparison between the organic relations of minute fossil bodies invisible to the naked eye, and those of still living bodies visible to the naked eye.

Thus the first three Plates exhibit recent small bodies naturally visible, with which the naturally invisible forms of the fourth Plate may be readily associated.

The first three Plates serve also to elucidate the true nature of the Polythalamia (hitherto mistaken), showing their greater affinity to the Bryozoa (Flustra) than to all other animal forms, and in particular the great difference there is between them and Cephalopods and Infusoria. They represent partly the unfolded, soft, external parts of living subjects, and partly dead, naked bodies, artificially divested of their calcareous shell, and not hitherto figured.

Lastly, these first three Plates serve to convey a view, according to some of their principal divisions, of the structure of the whole group of forms occurring in Polythalamia, and in particular to illustrate their frequent assemblage in families, or Polyparies, as they are termed. Plate I. contains simple forms; Plates II. and III. composite or family forms, Polyparies; of which Plate II. contains family forms assembled in single rows, and Plate III. family forms arranged in many rows.

If, as already observed, we examine a wall or paper whitened with finely levigated chalk, or a glazed visiting-card not coated with white lead alone, but also with chalk, they would appear, when magnified 300 times, more or less rich in subjects, as represented in Plate IV.

Plate I. contains *simple recent Polythalamia* from the sea-sand of Rimini. Fig. 1. *Rotalia Beccarii*; the shell only was known, but the figures show also the form of the animal when deprived of its shell by an acid, the form of both being the same. Fig. 2. *Marginulina Raphanus* (*Nodosaria Raphanus, Nautilus Raphanus priorum*), also very common at Rimini and other Italian coasts, and which had hitherto been erroneously ranked with Orthocera.

Plate II. contains *Polyparies of recent Polythalamia assem-*

* These plates do not accompany Mr. Weaver's paper.

*bled in single rows*, from the Red Sea and the Mediterranean. The two subjects represented in this Plate were collected by me in the year 1823, and it is peculiarly interesting, through my newly-discovered method of observing*, to have been able to see in several divisions of the internal body the remains of the siliceous Infusoria, of which they had made a repast fifteen years before. Fig. 1. *Peneroplis planatus*, d'Orbigny, *Nautilus planatus* of Fichtel and Moll, from the Red Sea. The shells of this animalcule were hitherto only known, but the soft organic animal form which they inclose is here also represented. Fig. 2. *Coscinospira Hemprichii*, a form from the Red Sea, also found in the Libyan part of the Mediterranean, and which was formerly erroneously placed adjoining the *Spirula* of the Cephalopods, and more recently as connected, through *Lituolites nautiloides*, with *Spirolina*.

Plate III. contains *Polyparies of recent Polythalamia assembled in many rows*. This Plate contains the only living animalcule of the Polythalamia group, hitherto so far observed as to admit of its classification. The three forms given in this Plate, constructed of many rows of animalcules, may be distinctly associated with the Flustra and Eschara of the Bryozoa, to which, through the well-known *Lunulites* and *Orbitulites* (hitherto ranked with coral animals), they approximate in a convincing manner. Fig. 1. *Orbiculus numismalis*, from the sea-sand of the Antilles Isles. Fig. 2. *Sorites orbiculus* = *Nautilus orbiculus*, Forskål, *Nummulina* (*Assilina*) *nitida*, d'Orbigny,? from the Red Sea. The same species lives also in the Mediterranean. In a part magnified 300 times we see the animalcule with eight feelers protruding from its cell. In some of the cells may be seen distinct shells of siliceous Infusoria; in others appear oviform globules. Fig. 3. *Amphisorus Hemprichii* closely resembles the *Sorites*; but it has cells on both sides bearing single animalcules, and hence

* The new method of observing is the following:—Place a drop of water upon a lamina of mica, and put into it of scraped chalk as much as will cover the fine point of a knife, spreading it out and leaving it to rest a few seconds; then withdraw the finest particles which are suspended in the water, together with most of the water, and let the remainder become perfectly dry. Cover this remainder so spread out with *Canadian balsam*, the turpentine of the *Pinus* (*Abies*) *balsamea*, and hold it over a lamp until it becomes slightly fluid without froth. A preparation thus made seldom fails, and when magnified 300 times in diameter we see that the mass of the chalk is chiefly composed of minute well-preserved organisms. In this preparation all the cells of the Polythalamia appear at first black with a white central spot, which is caused by the air contained in the cells, which, as is well known, appear under water as annular black bodies; but by degrees the balsam penetrates into all the single cells, the black rings of the air vesicles disappear, and we recognize all the small cells of the Polythalamian animals, often presenting a very pretty appearance.

the discs are twice as thick as in *Sorites*. If we compare *Sorites* with *Flustra*, we may place *Amphisorus* by the side of *Eschara*, but, being both free moving bodies, they are different from them.

Plate IV. contains the *invisible animalcules of the chalk and chalk marl*, displayed in twelve specimens of rock; 1 to 9 being portions from the chalk, and 10 to 12 from the chalk marl, magnified 300 times. In these specimens the calcareous Polythalamia amount to sixteen species, and the siliceous Infusoria to twelve species, with siliceous spicula of sponges. The twelve localities from which these specimens of the rock masses were derived are the following:—No. 1 to 5, *writing chalk*; namely, 1. from Puszkary, in Poland, opposite Grodno, from the shore of the Memel; 2. from Jütland, in Denmark; 3. from the island of Rügen in Pomerania; 4. from Gravesend, on the Thames; 5. from Meudon, near Paris; *firmer* writing chalk, No. 6, from Cattolica in Sicily; *compact, not writing* chalk, No. 7, from the Mokattum hills near Cairo; and No. 8, from the Catacombs of Thebes in Upper Egypt; *compact gray limestone*, No. 9, from the mountain mass of Hamam Faraûn in Sinai, Arabia; *chalk marl*, No. 10, from Oran in Africa; No. 11, from Caltasinetta in Sicily; No. 12, from Greece.

In the *general table* indicated above, under the head of No. 13 of the contents of the memoir, a list is given of the principal forms of the invisible organic bodies which constitute the rocks from which the twelve above-mentioned specimens were taken, as well as the chalk of Brighton, the chalk marl of Zante in the Ionian Islands, and the nummulite limestone of the Pyramids of Geza in Egypt. From this it results that the principal forms in these rocks consist of twenty-five species of calcareous-shelled Polythalamia, thirty-nine species of siliceous-shelled Infusoria, seven species of soft-shelled Infusoria of the flints, and five species of siliceous plants.

The twenty-five species of calcareous-shelled Polythalamia, belonging to eight genera, are the following:—

Flustrella *concentrica*; Globigerina *bulloides*?, G. *helicina*?; Planulina *sicula*, P. **turgida*; Robulina *cretacea*; Rosalina **foveolata*, R. *globularis*?, R. **laevigata*, R. *pertusa*; Rotalia **globulosa*, R. *ocellata*, R. *ornata*, R. *perforata*, R. *scabra*, R. *stigma*; Textularia *aciculata*?, T. **aspera*, T. *brevis*, T. **dilatata*, T. **globulosa*, T. *perforata*, T. *spinosa*, T. **striata*; Turbinulina *italica*? Quinqueloculina? from Benisuef, is doubtful. N.B. *Textularia globulosa*, when in fragments, is not easily distinguished from *Rotalia globulosa*; and in like manner the fragments of *Textularia perforata* may be confounded with *Rotalia perforata*.

The thirty-nine species of siliceous-shelled Infusoria belong to fourteen genera, and are as follow:—

Actinocyclus *ternarius*, A. **quaternarius*, A. **quinarius*, A. *senarius*, A. *septenarius*, A. *octonarius*, A. *denarius*; Cocconema *Cretæ*; Cornutella *clathrata*; Coscinodiscus *Argus*, C. *centralis*, C. *lineatus*, C. **minor*, C. **Patina*; Denticella *Fragilaria*, D. *tridens*; Dictyocha *Fibula*, D. *Navicula*, D. *polyactis*, D. *speculum*, D. *stella*, D. *triangula*; Eunotia *zebra*; Fragilaria *rhabdosoma*, F. *striolata*?; Gallionella *aurichalca*?, G. *sulcata*; Haliomma *Medusa*, H. *crenatum*; Lithocampe *lineata*, L. *Radicula*, L. *solitaria*; Navicula *africana*, N. *Bacillum*, N. *eurysoma*, N. *ventricosa*, N. *sicula*; Pyxidicula *prisca*; Synedra *ulna*.

The seven species of soft-shelled Infusoria of the flints belong to three genera, and are the following: —Chætophyta *Pyritæ*; Peridinium *pyrophorum* †; Xanthidium *bulbosum*, X. *furcatum*, X. *hirsutum*, X. *ramosum*, X. *tubiferum*.

The five species of siliceous plants belong to two genera, namely, Spongia (*Tethya*?) *aciculosa*, S. *cancellata*, S. **Cribrum*, S. *binodis*; Spongilla (*Tethya*?) *lacustris*‡.

Of these principal forms the before-mentioned rocks partake in the proportions as stated below: namely,

| | Species of Calcareous Polythalamia. | Species of Infusoria. Siliceous, in Chalk. | Species of Infusoria. Soft-shelled in Flints. | Species of Siliceous Plants. |
|---|---|---|---|---|
| The *Chalk* of | | | | |
| Puszkary contains | 6 | | | |
| Rügen | 7 | 1 | | |
| Jütland | 6 | | | |
| Gravesend | 6 | 3 | 5 | |
| Brighton | 7 | 1 | 4 | |
| Meudon | 9 | ..... | 2 | |
| Cattolica | 9 | | | |
| The *Chalk Marl* of | | Siliceous Infusoria. | | |
| Caltasinetta | 7 | 27 | ...... | 4 |
| Oran | 2 | 18 | ...... | 1 |
| Zante | 5 | 8 | ...... | 2 |
| Greece | 3 | 9 | ...... | 1 |
| The *Compact Chalk* of | | | | |
| Egypt | 8 | | | |
| Arabia | 6 | | | |
| The *Nummulite Limestone* of The Pyramids of Geza | 6 | Containing 4 species of Nummulite, the largest of which is one inch in diameter. | | |

† *Peridinium delitiense* has hitherto been found only in flint pebbles near Delitzsch, yet accompanied with forms that are common in the flints of the chalk.

‡ In the preceding lists, the species which are marked with an asterisk * are those which most frequently occur, forming the masses of the rocks. The *Rotalia globulosa* occurs in all the localities.

### *On the Chalk Marl, and its relations to the Chalk and its Flints.*

The whole coast of Oran in Africa appears to belong to the chalk formation, composing the plain east of the town, and extending thence to the Atlas. The marl brought from thence as tertiary by M. Rozet in great quantities I had an opportunity of examining in Paris, and I found not only Polirschiefer and an Infusoria conglomerate, but calcareous animalcules of the same species as occur in the chalk of Poland, Rügen, Denmark, and Paris, and which there mainly contribute to its mass. It thus appeared that the so-called tertiary formation of the coast of Barbary might, without much hazard, be brought into a nearer connexion with the chalk. In his description of this tract, M. Rozet states*, "The tertiary formation is extensively developed in Oran, forming the soil of the large plain on the east of the town, and on the south to the Atlas. It forms also the sea-coast to an extent of 3000 metres between Mers el Kebir and Cape Falcon, and the whole soil of the adjacent plain. The lower bed is a blue marl, like that which we found at Algiers and within the Atlas. It appears destitute of organic remains. The second or upper deposit consists of marly and calcareous beds in alternation, forming a thickness of 30 to 40 metres. In the plain these beds are apparently horizontal, as well as in the elevated plain of the Rammra hill; but in the hills south-west of the town of Kasba they are, on an extent of two hours march, inclined to the north, at an angle sometimes exceeding 30°. The beds of limestone are white and chalk-like, yellowish and coarse granular, usually forming the lower part, succeeded by others alternating with yellow marls, which are often slaty and charged with sand, and between them are found layers of ostreæ and other shells. Among them two beds are distinguished, each one metre in thickness, composed of very white finely-laminated marl, containing numerous well-preserved impressions of fishes, so that in a cubic mass of one foot we seldom fail to find three or four fishes. In these beds of marl thus enclosing the fishes, other organic remains do not appear; but in the calcareous and sandy beds which intervene, occur layers of large oysters mingled with gryphææ. The upper part of this deposit is composed of a calcareous breccia, which is exhibited at the surface in the soil of the whole plain on the south-west of Oran."

This exact description of the position and thickness of the white marl with impressions of fishes, has a reference to the

* Rozet, *Voyage dans la Régence d'Alger*, Paris, 1833. tome I. chap. v. pp. 56 63.

Infusoria conglomerate of Oran, to which I have already adverted. It is probably what formed the Tripel of the earlier periods of Italy. When M. Rozet speaks (at p. 28–30) of the great extent of the tertiary tract near Algiers as similar in its relations to those of Oran, I cannot agree with him. On the contrary, forming my judgment by the organic remains, I consider the desert tract near Algiers as really composed of a tertiary formation, which reposes on chalk. This opinion is founded on my observation, that the tract in Libya, extending from Alexandria to Siwa, is composed of tertiary beds, while from Cairo to Geza the chalk formation occurs, which terminates at the granite of Syene, but is far spread into the Desert. The valley of Siwa appears to form the northern boundary of the chalk in Eastern Libya.

In the South of Italy, at Caltasinetta and its neighbourhood, the relations had been correctly seized by our late friend Frederick Hoffmann, from whose diary I have been favoured with an extract by M. von Dechen. He represents the series of strata which occupy the greater part of Sicily as composed of limestones, sandstones, clays, and marls; the lower members being probably referable to the Jura formation, succeeded by such as clearly belong to the chalk, and many beds of which perfectly resemble the hard chalk of the north-west of Germany (Teutoburger Wald). Among the marls are white chalk-like thinly laminated masses, analogous to Tripel, designated by Hoffmann as *white chalk marl*, and which especially occur in the southern part of the island. The beds of the chalk formation usually dip 20° to 30°, while the strike is nearly constant, from 15° to 45° S. of E. and N. of W., parallel to the south coast. The tertiary beds which succeed the chalk are composed of loose sand, friable sandstone, testaceous breccias, clays and limestones. They cover the chalk unconformably, resting on the truncated edges of the latter. The chalk beds are upon the whole poor in organic remains, and these are seldom distinct; there occur Hippurites, Nummulites, Lenticulites, and in a few places indistinct Ammonites and Belemnites, while the tertiary beds are quite filled with innumerable Mollusks, of which nine-tenths are still living in the Mediterranean. This distinction is so striking that it scarcely required the difference of relative position in order to draw a correct line between the two formations. Even had so circumspect a geologist as Frederick Hoffmann not correctly seized and pronounced with decision on these local relations, the numerous microscopic siliceous Infusoria with calcareous Polythalamia which I have found in the chalk marl would have led to the same conclusion.

If we compare Hoffmann's description of this portion of Sicily with that given by Rozet of the coast near Oran, we cannot avoid recognizing a similarity of relations; and the thinly laminated marly beds with impressions of fishes, between Caltasinetta and Castrogiovanni, which Hoffmann refers with certainty to the chalk formation, correspond to the similar beds which occur near Oran, but which were said to be tertiary. And the parallel is confirmed by the microscopic siliceous Infusoria and calcareous animalcules which I have discovered in both.

The genera and species of the siliceous Infusoria in Sicily are so similar to those of Oran and Zante, that of thirty-six species, four occur in all the three countries, three in Caltasinetta and Zante, seven in Caltasinetta and Oran, while in all of them the *Coscinodiscus Patina* is greatly predominant. Of all these siliceous animals, not a single species has been found in the chalk of the North of Europe, nor even in the flints. On the other hand, the calcareous-shelled animalcules, which in the South of Europe accompany the siliceous animals, comprise about one half of the same species that are found in the North, yet exceeding them in quantity.

From the examination of the organic constituents of the chalk marl we learn the hitherto unknown fact, that numerous swarms of microscopic Infusoria were in existence within the period of the secondary formation of the earth's surface, chiefly belonging to such as possess siliceous cases or shells, and which for the greater part are members of such sections of the Bacillaria family as had previously appeared to be confined to the tertiary or newest formations.

Of the thirty-nine or forty species of siliceous Infusoria occurring in the chalk formation, thirty-four or thirty-five have not hitherto been found in the recent state; but it is remarkable that the remaining five or six species so closely resemble existing species of the present day, that they present no peculiar character by which they could be distinguished from them, and hence the application of new names appeared inadmissible. They are, *Eunotia zebra*, *Fragilaria rhabdosoma*, *F. striolata ?*, *Gallionella aurichalca*, *Navicula ventricosa*, *Syncdra ulna**.

In the chalk itself only four out of the thirty-nine or forty

* The indifference shown to climate by Infusoria, and the peculiarity of their organic development, seem to render it possible that they might be more readily preserved through many catastrophes of the earth than other forms. By the faculty which they possess of spontaneous division, a single individual can, under very favourable circumstances, be multiplied in the course of a few hours to the extent of millions.

species of siliceous Infusoria have hitherto been met with, namely, *Fragilaria rhabdosoma*, *Fragilaria striolata ?*, *Gallionella aurichalca*, and *Pyxidicula prisca*. They are very rare, and found only in the vicinity of the beds of flint.

[To be continued.]

## XXXVI.—*Description of a South American Wasp which collects Honey.* By Mr. ADAM WHITE, M.E.S.; an Assistant in the Zoological Department of the British Museum.

[With a Plate.]

SOME of the Wasp tribe of the New World form their nests of a solid and rather thick pasteboard. Such structures have been met with in Pennsylvania*, while they occur frequently in the more tropical parts of South America as far as Buenos Ayres†, and very probably much to the south of that point: in the description of the Isthmus of Darien‡, Wafer mentions "the bird's nest bee, the hives of which are black and hard, hanging from the trees like birds' nests."

The best known is that of the *Chartergus nidulans*§, which is formed "of a beautifully polished white and solid pasteboard, impenetrable by the weather||." It has been fully described by Reaumur in the sixth volume of his 'Mémoires': in the British Museum there are two specimens of this nest. They are securely attached to the branch of a tree by their upper end, and vary much in length, from a few inches, as in the Museum specimens, to two feet or even more. In the former case they are more or less round and have but four or five combs, while in the latter they are of a long cylindrical shape, and have a

* Rymsdyk, Mus. Britannicum, tab. 1. f. 2.

† Mr. Cuming tells me he has seen specimens there, at least four feet long: in a deserted one a swallow had built her nest.

‡ Voyage and Description of the Isthmus of America (1701), p. 214.

§ The *Vespa nidulans*, Fab., is figured by Coquebert (Ill. Icon. tab. 6. fig. 3.), and Guerin (Iconogr. pl. 72. fig. 7.). In Saint Fargeau's 'Hist. Nat. des Hymenopt.' i. p. 516, it constitutes, along with another black species, the genus *Chartergus*; I believe it is the type of Latreille's *Epipone*. Cuvier (Bull. des Sc.) seems to have first pointed out, in 1797, the error into which Reaumur fell, of considering a Chalcididous parasite found in these nests as being the constructors of them. He regarded it as the *Chalcis annulata* of Fabricius, an insect found in the pupæ of nocturnal Lepidoptera. In 1798 Fabricius described the insect as *Chalcis conica* (Suppl. Ent. Syst. 242), having obtained specimens from the nest: the name he afterwards altered to *pyramidea* (Syst. Piez. 167), as his former specific name was pre-occupied. Mr. Sells has recently found the parasite in the nest (Journal of the Proceedings of Entomol. Society, ii. p. 30), and Mr. Westwood has published a more accurate figure than that given by Reaumur (Ent. Soc. Trans., ii. pl. 20. f. 6.).

|| Kirby and Spence, Introd. i. p. 506.

corresponding number of partitions; additional combs are added to the lower part as the occupants increase in number. These combs are horizontal, convex on the under side, and fixed to the walls of the nest by their whole circumference. The cells are hexagonal and open downwards, as in most other nests constructed by the *Vespidæ*. Each of the combs has a hole near the middle, through which access is obtained to the uppermost apartments. The outer entrance is by a small round orifice near the middle of the under side, which is more or less funnel-shaped.

In the Museum there is a nest from the West Indies of a greyish brown colour; it is bell-shaped, and attached to the branch of a tree in the same way as the other. The base, however, is flat, the entrance being by a small hole close to the edge: each stage of combs has a similarly situated orifice to give access to the various compartments. There are five straight horizontal partitions, fixed, as in the preceding, by their entire circumference; on the lowest there are no indications of cells, on the fourth there is a circular cell unfinished, while in the three upper combs the hexagonal cells are confined to the middle. The texture of this nest is coarse, the fibres on the surface and throughout being distinctly visible. It is seven and a half inches long, the base where its diameter is greatest having nearly the same dimensions.

This nest closely agrees with one from Cayenne figured by Cuvier*; the constructor is a small Vespidous insect of a shining black colour, with brown wings and a pedicellate abdomen, which the French naturalist has named *Vespa Tatua*†, from its local name "La Mouche Tatou." Burmeister‡ says this insect forms a nest, having "the superior surface covered with a multitude of conical knobs;" in Cuvier's figure it is perfectly smooth.

The insects which form these curious habitations have been observed by Lacordaire§ in their native country. Their societies are not dissolved each year, as happens with the wasps of our climates, which, on the approach of cold weather, are nearly all cut off.

The nests are found in copse-wood, principally near plantations (at least in Guiana), and are generally suspended at a height of three or four feet from the ground. During the rainy season, from January to the middle of June, only perfect

* Bull. des Sc. par la Soc. Phil., n. 8.

† The *Polistes morio* of Fabricius, who describes the nest from Cuvier's communication. It is the *Epipona Tatua* of Saint Fargeau.

‡ Man. of Ent., transl. by Shuckard, § 296. p. 523.

§ Introd. à l'Entom., ii. p. 508.

nests are to be met with; in January and February the cells are in great measure filled with larvæ; in March and April these decrease in number, and by the end of May scarcely any are to be found. These are thought to turn into females, which, not finding room in their old nursery, emigrate and form new colonies, as when the fine season returns, which is about the middle of June, nests are to be found in progress; but instead of only one female being at work, as is the case with our wasps, Lacordaire has observed as many as a dozen busily engaged in constructing their new abode. As soon as a series of cells is completed larvæ may be found in them, and the nest is gradually increased by the addition of new combs. In September the structure is half finished, and towards the end of November it is most frequently completed. The old nests of the preceding year continue peopled as before, but new larvæ were only observed in them in abundance in September or October; these are believed to turn into neuters: if this is the case, the reverse takes place with the European wasps, the neuters of which are first excluded.

Mr. Walter Hawkins has presented to the collection of the British Museum a pasteboard nest from the banks of the Rio Yancay (Uruguay ?), which differs very materially from both the structures I have alluded to above. It seems to be of the same description as the fabric referred to by Burmeister,—by Westwood* as existing in the Berlin Museum, and appears to me to be identical with the nest of the "Chiguana" wasp referred to by Azara†.

As the accompanying figs., 1 and 2, drawn by Mr. Dinkel, give its shape and general appearance better than any description could do, it is only necessary to say, that, viewed sideways, it is of an oblong form, rounded at the base. The orifices at the side, near the bottom, bulge out considerably.

When viewed from beneath it is somewhat ovate. It is very generally covered with conical knobs of various shapes, nearly all of which are more or less rubbed at the end, but in some places, less exposed, they are pointed, and in many instances nearly three-quarters of an inch long. At the very top, and on the side above the entrance, there are but few of these projections; in two or three places the surface is very distinctly contracted, and in the concavities there are no projecting points; the knobs seem to run in irregular, generally transverse, ridges.

The entrances, as may be seen in fig. 2, are artfully protected by pent roofs from the weather, which, in the rainy season, is

* Introd. to Mod. Classif., ii. p. 251.

† Voyages dans l'Amér. Mérid., i. p. 171.

sometimes very violent; they are also so intricately twisted, as to prevent the ingress of any moth or other enemy, at least of any size. The hardness of the whole mass must tend very much to protect its constructor from the attacks of insect or honey-seeking animals; and the natives, with some degree of probability, believe, that feline and other animals are deterred from taking the nest by the pointed knobs with which it is covered; Mr. Hawkins's correspondent in Buenos Ayres assured him of this.

The substance is hard, the texture close, and, when seen with a slight magnifying power, seems curiously matted*. The natives say that it is principally formed of the dried dung of the "*Capincha*," which, from the description, would appear to be some sort of Water Cavy.

On making a longitudinal section of this singular insect-structure down the middle, I found there were fourteen combs in it, exclusively of a globular mass at the top, seemingly the nucleus of the nest; this is nearly encircled by the two nearest combs. The other twelve are arranged beneath these, the uppermost most nearly approaching a circle in their arrangement as they approximate to the mass at the top. The different "stories" of combs are attached to the common wall of the nest; the entrances to the various compartments are at the sides, a small irregular-shaped space being left between the comb and the outer envelope in various parts of it. *All* the combs are covered to the very edge by the cells, except the parts of them that are immediately close to the orifices of the nest, where, if they existed, they would impede the entrance and exit of the inhabitants. The uppermost combs are thickest, being throughout from seven to five lines in thickness, whilst the lower are not half that depth. The cells are small, hexagonal, and, as in other wasps' nests, have the opening downwards; they are formed of a light *papery* substance, similar in colour to the outer covering. This, as might be expected, is thickest at the top, where, internally, from the meeting of several combs, it is rather loose; at the base it is thinnest. The knobs are solid throughout, and, like the external envelope from which they arise, are formed of numerous layers of "paper" so closely blended as to be hardly di-

* The structure of paper and pasteboard, as made by insects, would form an interesting subject of investigation. In several specimens which I have had an opportunity of examining under a powerful microscope, there seem to exist great differences, some consisting of particles of wood or other vegetable substances, simply agglutinated; while in others these particles appear to have undergone a change within the body of the insect or some other animal, and to have lost all traces of their vegetable origin; others again, as in the present instance, seem to combine both.

stinguishable: the solid wall of the nest at top is about a quarter of an inch in thickness. The nest is nearly sixteen inches long: the broadest part, which is on the same line with the orifices, is more than a foot long; the narrowest point is nine or ten inches. At the base, an imaginary straight line, drawn from the orifices to the opposite side, would be nearly a foot long. It would seem as if the nest was complete; indeed, unless the insects had the power of redissolving the matter at the base, or the inclination to gnaw it off, I cannot see how they could make additions to it.

Many of the uppermost combs have the cells, in the middle, filled with a brownish red honey, which, in its present state, possesses scarcely any smell or taste. The occurrence of honey in the combs is interesting, inasmuch as it still further confirms the accuracy of Azara's observation, and is made by a Vespidous insect having the first joint of the abdomen elongated into a pedicel.

Azara, in the account of his residence in various parts of South America, mentioned the fact of several *wasps* of these countries collecting honey. The Baron Walckenaer, who edited the French translation of this work, published in 1809*, thought that the Spanish traveller, who was unskilled in entomology, had made some mistake with regard to the insects, and regarded the so-called wasps as belonging to some *bee* of the genus, of which the *Apis amalthea* is the type (*Melipona*.) Latreille also believed that they must be referred to the genera *Melipona* or *Trigona*, insects which, in South America, take the place of our honey-bee. These authors were afterwards clearly convinced of the correctness of Azara's observations, by the circumstance of M. Auguste de St. Hilaire† finding near the river Uruguay, an oval grey-coloured nest *of a papery consistence, like that of the European wasps*, suspended from the branches of a small shrub about a foot from the ground. He and two other attendants partook of some honey, and found it of an agreeable sweetness, free from the pharmaceutic taste which so frequently accompanies European honey. He gives a detailed account of its poisonous effects on himself and his two men, in the paper referred to. A. de Saint Hilaire *afterwards* procured specimens of the insect, which was described by Latreille‡ under the name of *Polistes Lecheguana*.

* Voyages dans l'Amér. Mérid., i. p. 165, *note*.

† Mémoires du Muséum, xii. p. 293, etc.; see also Ann. des Sc. (1824), iv. p. 335, etc.

‡ Mém. du Mus., xi. p. 13; xii. pl. 12. fig. B. Mr. Shuckard says (Lardn. Cab. Cycl., Ins., p. 183) *Brachygastra analis* of Perty (del Anim., etc., p. 146. tab. 28. f. 6.) is synonymous, and on comparing descriptions I

Latreille has entered at some length into its history, correcting the mistake he had fallen into in a preceding memoir*. He is inclined to believe that the nest figured by Hernandez† under the name of "Yzaxalasmitl" belongs to the Lecheguana. If this be the case, "Chiguana" or "Lecheguana" must be a name applied to different sorts of wasps‡, as Azara's Chiguana is said expressly to inhabit a hard nest, having the surface covered with prominent inequalities.

In Latreille's insect, the mesothorax is strongly truncated at the end, and the scutellum is rather square and hollowed out behind, the upper portion of the base of the abdomen being applied to it; the pedicel of the abdomen is extremely short. In the insect, specimens of which I found on opening the knob-covered nest I have described, the mesothorax and its scutellum are gradually rounded off, and the first joint of the abdomen is elongated into a pedicel.

I am somewhat at a loss to which of the modern subgenera to refer it, as it seems in some respects to differ from them all. It would come nearest Saint Fargeau's genus *Epipona*, which seems not the *Epipone* of Latreille's former works. From *Polybia* of the same author it would appear to be not distantly removed. I cannot find a description of it in any work I have access to.

*Myrapetra* §, nov. gen.

*Head* transverse, wider than the thorax; *stemmata* placed in an equilateral triangle on vertex: *antennæ* (in neuter) 12-jointed, inserted in a depression of the face above the clypeus, rather closer to the edge of the emarginate eyes than they are to each other; torulus deeply punctured. *Mandibles* rather long and stout, with nearly parallel sides; the outer margin with a few hairs, beneath they are hollowed out, and viewed from above seem to have several longitudinal striæ; at the end they are obliquely truncated and furnished with four teeth: the inner, when the mandible is viewed laterally, appears broad and truncated, but when seen from beneath is small and rather sharp; it is not much removed from the other three, which are acuminate, and

can find no difference in them. He proposed in the above volume the name *Nectarina* for Latreille's and Perty's insect, as *Brachygastra* is preoccupied in Entomology; but *Nectarinia* being already used in Ornithology, Mr. Shuckard proposes in lieu of it *Melissaia*, the species being *M. Lecheguana*.

* On South American Bees, published in Humboldt and Bonpland's 'Rec. d'Observ. de Zoologie.'

† Nov. Hist., etc., p. 333. Latreille quotes the other as being in all probability the Lecheguana's nest, but his doing so seems to arise from an inadvertent misquotation.

‡ St. Hilaire speaks of two species being distinguished in the country, one making white and the other reddish honey.

§ A fanciful word compounded of the names of two ancient cities, one in Asia Minor, the other in Arabia.

rise gradually one above another, though, measuring from their base to the tip, they are nearly equal in length. *Clypeus* somewhat longer than broad, somewhat cordate; in front acuminate, and edged with short stiff hairs.

*Thorax*: mesothoracic scutellum and metathoracic præscutum neither particularly abrupt nor excavated. *Upper wings* as long as the entire insect, with the marginal cell extending considerably nearer to the apex of the wing than the *third submarginal*, which is *dilated on the outer side at the base; second submarginal cell contracted towards the marginal, but has a part of the radial nervure common to both. Legs* rather long; posterior pair having the tarsus longer than the tibia, which terminate in two calcaria, the interior of which is much longer than the other, dilated and obliquely cut at tip (a structure found in many of the neighbouring genera, so that it must play some important part in the œconomy of these insects); the spurs of the first two pair of tibiæ equal in length; the tip of the posterior femora and the base (at least) of the lengthened first joint of tarsus, have each a brush of short hairs.

*Abdomen* rather slender: the first segment narrowed into a turbinate pedicel, not quite so long as the other segments taken together, at base cylindrical*; second segment very slightly contracted at base, then suddenly campanulate (or rather acorn-cup-shaped) and much larger than the others which it encloses; the tips of it are simple†.

* In Mr. Shuckard's collection, a black Mexican insect, and one at least of St. Fargeau's genera, have this part much depressed.

† There exists in the collection of the British Museum, without locality attached to it, a somewhat longer-bodied but shorter-winged insect, with the first *abdominal segment* pedicellate, the second much broader than in *Myrapetra*, and appearing encircled at the apex by a coronet of short flattened equal processes placed close to each other, somewhat like the peristome of certain mosses; the second segment nearly conceals the other segments, from one of which, however, the processes may arise.

The *clypeus* in this is rather square in front, angulated in the middle, and furnished with several short stiff hairs; the sides in front also angulated.

The *mandibles* are somewhat elongate, rather thicker at base than the tip, which ends obliquely and appears to have four close teeth (the inner in distinct?). The *metathoracic scutellum* is longitudinally hollowed in the middle; the *anterior wings* have the *second submarginal cell somewhat lozenge-shaped, and slightly but distinctly petiolate towards the radial nervure; the third cubital is dilated exteriorly at base.* I propose to name this subgenus *Anthreneida*.

The only species (*A. coronata*, n. sp.) I have seen, is the one alluded to above, which has the thorax and abdomen deeply punctured; it is brownish black, with the first abdominal segment rufous; clypeus in front yellowish, rather smooth. Over the whole of the insect there is more or less of a brownish silky pubescence, more especially on the second large, campanulate, abdominal segment; the wings are clear, except the marginal cell, which is brown (the brown extends somewhat over the radial nervure on the outside of third submarginal cell), and a narrow line of the same colour below costal nerve widening towards the stigma; the flattened abdominal processes are yellowish and margined at the extremity.

The following description may serve to distinguish the species *Myrapetra scutellaris*, n. sp. (Pl. IV. t. 4–7):

M. brunneo-fuliginosa, sericeo ubique pubescens, mesothoracis scutello, metathoracis præscuto flavescentibus; alis hyalinis, stigmate nervisque brunneis.

*Hab.* Amer. Merid. In Mus. Brit.

It is smooth; the scutellum has a fine impressed dark line down the middle; the stemmata are of an amber colour.

The figure of the insect is lithographed from an outline made by Mr. Westwood at my request, which, however, is slightly altered, as the specimen, when Mr. Westwood drew it, was unset. The section of the nest, fig. 3, was most carefully drawn by Mr. Basire, jun. from the original. In the Museum collection there are two specimens seemingly identical with those I took from the nest, and Mr. Shuckard has shown me a larger specimen which may very probably be the female; this has dark stemmata.

I have been unable to add a description of the maxillæ, palpi or tongue, the last of which, in an insect collecting honey as this does, must be particularly organized; but hope, that when more specimens are met with, I may have an opportunity of doing so.

I may add, that in the nest I found the remains of a black-bodied, black-winged fly, with rufous thorax, allied to *Bibio*; and of a neuropterous insect resembling the *Hemerobius nervosus* in size and markings of wings, but with a longer thorax: the nest described is the specimen alluded to by Mr. Gray, in the 'Synopsis of the British Museum,' p. 27 (ed. 42).

## BIBLIOGRAPHICAL NOTICES.

*The Principles of Botany.* By W. Hughes Willshire, M.D. London, 1840. 8vo, pp. 232.

This work has been written with the immediate view of assisting students of medicine in the acquisition of the amount of botany supposed to be required by the various bodies before whom they present themselves for their licence or diploma. It is perhaps to be regretted that any work should be published professing to give the *minimum* amount of the knowledge of a science required by the members of a liberal profession, and especially of one which, in some points, is so intimately connected with medicine as that of botany. Of late years the structure and functions of all organic bodies have been shown to obey common laws, and a proper knowledge of physiology can only be acquired by studying the organic kingdom as a whole. In this point of view, structural and physiological botany ought to constitute a portion of the fundamental studies of the medical student. We mention this particularly, because we believe it has been too much the fashion for students to learn, and examiners to require of them, only so much botany as shall enable them to tell the name of a plant when they see it, or, at most, its Linnæan class and order. We do not say this to disparage the work before us; we think Dr. Willshire has done his task well; but we would rather see his book used by medical students as a means of refreshing their memories than as an introduction to the science of botany. The volume is small and unpretending, and the author has succeeded in furnishing a large amount of matter in a small compass.

An outline is given of every department of the science, commencing with structural botany and passing on through the physiology and pathology of plants, and concluding with systematology. A few pages are devoted to morphology, in which the principles of this department are well laid down; but we think that the author might have usefully given more extension to this section of his book, especially as the subject is at present, in systematic botany, one of so much practical importance. In systematic arrangement the author follows DeCandolle, an outline of whose system, with the characters of the natural orders, he has given.

In illustration of the orders medical plants are referred to; but we think that, both for the convenience and use of the medical student, some of the more common wild or garden plants should have been introduced. As a condensed view of the principles of botany up to the time it has been written, we can recommend Dr. Willshire's volume both to the medical student and amateur botanist.

*Arcana Entomologica, or Illustrations of new, rare, and interesting Exotic Insects.* By J. O. Westwood, F.L.S., &c. No. 1.

Under this title Mr. Westwood has commenced the publication of a work much wanted by English entomologists. It is long since Drury and Donovan's works made us acquainted with the many splendid and singular insects with which the cabinets of English collectors are enriched. Since that time numbers of equally beautiful and singular species have been received in this country, especially from our different possessions abroad, which have either remained undescribed, or have been made known for the most part by short and meagre descriptions.

In the present work Mr. Westwood proposes to describe and figure some of the most interesting of the exotic novelties contained in our collections; and if we may judge by the present part, we may congratulate entomologists upon the proposed undertaking. It contains four plates, each of which consists of several coloured figures; the first plate illustrates several Asiatic cornuted species of *Cetoniidæ*, including both sexes of a new and splendid species brought home by Mr. Cuming. This plate contains not less than twenty different figures of the insects and their generic details. The second plate is devoted to four species of the extraordinary genus *Phyllomorpha*, of which the *Cimex paradoxus* is the type. Plate 3. represents the transformations of *Papilio Hector* from General Hardwicke's drawings; and Plate 4. illustrates two species of a curious new genus of Locusts.

The plates of this work are drawn by the author himself, who has been so long and well known as a delineator of insects. The figures are drawn with much spirit; although, in delicacy of execution, they will not bear comparison with Mr. Curtis's beautiful work. Figures of plants are also added, which give a more graceful appearance to the plates. The work has our cordial wishes for its success.

*Naturhistorisk Tidskrift.* Udgivet af Henrik Kröyer. Copenhagen, Vol. I. 1836 and 1837.

We have much pleasure in drawing the attention of the lovers of Natural History to this Journal, established in 1836 as an early and frequent medium of publication for the researches and observations of the naturalists of Denmark, and a vehicle of information relative to those of other countries. The principal articles in the first volume are the following:—

No. I. Prof. Schouw, Nature in Northern Africa.—H. Kröyer, On a new Crab, Geryon:—*Scutum cephalicum* longius quam latius, antice arcuatum, postice truncatum, longitudinaliter valde convexum; *frons* latior, declivis sed parum arcuata; *margines laterales anteriores* nonnihil recurvati, dentibusque præditi validis. *Regio branchialis* expressior apparet, minus vero regio *hepatica*; *pedunculi oculorum* crassi, breves; *margo orbitæ inferior* a fronte disjuncta, orbitaque igitur a fossula antennarum minime seclusa; margo orbitæ superior inferiori prominentior. Articulus antennarum externarum basilaris liber mobilisque; articulus secundus canto oculi interno exceptus ad frontem non prominet; tigellus terminalis longior articulis tribus prioribus plus duplo. Articulus caudalis tertius quartusque maris duobus prioribus latiores. Par pedum tertium et quartum, quæ paria præ ceteris longitudine eminent, inter se fere æqualia sunt.——Species, *G. tridens:* Margines laterales anteriores dentibus armati tribus validis; frons minutis quatuor iisque obtusis prædita; in medio marginis carpi superioris firmus quoque conspicitur dens, minorque in superiore brachii parte.—Chr. Drewsen, On the Migration of young Eels.—H. Kröyer, Ichthyological Notices: new Fish from Greenland, *Chirus præcisus* (Caput nudum; pinna dorsalis unica, longissima, caudali connexa; pinnæ ventrales jugulares; suturæ utrinque quaternæ, quarum ternæ ad mediam fere corporis longitudinem evanescunt. Mem. br. 6, P. pect. 18, ventr. 4, dors. 48, an. 34, caud. 11.), *Blennius lampetræformis.*—J. Schiödte, Monograph of the Danish species of the genus of Insects, *Amara Bonelli.*—Bibliographical Sketch of Geo. Cuvier, by the Editor.

No. II. J. W. Hornemann, On the Danish Flora.—J. Schiödte, On the genus *Amara.*—H. Kröyer, On Parasitic Crustacea, as regards the Danish Fauna; with descriptions of new species.

No. III. G. Forchammer, On Tertiary Fossiliferous Strata at Friderits, and the Bay of Veile.—Botanical Notices, by Drejer.—J. Voigt, Biography of Dr. Carey, founder of the Botanical Garden in Serampore.—Schiödte, On the genus *Amara*.—Kröyer, On Crustacea (*continued*).—Chr. Drewsen and F. Boie, Contributions to the Natural History of the Hymenoptera, with descriptions of new species.

No. IV. J. Schiödte, Synopsis of the *Pompilidæ* of Denmark.—S. Drejer, On *Polygonum*, *Stellaria graminea*.—Prof. Blytt, Botanical Notices.—J. Steenstrup, On the extinct Species of the two families *Anatiferidæ* and *Pollicipedidæ*, Gray.—G. Forchammer, On the Coal Formation of Bornholm, and on the Level of the Sea at Bornholm.—H. Kröyer, Notices of Northern Ichthyology.

No. V. J. W. Hornemann, On the Danish Flora.—Kröyer, On Crustacea (*continued*).—F. Boie, List of the Lepidoptera of Denmark, Schleswig-Holstein and Lauenburg.—H. Kröyer, On *Blennius Lumpinus*.

No. VI. F. Boie, Lepidoptera of Denmark, etc. (*concluded* from No. V ).—J.W. Hornemann, On the Danish, Norwegian, and Holstein Botanists and promoters of Botany that have received the honour of having genera of Plants named after them.—J. Schiödte, On a new genus of Braconoïd Ichneumonidæ, *Copisura*.—H. Kröyer, On Parasitic Crustacea.

*Tijdschrift voor Natuurlijke Geschiedenis en Physiologie.* By Professors Van der Hoeven and De Vriese. Part VI.
Nos. I. and II. 1839.

Contributions to our Microscopical Knowledge of delicate Animal Tissues; by P. Harting.—Some Contributions to the Natural Family of the Cacteæ; by Dr. W. H. De Vriese. In this article the author has given descriptions of some new species of *Echinocactus* and *Mammillaria* cultivated in the Garden of Amsterdam.

*Echinocactus macranthus.*

E. oblique-globosus, pallide-virescens, basi lignosus, attenuatus, 13-costatus; costis sinubusque acutis; aculeis 10–11; centrali uno longissimo ($6\frac{1}{2}$ centim.); radiantibus brevioribus, horumque summo maximo, infimo brevissimo, deflexo, uncinato; omnibus flavis vel fuscis; areolis exstantibus, ovatis, vel oblongo-ovatis, junioribus densissime velutino-tomentosis.

*Mammillaria Pfeifferiana.*

M. simplex, ovato-oblonga, glaucescenti-viridis; axillis supremis tomentosis, inferioribus nudis, mammillæ incrassato-conicæ; areolæ nudæ, junioribus tamen tomentosis. Aculeis exterioribus radiantibus, 19 horizontalibus, æqualibus; centrali uno, longissimo, curvatulo, subulato, verticali ratione centro radiorum imposito.

*Mammillaria speciosa.*

M. simplex, robusta, cylindraceo-columnaris, læte virens, axillis sublanatis, mammillis numerosissimis, exiguis, brevibus, depresso-conicis, basi rhomboideis; areolis junioribus tomentosis, reliquis nudis; aculeis radiantibus 22 brevissimis, setiformibus, interioribus 5–6–8 elongatis et horum uno quandoque centrali; omnibus levi tactu deciduis, niveis, centralibus apice rufis.

*Mammillaria recurvispina.*

M. simplex, glaucescens, subgloboso-depressa, mammillis conico-obtusis, crassis; areolis et axillis nudis. Aculei 8. Unus supremus tenuissimus, infimus longissimus crassior, reliqui tria paria efformant opposita. Omnes sunt reflexi, curvati, radiantes.

Notices respecting *Pæderia*; by P. W. Korthals. The author remarks, that as *Musca vomitoria* is misled by the peculiar smell of the Aroideæ, just so is *M. sarcophaga* misled by plants of this genus.—Description of the Gœttingen Botanic Garden; by Dr. J. F. Hoffmann.—Botanical Notices, by Dr. J. F. Hoffmann: On *Lemna arrhiza*; On the Occurrence of Petiolated Hairs in *Villarsia nymphæoides* and other Aquatic Plants; On the Spontaneous Ignition of *Dictamnus albus*.—F. A. G. Miguel De *Encephalarto horrido*, Lehm., ejusque formis.—Botanical Notices, by C. Mulder: Vegetable Monstrosities.—J. Van der Hoeven on the Heart of the Crocodiles, with an account of our knowledge thereof.—Dr. H. Schlegel on the Nostrils in Sula.—*Notices of Works:* Huschke De Bursæ Fabricii origine; Gould's Birds of Australia; Imhoff's Genera Curculionidum.

No. III.

Anatomy of the Scorpion Fly (*Panorpa communis*); by Dr. A. Brants.—Dr. A. J. D. Steenstra Toussaint De Systemate Uropœtico *Squali glauci*.—Q. M. R. Verhuell on the Differences between *Pieris Napi* and *Pieris Rapæ*.—H. C. Van Hall on the Increase of Trees in Thickness.—A. C. C. F. Van Winter's Geognostical Notices of the Basalts of the Central Rhine.—*Notices of Works:* Analysis of the New Transactions of the First Class of the Royal Institute of the Netherlands; Archives du Muséum d'Histoire Naturelle; Mayer's Comparative Anatomy; Van Deen's Anatomical Description of a monstrous 6-legged Frog; H. Schlegel's Drawings of Amphibia, 2nd Decade; J. Muller on the Auditory Organs in the *Cyclostomi*; Peligot and Decaisne on Sugar Beet-root.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

Nov. 18, 1840.—Read the first part of a Memoir on the Evidences of Glaciers in Scotland and the North of England, by the Rev. Prof. Buckland, D.D., Pres. G.S.

Dr. Buckland's attention was first directed by Prof. Agassiz in October 1838 to the phænomena of polished, striated, and furrowed surfaces on the south-east slope of the Jura, near Neuchâtel, as well as to the transport of the erratic boulders on the Jura, as the effects of ice; but it was not until he had devoted some days to the examination of actual glaciers in the Alps, that he acquiesced in the correctness of Prof. Agassiz's theory relative to Switzerland. On his return to Neuchâtel from the glaciers of Rosenlaui and Grindelwald, he informed M. Agassiz that he had noticed in Scotland and England phænomena similar to those he had just examined, but which he had attributed to diluvial action: thus in 1811 he had observed on the head rocks on the left side of the gorge of the Tay, near Dunkeld, rounded and polished surfaces; and in 1824, in company with Mr. Lyell, grooves and striæ on granite rocks near the east base of Ben Nevis. About the same time Sir George Mackenzie pointed out to the author in a valley near the base of Ben Wyvis, a high ridge of gravel, laid obliquely across, in a manner inexplicable by any action of water, but in which, after his examination of the effects of glaciers in Switzerland, he recognizes the form and condition of a moraine.

After these general remarks, Dr. Buckland proceeds to describe the evidence of glaciers observed by him in Scotland last autumn, partly before and partly after an excursion, in company with Prof. Agassiz; but he forbears to dwell on the phænomena of parallel terraces, though he is convinced that they are the effects of lakes produced by glaciers.

The district which Dr. Buckland examined previously to his excursion with Prof. Agassiz, lay in the neighbourhood of Dumfries; and the line of country which he investigated subsequently, extended in Scotland from Aberdeen to Forfar, Blair Gowrie, Dunkeld, and by Loch Tumel and Loch Rannoch to Schiehallion and Taymouth, and thence by Crief, Comrie, Loch Earn Head, Callender and Stirling, to Edinburgh; and in England by Berwick, Wollar, the Cheviots, Penrith, and Shap Fell, to Lancashire and Cheshire.

*Moraine near Dumfries.*—The picturesque ravine of Crickhope Linn, about two miles north of Closeburn, and one mile east of Thornhill, intersects nearly horizontal strata of new red sandstone, and is traversed by the Dolland rivulet. On emerging from the upper end of the ravine a long terminal moraine is visible, stretching nearly across the mountain valley, from which the Dolland Burn descends to fall into Crickhope Linn; and it resembles, when viewed from a distance, a vallum of an ancient camp, being covered with turf. It is formed principally of an unstratified mass of rolled pebbles, derived from the slates of the adjacent Lowder Hills, with a few rounded fragments of granite, the nearest rock of which *in situ* is that of Loch Doon, in Galloway, thirty miles to the north-west. Its height varies from twenty to thirty feet; its breadth at the base is about one hundred feet, and its length is four hundred yards. At the southern extremity it is traversed by the Dolland rivulet, and at the northern by the Crickhope Water; and in the centre it is intersected by a road.

*Moraines in Aberdeenshire.*—Dr. Buckland considers the gravel and sand which cover the greater part of the granite table-land from Aberdeen to Stonehaven to be the detritus of moraines; and the large insulated tumuli and tortuous ridges of gravel, occupying one hundred acres, near Forden, a mile east of Achinbald, to be terminal moraines; also the blocks, large pebbles, and small gravel spread over the first level portions of the valley of the North Esk, after emerging from the Sub-Grampians, to be the residue of moraines re-arranged by water.

*Moraines in Forfarshire.*—The cones and ridges of gravel at Cortachy and Piersie, near Kirriemuir, and at the confluence of the Carity valley with that of the Proson, are considered by Dr. Buckland to have been produced by glaciers, and modified in part subsequently by water. The polish and striæ on a porphyritic rock near the summit of the hill, on the left side of the main valley, and immediately above the moraines, he is of opinion must also be assigned to glacier action. The vast longitudinal and insulated ridges of gravel, extending for two or three miles up the valley east of Blair Gowrie, and the transverse barriers forming a succession of small lakes in the valley of the Lunanburn, to the west of that town, he considers to be moraines; likewise the lofty mounds comprising the ornamental grounds adjacent to Dunkeld Castle; the detritus covering the left flank of the valley of the Tay, along a great part of the road from Dunkeld to Logierait; that on the left flank of the Tumel valley from Logierait to Killicrankie; and on the left flank of the Garrie, from Killicrankie to Blair Athol.

The vast congeries of gravel and boulders on the shoulder of the mountain, exactly opposite the gorge of the Tumel, Dr. Buckland is of opinion was lodged there by glaciers which descended the lateral valley of the Tumel from the north side of Schiehallion and the adjacent mountains, and were forced across the valley of the Garry, in the same manner as modern glaciers of the Alps (that of the Val de Bagne, for example,) descend from the transverse, and extend across the longitudinal valleys. Dr. Buckland mentions the mammillated, polished and striated slate rocks, about one mile above the falls of the Tumel, on the left portal of the gorge of the valley, as the effects of a glacier which descended the gorge: he notices also the rounded outline and polish on veins of quartz, which project eight or ten inches above the weathered surfaces of masses of mica slate near the same locality. Similar mammillated masses of mica slate retaining striæ and flutings are visible at Bohaly, one and a half miles east of Tumel Bridge.

*Evidences of Glaciers on Schiehallion.*—The north and north-east shoulders of the mountain present rounded, polished, and striated surfaces, many of which have been recently exposed by the construction of new roads. On the left flank of the valley called the Braes of Foss, and near the thirteenth milestone, a newly-exposed porphyry dyke, forty feet wide, exhibited a polished surface and striated, parallel to the line of descent which a glacier from Schiehallion would take; and on the right flank, one hundred yards north of the eleventh milestone, another and smaller dyke of porphyry presented similar phænomena. In the intermediate space the recently uncovered slate rocks and quartzite are rounded, polished, grooved, and striated, parallel to the direction which a glacier would assume where each surface is situated.

*Moraines at Taymouth.*—Two lofty ridges of gravel, which cross the park at right angles to the sides of the valley between the village of Kenmore and Taymouth Castle, the hill, on which stands an ornamental dairy-house, and the gravel, on which are situated the woods overhanging the left bank of the lower end of Loch Tay, Dr. Buckland considers to be moraines, or the detritus of moraines; also the deeply-scored and fluted boulders of hornblende rock, with other debris near Fortingal, at the junction of Glen Moulin with Glen Lyon.

*Moraines in Glen Cofield.*—A remarkable group of moraines occurs on the high lands which divide the valleys of the Tay and the Bran; and between the sixteenth and fourteenth milestones thirty or forty round-topped moraines, from thirty to sixty feet high, are crowded together like sepulchral tumuli. These mounds, composed of unstratified gravel and boulders, Dr. Buckland says cannot be referred to the action of water, as they are placed precisely where a current descending from the adjacent high lands would have acted with the greatest velocity; and they exactly resemble some of the moraines in the valley of the Rhone, between Martigny and Löck. The village of Amulrie is considered by the author to stand on a group of low moraines; and the road for two or three miles from it, towards Glen Almond, to traverse small moraines or surfaces of mica slate, rounded by glaciers. A few conical moraines appear also on the high lands between Glen Almond and Crieff.

*Proofs of Glaciers in and near Strath Earn.*—This part of the valley of the Earn is flanked irregularly with ridges and terraces of gravel, the detritus of moraines; and on its north side, in the woods adjacent to Lawers House, near Comrie, hard slaty rocks of the Devonian or old red sandstone system have been rounded and striated. At the west end of Comrie, near the bridge, blue slate rocks have been also rounded and guttured.

*Evidence of Glaciers near Comrie.*—In this district Dr. Buckland tested the value of the glacial theory by marking in anticipation on a map the localities where there ought to be evidences of glaciers having existed, if the theory were founded on correct principles. The results coincided with the anticipations. On a hill above the gorge, called the Devil's Caldron, near Fentallich, are rounded surfaces of greenstone, partially covered by moraines; and at Kenagart, also immediately above the Devil's Caldron, is a small cluster of moraines, easily separable into lateral and terminal. Two miles up the valley a medial moraine forms a ridge on the level ground, in front of the confluence of Glen Lednoch and Glen Garron. The farmhouse of Invergeldy is stated to stand on the detritus of a moraine, and the glen descending to it from Ben-na-cho-ny to be partially obstructed with moraines. The surface of the granite at Invergeldy, which supplied the stone for Lord Melville's monument at Crieff, is rounded and mammillated, but too much weathered to present a polish or striæ. On a hill of trap, however, half a mile south of the farm of Lurg, there is a distinct polish, striated in the direction which a glacier descending the subjacent valley would assume. In

Glen Turret, on the shoulder of the mountain immediately above the south-west extremity of Loch Turret, a very deep ravine intersects a vast lateral moraine, which Dr. Buckland shows must have been lodged there whilst the Loch was a mass of ice, and the valley above it filled with a glacier more than five hundred feet above the present level of the lake. At the falls of the Turret, at the lower extremity of the gorge, is an extensive lodgement of moraines; and at the upper end, on the left bank of the Turret, near a gate which crosses the road, the slate-rocks are polished and furrowed; and at both these localities Dr. Buckland had anticipated that glacial action ought to be found.

*Evidence of Glaciers near Loch Earn.*—On the north bank of the Loch rounded and furrowed surfaces and portions of lateral moraines are exposed by the roadside; and at Loch Earn Head is a group of conical moraines at the junction of Glen Ogle with Loch Earn, and at the very point where, had they been brought by a rapid current, they would have been propelled into the Loch. It is nevertheless the exact position where the terminal moraine of a glacier would be deposited.

*Moraines near Callender.*—Moraines are stated to cover more or less the valley of the Teith from Loch Katherine to Callender, and the lofty terraces flanking the valley from Callender to Doune are considered to be the detritus of moraines, modified by the great floods which accompanied the melting of the ice. One of them, near Callender, has been mapped as the vallum of a Roman camp. The little lakes on the right bank of the Teith, four miles east of Callender, Dr. Buckland considers due to moraines obstructing the drainage of the country; and the greater part of the first table-land on the right bank of the Teith, between Callender and Doune, including the portion on which stands Mr. Smith's farm, to be composed of re-arranged glacial detritus.

*Proofs of Glacial Action at Stirling and Edinburgh.*—Having thus shown that glaciers once existed in the glens and mountainous districts of Scotland, Dr. Buckland proceeds to point out the evidence of glacial action at points but little raised above the level of the sea, and distant from any lofty group of mountains. In 1824 he had noticed that the trap-rock then recently exposed on the summit of the hill, between the castle and the church, was polished and striated, but at his last visit in 1840 these evidences had become obliterated by weathering. The grooves and scratches described by Sir James Hall on the Costorphine hills near Edinburgh, and on the surface of Calton Hill, Prof. Agassiz is of opinion cannot be explained by the action of water; but they resemble, he says, the effects produced by the under-surface of modern glaciers. In his recent examination, in company with Mr. McLaren, of the Castle Rock at Edinburgh, Dr. Buckland found further proofs of the correctness of the glacial theory, by discovering at points where he anticipated they would occur, namely, on the north-west angle of the rock, distinct striæ upon a vertical polished surface; and at its base a nearly horizontal portion of rock, covered with deep striæ; also on the south-west angle obscure traces of striæ and polished surfaces*. Some of these effects may be imagined to have been produced by stones projecting from the sides or bottom of floating masses of ice; but it is impossible, Dr. Buckland observes, to account by such agency for the polish and striæ on rocks at Blackford Hill, two miles south of Edinburgh, pointed out to him by Lord Greenock in 1834. On the south face of this hill, at the base of a nearly vertical cliff of trap, is a natural vault, partly filled with gravel and sand, cemented by a recent infiltration of carbonate of lime. The sides and roof of the vault are highly polished, and covered with striæ, irregularly arranged with respect to the whole surface, but in parallel groups over limited extents. These striæ, Dr. Buckland says, cannot be referred to the action of pebbles moved by water; 1st, because fragments of stone set in motion by a fluid cannot produce such continuous parallel lines; and 2ndly, because if they could produce them, the lines would be parallel to the direction of the current: it is impossible, he adds, to refer them to the effects of stones fixed in floating ice, as no such masses could have come in contact with the roof of a low vault. On the contrary, it is easy, he says, to explain the phænomena of the polish by the long-continued action of fragments of ice forced into the cave laterally from the bottom of a glacier descending the valley, on the margin of which the vault is placed; and the irregular grouping of the parallel striæ to the unequal motion of different fragments of ice, charged with particles of stone firmly fixed in them, like the teeth of a file. The cave is not three hundred feet above the level of the sea, and the proving of glacial action at this point justifies, the author states, the belief that glaciers may also at that period have covered Calton Hill and the Castle Hills of Edinburgh and Stirling.

Dec. 2.—The second part of Dr. Buckland's Memoir on the Evidence of Glaciers in Scotland and the North of England, was read.

The first part of the Memoir concluded with an account of glacial phænomena in the neighbourhood of Edinburgh (see *ante*, p. 326); and the line of country more particularly described in this portion extends southward from Edinburgh by Berwick, Newcastle, the Cheviots, the lake districts of Cumberland and Westmoreland, Kendal and Lancaster, to Shap Fell. A large portion of the low lands between Edinburgh and Haddington is composed of till or unstratified glacier-mud containing pebbles. In the valley of the North Tyne,

* In October 1840, Mr. McLaren found a polished surface on a portion of rock near the south-west base of Arthur's Seat.

Dr. Buckland has in his possession lithographs copied from drawings made by Mr. James Hall, of distinct west and east furrows which extend over a portion of the north side of the summit of Calton Hill, and on the surface of the carboniferous sandstone at Craig Leith Quarry. Dr. Buckland saw similar dressings in 1821 in a sandstone quarry near the house of Lord Jeffrey, two miles west of Edinburgh; and in 1840, in a railway section at Bangholm Bower, one mile north-east of Edinburgh, he found in stratified till and sand many striated and fluted boulders.

about one mile east of Haddington, is a longitudinal moraine midway between, and parallel to, the river and the high road; and Dr. Buckland directs attention to the trap-rocks which commence a little further eastward, and are intersected by the Tyne for four or five miles above Linton, as likely to present scored and striated surfaces, where the valley is most contracted. Four miles west of Dunbar another long and lofty ridge of gravel stretches along the right bank of the river; and for three miles to the south-east of Dunbar extends a series of terraces or modified lateral moraines. In the high valleys at the east extremity of the Lammermuir hills, between Cockburn's Path and Ayton, moraines dispersed in terraces are also visible at various heights on both sides of the river; and on the left margin of the estuary of the Tweed, three miles north of Berwick, round tumuli and oblong mounds of gravel are lodged on the slope of a hill 300 or 400 feet above the level of the sea.

*Moraines in Northumberland.*—On many parts of the coast of Northumberland, especially near Newcastle, deposits of till rest upon the carboniferous rocks. At the village of North Charlton, between Belford and Alnwick, Mr. C. Trevelyan pointed out to Dr. Buckland in 1821, a tortuous ridge of gravel which was supposed to be an inexplicable work of art; but which he became convinced, after an examination in 1838 of the upper glacier of Grindelwald and that of Rosenlaui, is a lateral moraine. Dr. Buckland was prevented from examining the gorges through which the Burns descend from the eastern extremity of the Cheviots, but he directs attention to them as points where striæ and other proofs of glacial action may be found. Immediately below the vomitories of the eastern valleys of the Cheviots, enormous moraines are stated to cover a tract four miles from north to south, and two from west to east; and the high road to wind among cultivated mounds of them from near Woller, through North and South Middleton, and by West and East Lillburn to Rosedean and Wooperton. On the left bank of the College Burn*, immediately above the bridge at Kirknewton, Dr. Buckland discovered last autumn a moraine thirty feet high, stratified near the top to the depth of a few feet, but composed chiefly of unstratified gravel, inclosing fragmentary portions of a bed of laminated sand about three feet thick. Some of these fragments were in a vertical position, others were inclined, and the laminæ of which they were composed, were, for the greater part, variously contorted. He is of opinion that these detached portions were severed from their original position, moved forward, and contorted by the pressure of a glacier, which descended the deep trough of the College Burn from the northern summit of the Cheviots.

*Evidence of Glaciers in the mountains of Cumberland and Westmoreland.*—Proofs of glacial action, Dr. Buckland says, are as abundant throughout the lake districts and in the districts in front of the great vomitories through which the waters of the lakes are discharged,

* For a notice by the late Mr. Cully, of a sudden flood in this district in 1830, see Proceedings of the Geological Society, vol. i. p. 149.

as in Scotland and Northumberland. Thus, in the vicinity of Penrith, near the junction of the Eden with the Eamont and the Lowther, are extensive moraines loaded with enormous blocks of porphyry and slate, brought down, Dr. Buckland observes, by glaciers, which descended from the high valleys on the east flanks of Helvellyn, and in the mountains around Patterdale, into the lake of Ulleswater (considered to be then occupied by ice), and from the valleys by which the tributaries of the Lowther descend from the east flank of Martindale, from Haweswater and Mardale. A remarkable group of these moraines is by the road side near Eden Hall four miles east of Penrith; and the detritus of moraines is stated to occupy the greater part of the valley of the Eamont, from Ulleswater to its junction with the Eden. On the southern frontier of these mountains in Westmoreland and Lancashire similar moraines occur on an extensive scale. Thus, immediately below the gorge through which the Kent descends from the mountains of Kentmere and Long Sleddale, many hundred acres of the valley of Kendal are covered with large and lofty insulated piles of gravel; and smaller moraines, or their detritus, nearly fill the valley from Kendal to Morecombe Bay. Five miles north-east of Kendal, on the high road from Shap, on the shoulder of the mountain in front of the valley of Long Sleddale, and at an elevation of 500 feet, a group of moraines occupies about 200 acres, and is distinguished from the adjacent slate rocks by a superior fertility. On the south of Kendal, the high roads from Burton and Milnthorpe to Lancaster, pass for the greater part over moraines or their detritus; and Lancaster Castle, placed in front of the vomitory of the Lune, is stated to stand on a mixed mass of glacial debris, probably derived from the valley of the Lune. The districts of Furness, Ulverston, and Dalton are extensively covered with deep deposits of glacier origin, derived from the mountains surrounding the upper ends of Windermere and Coniston lakes; and they contain a large admixture of clay, in consequence of the slaty nature of many of the mountains. A capping of till and gravel, thirty to forty feet thick, overlies the great vein of hæmatite near Ulverston. The numerous boulders upon the Isle of Walney also indicate the progress of the moraines from Windermere and Coniston to the north-west extremity of Morecombe Bay.

Dr. Buckland was prevented from personally examining, during his late tour, the south-west and west frontiers of the Cumberland mountains, but he conceives that many of the conical hillocks laid down on Fryer's large map of Cumberland, in the valley of the Duddon, at the south base of Harter Fell, are moraines; that some of the hillocks in the same map on the right of the Esk, at the east and west extremities of Muncaster Fell, are also moraines formed by a glacier which descended the west side of Sea Fell; and that many of the hillocks near the village of Wastdale were formed by moraines descending westward. Dr. Buckland is likewise convinced that moraines exist near Church in the Valley; also between Crummoch Water and Lorton, in the valley of the Cocker; and near Isle, in the valley by which the Derwent descends from Bassenthwaite lake towards Cockermouth, though there are no indications of them on Fryer's map.

Near the centre of the lake district are extensive medial moraines on the shoulder of the hill called the Braw Top, and formed by glaciers at the junction of the valley of the Greta with that of Derwent Water.

Dr. Buckland had no opportunity of seeking for polished and striated surfaces in the high mountain valleys of the lake district; but he found them on a recently exposed surface of greywacke in Dr. Arnold's garden at Fox Howe near Ambleside; likewise near the slate quarry at Rydal; and on newly bared rocks by the side of the road ascending from Grassmere to the Pass of Wythburn; he is also of opinion that many of the round and mammillated rocks at the bottom of the valley, leading from Helvellyn by the above localities to Windermere, owe their form to glacial action.

The remarkable assemblage of boulders of Criffle granite at Shalkbeck, between Carlisle and Cockermouth, Dr. Buckland conceives may have been transported across the Solway Frith on floating masses of ice, in the same manner as the Scandinavian blocks are supposed to have been conveyed across the Baltic to the plains of Northern Germany.

*Dispersion of Shap Fell Granite by Ice.*—The difficulties which had long attended every attempt to explain the phænomena of the distribution of the Shap Fell boulders, Dr. Buckland considers, are entirely removed by the application of the glacial theory. One of the principal of these difficulties has been to account for their dispersion by the action of water; northwards along the valley, descending from Shap Fell to Shap and Penrith; southwards in the direction of Kendal and Morecombe Bay; and eastward, over the high table-land of Stainmoor Forest, into the valley of the Tees, as far as Darlington. A glacier descending northwards from the Fell would, on the contrary, carry with it, Dr. Buckland says, blocks to the village of Shap, and strew them thickly over the space where they are now found; another, taking a southern course, would drop the boulders on the hills and valleys over which the road descends by High Borough Bridge to Kendal; and a third great glacier, proceeding eastwards betwixt Crosby, Ravensworth, and Orton, would cross transversely the upper part of the valley of the Eden, near Brough, and accumulate piles of ice against the opposite escarpment until they overtopped its lowest depression in Stainmoor Forest, and disgorged their moraines into the valleys of the Greta and the Tees. There are abundant proofs, Dr. Buckland states, of the existence of this glacier in large mud and boulder moraines, in the ascent of the gorge between Shap Fell and Birbeck Fell, and in the furrows and striæ, as well as the mammillated forms of the rocks at the portals of the gorge, particularly on the northern side. In the physical structure of this neighbourhood, Dr. Buckland points out other conditions which would have facilitated the accumulation of glaciers, as the lofty mountains of Yardale Head, which overtop Shap Fell on the north-west, and the still higher mountains to the west, whose snows must have nourished enormous glaciers; and he concludes by stating that Professor Agassiz, during an independent tour, arrived at similar conclusions respecting the mode by which the Shap boulders were distributed.

## ZOOLOGICAL SOCIETY.

August 25, 1840.—W. H. Lloyd, Esq., in the Chair.

Two papers were read, in which the authors resume the descriptions of the Shells collected by H. Cuming, Esq., Corr. Memb., in the Philippine Islands, who exhibited specimens in illustration of the papers.

The first of these papers is from W. J. Broderip, Esq.

Bulinus Dryas. *Bul. testâ elongato-ovatâ, vix subdiaphanâ, peristomate interrupto, crassiusculo, lato, expanso, subrecurvo; nitidè albâ vel flavescente brunneo castaneove vittatâ.*

Var. *a. alba, anfractu basali trivittato, vittâ superiore et inferiore striis nigro-fuscis; mediâ castaneâ, nonnunquam interruptâ.*

This variety is sometimes yellowish, and the three bands on the body-whorl are nearly uniform chestnut.

Var. *b. anfractu basali bicincto, vittâ superiore angustâ, vittâ inferiore tristrigatâ.*

Var. *c. anfractu basali nitidè albo, vittâ superiore et inferiore angustis nigrescentibus limbato.*

Var. *d. Pallidè flava fasciâ suturali albente, anfractu basali vittâ superiore et inferiore angustissimis, castaneis, limbato; cæteris castaneo univittatâ.*

Var. *e. Tota alba.*

*Hab.* ad Mansalai in insulâ Mindoro.

Legit H. Cuming in sylvis.

Mr. Cuming informs us that the animal of this elegant shell, which in the form of the spire and the distribution of the colouring, though not in the colouring itself, reminds the observer of *Achatinæ fasciata, emarginata* and *virginea* of Swainson (Zool. Ill.), varies much. In all the varieties the broadly expanded lip is white, both above and below, and the bands of the body-whorl terminate abruptly upon its upper part, so that the shell almost looks as if the wide white lip had been added to some of the Riband *Achatinæ*, for varieties of which some of the young might be taken by a cursory observer. The animal was ash-coloured, darker above. General length of the shell about two inches; width of body-whorl from $\frac{6}{8}$ths to $\frac{7}{8}$ths of an inch.

Bulinus Sylvanus. *Bul. testâ elongato-ovatâ, subdiaphanâ, subpyramidali, anfractibus ventricosioribus, fuscâ castaneo vittatâ, strigis et maculis flaventibus vel albentibus, longitudinalibus pictâ; peritremate interrupto, columellæ basi subsinuatâ, aperturâ subauriculari; labro expanso, recurvo.*

Var. *a. Fusca vel flavescens fasciâ suturali tenui albâ, apice pur-*

*purascente, anfractu basali castaneo trifasciato, fasciis inferioribus maximis, strigis angulatis longitudinalibus picto, anfractibus cæteris frequentissimè longitudinaliter strigatis et maculatis.*

Var. *b. Nitidè flavescens, anfractu basali castaneo quadrivittato.*

Var. *c. Flavescens anfractu basali bivittato.*

Several of this variety have traces of the longitudinal zigzag lines and spots upon the body-whorl.

Var. *d. Ventricosior, anfractu basali trivittato, apice purpurascente, vittis nigricantibus.*

Var. *e. Sordidè fusca strigis et maculis angulatis elongatis obscurè sparsa.*

Var. *f. Tota flavescens, lineâ tenuissimâ suturali albâ, gracilior.*

*Hab.* In insulâ Mindoro.

Legit H. Cuming in sylvis.

Some of the varieties of this fine shell, especially variety *b*, will remind the observer, at first sight, of the species last described; but Mr. Cuming informs us that the animal is reddish brown, and, besides other differences in the shell, the colouring-matter, instead of stopping short at that point of the body-whorl, just where the lip begins to expand, is continued on to the very rim, which is in most instances bordered with it; nay, the colour generally becomes more intense upon the upper part of the expansion. Varieties *d.* and *e.* were found at Calapan; varieties *e.* and *f.* at Puerto Galero. The latter variety has generally a chestnut oblique stripe or spot at the bottom of the whorl and on the upper expansion of the outer lip, continued from above the *columella*. Sometimes there is an obscure line of a somewhat darker hue belting the body-whorl in this same variety.

This species varies a good deal in length and breadth. The average length may be taken at about two inches, and the width across the body-whorl at from more than an inch to $\frac{6}{8}$ths of an inch.

Bulinus fictilis. *Bul. testâ subpupiformi, anfractibus sex ventricosis, lineis incrementi obliquis fortioribus, peristomate interrupto, expanso, crassiusculo, labro expanso, aperturâ subauriculari, suprà subangulatâ, albâ.*

Var. *a. Nitidè fusca strigis, punctis, lineisque albentibus notata, anfractûs basalis vittâ suturali angustâ subalbidâ.*

Var. *b. Albescens, strigis maculisque castaneo-nigricantibus longitudinalibus, clarioribus.*

Var. *c. Flavescens, lineis strigisque longitudinalibus albentibus, anfractûs basalis fasciâ angustâ obscurâ.*

Var. *d. Griseo-albens vel albens, strigis longitudinalibus albidis.*

*Hab.* in insulâ Philippinâ Cuyo dictâ.

Legit H. Cuming in sylvis.

In var. *a.* the dark ground-colour of the shell is striped, and powdered, as it were, with the whitish *epidermis*; in var. *b.* this whitish *epidermis* predominates, so that the longitudinal zebra-like stripes arising from the exposure of the dark brown, but shining ground-colour, are comparatively distinct. Var. *d.* seems to be the albinostate of the species. General length about 1⅝ths inch; breadth about ⅝ths.

Bulinus larvatus. *Bul. testâ elongato-pyramidali, gracili, subdiaphanâ, lineis incrementi obliquis, aperturâ auriculari, supernè angustatâ, labro crasso, expanso, recurvo, fuscâ strigis pallidis obliquè longitudinalibus, distantibus, variâ; aperturâ albâ; labri margine externo infernè fusco limbato.*

*Hab.* in insulâ Cuyo.

Legit H. Cuming in sylvis.

It is not without doubt that I have separated this shell specifically from the last; but in addition to the difference of shape, the colouring matter, here again, instead of stopping short just above the outer lip, where it begins to expand, as is the case with *Bul. fictilis*, is carried on and over the external expanse of the outer lip, so as to constitute a coloured rim on its lower external edge. In other respects there is much similarity between the two. General length about 1½ inch; breadth across body-whorl rather more than half an inch.—W. J. B.

Following is the continuation of Mr. G. B. Sowerby's paper:—

Helix decipiens. *Hel. testâ globosâ, tenuis, lævis, haud nitens, striis incrementi subtilissimè striata, plerumque pallescens, nonnunquam unicolor, sæpius zonis duabus nigris ornata; anfractibus quatuor, rotundatis, ultimo maximo; apertura subcirculari; peritremate reflexo, albo, columella albâ, subincurvâ, rectiusculâ.*

Long. 1·2, lat. 1·35.

*Hab.* supra folia arborum ad insulam Marinduque, Philippinarum.

The appearance of the different varieties of this species might lead to the supposition that they were distinct species, in consequence of the peculiarities of the outer portion of the epidermis. The whole epidermis of this species seems worthy of particular notice: it consists of an inner coat, which is rather thick, horny, apparently strongly adhesive, and of a greenish brown yellow colour; and of an outer partial coat, which is white and hydrophanous, and which does not entirely cover the inner coat, but is variously arranged upon it in the different varieties. The following are the most remarkable varieties:—

*a.* Shell brown, with two very dark-brown spiral bands, a lighter antesutural band, and a very dark columellar band. Lip white at the back as well as in front. From the island of Marinduque.

*b.* Shell coloured similarly to the last, but having its outer surface slightly rugulose. From the same locality.

*c.* Shell coloured similarly to the two former, but with an external white epidermis disposed in slightly interrupted spiral bands. Found on the leaves of trees in Tayabas, in the province of Tayabas, Island of Luzon.

*d.* Shell light brown, with a dark-coloured antesutural band, and very dark columellar band; external white epidermis disposed as the last. From the same locality.

*e.* Shell brown, not banded, with the white external epidermis disposed in irregular and interrupted lines, nearly following the direction of the lines of growth, but increasing in width so as to form an interrupted band at the circumference of the shell. Found on the leaves of small trees on the island of Capul.

*f.* Shell pale brownish yellow, with the white external epidermis similarly disposed, but forming two rather broader and less interrupted bands, one at the circumference and the other anterior. From the same locality.

*g.* Shell white, with alternating light and dark brown bands, antesutural line and band round the columella dark brown. From Ligao, South Camarenis, island of Luzon : found on the leaves of trees.

*h.* Similar to *g*, but the alternating bands are dark brown and black; the antesutural line and the band round the columella also are black. From Pasacao, South Camarenis: found on the leaves of trees.

*i.* Similar to the last, only destitute of the central brown band. From the same locality as *h*.

*k.* Shell white, with three brown bands; antesutural line and columellar band of the same colour. From Ligao.

*l.* Shell white, with two brown bands; antesutural line and columellar band of the same colour. From Ligao.

*m.* Shell white, with a single brown band at its circumference. From Ligao.

*n.* Shell white, with alternately very pale and dark brown bands, antesutural line and columellar band dark brown. From Ligao.

*o.* Shell very pale brown, with a very thin epidermis; two dark brown bands, the one before and the other behind the light brown circumferential band; antesutural line and columellar band dark brown. From Ligao.

*p.* Shell totally white. Also from Ligao.

HELIX OPALINUS. *Hel. testa pyramidalis, conica, obtusa, hyalina, tenuis, albido-viridescens, lævis, nitida, striis incrementi tenuissimis solùm sculpta; anfractibus senis, subconvexis, ultimo anticè obtusè subcarinato; suturâ distinctâ, anticè lineâ albâ angustissimâ; aperturâ obliquâ, subrotundatâ, supernè basi ultimi anfractûs ferè planâ modificatâ; peritremate subreflexo, propè columellam subincrassato; columellâ albâ, subincurvâ, sulco subobsoleto circumdatâ.*

Long. 1·25, lat. 0·8.

*Hab.* supra folia fruticum propè St. Jaun, Provinciam Cagayan Insulæ Luzonicæ.

A remarkably delicate species, having nearly the form of *Helix pileus*; it is, however, narrower in proportion to its height, its volutions are less numerous, and rather more convex. This elegant species has the usual colour and semitransparency of the *Semi-Opal*, which, however, becomes rather greener towards the base.

HELIX CINCINNUS. *Hel. testa ovato-pyramidalis, tenuis, lævis, plerùmque nitida, subhyalina; epidermide albo fuscoque variâ, haud nitidâ nonnunquam induta; spirâ elatiusculâ, obtusâ; anfracti-*

*bus senis, convexiusculis, solùm striis incrementi tenuibus indutis; suturâ distinctâ; aperturâ subovali, posticè acuminatiusculâ, supernè basi anfractûs ultimi rotundatâ modificatâ, sinistrorsùm sinuatâ; peritremate angusto, reflexo; columellâ albâ, anticè perobliquè subtruncatâ.*

Long. 1·8, lat. 1·1.

*Hab.* supra folia arborum ad Insulas Philippinas.

Another very variable species, particularly in its colouring and in the characters dependent upon its epidermis. Numerous, however, as its varieties are, and abundant as the species is, it does not appear to have been described either by Lamarck or De Férussac; indeed, I have not been able to find any species nearly approaching it, except *Helix ventricosa*, De Fér., which is figured in Chemn. vol. ix. f. 1007, 1008, and which somewhat resembles the banded variety of our shell. The following varieties have been brought by Mr. Cuming:—

*a*. Shell white, last volution pale green, which is darker in its anterior part. From the island of Rumblon.

*b*. The same as *a*, but having a dark brown band surrounding the columella. On some specimens of this variety the remains of a dark brown epidermis is to be seen about the anterior part of the last volution. From the island of Burias.

*c*. Shell white, with a pink band surrounding the columella, and scattered remains of a dark brown epidermis on the last volution. From Temple Island.

*d*. Shell white, with a dark brown band surrounding the columella, and scattered remains of a dark brown epidermis on the last volution. From the island of Burias.

*e*. Shell rose-colour, with scattered remains of a dark brown epidermis about the anterior part of the last volution. From Temple Island.

*f*. Shell red-brown, with a dark brown band surrounding the columella, and scattered remains of a dark brown epidermis about the anterior part of the last volution. From Temple Island.

*g*. Shell light red-brown, with a dark brown band surrounding the columella, and mottled with a nearly white, hydrophanous and a dark brown epidermis, which becomes altogether darker coloured toward the anterior part of the last volution. From the island of Burias.

*h*. Shell pink, epidermis as in *g*. From the island of Burias.

*i*. Shell white, with the dark brown columellar band and epidermis as in *g*. From the island of Burias.

*k*. Shell white, very pale greenish toward the anterior part of the last volution, with a broad dark brown columellar band, a narrow brown band at the circumference of the shell, and a pale antesutural brown band. From the island of Burias.

*l*. Coloured as *k*, but with broader and darker bands. From the same locality.

Bulinus ovoideus, Brug. *Bul. testa ovato-oblonga, ovoidea, alba lævis, striis incrementi exilissimis obliquis solùm sculpta, zonis* *nigris variis plerumque ornata; anfractibus quinque subventricosis, ultimo spiram ferè duplo longiori, aperturâ subovatâ, posticè subacuminatâ, intùs albâ, zonas exhibentibus; peritremate reflexo, albo; columellâ rectiusculâ, labio columellari subincrassato, anticè reflexo, ad labium externum adjuncto.*

*Hab.* ad insulam Ticao Philippinarum.

This species has been inadvertently figured in the 'Conchological Illustrations' under the name of *Luzonicus*, having previously been figured by De Férussac in his 'Hist. Nat. des Mollusques terrestres et fluviatiles,' tab. 112. f. 5, 6, and described in the 'Encycl. Méthod., by Bruguière* under the name of *ovoideus*, which name must of course be retained. Bruguière's specimen was quite white; those figured by Lister and De Férussac had a single dark band. Mr. Cuming has brought the following varieties:—

*a.* White, the anterior part of the first three volutions light brown. From the island of Masbate, on leaves of trees.

*b.* White, with three broad brown bands close behind the suture.

*c.* The same as the last, with an additional black band in front of the postsutural band.

*d.* White, with a narrow brown band behind the suture.

*e.* Brownish white, with perfectly white antesutural band, and three very broad dark brown bands.

*f.* White, with two dark brown bands, both anterior to the circumference of the shell.

*g.* White, with a single dark brown band. This is the variety that has been figured in 'Conch. Illustr.,' Bulinus, f. 53, under the name of *B. Luzonicus*; it is also given in Guérin's 'Magazin de Conchyliologie' (1838), tab. 116. f. 2. under the name of *B. Costerii*: of course both these names must be abandoned in favour of the older name of Bruguière.

*h.* Entirely white. This variety is of smaller size than most of the others.

*i.* Apex reddish brown, ground-colour white; anterior part of the last volution pale brown, with three dark brown bands.

*k.* Apex white or pale reddish, antesutural band white; then two broad dark brown bands, nearly confluent; then a lighter brown band, sometimes nearly white; then a broad dark brown band; and finally, the circumference of the columella white.

*l.* White, with two dark brown bands in front, and a very narrow light brown band behind the circumference.

Helix Albaiensis. *Hel. testa subglobosa, depressiuscula, tenuis, lævis, alba, plerumque fusco-zonata, lineis incrementi tenuissimis solùm insculpta; spirâ subdepressâ, anfractibus $3\frac{1}{2}$ subconvexis, ultimo maximo inflato; aperturâ extùs rotundatâ; peritremate albo, rotundato, reflexo, mediocri; intùs sinuatâ, sinu profundo, anticè per columellam, latiusculam, albam, posticè per modificationem anfractûs penultimi efformato; suturâ subinconspicuâ.*

Long. 1·2; lat. 1·5 poll.

* Hist. Nat. des Vers, tome vi. p. 335.

*Hab.* supra folia fruticum apud Matnog, Provinciam Albaiensem insulæ Luzonicæ.

The following three varieties of this new species have been discovered by Mr. Cuming, viz. :—

*a.* White, with a little light brown at the apex and outside the columellar lip.

*b.* White, with two brown bands, one anterior to, and the other posterior to, the circumference of the shell; a dark brown antesutural line and a dark brown band outside the columellar lip.

*c.* The same as *b*, with the two brown bands nearly meeting over the circumference.

HELIX AURATA. *Hel. testa depressiusculo-subglobosa, tenuis, lævis, subnitens, flava, apice roseo; spirá rotundato-depressá; anfractibus $3\frac{1}{2}$ convexis, ultimo maximo; aperturá semilunari, latá, posticè basi ultimi anfractûs gibbosá modificatá; labio externo posticè paululùm coarctato, deinde subreflexo, albo, crassiori, rotundato; columellá albá, latá, subincrassatá; suturá distinctá.*

Long. 0·9; lat. 1·4 poll.

*Hab.* in foliis arborum ad St. Jaun Provinciam Cagayan Insulæ Luzonicæ Philippinarum.

Two varieties of this remarkable and beautiful species have been found by Mr. Cuming. The similarity of the young shell to *Helix picta* is very great: the full-grown shell differs, however, very much in shape from that species. Both varieties are remarkable for a bright red apex.

Var. *a.* Bright yellow, with a scarlet band placed just before the suture, beginning at the second volution and increasing in breadth with the growth of the shell: this var. has also a blue line on the outside a little in front of the scarlet band, which is black within.

Var. *b.* Upper half of the shell bright yellow; lower half white.

HELIX ROISSYANA, De F. *Hel. testa subglobosa, crassiuscula, lævis, coloribus plerumque albo, nigroque fasciata, et ut assolent epidermide obscurá, haud nitente, obtecta; spirá obtusissimá; anfractibus $4\frac{1}{2}$, rotundatis, subventricosis, ultimo maximo, cæteris quadruplo longiori; suturá distinctá; aperturá sublunari, intùs albá, labii externi margine arctè revolutá, nigrá, columellari albá; columellá rectiusculá, planulatá, albá s. albicante.*

HELIX ROISSYANA, De Fér. 'Hist. Nat. générale et particulière des Mollusques terrestres et fluviatiles,' tab. 104. f. 2, 3.

Long. 1·2; lat. 1·4 poll.

*Hab.* propè Puerto Galero ad Insulam Mindoro, Philippinarum.

Five principal varieties of this species are remarkable; one alone has been represented, though not described by De Férussac. If the colours alone were to be depended upon as specific characters, two of these varieties would be considered distinct species. Deshayes has omitted to mention or to describe this species in his second edition of Lamarck (Anim. sans Vert.); I am therefore much gratified by having the opportunity afforded me of pointing out its characters and making known its several varieties.

Var. *a.* White, with a yellowish epidermis, a very dark brown, almost black, antesutural band, and a rather broad, black band surrounding the columella.

Var. *b.* The same as the last, with an additional broad intermediate anterior black band.

Var. *c.* Similar to the last, with the addition of a black band anterior to the sutural band, and with the anterior intermediate band much wider.

Varieties *a, b, c,* are all found at Puerto Galero.

Var. *d.* Nearly black all over, and only showing more or less distinct remains of white on the three first volutions; epidermis very thin and nearly colourless. Found at Calapan, in the Island of Mindoro.

Var. *e.* Of a dark chestnut-brown colour, with the same arrangement of colour as the last, but covered with a thickish, brown, opake, hydrophanous epidermis. From Puerto Galero.

I am compelled to regard as a variety of this species a shell which Mr. Cuming has brought from the island of Tablas, whose spire is more elevated, having nearly five volutions; it is of a dark colour, with more or less distinct lighter bands, and the same thickish, brown, opake, hydrophanous epidermis as the last: its columella, and the columellar lip, are of a brownish purple. I designate this as Var. *f.*

The figure given by De Férussac represents a rather dwarf variety, of which I have seen a specimen in Mr. Metcalfe's collection.

Helix (Cochlogena, De F.) ignobilis. *Hel. testa subgloboso-conica, tenuis, albicans, subhyalina, fasciis duabus castaneis ornata: spirâ subconoideâ; anfractibus $4\frac{1}{2}$, lævibus, nitidis, subplanulatis, striis incrementi tenuissimis solùm sculptis; suturâ distinctâ; aperturâ subrotundâ, intùs albâ, fasciis duabus conspicuis; peritremate reflexo, rotundato, albo; columellâ rectiusculâ continuo.*

Long. 1·2; lat. 1·2 poll.

*Hab.* ad insulam Romblon, Philippinarum.

The subconical form of the spire, with very slightly ventricose volutions, distinguish this from all its most nearly-related species. When young it is slightly carinated. The anterior part of the last volution is usually coloured of a pale yellowish tint.

Helix (Cochlogena, De F.) tenera. *Hel. testa subglobosa, tenuis, alba, subhyalina; spirâ subacuminatâ, obtusâ; anfractibus $4\frac{1}{2}$, lævibus, subventricosis, striis incrementi tenuissimis solùm insculptis, ultimo fasciâ angustâ, viridi picto; suturâ distinctâ; aperturâ subrotundâ, intùs albâ fasciâ solitariâ subinconspicuâ; peritremate tenui, reflexo, albo; columellâ latiusculâ, rectiusculâ, albâ, extùs anticè subangulatâ.*

Long. 1; lat. 1 poll.

*Hab.* propè Mansalai ad insulam Mindoro, Philippinarum.

*Var.* b. *fasciis duabus castaneo-nigris.*

Nearly related to the last (*H. ignobilis*): it may be distinguished by being rather smaller, by having its volutions rather more convex, its peritreme thinner, its columella straighter, and angular in front externally. A variety occurs with two dark brown, nearly black, bands, the one above and the other below the ordinary green band. The posterior of these is seen nearly up to the apex.

Helix (Cochlogena, De F.) collodes. *Hel. testa subglobosa, tenuiuscula, nitida, alba; epidermide lutescente induta, apice roseo; spirâ subelatâ, obtusâ; anfractibus quinque, ventricosis, ultimo ad basin paululùm planulato; suturâ distinctâ, anticè castaneâ; aperturâ subrotundâ, intùs albâ; peritremate reflexo, nigricante; columellâ albicante, paululùm recurvâ.*

Long. 1·2; lat. 1·2 poll.

*Hab.* ad insulam Tablas, Philippinarum.

I have named this species *collodes*, in consequence of the remarkable appearance of the epidermis, like a coat of glue covering all the outer surface except the apex. In form this species is much like *H. ignobilis*; its spire is not, however, so much acuminated, and the apex is much more obtuse than in that species: its peritreme, moreover, is thinner, and although reflected, it is not rounded as in that species.

Helix (Cochlostyla, De F.) Orbitulus. *Hel. testa subglobosa, crassiuscula, lævis, obliquè lineis incrementi tenerrimè insculpta; anfractibus 4½ ad 5, subventricosis, ultimo maximo, ventricosiori; suturâ distinctâ, anticè albâ; apertura subrotundâ, intùs albâ; peritremate latiusculo, rotundato, reflexo, albo; columellâ albâ, rectiusculâ, paululùm inflexâ.*

Long. 1·1; lat. 1·1 poll.

*Hab.* propè Mansalai ad insulam Mindoro, Philippinarum.

Var. *a*. Shell nearly globular; spire very obtuse, white, base dull yellowish; two spiral green bands commence at about the third volution, and increase in width and strength of colour until they reach the back of the outer lip; of these the lower is by much the broader.

Var. *b*. Shell *oblong*, and coloured in the same manner as the last: but the last volution is green above (the anterior side of the suture being always pure white), increasing in intensity from its commencement: in this variety the dull yellowish colour of the anterior or basal part of the last volution is much deeper than in var. *a*.

Var. *c*. Shell larger; its volutions rather more ventricose, similar to the last in colouring, but having two additional dark brown, nearly black bands, which are distinctly seen within. This is by far the largest and handsomest variety of the three.

*Note.*—"M. Valenciennes informs me that this species was brought in 1830 by the officers of the 'Favourite,' and placed in the galleries of the Museum of Paris, under the name of *H. chlorogrammica*, Val.; but as it does not appear that he has published either the name or any description of the species, I continue to use the name which I have given it above."

Helix (Cochlostyla, De F.) Oomorpha. *Hel. testa ovato-oblonga, crassa, obscura, spiraliter tenuitèr substriata, lineis incrementi decussata; anfractibus quinque subventricosis; suturâ di-*

*stinctâ; aperturâ suborbiculari, intùs obscurâ; peritremate fere continuo, albo, reflexo, rotundato; columellâ subundatâ, labio columellari extenso, ad umbilicum fere velato; umbilico mediocri.*

Long. 1·1; lat. 0·7 poll.

*Hab.* ad insulam Tablas dictam, Philippinarum.

Mr. Cuming has obtained only a single specimen of this species: it is very different from all the others, its peritreme being continuous nearly all round, the only interruption being about a seventh where it is intersected by the last volution; colour dull light brown, with a dark brown band in front of the suture; the greater part of the last volution dark brown, and having a light narrow band near the umbilicus in addition to the light band near the suture.

Helix incompta. *Hel. testa ovata, tenuiuscula, obscura; epidermide fuscâ, haud nitente induta, obliquè tenuiter lineis incrementi striata; anfractibus quinque subconvexis, ultimo majori; suturâ distinctâ, anticè posticèque fuscâ; aperturâ subrotundâ, posticè subacuminatâ; peritremate tenuiter reflexo, rotundato, anticè subtruncato, albo; columellâ rectâ, albâ, anticè subtruncatâ.*

Long. 1·1; lat. 0·66 poll.

*Hab.* ad insulam Tablas dictam, Philippinarum.

Nearly resembling the last in shape and in its dull surface, but differs in having no umbilicus, and in its peritreme not being nearly so continuous. The last volution has its suture brown, a brown band in the middle and another round the columella. A single specimen only was found.

Helix stabilis. *Hel. testa ovoidea, solidiuscula, lævis, nitidiuscula, alba; anfractibus senis, paululùm convexis, anticè castaneis, nigro-fasciatis, obliquè lineis incrementi striatis: aperturâ obliquâ, suboratâ, intùs albâ, peristomate albo, incrassato, rotundato, anticè subeffuso; columellâ albâ, inconspicuâ, labio columellari paululùm expanso.*

Long. 1·35; lat. 0·8 poll.

A species which in general appearance bears some resemblance to *Bulinus ovoideus* of Brug. and De F., tab. 112. f. 5, 6. (the same as *B. Luzonicus*, 'Conch. Illustr.' Bulinus, f. 53.); this species, however, increases more rapidly toward the anterior part; it has, moreover, one more volution. The aperture is placed very obliquely, so that the shell stands firmly when placed upon it. The dark burnt colour of the anterior part of this shell is seen in every volution in the form of a spiral postsutural band. It has a thick light-coloured epidermis, of which some traces have not been entirely effaced.—G.B.S.

## WERNERIAN NATURAL HISTORY SOCIETY OF EDINBURGH.

April 17, 1841.—Professor Jameson in the Chair.

A paper was first read "On the Nature and Currents of the Atmosphere, and their Influence on the Variations of the Height of the Barometer." By William Brown, Esq.

Mr. Goodsir then read a paper "On a new Genus, with descriptions of some new Species of *Pycnogonidæ*. With specimens and drawings." By Mr. Henry Goodsir, Surgeon, Anstruther.

Of the genus *Orithegia*, one species was described, *O. globosa*; of *Pallene* one species, *P. circularis*; of *Nymphon* four species, *N. pellucidum*, *spinosum*, *minutum*, *Knoxii*; and one species of a new genus, *Pephredo*,—*P. capillata*. One of these new Crustaceans was taken in Orkney, the others in the German Ocean and Firth of Forth. The paper concluded with some observations on the circulation in this family, and on the generative organs, the orifices of which the author has detected on the under surface of the body, at the insertion of one of the pairs of legs.

Mr. Goodsir then communicated a paper by Mr. Forbes and himself, "On a new genus of Ascidian Mollusks." This genus the authors styled *Pelonaia*, and characterized thus: *Testa* cylindrical, unattached; orifices without rays, on two equal, approximated, papillose eminences at the anterior extremity. They described two species,—*P. corrugata*, from the Firth of Forth, and *P. glabra*, from Rothsay Bay. The anatomy of both species was given in detail, and differed from that of the attached *Ascidiæ* in its perfect bilaterality. The authors adverted to the value of the genus as a connecting link between the Molluscous and Annulose animals, and referred to its analogical relations to certain of the *Echinodermata*.

## ROYAL SOCIETY OF EDINBURGH.

May 3rd, 1841.—Lord Greenock in the Chair.

The first communication was entitled "Experimental Researches on the Production of Silicon from Paracyanogen." By S. Brown, M.D.

The author had intimated in a former paper that he had been led to infer from experiment, that two familiar substances, long and universally regarded as distinct elements, are only modifications of one and the same material form; and having extended his inquiries, he now ventures to maintain that carbon and silicon are isomeric bodies. The method in which he establishes this proposition is very simple, and consists in the description of a number of processes by which carbon may be transformed into silicon; and crucial experiments, intended to prove that there is no intelligible source of fallacy in the processes which are given. Accordingly, the present communication is of a purely practical character. It is composed of five sections: the first treats of the production of silicon from free paracyanogen; the second, of the formation of amorphous mixed siliciures of copper, iron, and platinum, by the reaction of paracyanogen on these metals; the third, of the quantity of nitrogen separated from paracyanogen when it is changed into nitrogen and silicon; the fourth describes processes for the preparation of definite and crystalline siliciures of iron from the paracyanide of iron, and from the ferrocyanide of potassium; and the fifth gives easy formulæ for the extraction of silicic acid from the ferrocyanide of potassium by the action of carbonate of potassa.

Our reason for noticing this investigation in a periodical devoted to the objects of natural history, is this: If Dr. Brown's observations be corroborated by those who repeat his singular experiments, there will be opened up a new sphere of geological inquiry of the highest order. With the aid of a transelemental chemistry (for we understand Dr. Brown has transformed several other elementary forms besides carbon) we may approach the subject of the molecular genesis of the earth; and the geological relations of carbon and silicon are certainly sufficiently striking to warrant the entertainment of this hope. As it is, there are several points in natural history which seem to be illustrated by the particular case of transformation now in hand. As one instance, we would specify the siliceous character of many organic remains found in circumstances in which the source of silicon is perplexing and unintelligible.

In the discussion which followed, Professor Traill remarked, that though he had not had an opportunity of repeating Dr. Brown's experiments, yet, from his acquaintance with that gentleman, he had a strong conviction of their value; and this notwithstanding the very startling principles and extraordinary conclusions to which they necessarily led. He had no hesitation in saying, that since the early days of Davy, when that great chemist brought the metalloids to light, no investigation had been made approximating in importance to the present, whose publication would do honour to the Society, and whose interest, as it regarded the subjects of Botany, Palæontology and Geology, in its widest range, was altogether unbounded.

Professor Christison begged to meet a statement which he understood had gone abroad, that he had given a guarantee to the accuracy of these investigations. This was by no means the case. The fact was, that, now for some time otherwise employed, he was not capable even of testing these admirable experiments: no one, in fact, could do so but a first-rate analytic chemist, perfectly master of the most recent manipulations of the laboratory; and he would warn every one against coming to a decision regarding these conclusions, well styled *startling*, either for or against, without such preliminary investigation. At the same time, it was true that he had been familiar with the details of the inquiry; he had searched, along with the author, but in vain, for grounds of fallacy, and he formed the very highest estimate of their value and importance.

Professor Syme communicated a paper by Mr. Goodsir, "On the Anatomy of *Amphioxus lanceolatus* of Yarrell."

After a short statement of the labours of Yarrell, Couch, Retzius and Müller, the author gave a detailed description of the structure of *Amphioxus*, as observed in the dissection of one of two specimens taken by Mr. Forbes in the Irish Sea. The abdominal folds, and the anterior and posterior anal fins were described, and the existence of a fin in front of the anus illustrated by an observation made by Professor Agassiz, of the temporary existence of a similar fin in the embryos of certain freshwater fishes.

The osseous system presented two divisions,—the true or neuro-skeleton, and the intestinal or splanchno-skeleton. The true skeleton consisted of a chorda dorsalis, equally pointed at both extremities, without the slightest trace of a cranium, and destitute of any of the peripheral vertebral elements, with the exception of a row of cells—

germs of interspinous bones and fin-rays—along the base of the dorsal and anal fins. The tissue of this neuro-skeleton was not even cartilaginous, consisting merely of membrane and globular nuclei, derived from the original elementary cells. The splanchno-skeleton consisted of a hyoid apparatus, and of 70 to 80 pairs of elastic filamentous ribs. The hyoid apparatus—in two divisions, with 17 pieces in each—exhibited 34 rays, pointing inwards, and each springing from one of the 34 basal elements of the hyoid bone. These rays the author looked upon as developments of the tubercles and teeth of the central aspect of the branchial apparatus of the higher fishes, and not as branchiostegal rays. The ribs were enveloped in the mucous membrane of the intestine, and each alternate pair bifurcated below, to enclose the abdominal longitudinal vessel or heart. From these circumstances, and from other considerations, the author looked upon the ribs of *Amphioxus* not as true ribs, but as splanchno-ribs—repetitions of the hyoid bone—analogues of the tracheal and bronchial cartilages of the higher Vertebrata. The tissue of the splanchno-skeleton is more advanced than that of the neuro-skeleton; the ribs are cartilaginous; the hyoid bones hollow cartilages, with isolated cells or nuclei in their interior.

The nervous system presents nothing more than a spinal cord, without a trace of cerebral development, and from 60 to 70 pairs of spinal nerves. The spinal cord was in the form of a ribbon, pointed at both ends, with a dorsal median groove, and a line of black or grey matter; was composed of nucleated cells, without tubes or fibres, and gave origin to the nerves in single roots only. The nerves were all symmetrical, dividing into dorsal and ventral branches. The second pair sent back a dorsal and a ventral branch, to join the corresponding branches of the other nerves, along the sides of the body, and along the bases of the dorsal and anal fins; from which distribution the author was inclined to believe, that although the second pair in *Amphioxus* presented certain resemblances to the vagus, it was, in reality, the trifacial.

The vascular system consisted of a straight abdominal vessel, the branchial artery or heart, without any trace of valves or division into cavities. This vessel sent off lateral branches, which passing up on the internal surface of the intestine, along the ribs, communicated by a capillary respiratory system of vessels with a dorsal trunk or aorta.

The intestinal tube was straight from mouth to anus, its anterior half dilated, strengthened by ribs as described above, and its entrance guarded by the hyoid rays. This dilated portion of the canal received sea-water, as in the *Ascidiæ*, to act on the respiratory vascular ramifications on its internal surface, which is undoubtedly ciliated in the living animal. The digestive portion of the canal is narrow, and presents not a trace of a liver, or of any other assistant chylo-poietic viscus.

As there was no trace of branchial fissures—as the ribs were too numerous to be looked upon as true branchial arches (branchial arches alternating with branchial fissures)—and as the other organic systems were in the condition of those of an embryo before the appearance of branchial clefts, the author was led to the conclusion that the *Amphioxus* had never had, at any period of its existence, branchial clefts;—that it was an animal which had arrived at its perfect development before the branchial clefts had appeared, and, consequently, with an undeveloped osseous and nervous system, without a liver, and with an unilocular heart.

After examining the generative organs, and other departments of its anatomy, the author entered upon the consideration of the zoological position of *Amphioxus*, which he observed could no longer be ranked with *Petromyzon* and *Myxine*, but must take an ordinal place in any new arrangement of the class. In conclusion he remarked, that although genera allied to *Amphioxus* might now be rare, yet in the ages which have passed since the development of organic forms commenced, *Abranchiated* fishes may have been more common, and may yet afford subjects of research to the palæontologist.

## XXXVII.—*Information respecting Zoological and Botanical Travellers.*

May 27.—The subjoined letter, giving news of our friends Mr. Forbes and Mr. Thompson, has arrived just in time for insertion; and our wish to communicate it to our readers must be our excuse for omitting several articles. A letter from Mr. Schomburgk, dated Demerara, April 6, informs us that he was just setting out on a two months' expedition, intending to return in June, and to start again at the latter end of August.

*To Richard Taylor, Esq.*

My Dear Sir, Syra, 7th May, 1841.

According to my promise, I send a letter for the Annals, giving a sketch of our natural history proceedings, so far. I hope the news may interest my brother naturalists at home.

Best respects to all friends for myself and Mr. Thompson.

Believe me ever, dear Sir, most sincerely yours,

EDWARD FORBES.

On the 17th of April Mr. Thompson and I arrived at Malta, and found the Beacon about to sail for the Archipelago. During the four days we remained at Valetta we made some short excursions into the country, and were rewarded, amongst other things, by finding *Clausilia syracusana* in abundance, a species hitherto unrecorded out of Sicily. We left on the 21st, and directed our course to the Morea, proposing to water the ship at Navarino, and were a week on the passage, the winds being very light, and the weather delightfully fine, which afforded a favourable opportunity for making observations on the pelagic animals of the Mediterranean. The tow-net was overboard, and the hand-net in requisition whenever it was possible, but hitherto we have not met with that abundance of floating life which so delights the explorers of more northern seas. *Medusæ* have been few and far between, three or four species only having been seen, and but few individuals of each. Few floating creatures appeared in the morning or midday, however fine or calm the sea might be; but towards sunset they became more numerous. *Salpæ*, some single, and some united together in long chains, were by no means uncommon; sometimes very numerous towards the close of day; and the opportunity was not lost of observing the habits and structure of those interesting mollusca, of which four or five species have been caught. In the beginning of the night, when the sea was smooth, the curious animal named by Forskahl *Salpa democratica*, came to the surface in considerable numbers, and the microscopic examination of them has furnished some interesting results. About the same time, *Pteropoda*, chiefly an acicular species belonging to Rang's genus *Criseis*, were taken in the tow-net, and numerous minute Crustacea. The Pteropods taken gave me an opportunity of observing some points in their organization under a high power whilst the creatures were alive. I found the respiratory organ in the form of a curved process, projecting from the right side of the neck and clothed with large vibratile cilia. There were no cilia on their wing-like fins, but in some species there were rows of minute prickles regularly arranged. One morning six shells of a species of *Atlanta* were found in the tow-net, but the animals had perished.

On Wednesday, the 28th, we entered the fine bay of Navarino, and remained there three days, which were fairly divided between Zoology, Geology and Botany. The first was given to fossil-gathering on the tertiary banks which line the bay. These banks are full of well-preserved fossils, and during our short visit they yielded us fifty species of Testacea and several Echinidæ. Beds of beautiful amber were not uncommon in the tertiary, but where the amber prevailed there were no fossils. Generally the clay was reddish, and there the larger Zoophaga, the Arcæ, and the Oysters were most abundant: here and there were tracts of a dark blue clay, in which *Naticæ*, *Cerithia*, *Dentalia*, *Corbula Nucleus* and *Ringicula*, with a species of *Mytilus*, were associated together. In one limited spot, a beautiful species of *Neritina*, with all its colours as vivid as if recent, was not uncommon. It was possibly a freshwater species, washed by some ancient stream into the ancient sea. As an able ally, Mr. Spratt, one of the Beacon's officers, had previously collected the same species in Rhodes, associated with *Paludina clathrata* and a *Unio*. The abundance of *Rissoæ* in some places indicated a weedy bottom, and such parts as contained *Echinidæ* were harder than the others, containing few shells, and presenting the appearance of consolidated sand, as we might look for on seeing its inhabitants.

A day's dredging, and a search along the shore, turned up fifty-one living Testacea and three naked Mollusca, one of them a very beautiful little blue *Doris*. The number, state, etc. of the products were duly registered in the dredging papers of the Association. In the deeper parts of the bay the bottom was muddy, and it was interesting to find the same or representative species associated together in the mud which were grouped in the corresponding portion of the Pliocene. Only sixteen of the recent inhabitants of the bay were identical with the fossil species collected the day before.

By means of the seine seventeen species of fish were procured, several of which are not noted in the French account of the Morea.

Our botanical excursions to the mainland, and to the island of Sphacteria, filled the vasculum with a number of beautiful plants, most of which, however, were species common in the south of Europe. *Chrysanthemum coronarium* abounded around the town, *Psoralea bituminosa*, several species of *Cistus* and *Helianthemum*, *Phlomis fruticosa*, *Pistachia Lentiscus*, *Salvia officinalis*, *Poterium spinosum*, and Myrtle were the most abundant plants upon the hills. It was interesting to see how the botany corresponded to the geology, the vegetation of the tertiary being of a vivid green, while the prevalence of *Cisti* on the older limestone gave a brown hue to the country.

From Navarino we sailed round Cape Matapan to the islands of the Ægean, and our next anchoring-place was Syra, where we now are. In the sea among the isles, our tow-net furnished us with two species of *Firola* and a beautiful *Beroe*. A microscopic examination of the former exhibited no traces of vibratile cilia on their branchiæ or any part of their bodies. One of them exhibited considerable ferocity, attacking and swallowing a smaller species with all the zest of a practised cannibal.

During the voyage, favourable opportunities have occurred for making observations on the phosphorescence of marine animals. So far, the results have been, that none give out light unless irritated: that the *Salpæ* give out no light, though they sometimes appear so to do in consequence of luminous Crustacea taking up their abode in their interiors; that minute Crustacea are the chief source of the phosphorescence of the sea at night; and that the phosphoric light of *Aurelia Forskaliana* is given out from the bases of the tentacula, and that of *Beroe* from the vessels beneath the ridges of cilia.

More zealous allies than Captain Graves and his officers in the good cause of Natural History can nowhere be found; and with such aids, results of greater importance than those I have sketched out, will, I trust, soon turn up. EDWARD FORBES.

## MISCELLANEOUS.

*Motacilla alba* of Linnæus.—Two pairs of this White Wagtail, which is distinct from the common Pied Wagtail of this country, were seen by Mr. F. Bond of Kingsbury, near the reservoir, in the early part of the present month, and although these birds were very shy, Mr. Bond succeeded in shooting three of them, two males and a female. The female is distinguished from the male by the purer pearl-grey colour of the plumage on the back; and the black on the back part of the head does not extend so far down the back of the neck. The differences between the Pied and the White Wagtails were first pointed out by Mr. Gould, and figures representing the distinctions will be found in his 'Birds of Europe,' and in my own work on our British Birds.—WM. YARRELL, 18th May, 1841.

CHÆTURA RUFICOLLIS; CAYENNE.

May 8, 1841.

Gentlemen,—Amongst the many additions to the ornithological department of the Museum of the Liverpool Royal Institution which have been added of late, is a Swallow, which appears to me to be new to science, and on showing it to Mr. Natterer, he considered it as never having been described. It belongs to that division which Mr. Swainson characterises under the name of *Chætura*, and I propose the specific name of *ruficollis*, from a distinct rusty colour which surrounds the neck. The throat and breast are of the same colour, but having a mottled appearance, from the feathers of these parts being only edged with rufous. The chin is nearly sooty-coloured, the feathers being very slightly edged with rufous. Body above and below sooty black; the outer webs of the wings and tail much darker, with slight purplish reflections. The top of the head is dark sooty, but the front is brownish black. Should you think the above worthy a place in your valuable Magazine, I shall feel obliged by its insertion. And remain yours, etc.,

HENRY JOHNSON, Curator,
Liverpool Royal Institution.

YOUNG GIRAFFE.

A young male Giraffe was born at the Garden of the Zoological Society, on Thursday last, the 27th of May. The mother and fawn are quite well.

METEOROLOGICAL OBSERVATIONS FOR APRIL 1841.

*Chiswick.*—April 1. Cloudy. 2. Fine: clear. 3. Slight haze: cloudy and fine. 4. Cloudy: slight rain. 5. Cloudy and fine. 6, 7. Very fine. 8. Fine in the morning. hail-shower at 1 P.M.: cloudy and fine at night. 9. Overcast and cold. 10—12. Cloudy and cold. 13. Cloudy: rain. 14. Cloudy: slight rain. 15. Showery. 16, 17. Fine. 18. Overcast and cold. 19. Fine. 20. Overcast. 21. Cold and dry. 22. Cloudy and cold. 23. Heavy rain. 24. Fine. 25. Very fine: slight rain: cloudy and windy at night. 26. Hazy: fine. 27. Very fine. 28. Rain. 29. Rain: very fine: clear at night. 30. Dry haze throughout the day: clear at night.

*Boston.*—April 1. Fine: rain early A.M. 2. Stormy: rain early A.M. 3, 4. Fine. 5. Cloudy: rain P.M. 6. Fine. 7. Cloudy: rain P.M. 8. Cloudy. 9. Fine: rain early A.M. 10. Cloudy. 11. Cloudy: rain early A.M.: hail-storm P.M. 12. Cloudy: rain early A.M. 13. Fine: rain early A.M. 14, 15. Fine: rain P.M. 16. Fine: ice this morning. 17. Fine. 18. Cloudy. 19. Fine. 20. Fine: hail and rain P.M. 21. Cloudy: rain P.M. 22. Cloudy: rain early A.M. 23. Rain. 24. Fine. 25. Fine: rain early A.M. 26. Cloudy. 27, 28. Fine. 29. Cloudy. 30. Fine.

*Applegarth Manse, Dumfries-shire.*—April 1. Fine A.M: rain P.M. 2. Fine: showers P.M. 3. Fine: one shower. 4. Fine A.M.: rain P.M. 5. Fine: slight shower. 6. Fine and fair all day. 7. Rain P.M. 8. Fair A.M.: shower P.M. 9. Fine and fair all day. 10, 11. Occasional showers. 12. Fine and fair. 13. Wet P.M. 14. Showery P.M. 15. Rain and hail. 16. Rain, sleet and hail. 17—20. Showers. 21. Fair and cold. 22, 23. Frosty morning: fine. 24. Very wet P.M. 25. Rainy forenoon. 26. Wet all day. 27. Rain A.M.: cleared up. 28. Beautiful day: thunder and rain. 29, 30. Fine and fair.

Sun shone out 27 days. Rain fell 20 days. Thunder 2 days. Frosty mornings 2. Hail 2 days.

*Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. Veall *at Boston, and by* Mr. Dunbar *at Applegarth Manse, Dumfries-shire.*

| Days of Month. 1841. April. | Barometer. London: Roy. Soc. 9 a.m. | Barometer. Chiswick. Max. | Barometer. Chiswick. Min. | Barometer. Boston. 8½ a.m. | Barometer. Dumfries-shire. 9 a.m. | Barometer. Dumfries-shire. 8½ p.m. | Thermometer. London: Roy. Soc. Fahr. 9 a.m. | Thermometer. London: Roy. Soc. Self-register. Max. | Thermometer. London: Roy. Soc. Self-register. Min. | Thermometer. Chiswick. Max. | Thermometer. Chiswick. Min. | Thermometer. Boston 8½ a.m. | Thermometer. Dumfries-shire. Max. | Thermometer. Dumfries-shire. Min. | Wind. London: Roy. Soc. 9 a.m. | Wind. Chiswick 1 p.m. | Wind. Bost. | Wind. Dumfries-shire. | Rain. London: Roy. Soc. 9 a.m. | Rain. Chiswick. | Rain. Boston. | Rain. Dumfries-shire. | Dew-point. Lond.: Roy. Soc. 9 a.m. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 29·642 | 29·632 | 29·596 | 29·15 | 29·51 | 29·40 | 46·3 | 54·7 | 43·7 | 52 | 41 | 46 | 51 | 38 | W. | W. | N. | SW. | ·061 | ·05 | ·08 | ... | 45 |
| 2. | 29·662 | 29·727 | 29·600 | 29·12 | 29·45 | 29·60 | 47·7 | 51·7 | 44·6 | 56 | 26 | 47 | 48½ | 36½ | NW. | NW. | NW. | W. | ·058 | ... | ·04 | ... | 46 |
| 3. | 29·728 | 29·707 | 29·640 | 29·25 | 29·49 | 29·47 | 45·0 | 53·6 | 38·2 | 57 | 26 | 43·5 | 48½ | 35½ | SW. | NW. | calm | SW. | ... | ... | ... | ... | 44 |
| 4. | 29·676 | 29·642 | 29·467 | 29·14 | 29·35 | 29·23 | 43·7 | 53·6 | 38·3 | 55 | 39 | 46 | 51 | 36½ | S. | SW. | calm | WSW. | ... | ·11 | ... | ... | 41 |
| 5. | 29·404 | 29·436 | 29·371 | 28·94 | 29·28 | 29·55 | 47·0 | 56·0 | 43·0 | 56 | 35 | 47·5 | 51 | 40½ | SE. | S. | calm | E. | ·102 | ... | ... | ... | 43 |
| ○ 6. | 29·710 | 29·745 | 29·661 | 29·28 | 29·64 | 29·63 | 46·4 | 54·2 | 43·2 | 55 | 31 | 46·5 | 53½ | 35 | N. | NE. | calm | E. | ... | ·02 | ·08 | ... | 43 |
| 7. | 29·806 | 29·781 | 29·777 | 29·40 | 29·60 | 29·56 | 43·3 | 53·8 | 40·3 | 52 | 37 | 38 | 49½ | 39½ | E. | SW. | N. | S. | ·036 | ·03 | ... | 0·11 | 40 |
| 8. | 29·806 | 29·779 | 29·775 | 29·29 | 29·45 | 29·68 | 47·0 | 54·0 | 42·4 | 53 | 34 | 45 | 52 | 38½ | NW. | W. | W. | NW. | ·033 | ... | ·07 | ... | 45 |
| 9. | 29·910 | 29·988 | 29·820 | 29·43 | 29·83 | 29·93 | 48·0 | 52·5 | 41·7 | 55 | 37 | 47 | 51½ | 32 | NW. | N. | calm | NNW. | ·125 | ·01 | ·03 | ... | 44 |
| 10. | 30·082 | 30·020 | 29·958 | 29·62 | 29·98 | 29·97 | 44·7 | 53·7 | 40·3 | 49 | 31 | 46 | 49 | 37 | NW. | E. | calm | NE. | ... | ... | ... | ... | 41 |
| 11. | 29·954 | 29·939 | 29·923 | 29·65 | 30·00 | 30·00 | 40·8 | 46·7 | 38·6 | 49 | 32 | 42 | 45½ | 33 | N. | NE. | calm | NE. | ... | ·01 | ·07 | ... | 38 |
| 12. | 29·912 | 29·962 | 29·907 | 29·54 | 29·90 | 29·80 | 41·2 | 47·2 | 36·7 | 45 | 27 | 43 | 48½ | 32½ | NNW. | NE. | calm | N.SSW. | ·025 | ... | ·05 | ... | 35 |
| ☾ 13. | 30·100 | 30·130 | 30·077 | 29·63 | 29·78 | 29·83 | 45·3 | 46·6 | 37·7 | 56 | 42 | 46 | 52 | 38½ | S. | SW. | calm | W. | ... | ·08 | ·02 | ... | 38 |
| 14. | 30·110 | 30·088 | 29·983 | 29·58 | 29·76 | 29·78 | 49·8 | 53·0 | 45·0 | 57 | 32 | 49 | 51 | 42 | S. | SW. | calm | W. | ·080 | ·01 | ... | 0·70 | 41 |
| 15. | 29·916 | 29·899 | 29·761 | 29·31 | 29·65 | 29·55 | 48·7 | 56·7 | 42·4 | 58 | 26 | 47 | 47 | 35 | S. | NW. | calm | SW. | ... | ·05 | ·10 | ... | 43 |
| 16. | 29·742 | 29·762 | 29·714 | 29·28 | 29·48 | 29·56 | 45·7 | 55·3 | 37·7 | 57 | 31 | 46·5 | 49 | 37½ | SSW. | NW. | calm | W. | ·063 | ... | ·10 | ... | 41 |
| 17. | 29·914 | 29·946 | 29·874 | 29·45 | 29·75 | 29·63 | 46·4 | 54·6 | 42·4 | 60 | 39 | 48 | 53 | 33 | W. | NE. | calm | SW. | ... | ... | ... | ... | 41 |
| 18. | 29·972 | 29·975 | 29·924 | 29·37 | 29·67 | 29·67 | 49·4 | 54·6 | 42·8 | 61 | 41 | 51 | 50½ | 40½ | SW. | W. | calm | SW. | ... | ·14 | ... | ... | 43 |
| 19. | 29·908 | 29·895 | 29·881 | 29·30 | 29·60 | 29·70 | 48·7 | 59·2 | 44·8 | 58 | 32 | 48·5 | 51 | 39½ | NW. | W. | NW. | W. | ·166 | ... | ... | ... | 42 |
| 20. | 29·800 | 29·803 | 29·682 | 29·27 | 29·54 | 29·70 | 46·8 | 56·8 | 42·2 | 56 | 36 | 48 | 49 | 39 | W. | W. | calm | W. | ... | ... | ... | ... | 39 |
| ● 21. | 29·852 | 29·904 | 29·810 | 29·46 | 29·92 | 30·03 | 47·6 | 52·8 | 41·7 | 53 | 40 | 46·5 | 47½ | 37 | NNE. | NE. | calm | NE. | ... | ... | ·36 | 0·12 | 45 |
| 22. | 29·882 | 29·866 | 29·734 | 29·48 | 29·94 | 29·72 | 45·3 | 53·2 | 41·0 | 53 | 41 | 45 | 49 | 28½ | NE. | NE. | E. | SW. | ... | ·32 | ·07 | ... | 39 |
| 23. | 29·424 | 29·645 | 29·450 | 29·10 | 29·53 | 29·41 | 43·7 | 51·6 | 42·3 | 48 | 28 | 44 | 51 | 31 | NW. | NW. | E. | SW. | ·500 | ·52 | ·09 | ... | 44 |
| 24. | 29·712 | 29·677 | 29·528 | 29·20 | 29·37 | 29·18 | 48·5 | 55·0 | 40·2 | 56 | 39 | 49 | 51½ | 33½ | S var. | SW. | calm | SE. | ·333 | ·15 | ·32 | ... | 43 |
| 25. | 29·688 | 29·846 | 29·650 | 29·13 | 29·28 | 29·20 | 50·5 | 65·7 | 43·9 | 59 | 52 | 50 | 54 | 38 | S. | S. | W. | SSE. | ·072 | ... | ·21 | ... | 46 |
| 26. | 30·040 | 30·100 | 29·980 | 29·39 | 29·53 | 29·74 | 57·7 | 59·3 | 50·2 | 66 | 55 | 59 | 51 | 45½ | S. | SW. | SW. | S. | ... | ... | ... | ... | 51 |
| 27. | 30·140 | 30·103 | 30·078 | 29·47 | 29·80 | 30·00 | 63·3 | 72·2 | 56·5 | 75 | 46 | 65·5 | 55 | 47½ | S. | SW. | calm | SSE. | ... | ... | ... | ... | 56 |
| ☽ 28. | 30·200 | 30·132 | 30·099 | 29·50 | 30·10 | 30·10 | 63·3 | 72·4 | 57·0 | 76 | 45 | 66 | 61 | 41½ | N. | NE. | calm | SE. | ·022 | ·07 | ... | 1·00 | 58 |
| 29. | 30·152 | 30·141 | 30·098 | 29·56 | 30·06 | 30·18 | 52·3 | 71·6 | 50·6 | 71 | 42 | 53 | 59 | 45½ | N. | NE. | calm | SE. | ·072 | ·01 | ... | ... | 55 |
| 30. | 30·226 | 30·171 | 30·091 | 29·68 | 30·17 | 30·03 | 58·4 | 69·2 | 46·6 | 68 | 41 | 53·5 | 64 | 41 | NE. | NE. | calm | SE. | ... | ... | ... | ... | 47 |
| Mean. | 29·869 | 29·881 | 29·796 | 29·36 | 29·681 | 29·694 | 48·4 | 56·4 | 43·2 | 57·40 | 36·79 | 48·4 | 51·5 | 37·6 | | | | | Sum. 1·748 | 1·58 | 1·69 | 1·93 | Mean. 44 |

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 45. JULY 1841.

XXXVIII.—*On the Existence of Branchiæ in the young* Cæciliæ; *and on a Modification and Extension of the Branchial Classification of the* Amphibia*. By JOHN HOGG, Esq., M.A., F.R.S., F.L.S., F.C.P.S., &c.

LOOKING over, in November last, the volume of the 'Comptes Rendus' of the meetings of the Academy of Sciences at Paris for the year 1839, I came to the report of a paper entitled, "Notice historique sur la place assignée aux *Cécilies* dans la série zoologique, par M. de Blainville," in which (No. 22, at p. 673) I read the passage which I have thus translated:— "In the mean time, in 1836, on the opportunity of describing some reptiles which were brought from California by M. P. E. Botta, I gave a characterized analysis of my system of Herpetology and Amphibiology, and I supported the place that I had assigned to the *Cæcilia* by the curious fact observed by Prof. Müller of a young *Cæcilia* in the Museum at Leyden, which was furnished with *branchial apertures*.

"1839. Although this fact appears not to have been known, any more than, without a doubt, my own labours on this subject were, to Mr. John Hogg, who has just published a long memoir on the Classification of the Amphibia in Mr. Charlesworth's 'Magazine of Nat. Hist.' for June [and concluded in the August Number] 1839, it will be there seen that he has also arrived at the same conclusion with us; that is to say, of making a distinct class of the Batrachians under the name of *Amphibia*, and a separate order of the *Cæciliæ* under the new denomination of *Abranchia*, because he has selected for his principal consideration the organs of respiration: only that he places them at the commencement, in order to connect

* [This communication, in its original state, was received by the Editors in the middle of February; but they retained it until the author's return to London, in order to direct his attention to the papers on the *Lepidosiren* by M. Milne Edwards and Sir W. Jardine.—ED.]

them with the *Ophidians*, instead of terminating the class by them*."

Here it was that I received the first intimation of Prof. J. Müller's discovery of *branchial apertures* in a young *Cæcilia*; and on a further perusal, I found that this historical notice by M. de Blainville was both in answer to, and continuation of, M. Duméril's 'Mémoire sur la classification et la structure des Ophiosomes ou Céciloïdes, famille de Reptiles qui participent des Ophidiens et des Batraciens, rélativement à la forme et à l'organisation,' which had been read at a previous meeting of the Academy, and the report of which is inserted in a former number (20) of the same volume of the 'Comptes Rendus' (p. 581).

M. Duméril has given a brief description of this highly interesting discovery; but as this is abridged from a *part* only of Prof. J. Müller's own account as published in Oken's 'Isis' for 1831, p. 710, and supposing that the whole of so distinguished an anatomist's paper on the subject—which also comprises his classification of the *Amphibia*—will be received with satisfaction, since it is published in a foreign work not frequently to be met with in England, I make no apology for giving a translation of the whole from the original German.

"Branchial apertures discovered in a young *Cæcilia hypocyanea*, in the Museum of Natural History at Leyden, by Prof. John Müller.

"In the spring of the year 1831 I visited the great Museum of Zoology and Anatomy at Leyden, where the particular kindness of MM. Temminck, Van der Hoeven, Sandifort, Brörs, Schlegel, and Dr. Haan, made my short stay highly profitable and useful. On an examination of the *Cæciliæ* which are preserved in that exceedingly rich Museum of Natural History, I discovered, in quite a young *Cæcilia hypocyanea*, upon each side of the neck, some lines from the extremity of the fissure of the mouth, an aperture a line in length. This opening is in length somewhat more than in height; it is placed in the yellow band which marks the sides of the *Cæcilia hypocyanea*, and this yellow band is just there much wider. The edge of the aperture is sharp; in its interior black fringes were visible, which appear fixed to the horns of the tongue-bones or branchial arcs, but they did not project out of the aperture. The apertures themselves continue in more open communication with the cavity of the mouth. This young *Cæcilia*, which,

* Comptes Rendus des Séances de l'Académie des Sciences, tom. ix. No 22. 2e Semestre, 1839.

being the only specimen, could not be dissected, measured $4\frac{1}{2}$ inches in length; whilst a full-grown specimen of the same species, that exhibited no vestige of these apertures, was more than a foot long.

"It is therefore now ascertained, that the *Cæciliæ*, which have so many anatomical resemblances with the naked Amphibians, really belong to them, and that they undergo metamorphosis. They likewise resemble in external structure the *Amphiumæ*, which, with a vermiform shape of the body, retain their gill-apertures during life, without the branchiæ remaining. The division of the *Batrachians* is too confined and defective. All the *scaled* or *shielded Amphibians* (the Crocodiles, Lizards, Serpents and Tortoises) have as common characters—one distinct penis or two, a double cloaca, two orifices in the organ of hearing, and a cochlea. These must constitute one division. All the *naked Amphibians*, on the contrary, have no penis, a single cloaca, only one orifice, and no cochlea in the ear. All the *Amphibia nuda* possess either early gills, later lungs, or both during the whole of life. The orders of the *Amphibia nuda* are as follow:—

"I. *Gymnophidia* seu *Cæciliæ*. Without feet, branchial apertures in the young state.

"II. *Derotremata*, from δερη, *neck*, and τρημα, *aperture*. Four rudimentary feet. Apertures in the neck throughout life without branchiæ. Here belong the *Amphiuma* and *Menopoma*.

"III. *Proteidea*. Gills and lungs through the whole of life. *Proteus*, *Axolotl*, *Menobranchus*, *Siren*.

"IV. *Salamandrina*.

"V. *Batrachia*.

"Messrs. Schlegel and Van der Hoeven will gladly testify the accuracy of the before-mentioned assertion concerning the *branchial apertures* of the young *Cæcilia*. This animal remains preserved in the Museum at Leyden. The anatomy of the *Cæcilia lumbricalis*, and many of the doubtful or anomalous Serpents, I have described in a separate paper that appeared in Meckel's 'Archives.' I will communicate in a supplement thereto, a drawing of the young *Cæcilia hypocyanea* with its gill-apertures. I have there also endeavoured to place the distribution of the anomalous and true Serpents upon anatomical grounds; and the arrangement of the *naked Amphibians*, except the second principal division of the *Amphibia* in the five orders above given, is accurately made from full anatomical examinations. These orders of the *Amphibia nuda* are proposed according to the form of the animals, which are there just so separated as the Serpents, Lizards, Crocodiles, and Tortoises are in the division of the *Amphibia squamata*."

Now the species of *Cæcilia* there described by Prof. J. Müller is the *C. hypocyanea* of Van Hasselt, which was so named on account of its pale *blue* colour along the *under* part of its body; it is synonymous with what Linnæus names *C. glutinosa*, and what Wagler calls *Epicrium Hasseltii*, and is a native of Ceylon as well as Java.

But it is remarkable that, although nearly ten years have transpired since this discovery took place, no mention is made of it in any English work on Natural History* with which I am acquainted; *except* indeed in Dr. Grant's last Part (VI.) of his 'Outlines of Comparative Anatomy,' published in the latter part of 1840, where (at p. 551) he has given an extremely short notice of it under the head of 'Organs of Respiration.'

The *presence* of branchiæ then, in the *Cæcilia* in its young state, obliges me to modify, in some degree, the classification which I had instituted four years ago for the *Amphibia*, and which is given in the 'Magazine of Natural History,' new series, vol. iii. pp. 265, 367. For this purpose, my Order I. *Abranchia* must be entirely removed, since it is now clearly proved that every genus of the *Amphibia* is furnished, either at the first period of existence with some kind of branchial apparatus which is afterwards exchanged for a pulmonary one, or else with both sorts of apparatus during the entirety of life.

The late discovery of Müller has decided—what indeed the appearance of the hyoïd bones in the adult *Cæcilians* had given reason previously to suspect—namely, the former existence of branchial apertures with gills or branchial fringes, and a subsequent metamorphosis as to these organs, in the *Cæciliadæ*†. Wherefore the true place to be assigned to this family in the branchial classification is, among the *Caducibranchia*, or those *Amphibia* whose gills *decay* at an early period; although from that able Professor's description it appears that the *gills* themselves, or the *fringes*, are *concealed within* the branchial apertures, and do not hang out of, or project from, those apertures, as they do in the other families of the *Caducibranchia*.

* I fully expected to have seen these *branchiæ* described in the account of the *Cæcilians* at p. 285 of Cuvier's 'Animal Kingdom,' translated by Messrs. Blyth, Mudie, Johnston and Westwood, particularly as its preface says—"the present edition embodies *all* the discoveries of more recent naturalists," and which has only just been published; but I was disappointed.

† See my paper in Mag. Nat. Hist., vol. iii. N. S. p. 368.

It then becomes necessary so to separate them into *two* distinct tribes:—the *first* of which I name *Celatibranchia*, signifying the *gill-fringes concealed*; and the *second* I designate by the term *Prolatibranchia*, i. e. having the *gill-tufts exposed*. Nevertheless, much still remains to be investigated with respect to the early mode of life, aquatic respiration, development of the lungs, and changes in the circulatory organs of the *Cæcilians*.

In Prof. Müller's arrangement given above, the *Cæciliæ* are classed in the *first* order of his *Amphibia nuda* under the name of *Gymnophidia*, or *Naked Serpents*; though I must observe, that this name cannot be strictly applied to these *snake-like* Amphibians, because they are in reality not altogether *naked*, being furnished with numerous *small scales*.

M. Duméril also says in his Memoir*, that M. Bibron and himself have determined, "in the eighth volume of the 'Natural History of Reptiles,' which is now printing, to establish amongst the *Batrachians*, and under the name of *Péromèles*, a first sub-order comprising all the genera that are without *legs*. These are four in number, and compose a family which we call *Ophiosomes* or *Céciloïdes*, because these appellations will remind us of their resemblance to the Serpents, and at the same time will recall the principal genus—the most numerous in species—which is distinguished as the first by the name of *Cæcilia*."

However, I may here remark, that this sub-order of *Péromèles*, derived from πηρος, *wanting*, and μελος, *limb* or *leg*, is merely synonymous with Oppel's family *Apoda*, which he formed in 1811 for the genus *Cæcilia*, although previously given by Linnæus to an order of Fishes, and which has been subsequently adopted by several zoologists. But in what order or family M. de Blainville has recently placed the *Cæciliæ* in his system of Amphibiology, given in 1836 in his description of reptiles brought from California by M. Botta, I cannot ascertain, not having seen the work itself, but only the passage in the historical notice, before cited, from the 'Comptes Rendus,' p. 673. Yet I am much gratified in learning that M. de Blainville agrees with me in making the *Batrachians* (of the French naturalists) constitute a distinct class under the name of *Amphibia*, and not merely the *fourth* order of the class *Reptilia*, according to the old arrangement of M. Brongniart and his followers, as MM. Daudin, Duméril, Cuvier, etc.

Again, I think a further modification is requisite in my

* Comptes Rendus, 1839, tom. ix. No. 20 p. 583.

previous classification, which is, to separate the Toads from the Frogs (*Ranidæ*), and to place them, as Prof. Bell has done, in *another* family, *Bufonidæ**; one of the chief distinctions of the latter being the *absence of teeth*.

Next, the late discovery of a very remarkable and anomalous animal renders an extension of my proposed classification very necessary;—the animal which I mean is what Fitzinger† and Natterer‡ denominate "Lepidosiren," and consider as forming a new genus of the fish-like *Amphibians*, whilst Prof. Owen § regards it, with another species, as being more nearly allied to the *Fishes*. And I may remark that the *L. paradoxa*, a native of the marshes near the Amazon, in South America, where it is named Caramuru, is extremely like the *Siren* in general character and form; whilst the *L. annectens*, which inhabits the river Gambia in Africa, more resembles in its shape the *Siredon pisciformis*, or Axolotl of Mexico. It is also used for food by the inhabitants of that part of Africa, as the Axolotl frequently is by the Mexicans.

Now the presence of distinct *lungs* in both these animals makes me at once dissent from the opinion of the latter author, and decides with me the question—whether they are to be esteemed as true *Amphibians*, or true *Fishes*?

Yet Prof. Owen has resolved this question in favour of their being *Fishes*, principally from their *nose*; which consists of two membranous sacs, plicated within, opening externally on the upper lip, but (according to his observation) without communicating with the fauces or mouth ||. The other ichthyic

* History of British Reptiles, p. 105.

† Froriep's Notizen, vol. i. p. 90; and Wiegmann's Archiv, 1837, p. 232.

‡ *Lepidosiren paradoxa*, eine neue Gattung, aus der Familie der Fischähnlichen Reptilien, von Johann Natterer, Annalen des Wiener Museums der Naturgeschichte, 1837, vol. ii. p. 165.

§ Description of the *Lepidosiren annectens*, Linn. Trans., vol. xviii. p. 327.

|| M. Milne Edwards, in his paper 'On the Natural Affinities of the *Lepidosiren*' in the Ann. des Sci. Nat. for September 1840, writes as follows:—"One of the reasons upon which Mr. Owen most insists for placing the *Lepidosiren* amongst fish, is the want of communication between the nasal cavity and the mouth; but M. Bischoff asserts, that in the species which he dissected there exist hinder-nostrils (*arrière-narines*) opening into the cavity of the mouth near to the commissure of the lips. I also saw these posterior openings of the nasal cavity in the *L. paradoxa* dissected by M. Bibron, and their abnormal position appears to be in part explained by the absence of superior maxillary bones." This paper, a translation of which was given in the 'Annals and Mag. Nat. Hist.' for February 1841, p. 467, I had not seen until some time after mine was written and in the editors' hands. I must here point out that Mr. Owen made his dissection of the *L. annectens*, while MM. Bischoff and Bibron examined the *L. paradoxa*.

characters observable in their organization I regard as of minor importance.

Thus it seems to me, that we must either account these animals as *Fishes* endowed with true and well-developed *lungs* of a vascular and cellular structure and fitted for respiring air, similar to those of the *Amphibia* and *Reptiles*, and with some other essential characters also common to the *Amphibia*; or as *Amphibians* possessing *nasal sacs* with an external orifice only (according to Mr. Owen) and adapted for smelling like those of the *Fishes*, and likewise having a few other ichthyic characters; or in fewer words, *either* as *Fishes* with the *lungs* and some other principal characters of the *Amphibia, or* as *Amphibians* with the *nose* and a few other inferior characters of *Fishes*.

Here, then, we must elect, whether we assume the *lungs* or the *nose* as the chief characters whereby to decide in which class of the *Vertebrata* these animals ought to be most correctly placed. However, it will be readily admitted by all naturalists, that the former or the *respiratory* organs far exceed in importance the latter or the *olfactory* organs, and therefore must compel us at once to select them for the classification of these animals in preference to the latter. And surely even by considering these animals as *Amphibians** possessing the *nose* or *nasal sac* of *Fishes*, it will be much less incongruous and much less departing from the usual and received characters of the divisions of the *Vertebrata*, than if we were to esteem them as *Fishes* furnished with the *lungs* of the *Amphibia*; for this I cannot but think would be too anomalous and too much at variance with the general definition of Fishes —as having gills but *no lungs*—notwithstanding that the air or swimming-bladders of two or three genera of Fishes of the

* M. Milne Edwards has likewise stated, in the paper already quoted, *two* other characters belonging to the *L. paradoxa*, which afford strong evidence in favour of its being correctly esteemed an *Amphibian*. The *first* is, that "M. Bibron has also satisfied himself of the existence of the *two auricles* of the heart described by M. Bischoff, so that in this important respect the *Lepidosiren* stands remote from Fish and approaches nearer to most Reptiles." And the *second* is, that "the lungs of Mammalia, of Birds, and of Reptiles, as every one knows, always originate from the *ventral face* of the digestive tube, whatever their position may be in the splanchnic cavity, and it is always on the ventral side of the pharynx that the opening of the glottis is found; it is the *same* with the *Lepidosiren*."

Now if, on a more minute examination of the *L. annectens*, this animal shall be found never to possess any hinder nostrils communicating with the mouth, and that its heart has only a *single* auricle, then I think it will be necessary to consider it as a *genus* distinct from the *L. paradoxa*, and which I would name *Protomelus*. I must also add, that the *L. paradoxa* has fifty-five pairs of ribs, whilst the *L. annectens* possesses only thirty-six.

family *Clupeidæ* somewhat approach in cellular structure to the lungs of Reptiles.

Wherefore I agree with M. Fitzinger, Dr. Natterer and Prof. Jones*, in regarding these animals as two distinct species of a new *genus*, belonging rather to the *Manentibranchious Amphibians* than to any order of Fishes.

I find also that M. Bischoff concludes, from a skilful dissection of the *L. paradoxa*, that it is an *Amphibian* and not a Fish. See his memoir published at Leipsig in 1840; also the translation of it, with five plates, in the 'Annales des Sciences Naturelles' for August and September 1840. At page 155 of the latter number, Prof. Bischoff observes, concerning the *L. paradoxa*, that its nasal cavities are perforated behind† and open into the mouth; that its heart has two auricles; that its lungs have not the character of swimming-bladders; and that the organization for the most part of its soft parts, especially of those of circulation and respiration, differ from those of Fishes. It is likewise said that this animal produces a sound resembling the cry of a cat. Again, as it is evident, the name "Lepidosiren," signifying a *Scaly Siren*, which was given by M. Fitzinger to this genus, is not altogether appropriate, since it would lead us to conclude that this is the *only* Amphibian possessing *scales*, whereas the *Cæciliæ*, as it is well known, are likewise furnished with small *scales*. And Prof. Owen says, at p. 332 of the Linn. Trans., vol. xviii., that he recorded, in the *MS.* Catalogue of the Museum of the Royal College of Surgeons in London, the *Lepidosiren* under the name of '*Protopterus*'—doubtless derived from πρωτος, *first*, and πτεpov, *fin*—to express the *primary* or rudimentary form of its four *fins*. But, since I maintain that this genus really belongs to the *Amphibia*, this name could not possibly apply to it, although that of *Protomelus* would be more characteristic, which signifies the *first* or *primary* form of the *limbs* or *legs*,

* General Outline of the Animal Kingdom, p. 538.

† But Sir W. Jardine considers "the structure of the *nostril* as entirely analogous to that of the organ in Fishes: it is not a respiratory organ in *L. paradoxa*,' the double opening is only similar to the valvular separation of the sac in Fishes."—See 'Remarks on the Structure and Habits of *L. annectens*' in the 'Annals and Mag. of Nat. Hist.' for March last, p. 26. This, however, is evidently a mistake, as will appear from the following "addition," which M. Bischoff has given to his paper in 'Annal. des Sci. Nat.,' Sept. Number, p. 155. "Again I add, on the subject of *nasal cavities*, on which so much has already been urged, that some weeks since, at my request, my father-in-law, M. Tiedemann, has likewise examined the nasal cavities of a very small specimen, and that he has found the canal to be in length $5\frac{1}{2}'''$ (rhénales), proceeding obliquely at the back and on the outside, and opening into the cavity of the mouth. The species of Congers, on the contrary, which are found at Vienna, do not present any similar canal."

from $\pi\rho\omega\tau o\varsigma$ and $\mu\epsilon\lambda o\varsigma$; still, in preference to this last appellation, I propose the name of *Amphibichthys*, derived from $\alpha\mu\phi\iota\beta\iota o\varsigma$ and $\iota\chi\theta\upsilon\varsigma$, for this new genus; because it is, of all the *Amphibia*, that which retains the most fish-like or *ichthyic* characters, and is, in fact, intermediate between those two classes.

But it is necessary, for the reception of this new genus—a type also of a new family in the Order III. *Manentibranchia* of my Branchial Classification, to divide it into *two* groups or *tribes*, because the gills in the *Amphibichthys* differ in being merely *fimbriæ* or fringes *concealed within* the branchial apertures like those in most Fishes, and are not *ramified* or *tufted*, and *externally* persistent, as in the *Siren* or *Proteus*; wherefore the former tribe I distinguish by the appellation of *Fimbribranchia*, and the latter by that of *Ramibranchia*.

Here, then, I subjoin my Classification of the *Amphibia* founded upon the *organs of respiration*, as modified and extended in the manner I have already explained.

Division I. Vertebrata.

Class IV. Amphibia.

Sub-Class I. Monopneumena. Respiring singly, *either* by gills only, *or* by lungs alone.

Order I. Caducibranchia. Gills *decaying*.

Tribe I. Celatibranchia. Gill-fringes *concealed*.

Family I. *Cæciliadæ*. Body lengthened, slender, snake-like, skin smooth, wrinkled, mostly with minute scales; tail extremely short; legs none.

Genus: *Cæcilia*.

Tribe II. Prolatibranchia. Gill-tufts *exposed*.

Family I. *Ranidæ*. Adult body slender, oval; skin smooth or granulated; tail none; legs four; tongue long; teeth minute, fine; tympanum open.

Genera: *Rana*, *Ceratophrys*, *Hyla*.

Family II. *Bufonidæ*. Adult body short, roundish, thick, frog-like; skin tuberculated; tail wanting; legs four; tongue long; teeth none; tympanum open.

Genera: *Bufo*, *Rhinella*, *Otilopha*.

Family III. *Dactylethridæ*. Adult body short, sometimes oval, frog-like; skin smooth or tuberculated; tail none; legs four; tongue wanting or distinct; teeth minute or partly absent; tympanum hid.

Genera: *Dactylethra*, *Bombinator*, *Breviceps*.

Family IV. *Astrodactylidæ*. Adult body short, flat, frog like, tailless; skin with tubercles; legs four; tongue wanting; teeth none; tympanum hid.

Genus: *Astrodactylus* (*Pipa*).

Family V. *Salamandridæ*. Adult body long, lizard-like; tail long, round or compressed; tympanum none; legs four.

Genera: *Salamandra*, *Salamandrina*, *Molge*, *Triton*.

Sub-class II. Diplopneumena. Respiring doubly, *both* by gills *and* lungs.

Order II. Imperfectibranchia. Gills *imperfect*.

Family I. *Menopomatidæ*. Body long, lizard-like; or lengthened, snake-like; with a tail; legs four; gill-like organs internal.

Genera: *Menopoma, Amphiuma*.

Order III. Manentibranchia. Gills *permanent*.

Tribe I. Ramibranchia. Gills *ramified* or *tufted*.

Family I. *Sirenidæ*. Body lengthened, snake-like, having a tail; legs two in front; gills tufted, external.

Genera: *Siren, Parvibranchus*.

Family II. *Proteidæ*. Body long, lizard-like, or fish-like, with a tail; legs four; gills ramified, external.

Genera: *Proteus, Menobranchus, Siredon*.

Tribe II. Fimbribranchia. Gills *fringed*.

Family I. *Amphibichthyidæ*. Body lengthened or long, fish-like, covered with scales, having a tail; dorsal and caudal membranes, resembling fins, strengthened by soft rays; legs four, rudimentary; gills fimbriated, internal.

Genus: *Amphibichthys* (*Lepidosiren*).

It is worthy of remark, that in comparing the gradual modifications in the organization presented by the different families in this very natural class, there will be found many singular resemblances even between the two extreme groups, the *Cæciliadæ* and the *Amphibichthyidæ*; inasmuch as they both possess scales, and the former seem to be furnished, in their young state, with the same kind of *fringed* gills, concealed within the branchial cavity, as the latter retain during the whole of life: and whilst, on the one hand, the *Cæciliadæ* are snake-like in their form and habits, they constitute the link between the class *Reptilia* and the class *Amphibia*; so, on the other hand, the fish-like shape and characters of the *Amphibichthyidæ* as clearly and gradually connect the class *Amphibia* with the class *Pisces*, both approximations being carried on in a most extraordinary and beautiful manner. And I have before noticed, that the order *Abranchia*, which had been previously formed for a certain *genus* in this class, cannot be applied to any *Amphibian*; for it is now well ascertained that every animal included in this class possesses, during one period of its existence at least, some *branchial* apparatus, which, with the retention of *lungs*, fully proves that these animals ought, according to their natural conformation, to be arranged in a *distinct* class, and not in a *mere* order of the class *Reptilia*. Wherefore the principal characters of the *three* latter classes of *Animalia Vertebrata*,—*Reptilia, Amphibia, Pisces*,—taken from their *organs of respiration*, are, membranaceous and cellular lungs without any gills for the *first* class; either gills in the early part of life, then cellular lungs in their adult state, or gills or some branchial apparatus, coexisting with cellular lungs through the whole of life, for the *second*; and gills only, without lungs, for the *third* class.

Norton House, Stockton-on-Tees, April 10th, 1841.

[Note.—Mr. Owen nowhere assumes that the nose, as an absolute zoological character, is equal in importance to the lungs; but believing, with other Comparative Anatomists, that the air-bladder of the fish is essentially a lung, and being able to trace its assumption of the true pulmonary structure within the undoubted limits of the class of Fishes, he is not disposed to allow the respiratory organ to be so important, in relation to the classification of the *Lepidosiren*, as the nasal organ, which manifests no essential alteration of structure in the class of Fishes; but exhibits, throughout that class, a marked distinction from the structure of the nose in Reptiles. Mr. Owen's arguments for the essentially ichthyic character of the *Lepidosiren* are based upon the cumulative evidence of its dermal, dental, osseous, digestive, sensitive and generative systems, rather than on any single and arbitrarily chosen character.—See his 'Concluding Observations,' Linn. Trans., vol. xviii. p. 350; also the Proceedings of the Microscopical Society at p. 211 of our present volume, containing Mr. Owen's examination of the structure of the teeth, which he finds to be altogether such as is peculiar to Fish. The new naming of the genus we cannot approve.—Ed.]

## XXXIX.—*Supplement to a Catalogue of Irish Zoophytes.* By Arthur Hill Hassall, Esq. Read before the Natural History Society of Dublin, November 6th, 1840.

[Concluded from p. 287.]

*Valkeria imbricata.* "Cells in dense clusters, irregularly scattered on the polypidom," cylindrical. Plate VIII. fig. 2.

I have added to the usual definition of this species the word cylindrical, as the form of the cells is the most important practical point of distinction between it and the preceding species. *Valkeria imbricata*, in the first stage of its formation, consists of a single layer of cells spread over the surface to which it is attached (usually *Fucus vesiculosus*), and not rising from it in the form of an independent polypidom. In this stage of its growth it constitutes the *Bowerbankia densa* of Dr. Farre. This fact I have ascertained from a comparison of Dr. Farre's figure and description of that species with it, and its concurrence with these is so close as not to admit of a doubt upon the subject. *Bowerbankia densa* is, therefore, not a distinct species, but merely a condition of the well-known one, *Valkeria imbricata.* Although the examination of numerous specimens of *V. imbricata* which I have made has resulted in the eradication of *B. densa* as a distinct species, I yet must not omit to notice the admirable memoir published in the 'Philosophical Transactions,' upon this and an allied species by Dr. Farre, the gentleman by whom *Bowerbankia densa* was first described and figured as a distinct species, and to whom we are indebted for almost all we know of the anatomy of the Ascidian type of zoophytes.

Some time since, I forwarded to Dr. Johnston specimens under the name of *Bowerbankia densa* for examination: one of them was in fact *Valkeria imbricata* in the primary stage of its growth, that is, spreading over a plain surface; the other was elevated in the form of a distinct polypidom, the condition in which *V. imbricata* is usually met with. I remarked on these specimens somewhat to the following effect, not at the time recognising them as belonging to the species *Valkeria imbricata*, that they represented the species *Bowerbankia densa*, and that *it* did not always confine itself to the surface of the object upon which *it* grew, but sometimes rose from it as a separate polypidom. Dr. Johnston remarked upon them, that they represented "the species in its perfect state." In another letter Dr. Johnston writes, "Accidentally viewing your specimens of *Bowerbankia densa*, var. *ramosa*, it at once flashed on my mind that they were *Valkeria imbricata*, which is indeed the fact. *Bowerbankia densa* and *Valkeria imbricata*, are they not states of one and the same species? Your observations will probably result in the erasure of a spurious species." I have thus Dr. Johnston's testimony in favour of the identity of *Bowerbankia densa* and *Valkeria imbricata**.

Sea Point, Dublin bay: not common.

I may here observe, that many species of zoophytes, as well as the above, spread over the surface of attachment in a single layer, prior to becoming elevated into separate and independent polypidoms. This with many species appears to be a law of their growth, and is very obvious in the Flustras.

*V. pustulosa.* Not common: Dublin Bay.

*Langenella repens.* Some weeks ago I forwarded a zoophyte to Dr. Johnston which I conceived might be *Langenella repens.* Dr. Johnston observed on the specimen sent, "This may be *Langenella repens*, but it is not so like as to make one certain; your conjecture is very probably correct, and then it throws light upon a thing which has puzzled us.........If you will turn to my figure of *Flustra membranacea*, you will find some processes or tubes figured, which, in the description, are left undecided as to their nature. These I now consider to belong to *Langenella repens*, or an allied and solitary species." Since the receipt of the letter containing the above observations, I have made a particular examination of these tubes, and have arrived at the conclusion that they are not zoophytes at all. On *Flustra membranacea* the tubes are unconnected with each other, and appear to form shut sacs, no opening being visible at either end, and certainly none is present at its free extremity. Their bases are fixed to the back of the polype cells, and each tube is filled in a recent state with a clear fluid. The use of these processes on *Flustra membranacea* appears therefore to me to be still involved in obscurity. Plate VIII. fig. 3. represents a few of the cells of the

* The cells of *Valkeria imbricata* first manifest themselves on the main stems as mere buds or protuberances, and in this stage of their formation are imperforate.

zoophyte which I thought might be *Laugenella repens.* I have given a figure of it in order to avoid any error.

I have recently met with a single specimen of a species of *Bowerbankia*, or, perhaps, I should rather say, of *Valkeria*, differing both from *B. densa* and *V. imbricata*, but in some measure uniting the characters of each. The polypi have only eight tentacula, and the cells are nearly as large as those of *Bowerbankia densa*, but are of a different shape, the upper half of the cells being much narrower than the lower. See Plate VIII. fig. 4.

PEDICELLINA, *Sars.*

Corpora gelatinosa, nuda, pedicellata, clavata, in surculo tereti repente verticalia. Clava oblonga, compressa varie dilatabilis, supra serie tentaculorum coronata. Tentacula cylindrica cirrata. Os et anus vicina in extremitate superiore excavata.

*Pedicellina echinata*, pedicellis echinatis.

The above are the characters of a very curious and remarkable zoophyte, imperfectly figured and described, first by Ellis and subsequently by Lister, and of which mention is also made by Fleming under the name of *Hydra coronata*. When in Belfast a short time since, among other works which Mr. Thompson was kind enough to procure for my examination was a copy of Sars's 'Beskrivelser over Polyp.,' &c., published, I believe, in 1835; on looking over which I discovered a figure and description of this but little known species under the name of *Pedicellina*; which name, as well as Sars's generic and specific characters, I have adopted. Sars has described a second species belonging to the genus *Pedicellina*, distinguished from the former by the foot-stalk being destitute of hairs. This species I have not met with. To Ellis is due, I believe, the credit of having first noticed the species of which I am about to give a detailed account.

Before meeting with Sars's work, I had ventured to change Fleming's decidedly incorrect generic appellation of *Hydra*, and to substitute in its place that of *Cardua*, retaining the specific term. I was induced to confer this name upon it from the great resemblance which the polypes of this zoophyte bear to the heads of thistles, and this resemblance is strengthened by the presence of hairs upon their surface. A descending gullet, stomach, and ascending rectum, are distinctly visible. Just above the stomach and apparently connected with it, a yellow body may be noticed: this is in all probability a liver; it is not a gizzard, as no food was seen to pass into it, although I was able to trace its passage in its whole course along the intestinal canal. Above this yellow body a dark, ill-defined mass is seen, the nature of which I am not able to determine. The tentacula are about ⅓rd the length of the head of the polypus, and are about sixteen in number, tuberculated, and thickly ciliated, as is also the interior of the whole line of the alimentary canal. Near the junction of the stomach and ascending rectum, and contained within them, a small dark body may often be observed in active rotatory movement; the nature of the body, which has been noticed in some other zoophytes, and the cause of its motion, have not, I believe, been fully understood: it is nothing more than fæcal matter kept in constant rotation by the action of the cilia lining the whole internal surface of the alimentary canal, and which, by their peculiar arrangement, drive it on towards the place by which it is to make its exit—thus supplying the office of proper propelling muscles. The polypi are usually non-symmetrical, one side being more bulged out than the other, but they are capable of assuming various other forms and appearances. The tentacula, too, vary much in their disposition, being sometimes directed either outwards or upwards; at others they are curved inwards, usually to a small extent, but occasionally so much so as to be entirely lost to view, being concealed by the outer tunic of the polypus. The motions of the polypi of this species are very lively and peculiar. All the Ascidian zoophytes are much more vivacious and active in their movements than the Hydroid, and this is the necessary result of their higher organization. "The stems, though commonly still, have free power of motion; and when one is disturbed it bends quickly to and fro, so as to strike one or two more; these again strike upon others, and thus for a few seconds all are in action; but they soon return to quietness, and the arms, which during the commotion had been doubled up, open again."—*Lister.*

I much regret that I was unable, from want of time, to carry my observations further on the anatomy of this species, so well adapted, both from its size and the circumstance of its being the only known naked Ascidian zoophyte, for anatomical examination. I have sent a more perfect figure than has yet been given of this species to Dr. Johnston.

On *Vesicularia spinosa*: very rare: Dublin Bay.

*Crisia aculeata.* Milne Edwards has figured this species, which I described in the 'Annals of Natural History' for November 1840, in the 'Annales des Sciences Naturelles' for April 1838, under the name of *La Crisie ivoire.* How Milne Edwards could have confounded this somewhat rare species with the common one *C. eburnea,* I am at a loss to conceive. Upon this latter species in no case have I ever met with spines; and had they ever existed, traces of them would have been visible on the sides of the cells, as they always are in *C. aculeata*, even when the teeth themselves have been broken off.

Rarely found on stones, east of Kingstown harbour.

*Hippothoa lanceolata.* See Plate VIII. fig. 5, 6, for a representation of this elegant species.

Trawled up off Bray on old valves of *Pecten communis.*

*Anguinaria spatulata.* On stones east of Kingstown harbour, abundant; also at the Giant's Causeway, on Fuci.

*Tubulipora verrucaria,* Milne Edwards. This species in its perfect state, as it occurs in Dublin Bay, resembles in outline a pentapetalous flower, being *slightly* five-lobed. This peculiarity has not, I believe, been noticed. Some time since, not knowing that it had been described, I gave it the name of *Tubulipora floriformis,* to express this peculiarity of form. To Mr. Thompson of Belfast the credit of the discovery of this as a *native* zoophyte is due, a fact of which I was ignorant when I published a former paper on Irish zoophytes. Mr. Thompson has also been the fortunate discoverer of one or two other undescribed and beautiful species of *Tubuliporidæ*.

Monkstown, Dublin Bay, on the frond of *Laminaria digitata*: not common.

*T. lobulata?* Polypidom six-lobed; cells irregular, united.—A. H. H. Polypidom divided into six lobes of unequal size; tubes joined, of irregular form and size. See Plate X. fig 1, 2. Of the above *Tubulipora* I have met with but a single specimen; its appearance and development however is so different from any hitherto described, that I conceive myself justified in considering it to be a distinct species.

*Cellepora ramulosa*. Not common: obtained by trawling off Howth.

*C. bimucronata*. Cells ovate, disposed in a single layer; apertures circular, with a slight excavation below, armed on each side with a short strong process.—A. H. H. A species of *Cellepora* is described by Lamarck under the name of *Cellepora bimucronata*, and which I conceive to be identical with that defined above. Although I am inclined to consider this as a distinct species, I yet do not feel assured that it is really so; if not, it is to be regarded as *C. pumicosa* in the first stage of its formation. See Plate IX. fig. 1.

*Berenicea hyalina*. On the roots of *Laminaria digitata*, Bray Head: not uncommon.

*Lepralia nitida*. *Lepralia costata* or *thoraciformis* would not be an inappropriate name for this curious species, resembling, as each cell so accurately does, a miniature human thorax; the cross pieces representing the ribs, and the broad band into which these are inserted being analogous to a sternum. A distinct spine is frequently to be observed on each side of the lower angle of the mouth of the cell.

On stones east of Kingstown harbour: rare.

*L. coccinea*. On stones below low-water mark, east side of Kingstown harbour: common.

*L. variolosa*. On a bivalve, Sea Point: rare.

*L. ciliata*. "Cells ovate-globose, frosted; the aperture contracted, circular, armed with from five to seven long spines."

The lower border of the mouth of each cell is prolonged into a spout-like process, beneath which, in perfect specimens, a pointed tooth, somewhat shorter than those surrounding the aperture, is visible. See Plate IX. fig. 2.

Rather abundant on stones, shells, and fuci, Dublin Bay.

The following species of *Lepralia* have never, I believe, been described as British zoophytes; whether they are altogether new I cannot say. I have not, however, been able to identify them *with certainty* with any hitherto described, although I have consulted numerous works with this view; among others, Delle Chiaje's 'Anim. senza Vert. di Napoli,' in which many *Lepraliæ* are figured.

*L. appensa*. Cells somewhat raised anteriorly, frosted, larger above than below; aperture quadrangular, surrounded [illegible] long slender spines of nearly equal lengths; the lateral walls of each cell are prolonged into large, triangular, winged appendages, which are hollow, and communicate with the interior of the cells. See Plate IX. fig. 3. These appendages are always present.—A. H. H. The front wall of each cell rises into the mouth in the form of a strong pointed process.

*L. pedilostoma.* Crust spreading irregularly; walls of the cells reticulated; aperture calceoliform; margin plain, everted.—A. H. H.

The crust of this species in a recent state is always of a red colour. The cells are but little raised, and are closely approximated to each other. Their divisions and arrangement are often rendered unequal and irregular by the rough surface on which they are developed, being usually found in the crevices of rocks and on stones. See Plate IX. fig. 4.

Blackrock and Portmarnock: not uncommon. I have also found specimens of this species adhering to the bottom of an old hulk, the Olbers, in Plymouth Sound.

*L. insignis.* Cells raised, ventricose; aperture armed with from five to seven spines. A long spinous process rises out of the cell, low down and to one side.—A. H. H.

This singular species is readily distinguished from all others by the position of a sharp spine or tooth, which proceeds, not from near the aperture, but low down, from the side of the cell, in the wall of which a hole is visible if one of the spines be broken off. The aperture of the cells describes ¾ths of a circle, the lower part being straight. In addition to the spines which surround the aperture, and which gradually diminish in length on each side, a short process rises from the front of the cell, just below the aperture. See Plate IX. fig. 5.

Dublin Bay.

*L. cylindrica.* Crust opaque; cells cylindrical; aperture circular, plain, slightly contracted: a single broad triangular tooth rises from the anterior wall of the cell just below its aperture.—A. H. H.

This species bears a considerable resemblance to *Berenicea hyalina*, from which, however, it is estranged by the opacity of the crust as well as by the presence of the tooth. There is a neck or collar joined to the aperture in *B. hyalina* not present in this. See Plate IX. fig. 6.

A single specimen on the root of *Laminaria digitata*, Dublin Bay.

*L. punctata.* Cells oval, not much raised; apertures subquadrangular, having the lower lip thickened and somewhat everted. On each side of the opening of the cell a small triangular process is seen, and from the upper margin of the aperture three or four short teeth arise. The walls of the cells are perforated with small holes, which give them a dotted appearance; this is an invariable character of the species. See Plate IX. fig. 7.—A. H. H.

On stones, east of Kingstown harbour.

*L. linearis.* Cells much depressed, radiating in lines from a centre, and increasing in size towards the edge of the crust, upper part rounded; aperture contracted, circular, with a minute spout-like elongation below; teeth either three or four, surrounding the upper half of the aperture: on either side of the small spout-like elongation referred to, a short blunt process is visible. See Plate IX. fig. 8.—A. H. H.

On stones east of Kingstown harbour, and at the Giant's Causeway: not common.

*Membranipora stellata*, Thompson. A species has been described by Mr. Thompson in the 'Annals of Natural History' for April 1840, p. 101, under the name of *Flustra* or *Membranipora stellata*. This supposed species I have ascertained to be merely *Membranipora pilosa*, with the bristle abortive, on an expanded surface. I wrote to Mr. Thompson upon the subject, at the same time forwarding specimens for examination, and that gentleman's reply was confirmatory of my opinion. Mr. Thompson was, I believe, the first who described *M. pilosa* to assume the *stellate* form, and to have the cells disposed in the manner indicated in the description of *M. stellata*.

*Flustra truncata*.—Giant's Causeway, abundant; but not found upon the coast of Dublin.

*F. avicularis*. This species in a recent state is of a reddish colour, but becomes of a grayish black in drying; this change of colour in drying is, I believe, peculiar to this species, and the cause of it I am not acquainted with. I have sometimes observed the bird's-head appendages (whose motions are so very peculiar and unaccountable) described as belonging to *C. avicularia*, on this species. I now find that this species is very abundant in Dublin Bay.

*F. lineata*. Not uncommon on *Patella cærulea*: Bray.

*F. tuberculata*. Not common: Merrion, Dublin Bay.

*F. distans*. Polypidom encrusting, grayish, calcareous, reticulated; cells oval; margin broad, having its inner edge slightly crenulated; two short processes are visible at each upper angle of the cells.

I am informed by Dr. Johnston that this species was discovered some years ago by Mr. Bean, but that the habitat of his specimen was unknown. It is on this account, I imagine, that no description of it has as yet been given in Dr. Johnston's 'British Zoophytes.' Dr. Johnston, in a recent letter to me, remarks, "yours is the only native specimen I have seen." From a comparison of specimens of this with *Flustra tuberculata*, I cannot help suspecting that they are in fact one and the same species. When at Belfast a short time since, I saw several fine specimens of this species in Mr. Thompson's cabinet, obtained some time since upon the coasts of Down and Antrim.

On stones east of Kingstown harbour: not common.

*F. carnosa*. This species, which is undoubtedly no *Flustra*, ought to be raised to a generic rank and placed in the family *Alcyonidulæ*. Pallas asserts (I quote from memory) that the tentacula vary from 18 to 30: this assertion I am not able to verify, having constantly found tne number of tentacula in each polype to be the same, viz. 30.

Dublin Bay: abundant on *Fucus siliquosus.*

*F. Hibernica.* I have now ascertained that this species, which I described in my Catalogue of Irish Zoophytes published in the 'Annals' for November 1840, is not a *Flustra* but a *Lepralia*, which I have again figured and described in this paper under the head of *L. pedilostoma.* The figure given with the Catalogue represents a posterior view of the cells, the wall of each cell posteriorly being absent. The error of figuring the cells posteriorly instead of anteriorly, and the absence of the posterior wall, are thus accounted for. The specimen from which the figure was taken adhered to an *Ascidia*; this *Ascidia* grew on the under surface of a rock, in removing which, the *Lepralia*, which covered the rock before the *Ascidia*, also came away,—the *mouths* of the cells adhering to it, and the wall still remaining attached to the rock. The detection of an error of this nature is almost as pleasing as the discovery of a new species.

*Cellularia avicularia.* This species I now find to be abundant in the Bay of Dublin and about the neighbouring coast.

*Alcyonidium gelatinosum.* Occurs in long rope-like masses, and is rarely obtained except by trawling. Rare, off Howth and Lambay.

*A. hirsutum.* The polypidom of this species in its young state is clavate, and not branched. As in this condition it might, possibly, be mistaken for a distinct species, I have given two figures of it, one representing it of its natural size; the other is a magnified view of it, with many of the polypi protruded. When under the microscope it presented a very beautiful appearance, some faint idea of which the drawing, Plate X. fig. 3, 4., is intended to convey.

*A. parasiticum.* Polypidom encrusting, spongy; cells polygonal, but irregular in size and arrangement. Polypes with sixteen tentacula.

The nature of this production, which has long been involved in obscurity, I have at last succeeded in determining. By very many it was not considered to be a zoophyte at all; I have, however, ascertained, beyond all doubt, that it is a true polypiferous production of the genus *Alcyonidium.* Dr. Johnston describes the polypidom as "entirely composed of particles of sand cemented together with mud or clay." Were this really its character, this fact alone would be sufficient to decide that it could not be a zoophyte; for the polypidoms of all true zoophytes are growths, and not artificial formations. Numerous sandy particles are certainly found in connexion with it, but not, in my opinion, incorporated with it; their presence, I believe, being confined to cells vacant by the death of the polypi. If previously dried, and then dropped into water, it immediately sinks to the bottom, and does not remain there wholly unaltered, but slowly absorbs a portion of the fluid until it has attained its original dimensions. I also believe that I have detected a few siliceous spiculæ, and certainly numerous siliceous granules, which are to be distinguished from the particles of sand by their much smaller size. In a recent state a membrane is attached to the edges of each cell; this rises up in a globular form, and bears a near resemblance to the papillæ on *A. hirsutum*. The polypi correspond so closely with those of the other species of *Alcyonidium*, that I have thought it superfluous to give a separate figure of it, having the same number of tentacula, viz. 16.

Encrusting various flexible corallines, Dublin Bay: common.

*A. echinatum*. It is not a little remarkable, that the polypi of this common species should have remained hitherto undescribed. I was lately so fortunate as to meet with some specimens in which I had an opportunity of examining the animals in a living condition. The result of this examination proves, that it is not only not allied to the family with which it has up to this time been classed, but that it is a true Hydra zoophyte, related closely to *Coryne squamata*, between which and *Hermia glandulosa* it forms a new and distinct genus. This new genus it was my wish to have dedicated to Dr. Johnston, the author of the work on British Zoophytes, in acknowledgment of the valuable services rendered by that gentleman to this interesting department of natural science. In this desire I have, however, been disappointed, from the circumstance of a genus in botany having been dedicated to Dr. Johnston, the editor of Girard's 'Herbal.'

The generic name which I have adopted was suggested to me by my friend G. J. Allman, Esq.

The following are the characters of the genus

ECHINOCHORIUM, *Hassall*.

Polypidom encrusting; surface raised into numerous rough papillæ; polypi hydroid, naked, pedicellated.—A. H. H.

*Echinochorium clavigerum*. Polypidom muricated with rough spinous papillæ about a line in height. Polypi more or less clavate, not retractile within cells; tentacula claviform, about $\frac{1}{3}$rd the length of the body, retractile.

There are numerous indentations on the surface of the polypidom, in each of which the base of a polype is inserted; this latter is about $\frac{1}{4}$th of an inch in height and is of a white colour; its head is somewhat enlarged, and is surrounded with numerous contractile club-shaped tentacula; the number of these varies considerably, but frequently amounts to between twenty and thirty. The tentacula are not arranged in any determinate order, as they always are in the Ascidian type of zoophytes, but are variously disposed. This observation applies to all Hydroid zoophytes. Whether the polypes are separate or united at their bases, I am unable to say. See Plate X. fig. 5., which is a magnified representation of this genus and species. This species does, I believe, possess a stomach, which in one of the polypi in the figure is seen to be everted. Fig. 5, *b*.

Dublin Bay and Portmarnock: common.

A marked correspondence exists between the natural history of the coast of Antrim and the opposed shore of Scotland; and the relation is particularly obvious in the distribution of zoophytes, three species of which, common in the North of England and on the Scottish shore, being also present on it, and not, I believe, found upon any other part of the coast of Ireland. Thus *Thoa muricata* (never before recorded as Irish), *Sertularia filicula* and *Flustra truncata*, all more or less extensively distributed upon the English and Scotch coasts, are occasionally met with on the Antrim coast, in the neighbourhood of that wonder of the world, the Giant's Causeway. Ireland, therefore, it may fairly be inferred, is indebted to Scotland for the presence of at least three species of zoophytes, and probably for some others. I think I may venture to predict that *Thuiaria thuja* will eventually be found on the coast of Antrim. I now find that only one species of *Plumularia* is wanting in the Bay of Dublin, and that is *P. pennatula.*

To the title of my Catalogue an objection has been raised by Mr. Thompson of Belfast, on the ground that it does not embrace the whole coast of Ireland, but is confined to a particular portion of it. The justice of this observation, as originally applied to that portion of the Catalogue which has already been published, I willingly admit. It should rather have been entitled a 'Catalogue of the Zoophytes of Dublin and its vicinity;' this title, however, would not be equally applicable to the continuation of the Catalogue, as to some species I have given a second locality.

I wish it to be distinctly understood, that the Catalogue which has been already published, as well as this Supplement, contain only the results of my own personal observation and research. I have, therefore, not deemed it necessary to advert to the writings of other Irish naturalists on this branch of natural history, not having had occasion to refer to them. I may, however, mention, that a catalogue of Irish zoophytes was published by Mr. Templeton, of Belfast, some years ago; that many of Ellis's specimens were obtained on the Irish coast; and that a list of unrecorded species was published by Mr. Thompson in the 'Annals of Natural History' for June 1840, at which time my Catalogue was with Mr. Taylor, the editor, for publication. I must not omit to notice also, that many rare species of zoophytes were procured by Mr. R. Ball and Miss Ball of Dublin, at Youghal, county of Cork.

I have now brought the enumeration and description of the species to a conclusion. During the compilation of this Supplement I have had occasion to make various references to Dr. Johnston, who has always promptly and kindly favoured me with his opinion, and to whom, therefore, my most sincere thanks are due.

For the beautiful drawings which accompany this communication, some of which I have had the pleasure of exhibiting to the Society, I am indebted to the skill and perseverance of a lady, whose name I would most willingly mention were I authorized to do so.

Having brought this paper to a termination, it now only remains for me, in the first place, to thank the Society for the attention with which it has listened to me, and to hope that any errors of detail which may have been noticed will be excused, when the time occupied, less than two months, not merely in the preparation of the manuscript and drawings, but also in obtaining the materials for it, is taken into consideration; and secondly, to beg its acceptance of a collection of Irish zoophytes, a portion only of which is now upon the table.

In taking my leave for the present, I cannot refrain from the expression of my most cordial wishes that the affairs of this Society may "go on and prosper," conferring, as it must necessarily do, moral and intellectual benefit, not merely on the members composing it, but, through them, upon the country at large. I shall at all times feel great pleasure in contributing my mite towards the promotion of its objects. With this paper terminate, I regret to say, my labours in this interesting, and as yet not fully explored, field of natural history. In a few days I shall be called upon to quit the beautiful ocean,—beautiful in its strength, its purity, its freshness, its majesty, and in its infinity; beautiful in calm and storm; and its still more beautiful and ever-varying productions, in the study and contemplation of which I so much delight.

## EXPLANATION OF THE PLATES.

Plate VI. Fig. 1. A magnified representation of *Coryne squamata*. Fig. 2. *Hermia glandulosa*, a single polype, magnified, exhibiting the reproductive gemmules. Fig. 3. *Sertularia Margarita*, nat. size. Fig. 4. Do., magnified. Fig. 5. *Sertularia pumila*, magnified.

Plate VII. Fig. 1, 2. *Thuiaria articulata*.

Plate VIII. Fig. 1. *Plumularia frutescens*, natural size. Fig. 2. *Valkeria imbricata*, natural size. Fig. 3. *Laugenella repens?* magnified. Fig. 4. New species of *Valkeria*. Fig. 5, 6. *Hippothoa lanceolata*.

Plate IX. Fig. 1. *Cellepora bimucronata*. Fig. 2. *Lepralia ciliata*. Fig. 3. *L. appensa*. Fig. 4. *L. pedilostoma*. Fig. 5. *L. insignis*. Fig. 6. *L. cylindrica*. Fig. 7. *L. punctata*. Fig. 8. *L. linearis*: all magnified.

Plate X. Fig. 1. *Tubulipora lobulata*, natural size. Fig. 2. The same magnified. Fig. 3. *Alcyonidium hirsutum*, in its young state. Fig. 4. The same magnified. Fig. 5. *Echinochorium clavigerum*: *a*, one of the polypes with its feelers retracted: *b*, one with the stomach everted.

## XL.—*On the Composition of Chalk Rocks and Chalk Marl by invisible Organic Bodies: from the Observations of Dr. Ehrenberg.* By Thomas Weaver, *Esq., F.R.S., F.G.S., M.R.I.A, &c. &c.*

[Concluded from p. 315.]

### *On the Composition of the Compact Limestone of Upper Egypt and Arabia by the invisible Animalcules of the White Chalk of Europe.*

Both the nummulite limestone of the pyramids of Geza on the left bank of the Nile, and the same kind of rock on the right bank near Cairo, contain numerous microscopic animalcules of the chalk, which serve as a cement to the Nummulites. I had often examined microscopically specimens which I had brought from thence, but I did not succeed in separating and rendering visible the different elements with equal clearness, until I applied my newly-acquired practice, which was much facilitated by immersing these stones a longer time in water. The same result attended the examination of the other calcareous rock masses of Upper Egypt and Arabia, showing that the animalcules of the chalk occupy in a surprising manner a wide extent of country in Libya.

Nummulite limestone, wherever occurring, has been most usually referred to the tertiary period, although perhaps often belonging to the chalk. In Egypt it possesses no great extent. On the right bank of the Nile it is deposited only in the small hills near Cairo, and on the left bank, as it appears, in a tract extending from Siout to the declivity of the compact limestone, which latter constitutes the mass of the rocks that line the course of the Nile in Upper Egypt. It forms the foundation and principal material of the Pyramids. Northward it is directly bordered by the slimy delta of the Nile, the productive soil of Egypt. Between the Oasis of Jupiter Ammon and the Mediterranean, is a wide elevated plateau or tableland of rock, among whose numerous organic remains are known tertiary forms. The whole of Upper Egypt, as far as Syene, has a similar character. In 1828, though assured that its limestone rocks were more ancient than the tertiary period, yet, from want of distinct fossils, I was doubtful whether they might not be referred to the Jura formation. On the south, and not far from Syene, this limestone is incumbent on sandstone (Quadersandstein?), and the two repose on granite and the primary rocks connected therewith. I gave these views in 1828 in the geologically coloured map which accompanied the first section of the first volume of my Travels in Egypt, Libya, Nubia, and Dongola.

It now results, from the microscopic examination which has taken place, that the whole of the limestones of Benisuef, Siout and Thebes, on the western bank of the Nile, and of Cairo and Kineh (including the gray marl near Kineh), on the eastern bank, and which inclose the Nile at an elevation of frequently 100 to 300 feet above its level, extending along the river full sixty German miles in length, are, like the Nummulite limestone, composed of an inconceivable accumulation of microscopic calcareous-shelled animalcules, which are of precisely the same genera and species as those which constitute the chalk of Europe. The table-land formed by these calcareous rocks extends far westward into the Desert, and it is perhaps principally composed of them.

A new and unexpected light is thus thrown on these extensive regions. The phænomena apparent in Egypt may be connected with those of Western Africa. It has been already shown that the same animalcules constitute the territory of Oran, stretching far along the foot of the Atlas; and when we consider the equality of surface which prevails in the plain of the Great Desert, or Sahara, of the North of Africa, and compare it with what I have myself seen along the whole extent of its eastern border, as well as on a large portion of its northern, we may be well permitted to think of a similarity of composition.

But these distinct indications of a similar organic influence extend not merely to the west but also to the east of Cairo, expanded into Asia. The specimens collected by Dr. Hemprich and myself from Hamam Faraûn, and Tor in the Sinaian portion of Arabia, which I had formerly considered as ash-gray marl and yellowish-gray limestone of the tertiary epoch, were now proved, by the new method of examination, to consist of quite the same microscopic chalk animalcules as constitute the hilly masses of Upper Egypt. And from hence this formation appears to be continued eastward far into the interior of the Great Desert plain, trending toward Palestine; but on the Arabian coast of the Red Sea we did not find it further south than Tor, which locality alone, among all the points of the east, yielded flints similar to those which occur in the European chalk.

We have here to remark on the absence of siliceous animals in this limestone and marl formation, while the so-called Egyptian pebbles and jaspers occupy the same position in horizontal layers as the flints in the North of Europe, appearing as their substitute. But in these jaspers the organic siliceous elements are no longer to be distinctly found by reason of their intermixture with other substances, and their consequent opacity, giving rise to dendritic and other delineations. It seems as if the solution and conversion of the organic into the inorganic in the Egyptian pebbles (*Cailloux d'Egypte*) is throughout more perfect than it is in many flints, although the constituent elements of both kinds of stone are very probably quite the same.

*On the principal Organic Calcareous Forms which compose the mass of all Chalk.*

From what has been already stated, it is evident that the production of the calcareous mass of the chalk is not to be attributed, as formerly conceived, to the larger organic bodies, but to the minuter, and in the greatest measure to such as are invisible, consisting of eight genera of Polythalamia with twenty-five species, and excluding all such as may be distinguished by the naked eye, that is, exceeding $\frac{1}{24}$th of a line in magnitude; the latter, however, are comparatively rare. It is possible that several other, and perhaps many species of the same genera, may yet be discovered in the chalk, as well as other genera, since the investigations hitherto made could only be applied to a minimum of its substance; yet, as these were conducted by me on chalk from many regions, it does not appear probable that other sections of the animal kingdom will be found to have taken so great a share in the formation of chalk as the Polythalamia, the principal prevailing forms of which I have indicated.

From the preceding it is also apparent that the chalk rocks of all countries agree in their constituent organic forms not only according to the zoological class, but also in genera, and for the most part in species likewise; this character being not confined to the white tender writing chalk of Europe, but extending also to the compact limestone rocks of the North of Africa and the West of Asia. Particularly striking is the characteristic persistence of single forms through all these different and widely-separated countries. Thus in all of them are to be found *Rotalia globulosa*, with *Textularia globulosa*, *T. aciculata ?*, and *T. striata*, as well as *Planulina turgida*, thus giving a common character to all these rock formations; and this character becomes the more important, when we consider that these forms are the most numerous, and in fact are the chief constituents of the chalk*.

* The Polythalamian forms which Mr. Lonsdale noticed in the English chalk in 1837 as visible to the naked eye, and amounting to 1000 in one pound of the chalk, and which, with Mr. Lyell, he has named *Lenticulina* and *Discorbis*†, appear, judging by the figures, to be referable to *Rotalia ornata* and *R. globulosa*, including perhaps fragments of *Textularia globulosa*.
I may here remark, that my continued researches on the Polythalamia of the chalk have convinced me, that very frequently in the earthy coating of

† Dr. Buckland's Bridgewater Treatise, 2nd Edition, vol. i. p. 448. 1837. Lyell's Elements of Geology, 1838.

If now the question be asked whether the forms which occur in such masses in chalk belong to it exclusively, and are hence to be considered characteristic of that formation, I am almost disposed to reply in the affirmative. The analogous forms which occur in sea-sand, tertiary sand, and indeed in all modern formations, are viewed for the most part as different and larger species, although of the same genera; and it does not appear that any of these forms can be referred with perfect certainty to such as are now living in the sea.

To the theory of the formation of limestone, the observation is important, that these organic deeply-seated relations are not peculiar to the chalk formation. The tertiary calcareous beds consist, in like manner with the chalk, of multitudes of such Polythalamian animals, which compose in many quarters sandy sea-downs of great extent; and even in the sandy desert of Libya we can recognize distinct Polythalamia. On the other hand, having succeeded in discovering microscopic Polythalamia in the compact flints of the Jura limestone from Cracow, which are of decidedly different forms from those of the chalk, the calcareous animals being *Nodosaria urceolata*, n. sp., and *Soldania elegans*, n. sp., and the siliceous *Pyxidicula prisca?*, with *fragments of soft sponges*, it becomes apparent that such invisible organic bodies were also present in the formation of the Jura limestone.

*On the Geographical Distribution of Living Polythalamia on the African and Asiatic Coasts of the Mediterranean, and in the Red Sea.*

The materials collected by Dr. Hemprich and myself in the Mediterranean refer to four points on the Libyan coast, and one point on the Syrian coast. In regard to a second point on the latter coast (St. Jean d'Acre), I have acquired a knowledge of some forms from the collection of Dr. Parthey.

From the Red Sea nine forms were made known to us by d'Orbigny, collected from sand presented to him by Deshayes. But from the collections made by Dr. Hemprich and myself from thirteen points along the whole length of the Red Sea, it appears that very numerous forms exist. Of seven of those points, one occurs on the western (African) coast at Suez, and six on the eastern (Arabian) coast, namely, at Tor, Erraic and el Ard, Moileh, el Wusch and Gumfüde; and of the remaining six, five are islands on the Arabian side, namely, Sanafer,

flints, which is partly calcareous and partly siliceous, the original calcareous-shelled animal forms have exchanged their lime for silex, without undergoing any alteration in figure, so that while some are readily dissolved by an acid, others remain insoluble; but in the chalk itself all similar forms are immediately dissolved.

Maksure, Barkan, Sanac and Ketumbul, and one an island on the African side of the Red Sea, namely, Massaua.

It is possible that by repeated and closer examination of the marine productions collected by us, many other Polythalamia may be found besides those already discovered. In the mean time, as a preliminary, I have drawn up a list of the species hitherto met with*. From this it results that the total number of species of Polythalamia observed in the Red Sea are *fifty*, and in the Mediterranean, on the Libyan and Syrian coasts, *twenty-seven*. The new species derived from the two seas amount to *fifty-four*, of which *twenty-seven* species are peculiar to the Red Sea, and *seventeen* are common to both seas. Particularly worthy of notice is the wide distribution and massy development of the *Peneroplis planatus* and *Sorites Orbiculus*, which are rare on the European coast. These forms are not only present almost everywhere in the East, but constitute the predominant masses. On the other hand, the *Rotalia Beccarii*, which composes the Italian hills, occurs only singly and very rarely in the Red Sea; and I nowhere found it on the Libyan and Syrian coasts. The *Sorites Orbiculus* I have also from St. Domingo.

In reviewing these subjects, even a superficial comparison of them with the contents of the chalk and chalk marl, is attended with the striking result, that none of these living forms are found among the animalcules of the chalk, not even among those which compose the compact limestone of the Egyptian and Arabian rocks, and which are still partly washed by the sea near Hamam Faraûn.

*Remarks on Polythalamia.*

After a preliminary view of the researches of earlier labourers in this branch of zoological inquiry, Dr. Ehrenberg observes:—A lively interest respecting the minute Polythalamian bodies which enter into the composition of sea-sand was excited anew by the work of Alcide d'Orbigny in 1826, in which are contained a great number of new species, while many of those which were previously known are examined with greater

* Of d'Orbigny's nine species from the Red Sea, there are three which I cannot identify, namely, *Triloculina bicarinata*, *Quinqueloculina limbata*, and *Q. punctata*; but the other six are probably these with which I have become acquainted, and to which I have therefore given the same names, namely, *Textularia communis*, *Calcarina Defrancii*, *C. Gaudichaudii*, *Quinqueloculina sulcata*, and *Vertebralina striata*. His *Assilina* (*Nummulina*) *nitida* I hold to be the *Sorites Orbiculus*.

Although I possess and have compared many of the Polythalamia which have been des ribed by d'Orbigny derived from the same localities, yet I am in want of a great number of the originals named by him, and as this author has generally given new names unaccompanied by descriptions, I have not in most cases been able to determine to what form the name given by him belongs.

care, and an improved and easier view is taken of the whole subject. By his active exertions he had collected between 600 and 700 species from the sea-sand of France, Italy, England, the Isle of France, Sandwich Islands, the Malouine and Marian Isles, &c., of which, however, only 425 received names. The whole mass of these microscopic animalcules, which he again decidedly associates with the Mollusks and Cephalopods, but in a distinct order under the name of *Foraminifères*, are distributed by him into five families, according to the spiral or other form in the grouping of the cells; these families comprising fifty-two genera. On this work Deshayes made various critical remarks in the *Dictionnaire Classique*. D'Orbigny expressly states that the animal of the Polythalamia (his Foraminifera) resembles the Sepia in the structure of its body, although much smaller, and then proceeds to give the essential characters of the living body of the Polythalamia, yet without naming specifically or generically any one animal from which they were taken*.

Both Blainville and Dujardin have made the correct observation that the minute shells of the Polythalamia are external cases, and not, as incorrectly viewed by Denys de Montfort and Alcide d'Orbigny, internal bones. Yet in referring the microscopic so-called Cephalopods to the Infusoria, Dujardin commits a mistake†. It was this contradiction between observers that induced Férussac, in his great work, *Histoire Naturelle des Mollusques*, to exclude the Foraminifers from the class of the Mollusks; and others entertained similar objections, yet without assigning to them a correct position.

In the year 1831 I laid before the Academy contributions to the knowledge of Coral animals, with an attempt to class them physiologically; which attempt was entirely founded on my own observations of the living animalcules, when, accompanied by Dr. Hemprich, I travelled on the Red Sea in the years 1823 and 1825. In that work I designated the Coral animals as composed of two strongly marked organically distinct groups, under the names of *Anthozoa* and *Bryozoa*. In the year 1831 also, I communicated in the *Symbolæ Physicæ* the first development made of the complicated structure of the *Halcyonella stagnorum*, one of the Bryozoa, and showed that it was quite similar to that of Flustra.

The researches of Dujardin in 1835 gave an entirely new direction to the ideas which had been formed of the Polythalamia, showing that not a trace of resemblance was to be found between them and Sepia; on the contrary, the greatest simplicity of structure became apparent, bespeaking a simple ani-

* *Annales des Sciences Naturelles*, 1826, t. vii. p. 245.

† *Annales des Sciences Naturelles. Seconde Série*, t. iv. p. 343, 1835.

mal body covered by a shell, with the power of extending or contracting itself at will. But when Dujardin expressly compares the Polythalamia to the *Proteus* (*Amoeba*) of the Infusoria, such an association cannot be admitted, unless it be first proved that a polygastric structure exists in those bodies. He has given to them the new name of *Rhizopodes*.

I showed, in 1837, that the Polythalamia could not well possess an organization similar to that of the Infusoria, as not a single known true species of Infusoria has a calcareous shell; and I had, in 1823, discovered, as I conceived, a true living Polythalamia of earlier authors, resembling in organization the very complex Flustra. The correctness of this view was fully established in 1839, after having examined anew, according to my improved method, the small *Nautilus Orbiculus* of Forskål, which d'Orbigny designated in 1826 as *Nummulina (Assilina) nitida*, specimens of which I had collected from the sand of the Red Sea in 1823, and which I have named *Sorites Orbiculus*. The result proved that the disc-like shell was a Polypary, often composed of more than one hundred single animalcules, the cells of which quite resemble those of a Flustra, the animal putting forth and retracting from six to eight tentacula. And I even discovered in the interior of the single cells well-preserved siliceous Infusoria, the last food taken by the animal; and in some of them also small globular bodies, which, without much constraint, may be considered as eggs. Though I had at an early period observed that the disc was composed of many cells, yet I could not perceive an opening to them; but the discovery of Infusoria in their interior led me to consider by what means they could have been introduced. Reflection reminded me that I had often seen Coral animals which in the expanded state exhibited many large bodies with tentacula and a large mouth, yet when contracted left scarcely a trace of the openings through which they were protruded from the common Polypary. As such I remembered *Pennatula*, *Lobularia*, *Halcyonium* and similar forms, in which I had frequently observed, that in the skin of the animal existed calcareous particles, which on the contraction of the skin so completely closed the opening as to render it no longer perceptible. Renewed examination of the closed surface of the cells of the *Nautilus Orbiculus*, Forskål, now showed to me that in them also dendritic calcareous particles exist, the close approximation of which closes the cell, so that the cover of the cell is in fact the dried skin of the animalcule. I now made an experiment in proof, by dissolving the small shell in dilute muriatic acid, in order to obtain the animal body in a free state; and it succeeded perfectly. I obtained as many animalcular bodies as there were cells, connected together by band-like processes, and in the interior of many of them there were well-preserved siliceous Infusoria. I then treated in the same manner the *Flustra pilosa* and *F. membranacea* of the Baltic, and found in their interior also siliceous Infusoria. The same results followed a similar examination of the shells of *Rotalia* from the sand of Rimini, of the shells of *Peneroplis planatus*, *Pavonina Antillarum*, and of *Orbiculina numismalis* from the sea-sand of St. Domingo, as well as of other shells with their animals from the sand of the Red Sea and the Mediterranean; so that now a view is obtained of the more general organization of the principal groups of the Polythalamia.

It results clearly from what has been said in respect of these species, which are so common and widely distributed, and which have hitherto been designated in systems as small Nautili, that the straight-jointed shells of Nodosaria (formerly viewed as Orthocera), as well as the spiral shells of Rotalia, Cristellaria, &c. (considered as Nautili or Ammonites), and the shells of Biloculina resembling vermiform tubes (*Serpula*), are none of them internal calcareous parts which were encased by an animal body, similar to the internal bone of Sepia, or the cylindrical spiral bone of Spirula; but, on the contrary, that they are external calcareous shells, bearing analogy to those of Mollusks, or more correctly to those of Flustra and Cellepora, which, after separation by an acid, disclose and render visibly free the internal simple body or the Polypary, exhibiting precisely the same form. If the shell of Polythalamia be frequently perforated with pores, this is no proof that no other openings exist, or that the animals receive nourishment through many tubes, for the same structure is not unfrequently found in Flustra accompanied with the peculiar opening from which the fore-part of the animal body may be protruded; and in these exist also fringe-like filaments, which are extensile and retractile, and by no means to be compared to the pseudopodia or variable feet of Amoeba, but probably bear analogy to the mantle fringes of many Mollusks, applicable to the purposes of creeping and attachment, and for which perhaps they were specially designed. Moreover, Flustra possess a distinct large animal organization; and the siliceous Infusoria, and probable eggs found in Polythalamia, clearly bespeak in them also similar relations, the discovery of which, however, had hitherto been prevented by the calcareous encasement and the minuteness of the objects.

It has resulted from the examination of the soft small animal bodies of living Polythalamia, that while many resemble Flustra or Eschara assembled in families or polyparies, each such family being often composed of hundreds of much minuter single animalcules, many others are single animals after the manner of Mollusks. Hence arise external characters and forms which have often a reference to very different relations, which it is first necessary to distinguish before we can succeed in obtaining a clear view of the whole. The assiduous and careful labours of d'Orbigny retain their full value, serving as a basis to all future researches; and if in the present communications I shall have succeeded in turning the inquiry into a more physiological channel, my object will be attained.

To the term *Polythalamia*, (originally introduced by Dr. Breyn, of Danzig, in 1732,) a different extension or signification under other names has been given by different authors. To remove this unsteadiness and wanton change of names, which only lead to obscurity, it appears advisable to apply the term Polythalamia, in preference, as Soldani had done, to that group in which the animalcules actually live in many cells, and do not, like the Nautili, possess many empty cells. This distinction, that the animal of the Polythalamia has no empty cells, but that all its cells are simultaneously occupied, is of particular importance in their systematic arrangement among other animal bodies. Where there are many cells, they consist either of so many single animals, the whole constituting a polypary, or of organically filled integrant portions of one and the same individual forming groups. Both structures are foreign to the true Cephalopods. The shell-bearing Cephalopods may with Linnæus be divided into the *unilocular* and *multilocular*.

On the other hand, the want of a sipho which has been assigned as a character of Polythalamia, and from which they were named *Asiphonoidea* by De Haan, is incorrect, inasmuch as many really possess a part which may be fully compared to a sipho, if not in function, yet in form, namely, the tube which connects the separate cells of Nodosarina and of all individual many-celled forms. It is only in the *Miliolina* family among the simple Polythalamia, and it is only in the families of *Asterodiscina* and *Soritina* among those forming polyparies, that the want of a sipho is really necessary, because they live individually in single cells. But all the Nodosarina, Textularina, Uvellina, Rotalina, and Plicatilia among the simple Polythalamia, and the Frumentarina, Helicosorina, and Alveolinea among those which form polyparies, possess tubes of connexion between the cells, which very frequently resemble also in form the sipho of the Nautilus. D'Orbigny, it is true, states also that the cells of Foraminifers are connected by several openings; that, however, proceeds from an erroneous view, for such Polythalamia alone present several openings at the border of the cells, whose calcareous surface is interrupted in the form of a net-work, exhibiting often a relation analogous to that which is frequent in Madrepora and Astræa, in which the soft body is not divided or sharply cut off by compact calcareous plates, but the soft parts appear interwoven with minute calcareous rods, in a lattice-like manner. These numerous small connecting openings, which are sometimes visible in some of the Rotalia and Rosalina, and also in the Textularia, I do not consider essential, but hold that the true channel of connexion has always a large diameter, and is simple for each single animal. The erroneous view of d'Orbigny and of all his followers becomes so complicated, that polyparies are held to be single animals, and consequently the various connecting openings to be those of a simple individual.

With respect to d'Orbigny's genus *Nummulina*, although it has derived advantage from his diligent investigations, I consider it as composed of very heterogeneous elements, which belong to quite different divisions of animals. Some species of the sub-genus *Assilina*, and perhaps all of them, may belong to the families *Sorilina* and *Asterodiscina*, while the *Assilina nitida* of the Red Sea is assuredly Forskäl's *Nautilus Orbiculus*, that is, *Sorites Orbiculus*.

I am of opinion that all those species which are provided with visible traces of mouths or openings, as in Lamarck's genus *Lenticulina* with d'Orbigny's character of Nummulina, are to be received among the Polythalamia; but that all such species as have the form of a lens or disc, and are provided with internal spiral cells, but without a trace of such mouths, the cells being moreover separated from the external surface by thick calcareous layers, are to be considered as internal bones. These mouthless Nummulina are rather to be ranged with the Velellida of the Acalepha along with *Porpita*, where similar internally cellular coin-shaped bones exist. The considerable size of many Nummulina is also striking and foreign to Polythalamia, but agrees very well with the family of the Velellida, as also in the want of traces of the attachment of muscles, and in the want of a sipho or channel of connexion between the cells. Until better informed, therefore, I decidedly exclude the mouthless Nummulina from the Polythalamia, and retain only Lamarck's Lenticulina in the sense attached to d'Orbigny's Nummulina in a young state.

The distinctive character of the Polythalamia, when compared with their nearest relatives the *Flustra*, *Eschara*, *Cristatella*, &c., consists in the shell, and in their freedom of motion. But with this may be combined the power of attaching itself to other bodies, just as in the *Cristatella* (or *Hydra* also) which often remains long attached, and then creeps again. Those bodies which are apparently Polythalamian, but are really adherent and immoveable, belong to the *Cellepora*, *Flustra*, *Tubulipora*, and similar forms. The simplest Polythalamian form is the *Miliola* in Dujardin's sense, if there be really such self-existent animals, and they be not the young of others, or of many-celled forms most nearly related to Biloculina. And perhaps *Gromia oviformis* might be so viewed, should it not prove to be a *Difflugia* (an Infusoria). In this series I myself place provisionally, as doubtful, those numerous small globules of the sand of Rimini which have no distinct opening, or sometimes present a very minute one. The next simplest form is that of a simple straight row of cells, as in the *Nodosaria*, a jointed continued development of a simple body. *Textularina*, *Uvellina* and *Rotalina* (Lenticulina), may, as to external form, be viewed as Nodosarina developed in another manner, namely, in botryoidal or spiral forms

I have here to make a remark that appears important. In the entire vast mass of known Polythalamia, a case or vestment prevails which is either cuticular or composed of a calcareous substance, while in Infusoria either a cuticular or siliceous substance prevails, so that hitherto no calcareous-shelled Infusoria nor siliceous-shelled Polythalamia had presented themselves. Yet among the fossil microscopic organisms of the chalk marl of Sicily, we find intermingled with the Infusoria shells bodies whose forms may be ranked with Polythalamia, namely, with Nodosarina, but the shells of which are siliceous, insoluble in acids, and which to the eye have a more transparent vitreous aspect than the calcareous shells when penetrated by balsam. I have hence been induced to place these siliceous-shelled forms, until a further knowledge may be acquired of their organization, among the polygastric Infusoria near the shelled Amoeba, in a separate family, under the name of *Arcellina composita*, or *Polycystina* *. Such siliceous-shelled *Polycystina*, resembling calcareous-shelled Polythalamia, are the genera *Lithocampe*, *Cornutella* and *Haliomma*, with several species.

I wish here to draw attention to a small character hitherto unregarded, which is distinctive of true Polythalamia, and often even of their fragments. It consists in this, that in the tube or channel of connexion between the cells, the mouth of the tube which belongs to the earlier smaller cell is overgrown and surrounded by the succeeding larger cell. If the mouth of the last cell be prolonged in a beak-like form, we find in all the earlier smaller cells a distinct tube, quite similar to the hard remains of the sipho in the Nautilus; but so placed that the tube always projects forward from the smaller into the larger cell, and never backward from the larger into the smaller

* This view has been already indicated in the work "On the Infusoria as perfect organisms," 1838, p. 136.

cell. In the Nautilus, this projection of the tube of connexion is reversed, always proceeding from the larger to the smaller chamber, so that in the last, the greatest chamber, the body of the animal thus acquires a smooth foundation, upon which it can move more freely. In true Nautili also the base of the cells is concave or undulated in the forward direction, while in the Polythalamia it appears without exception to be either quite straight or convex in that direction. This character was also observed by Fichtel and Moll.

The tabular view which I have given of the Bryozoa, founded as it is on the new observations which I have made, is drawn up with special regard to a definite expression of fossil phænomena, the ancient names of d'Orbigny being mostly retained. This very diligent precursor in these studies first laid down a foundation rich in forms and systematically ordered, which may serve for all future investigations, and has given names to families which are well adapted to his purpose; but these I have been obliged to alter, yet not arbitrarily, inasmuch as from the difference of our views it became necessary to separate from each other the forms which constitute his families, according as they are either simple Polythalamia, or Polythalamia composing polyparies.

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Since the foregoing pages were drawn out, a newer work by Dr. Ehrenberg has made its appearance, embracing communications made to the Berlin Academy, on the continued researches of the author between September 1839 and August 1840, and bearing the title, "On the numerous Living Species of Animals found in the Chalk Formation*." Of this very interesting publication I had designed presenting an abstract, but having learned that a complete English edition of the work is about to appear† accompanied by the engravings, I now confine myself to a few notices immediately connected with the preceding part of this paper.

In this memoir Dr. Ehrenberg repeats his objections to the views entertained by MM. Alcide d'Orbigny and Dujardin. It has been seen, that to the Polythalamia, whose minute and often microscopic calcareous shells compose in inconceivable numbers, and in now nearly 1000 known different forms, the principal mass of chalk rocks and of many sands of the sea, M. d'Orbigny had several years since ascribed an external animal bearing the form of a Sepia, the small shell itself, which

* *Ueber noch zahlreich jetzt-lebende Thierarten der Kreidebildung*, pp. 94, with four plates, Berlin, 1840.

† In the Scientific Memoirs of Mr. R. Taylor. Its publication cannot fail to prove very acceptable to British Naturalists in general.

often resembles an Ammonite or Nautilus, being considered as the internal bone. On the other hand, at a later period, M. Dujardin denied that these animals possessed any organic structure, stating that they consisted simply of an animated slime capable of extension, encased by an indurated external shell, and associating them with the pseudopodian Amoeba of the Infusoria. Dr. Ehrenberg now further demonstrates, by figures and descriptions, their true organic structure, thus fully establishing his former positions, both as to simple Polythalamia and Polythalamia forming Polyparies. He proves that they are not internal bones, but external shells encasing a soft body, the shell being perforated, as it were, in all parts by numerous pores, from which the animal projects long filaments, capable at will of extension, retraction and bifid division, and productive of locomotion. The author further observes: M. Dujardin has, in August 1840, presented to the Paris Academy a *Mémoire sur une Classification des Infusoires en rapport avec leur organisation*, in which a new arrangement of the Infusoria is exhibited, and in this the Polythalamia are again introduced as *Rhizopodes* in association with *Amoeba* and *Actinophrys* of the Infusoria, forming a separate family. If, however, anatomical and physiological details are to be taken into account when we proceed to the systematic arrangement of different organic bodies, and we are not governed merely by the relations of external forms, M. Dujardin's arrangement cannot be deemed a happy one. He has in no case shown a polygastric structure in the Rhizopodes, and that it is not polygastric is proved anew by my investigations now communicated.

It has been shown in a former part of this paper that Dr. Ehrenberg had recognized six species of Infusoria in the chalk formation, so closely resembling living species as not to be distinguished from them, and hence he was led to give to them the same names; namely, *Eunotia Zebra*, *Fragilaria rhabdosoma*, *Fragilaria striolata ?*, *Gallionella aurichalca*, *Navicula ventricosa*, and *Synedra ulna*. He had also referred, with a mark of interrogation, the following four species of calcareous-shelled Polythalamia to the white chalk, in which they are very extensively distributed, namely, *Globigerina bulloides*, *Globigerina helicina*, *Rosalina globularis*, and *Textilaria aciculata*, all of which were stated by M. d'Orbigny to have occurred in the living state only in the Adriatic Sea and the Ocean. If any doubt had existed as to the identity of all these fossil and living species, it has been completely removed by the later researches of Dr. Ehrenberg, by which the actual number of known species found in the chalk formation and in the living state has been extended to fifty-seven, namely, of calcareous-shelled Polythalamia nine species, and of siliceous-shelled Infusoria forty-eight species. The following is a list of these species and of the localities in which they occur, both in the living and fossil state. In the fossil localities, W. C. signifies white chalk, C. M. chalk marl, and C. C. compact chalk.

### *Calcareous-shelled Polythalamia.*

| | Living. | Fossil. |
|---|---|---|
| 1. Globigerina bulloides | In the Adriatic Sea and the Ocean | W. C. Denmark. |
| 2. —— helicina | | W. C. Cattolica. |
| 3. Rosalina globularis | | W. C. Gravesend. |
| 4. Planulina (Synon. Rotalia) ocellata | North Sea, near Cuxhaven | W. C. Cattolica. |
| 5. Rotalia globulosa | —————— | W. C. in Russia, Poland, Prussia, Denmark, England, France and Sicily; and C. M. in Greece, Zante, Sicily and Oran. |
| 6. —— stigma | —————— | W. C. Cattolica. C. M. Caltasinetta. |
| 7. —— (Synon. Planulina?) turgida | —————— | W. C. England, France, Prussia, Denmark. C. M. Oran. C. C. Egypt and Arabia. |
| 8. Textilaria aciculata | ——————, and Adriatic and the Ocean | W. C. Prussia, Denmark, England and Sicily. C. M. Greece. C. C. Egypt and Arabia. |
| 9. —— globulosa | North Sea | W. C. of all European countries, from Wolsk to Ireland. C. M. Sicily, Oran, and Greece. C. C. Egypt and Arabia. |

### *Siliceous-shelled Infusoria.*

| | | |
|---|---|---|
| 10. Actinocyclus quinarius | North Sea, Tjørn Isle in the Cattegat | C. M. Caltasinetta. |
| 11. —— biternarius | North Sea, Tjörn | C. M. Oran and Caltasinetta. |
| 12. —— senarius | North Sea, Cuxhaven, Christiania, Tjörn | C. M. Oran, Caltasinetta, and Greece. |
| 13. —— septenarius | North Sea in the Cattegat | C. M. Oran, Caltasinetta, and Zante. |
| 14. —— octonarius | —————— | C. M. Oran and Caltasinetta. |
| 15. —— nonarius | N. Sea, Cattegat near Tjörn. | C. M. Oran. |
| 16. —— denarius | —————— | C. M. Oran. |
| 17. —— undenarius | ——————, and Bay of Christiania. | C. M. Oran and Zante. |
| 18. —— bisenarius | Cattegat near Tjörn | C. M. Oran. |
| 19. —— quindenarius | —————— | C. M. Oran. |
| 20. Amphitetras antediluviana | —————— | C. M. Oran and Greece. |

| | Living. | Fossil. |
|---|---|---|
| 21. Biddulphia pulchella. | Baltic, N. Sea, Mediterranean, and Ocean near Cuba . . . . . . . . . . | C. M. Greece. |
| 22. Cocconema lanceolatum . . . . . . . . . | Brackish and fresh waters. | C. M. Greece. |
| 23. Coscinodiscus Argus. | North Sea, Cuxhaven . . | C. M. Caltasinetta and Oran. |
| 24. — eccentricus . . . | ——, Tjörn in Cattegat, and Mexican Gulf, Vera Cruz. | C. M. Oran. |
| 25. — lineatus . . . . . | North Sea, Cuxhaven . . | C. M. Caltasinetta. |
| 26. —— minor . . . . . . | . | C.M. Caltasinetta, Oran, and Zante. |
| 27. —— Oculus Iridis . . | | C. M. Greece. |
| 28. —— Patina . . . . . | —— . . | C. M. Zante. |
| 29. —— radiatus . . . . . | ——,and Baltic, Wismar. . . . . | C. M. Oran, Caltasinetta, and Zante. |
| 30. Dictyocha sulcata . . | North Sea near Tjörn . . | C. M. Caltasinetta, Oran, Zante, and Greece. |
| 31. Fibula . . | N. Sea, Christiania and Tjörn, & Baltic, Wismar | C. M. Oran and Caltasinetta. |
| Pentasterias . . | N. Sea, Christiania haven. | C. M. Zante. |
| 33. —— Speculum . . | N. Sea, Cuxhaven, Christiania and Tjörn, Baltic, near Kiel | C. M. Caltasinetta, Oran, Zante, and Greece. |
| 34. Eunotia granulata . . | Brackish and fresh waters. | C. M. Greece. |
| 35. —— Zebra . . . . . . | Berlin fresh waters . . . . | C. M. Greece. |
| 36. Fragilaria rhabdosoma | Berlin, Halle, Copenhagen, Sweden . . . . | W. C. Gravesend |
| 37. —— striolata . . . . . | . . . . . . . . . . . . . . | W. C. Gravesend. |
| 38. Gallionella aurichalca | Berlin fresh waters, Leipzig, Thuringia, Franconia, Würzburg, Stuttgart, and on rocks near the Faroe Isles . . . . | W. C. Rügen. |
| 39. —— sulcata . . . . . | North Sea, Cuxhaven . | C. M. Caltasinetta, Oran, Zante, and Greece. |
| 40. Grammatophora africana . . . . . . . . . . | N. Sea, Heligoland, Tjörn | C. M. Oran. |
| 41. —— angulosa . . . . | North Sea, Tjörn . . . . | C. M. Oran. |
| 42. — oceanica | Callao in Peru, Vera Cruz in Mexico, Tjörn in Cattegat, Wismar in Baltic, and the Mediterranean. . . . . . . . . . | C. M. Oran. |
| 43. —— undulata . . . . | Among marine Confervæ near Vera Cruz. . . . . | C. M. Greece. |
| 44. Haliomma radians . . | North Sea, Cuxhaven . . | C. M. Greece. |
| 45. Navicula Didymus. . | N. Sea, Cuxhaven, Baltic, Wismar . . . . . . . . . | C. M. Caltasinetta. |
| 46. —— Entomon . . . . | N. Sea, Christiania haven. | C. M. Greece. |
| 47. —— norwegica . . . | —— | C. M. Greece. |
| 48. —— quadrifasciata . | —, and Tjörn Isle. . | C. M. Greece. |
| 49. —— ventricosa . . . . | Paris, Berlin, Saxony, Bohemia, Buchtarma in Altai, and Irtysch. | C. M. Oran. |
| 50. — viridula . | Berlin fresh waters, Weissenfels in Saxony, and Wismar in Mecklenburg. | C. M. Greece. |

| | Living. | Fossil. |
|---|---|---|
| Peridinium pyrophorum . . . . . . . . . | Baltic, near Kiel . . . . | Flints of the W. C. near Gravesend, and Flints of the plain of North Germany near Delitzsch. |
| Striatella arcuata . | Gulf of Flensburg, Breakers near Gothenburg. | C. M. Oran. |
| 53. Synedra ulna | Baltic near Wismar, Berlin fresh waters, North of Germany, Denmark, Scotland, Holland, the Ural, and perhaps Isle of France, and Mascarene Isles . . . . . . . . | C. M. Oran. |
| 54. Tessella Catena . . . | Breakers near Gothenburg and Berlin waters. | C. M. Caltasinetta. |
| 55. Triceratium Favus | North Sea, Cuxhaven . . | C. M. Greece. |
| 56. Xanthidium furcatum | Berlin | Flints of W. C. Gravesend, and Flints of Delitzsch. |
| 57. —— hirsutum . . . . | Peat waters near Berlin. | Flints of W. C. Gravesend, and Flints of Delitzsch. |

Of these fifty-seven species, thirty belong to the geologically acknowledged chalk and its Sicilian marls. The remainder from Oran, Greece (probably Egina), and Zante, though perhaps from beds not equally well defined by relative position as chalk marls, yet occurring, as they do, with numerous decided calcareous and siliceous animals of the chalk,—the geological relations of these species may also be considered as firmly established.

These new discoveries naturally lead to the conclusion that we have now no very definite boundary between secondary and tertiary tracts, and that the first dawn or eocene period of the present living organic creation, must be sought for deeper than the chalk formation; a view that appears to be confirmed by the occurrence of a living *Trochus* below the chalk, of the *Paludina vivipara* and *Cyclas cornea* in the Weald Clay, and of the *Terebratula caput serpentis* in the Upper Oolite. But as this and other interesting conclusions and views entertained by the author will be shortly laid open to the reader, with a full detail of the progressive researches made, I shall not now enter further upon the important matter contained in the volume.

## Appendix.

Closely connected with the preceding subjects is the valuable Memoir of M. Alcide d'Orbigny, which has recently appeared, entitled, "On the Foraminifers of the White Chalk of the Paris Basin*." The subjoined extracts may serve to convey a view of the general scope of the work, which, placed in parallel with that of Dr. Ehrenberg, cannot but excite a double interest in the mind of the reader.

Previously to entering upon the direct object of the Memoir, M. d'Orbigny indulges in a few general reflections.

Let us, says the author, cast a rapid glance upon what has existed and upon what still exists in nature, in reference to the Foraminifers. We have found them distributed through the oolite series, extending from the lias to the uppermost beds; but in the cretaceous system they appear still more numerously and more varied in their forms. The Neocomian beds, those of the gault and the green sand, contain many; but in proportion as we ascend from the lower to the higher strata, they increase infinitely. In these latter the rock may be said to be often composed of them, and, as an example, we may mention the largest of the Pyramids of Egypt. In the white chalk the number is nearly as great as in those seas in which they now most abound. In a word, we have found Foraminifers in the cretaceous basins of the Seine, the Loire, the Gironde, and of the whole South of France, and in Belgium.

If we pass to the tertiary tracts, a whole world is opened to us. The multiplied Foraminifers which appear in the basins of Paris, Bourdeaux, Touraine, Italy, Austria, Germany, England, and Belgium, often form there the greater part of the mass. A bed of considerable thickness in the environs of Gentilly, near Paris, is entirely composed of them, the Foraminifers being in contact with each other, scarcely united by a slight cement. In a cubical inch of the rock we have found *fifty-eight thousand*, which is equal to *three thousand millions* in a metre, and shows what myriads may exist in the Paris basin. These small bodies, which we thus see forming entire beds in the lowest portions of the tertiary series, are not less common in the higher stages; for in Austria, and

* *Mémoire sur les Foraminifères de la Craie Blanche du Basin de Paris*, in the 4th vol. part 1 of the Transactions of the Geological Society of France, 1840.

in the environs of Sienna in Italy, they often constitute one-sixth of the fossil mass; they are also extensively distributed in the Crag of England* and of Belgium. So much in reference to what has existed; let us now throw a glance upon that which exists.

We are in the present day acquainted with Foraminifers from every region of the sea, and we know that they exist in extent from the equator to the frozen portions of continents. If we judge of the important part they play by their numbers in certain quarters, it will be impossible to doubt that their remains form the greater part of the banks of sand which impede navigation, obstruct gulfs and straits, fill up ports, and form with corals those isles which are daily rising in warm regions from the bosom of the ocean.

Thus these minute shells, which, anterior to our epoch, have assisted in leveling basins of immense extent, and in forming mountains, are now still constantly changing the depth of coasts and modifying the bottom. This view of their agency in nature is doubtless sufficient to prove the importance which attaches to their study.

We will add, that the comparative study of the fossil Foraminifers of all beds has proved to us a fact important to geology, namely, that each bed has its characteristic species, which serve to distinguish it, let the circumstances be what they may; and as these minute shells are infinitely more common than those of Mollusks, the knowledge to be derived from them is so much the more certain, and becomes extremely interesting.

Another fact no less curious has been demonstrated to us by the study of living species from every region of the globe†. Many genera are peculiar to the hottest zones of continents, while others, on the contrary, are found only in temperate or cold regions. Hence the geographical distribution of living genera and species offers to us a means of comparison of the highest importance with a view to the determination of the temperature of the waters in which fossil species lived,

* Mr. Lyell has communicated to us the species which he discovered in the Crag.

† We are acquainted at present with nearly *fifteen hundred* living and fossil species of Foraminifers; and how many important facts may be derived from the study of these small bodies may be seen in three works which we are now publishing: 1. the Fauna of the Antilles, printed in *l'Histoire politique, physique, et naturelle de l'Ile de Cuba*, by M. de la Sagra; 2. that of the Canaries, published in *l'Histoire Naturelle* of those islands, by MM. Webb and Berthelot; 3. the Fauna of the southern extremity of America, forming a part of our *Voyage dans l'Amérique Méridionale*.

and may lead to very satisfactory results in geology, if we may judge by the fruits of our observations in this respect.

We could have desired to establish some general facts of much greater extent, founded on new observations recently made by us on the class of the Foraminifers; but the present occasion not admitting such an extension, let us pass to the Foraminifers of the white chalk of the Paris basin.

The geological position of the white chalk of Paris is so well known that we have not thought it necessary to speak of it; yet, if we seek to determine its position relatively to the other cretaceous beds by means of the Foraminifers it contains, compared with living species, the *facies* of the genera and species proves to us, that the chalk of Maestricht, of Fauquemont (Belgium), of Tours, of Chavagne, and of Vendome, is above it; while, on the contrary, all the other beds are below it; thus in the chalk of Maestricht and the upper beds of the basins of the Loire, we recognize only genera still existing, or at least occurring in tertiary tracts, while the white chalk of the Paris basin already exhibits to us different genera, such as *Flabellina*, *Verneuilina*, and *Gaudryina*, and a great number of species quite distinct.

It would therefore be easy to establish, by means of the Foraminifers alone, the relative antiquity of the cretaceous beds; but we must previously make two geographical sections quite independent of each other, founded on the zoological forms; the first comprising the entire basin of the Seine, of the Loire, of Belgium, and of England, in which we find a striking analogy between the species found in all the beds, from the lowest to the highest, with a regular passage from one to the other; the second, comprising the West and South of France, in which the species of Foraminifers have not only no analogy with those of the other section, but in which, moreover, almost all the genera are different. If we seek an example of this fact, we shall find it on comparing the green sand of the environs of Mans with that of the mouth of the Charente. The first, which in fact contains species approximating to those of the white chalk of Paris, contains already several species analogous to those which have lived up to that bed; while the second, with perfectly distinct species, presents to us genera different from all that we know in the cretaceous beds of the North of France and of Belgium.

The Foraminifers are sufficient to establish the following descending order of superposition in the cretaceous beds: —

| *Group of the North of France and of Belgium.* | *Group of the West and South of France.* |
|---|---|
| Upper chalk of Maestricht and Fauquemont (Belgium). | |
| Coral chalk of Valognes and Nehou. | |
| Coral chalk of the basin of the Loire, at Vendome (Loir and Cher), at Chavagne (Maine and Loire), at Tours (Indre and Loire). | |
| White chalk of Ciply (Belgium). | |
| White chalk of Paris, of the departments of Yonne and Aube, and of England. | |
| | Nummulite chalk of Royan (Charente Inférieure), of Saint Martory (Haute Garonne), of Saint Gaudens, &c. |
| | Coral chalk of Saintes (Charente Inférieure). |
| Chalk marl of the Loire, with *Gryphæa columba*. | Ammonite chalk of Martrous, near Rochefort (with *Gryphæa columba*). |
| | Caprine chalk of the Isle of Aix, of the Corbières (Aude). |
| Green sand of Mans (Sarthe). | Green sand of Fouras, of the Isle of Aix, and Corbières. |
| Gault of the environs of Troyes (Aube). | |
| Neocomian tract of Aube. | |

To establish zoologically what we have advanced, let us pass in review the succession of the genera, and endeavour to convey an idea of the modifications which have taken place in the Foraminifers of the cretaceous system, in the ascending order of the beds.

At the epoch of the Neocomian formation we have hitherto found only the genus *Textularia*.

The green sand presents, as we have said, two series of genera nearly distinct. That of the mouth of the Charente contains the genera *Dentalina*, *Cristellaria*, *Lituola*, *Alveolina*, *Chrysalidina*, and *Cuneolina*; that of Mans, the genera *Dentalina*, *Citharina*, *Frondicularia*, *Flabellina*, *Cristellaria*, *Bulimina*, and *Guttulina*. Hence we see, that, with the exception of two genera common to both localities, all the rest are different in each of them.

If we follow our examination of the succession of genera in the cretaceous groups of the South and the North, we shall find—

1. That in the South the same genera of the green sand are reproduced in the Caprine chalk. By degrees they prevail at length in the upper beds, and are reduced to the *Cristellaria* alone in the environs of Saintes; but near the mouth of the Gironde (at Royan) they are accompanied by the genera *Nummulina* and *Guttulina*, as well as on the whole line of the foot of the Pyrenees, at Saint Martory, at Saint Gaudens, extending into the department of Aude; thus pre-

senting a zone well characterized by the abundance of Nummulina, of which we have not found the analogue in the cretaceous beds of the North of France.

2. That in the North the succession is far from taking place in the same manner; and that the Foraminifers, in much greater numbers, present a larger suite in superposition, with facts not less curious. The genus *Citharina*, which constitutes the greatest portion of the species in the oolite formation, ceases with the green sand of Mans, being found no further in the cretaceous beds. In the chalk marl of the banks of the Loire we meet for the first time with the genus *Lituola* with the *Dentalina*; but all at once, in the white chalk, we observe a great number of species, among which, with all the genera and even some analogous species of the green sand of Mans, there appear for the first time on the globe the genera *Nodosaria*, *Marginulina*, *Valvulina*, *Rotalina*, *Rosalina*, *Truncatulina*, *Uvigerina*, *Verneuilina*, *Gaudryina*, *Globigerina*, *Pyrulina*, *Sagrina*, *Flabellina*, and *Frondicularia*. These genera contain a considerable number of species; but with the white chalk the genus *Flabellina* ceases, which had continued hitherto from the green sand, and the genera *Verneuilina* and *Gaudryina*, which first appear in the white chalk, also terminate with it; while in its interior the Frondicularia abound, as well as species whose cells form a pile on a single line.

The white chalk of Ciply, although contemporaneous with that of the Paris basin, since it also contains Flabellina, does not present the same species, and may perhaps be a little higher in the series, but we have not as yet sufficient data to enable us to affirm this fact.

In the beds which we consider higher in the series than the white chalk of Paris, namely, in the coral chalk of Tours, of Chavagne, and of Vendome, we meet for the first time with the genera *Polystomella*, *Polymorphina* and *Globulina*, yet accompanied with the same genera as those of the white chalk, with the exception of those whose discontinuance we have noticed: again, in the upper chalk of Maestricht and Fauquemont we have, with the three genera just mentioned, also the genera *Nonionina*, *Faujasina*, and *Heterostegina*. All are found living at present, or at least occurring in tertiary tracts; but we arrive at the last beds of the cretaceous group without having seen a single species of the *Miliola* of Lamarck (our order of Agathistègues), which, as we ascertained in 1825, only commences with the tertiary beds, and may be considered as the most certain sign of a change of formation.

This rapid survey shows that in ascending from the lower to the higher beds of the cretaceous group, the genera and species of Foraminifers progressively increase, and that the forms, at first very simple, analogous to those of oolitic tracts, afterwards more complicated and specially appropriate to the lower beds of the cretaceous system, have at last been replaced in the upper parts by forms still more varied, the whole recurring in tertiary tracts, and even in the living state; facts which it has appeared to us important to establish in the history of Palæontology.

M. A. d'Orbigny then proceeds to describe the species of Foraminifers found by him in the white chalk of the Paris basin. The following is a list of them, together with their localities:—

| | | Localities. |
|---|---|---|
| 1. | Nodosaria limbata | Meudon: very rare. |
| 2. | Dentalina aculeata | Common at Sens: more rare at Meudon and in England. |
| 3. | ——— communis | Meudon: rare. Its analogue is found fossil in the Subapennine tracts of Italy and Austria, and living in the Adriatic. |
| 4. | ——— gracilis | At Sens and in England. |
| 5. | ——— nodosa | Common at Sens, more rare at Meudon and St. Germain. |
| 6. | ——— Lorneiana | Only in the environs of Sens. |
| 7. | ——— sulcata | Very common at Sens, Meudon, and St. Germain, and in the chalk of England. Found also in the green sand of the environs of Mans (Sarthe). |
| 8. | ——— multicostata | Sens, St. Germain: rare. Also at Maestricht rarely. |
| 9. | Marginulina trilobata | Common at Sens, very rare at Meudon, St. Germain, and in England: found only in the young state. |
| 10. | ——— compressa | Meudon: very rare. Occurs also in the green sand in the environs of Mans. |
| 11. | ——— elongata | Common near Sens, very rare at Meudon and St. Germain. Occurs also in the chalk of Ciply. |
| 12. | ——— gradata | Only near Sens. |
| 13. | ——— raricosta | Meudon: very rare. |
| 14. | Frondicularia radiata | Meudon and St. Germain: very rare. |
| 15. | ——— elegans | Meudon and Sens: very rare. |
| 16. | ——— Verneuiliana | Common at Sens, on the banks of the Yonne; rare at St. Germain and Meudon. |
| 17. | ——— Archiaciana | Meudon and Sens: rare. |
| 18. | ——— ornata | Found only once at Meudon. |
| 19. | ——— tricarinata | Environs of Sens: seems to be rare. |
| 20. | ——— angulosa | Meudon: very rare. |
| 21. | Flabellina rugosa | Sens and Meudon: common |
| 22. | ——— Baudouiniana | Only at Sens. |
| 23. | ——— pulchra | Meudon: very rare. |
| 24. | Cristellaria rotulata | Very common in the white chalk of Meudon, St. Germain, Sens, and in England. Occurs also in the green sand near Mans. |
| | ——— navicula | Sens and Meudon: rare. |
| | ——— triangularis | Sens: very rare. |
| | ——— recta | Meudon and St. Germain: rather rar |

| | Localities. |
|---|---|
| 28. Cristellaria Gaudryana | Only at St Germain: rare. |
| 29. Lituola nautiloidea | Very common at Sens in the complete state, at St. Germain only young, and adult very rarely at Meudon. Occurs also in the chalk of England. |
| 30. Rotalina Voltziana | Very common at Meudon, St. Germain, and in England. |
| 31. ——— Micheliniana | Common at St. Germain, Meudon, and in England; rare at Sens. |
| 32. ——— umbilicata | Common at Meudon and St. Germain; rare at Sens and in England; common also in the tertiary tracts of Austria. Its analogue is found living at Rimini in the Adriatic, there being no difference between the fossil and living species. |
| 33. ——— crassa | St. Germain, Meudon, and England: rather rare. |
| 34. ——— Cordieriana | St. Germain, England, and upper chalk of Maestricht. |
| 35. Globigerina cretacea | St. Germain and England. |
| 36. ——— elevata | Common near Sens; rare in England. |
| 37. Truncatulina Beaumontiana | Meudon and England: rare. |
| 38. Rosalina Lorneiana | Common at St. Germain and Meudon; rare at Sens and in England. |
| 39. ——— Clementiana | Rare at St. Germain, more common in England. |
| 40. Valvulina gibbosa | St. Germain: rare. |
| 41. Verneuilina tricarinata | St. Germain and Sens: rather rare. |
| 42. Bulimina obtusa | Very common at Meudon; rare at St. Germain and in England. |
| 43. ——— obliqua | Very common at Meudon, St. Germain, Sens, and in England. |
| 44. ——— variabilis | Very common at Sens; rare at Meudon, St. Germain, and in England. |
| 45. ——— brevis | Very common at Meudon, St. Germain, and Sens. |
| 46. ——— Murchisoniana | St. Germain and England: rare. |
| 47. Uvigerina tricarinata | Sens: very rare. |
| 48. Pyrulina acuminata | Very rare at Sens and St. Germain; very common at Meudon. |
| 49. Gaudryina rugosa | Meudon, St. Germain, and Sens: rather common. |
| 50. ——— pupoides | Rather common at Meudon, Sens, St. Germain, and in England. |
| 51. Textularia trochus | Only at Meudon. |
| 52. ——— turris | Sens, Meudon, St. Germain, and England, without being common. |
| 53. ——— Baudouiniana | St. Germain and Meudon: rare. |
| 54. Sagrina rugosa | St. Germain and Meudon. |

From the preceding list it appears, that of the fifty-four species found in the white chalk of the Paris basin, *thirty-eight* occur at Meudon, *thirty-three* at Saint Germain, and *twenty-eight* at Sens: of these numbers, *nine* are peculiar to Meudon, *two* to Saint Germain, and *six* to Sens, while all the others are simultaneously common to two or three localities, thus proving the perfect identity of the beds. It will be seen also, that of these fifty-four species, *twenty-two* are common to the white chalk of England also.

Of the fifty-four species, *seven* occur also in lower or higher beds: thus in the green sand of Mans are found three species, *Dentalina sulcata*, *Marginulina compressa*, and *Cristellaria rotulata*; in the coral chalk of Tours, which is higher in position than the white chalk, two species, *Bulimina obtusa* and *Textularia turris*; and in the chalk of Maestricht, being the highest in position, two species, *Dentalina multicostata* and *Rotalina Cordieriana*. We also find two species, the analogues of which occur both fossil in the tertiary tracts of Austria and Italy, and in the living state in the Adriatic, namely, *Dentalina communis* and *Rotalina umbilicata*. With these exceptions there still remain *forty-seven* species peculiar to the white chalk, showing clearly that it forms a bed distinct from all the rest of the cretaceous system, belonging to a small local fauna well-defined.

On comparing the above genera given by M. d'Orbigny with those named by Dr. Ehrenberg in his tabular view of the Bryozoa, inserted in the early part of this paper, it will be seen that Nodosaria, Dentalina, Marginulina, Frondicularia are included in the family of the Nodosarina of the latter author; Cristellaria, Rotalina, Truncatulina, included in his family of the Rotalina; Globigerina, Rosalina, Valvulina, Bulimina, Uvigerina, Pyrulina, in his family of the Uvellina; and Textularia in his family of the Textularina. The *Lituola nautiloidea* of Lamarck and d'Orbigny is the *Coscinospira nautiloides* of Ehrenberg, included in the Fabularina family of the latter.

If we now, observes M. d'Orbigny, compare the fauna of the Foraminifers of the white chalk with those of different seas, with a view of determining the analogy of composition, and of obtaining data respecting the temperature of that basin at the time when these species lived, we shall find this analogy more striking in the Adriatic Sea than anywhere else. There only, the same as in the chalk, are found in abundance Nodosaria, Dentalina, Marginulina, Frondicularia; there only occur a considerable number of species of Bulimina. This sea alone in the present day contains living Frondicularia; of Frondicularia so varied in the white chalk; and, to complete the approximation, it exhibits to us the only two living species, the analogues of which are found in the fossil state in the white chalk, namely, *Dentalina communis* and *Rotalina umbilicata*. This analogy of zoological forms would lead us to believe, 1st, that the basin in which is deposited the white chalk of Paris was subject to a warm temperature; 2nd, that it was circumscribed, protected from waves and from every violent current proceeding from a distance, since the bodies are deposited there without having experienced the slightest wearing previous to their becoming fossil; 3rd and lastly, that it extended to the whole of the white chalk of England.

## *Concluding Remarks.*

The preceding extracts from the labours of Dr. Ehrenberg and M. A. d'Orbigny show that microscopic Polythalamia are found in all calcareous formations from the lias upward; but in England they have been lately discovered in still deeper strata. Mr. Tennant was, I understand, the first to announce their discovery in 1839 in the mountain limestone of England. In 1840 they were also met with in the Kendal limestone, from which Mr. Lonsdale has prepared thin slices mounted on glass, which appear transparent under a strong light, exhibiting the crowded state of the microscopic Polythalamia in great perfection. Mr. Bowerbank also has been led to turn his attention to this subject by examining the siliceous bodies of the chalk, green sand, and oolites*.

I had written thus far, when an interesting article by the Rev. Dr. Buckland, in reference to the researches of Dr. Ehrenberg up to 1839, met my eye, entitled, "On the agency of Animalcules in the formation of Limestone†," which notices in particular the researches of MM. Tennant and Darker on this subject in the Derbyshire limestone and the Stonesfield slate, as well as the labours of Mr. Bowerbank, referred to above, and conveying judicious reflections. Dr. Buckland justly remarks, that in the application of the microscope from the living to the fossil Infusoria and Foraminifers we are commencing a new and important era in Palæontology. A very interesting branch of the inquiry will be to ascertain whether these microscopic bodies retain throughout a distinctive character in the several formations into whose composition they enter. In the unbounded field of nature presented to the consideration of the Microscopical Society of London lately established, no subject appears more worthy of their attention than an examination of the microscopic organic constituents of all the older limestone formations of the British Isles, as well as of other countries; and it is much to be desired that this attention may not be wanting, although the concurrence of many labourers may be required to reap a harvest of great promise, yet of indefinite extent.

* Proceedings of the Geological Society, March 11, 1840.

† Edinburgh New Philosophical Journal, January to April, 1841.

## XLI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from p. 177.]

### 2. *In the Cryptogams.*

M. Unger * has published an interesting treatise on the structure and functions of the organs of fructification of *Riccia glauca*; he first notices the anatomical structure of the foliaceous substance, and shows that the want of stomata is made up for by the loose conjunction of the cells on the surface (this formation of the upper cells is particularly evident in *Riccia crystallina*, Meyen). Then follows the description of the observations of the development of both kinds of organs of fertilization; but the first stages of their appearance have not been observed, because, as M. Unger says, the proper time was already passed. The sporiferous organs (called Pistils, Meyen) always appear in a large air-cell, and are said to arise by the conjunction of a group of parenchymatous cells, which during their increase and enlargement form a cavity in their centre, which exhibited only one opening outwards. This bottle-shaped organ lengthens its neck until it reaches the surface of the thallus, and now the enlargement of the lower part of the sporangium commences (which is formed by the ovarium of the pistil). The contents of the sporangium appeared first as a homogeneous, colourless, fluid matter, and as a granular substance; this collected gradually in the middle, and then appeared as contents of that cellular tissue out of which the primitive cells of the spores are formed.

It appeared also as a general fact, that at the periphery one layer of cells produces no spores in their interiors (here also a similar case of cells as in the formation of pollen in the anthers of the Phanerogams, M.). In the structure of the spores, M. Unger confirms the statement that the outer brown skin is not composed of cells, but is only a reticulate deposition of cellular matter.

The other organs of generation, the so-called anthers, were not found in such great numbers; they were dispersed, and occurred singly. They are said to consist in a regular separation of the parenchymatous cells of the thallus: here also the contents form a granular substance, which appears in the

* Anatomische Untersuchung der Fortpflangungstheile von *Riccia glauca*, Linnaea, p. 1 to 17.

form of cells of extraordinary smallness, as in the anthers of the Mosses.

M. Unger draws the following results from his observations:—

1st. That the original development in *Riccia glauca* of both those organs is simultaneous, and that they therefore seem to have a nearer relation to each other. 2nd. That both organs represent cavities formed from cellular tissue, which are provided with lengthened openings, and that therefore a *material* communication of their contents is not improbable. 3rd. That the function of the neck-shaped passage of the sporangium is confined to the earliest period of its development, etc., and that, finally, the transference of the contents of the anthers to the sporangia is a cause of the formation of spores.

M. Mohl has published some new and very fruitful observations on the development of the speres of the *Jungermanniæ*; he chose for his experiments *Anthoceros lævis*, in which the primitive spore contains but few globules, which renders the progress of the formation easier to follow. The youngest primitive cells which M. Mohl found appeared as transparent, partly spherical cells, in which one could observe a cell-nucleus, as in the phanerogamic plants. Afterwards a gummy substance was formed round the disc of the nucleus, and this finally covers more than half of it; the green granules appear more plainly, and the mass divides into two parts. At the edges this green mass passes into a colourless, gummy, but fine granular substance, which forms larger or smaller meshes; M. Mohl compares this substance very correctly to the bladders of foam. After this divided green mass has gradually increased, these two halves divide again into two parts, and thus four nuclei, lying close to each other, are formed (grain-cells, M. Mohl calls them), in which change the true cell-nucleus takes no part, but lies separated by itself. At the same time the side of the primitive cells thickens, and adopts the form of the well-known mucous substance, and now follows the division of its cavity. Lines are formed on the inner surface of the primitive cell, which are correctly represented as projecting edges, which afterwards grow towards the middle of the cell between two masses of granules, and join together. After this division, nothing is visible of the nucleus. A short time after the division of the primitive cell, the formation of the spore-cuticle commences, namely, in each of the four compartments, and the granular masses lie in the interior of each of these new-formed cells, and are fastened by threads of gum to the circumference of the spore-cuticle. The remaining observations agree with the results of former ones, and are already known. A series of excellent delineations accompanies the paper. M. Mohl then proceeds to compare his view of the formation of the spores with that of M. de Mirbel. According to the view of the latter, the formation of the spores depends principally on the primitive cell, for the contents are divided mechanically into four parts by the projecting partitions. According to M. Mohl's earlier idea, the development of four spores in a primitive cell depends solely on the organic change of the contents; but his late observations on *Anthoceros* appear to support an intermediate view, for the development of the partitions is produced by that of the contents of the primitive cell. Finally, M. Mohl endeavours to show that no great importance must be attributed to the circumstance of the four divisions of the primitive cell communicating with each other or not, and that we must not consider this process as a characteristic distinction between the primitive cells of the spores and those of the pollen-grains. In *Anthoceros lævis* M. Mohl could not observe this division; in *Anth. punctatus* he thinks he saw it, and also in *Jungermannia epiphylla*, but not in *Riccia glauca*. I have published the results of some new observations on the formation of the spores of *Aneura pinguis*, which may be regarded as a sequel to those spoken of in the third volume of my 'Physiology' (Berlin, 1839). In the first stages of the fruit there were found only very tender long cells, which were imbedded in a gummy matter; these cells enlarged, and at length lay close to each other, and at a later period it was seen that from these at first perfectly homogeneous cells, not only the elaters, but also the spores, were formed; some become elaters, and others undergo a series of changes, until at length the spores are produced. The cell out of whose division four spores are always produced, I have called primitive spore (Mutter-spore), and of these primitive spores, three, four, or even five are formed in each tubular cell; whilst those neighbouring cells which afterwards produce the formation-tunic retain their granular contents unchanged, until the spores are perfectly developed. As soon as the primitive spores are formed, a gelatinous membrane appears at their periphery; this has been called primitive cell; I designate it as formation-tunic or skin (Bildungsbrülle). Some time afterwards I observed two, three, or even four primitive spores enclosed in their formation-tunics, connected with each other in a row, and occupying the place of the original tubular cell, but from want of material I could not determine whether these formation-tunics were derived from the single members into which the primitive tubular cell may by transverse division be dissolved, or whether, as appeared in some cases, the primitive spores with their coverings make their appearance within the tubular cell, whose sides are then absorbed. The drawings accompanying the article will make this clearer. Sometimes only a part of the tube is changed into primitive spores, etc., and the rest remains undeveloped in one of the primitive cells of its own tube, by which the appearance of stalks sometimes seen on the single primitive cells is explained: as the primitive cell is absorbed, they also disappear. In several fruits of *Aneura pinguis* I was able to observe, at the time when the division of the primitive spore by the contraction of the sides takes place, the existence of a second formation-tunic (it was not the inner surface of the outer one), but neither of them took any part in the division of the spore, as is seen in the delineations. However, last winter I observed that they did take part in the division of the spores in individuals of *Aneura pinguis* (the large turf variety), inasmuch as the gelatinous membrane entered into the contractions of the membranes of the primitive spores, but was never completely separated, as is the case with *Pellia epiphylla*. Whether in *Aneura* the formation of nuclei precedes the division of the primitive spore into four others cannot be observed, inasmuch as these cells are filled with a green matter which prevents our seeing the internal process: I have also not been able to observe it in *Pellia epiphylla, Sphagnum palustre*, etc. Directly after the production of the spore by division, each one exhibited a peculiar formation-tunic, just the same as the pollen-grains; at a later period both the common formation-coverings, as also the special ones, are absorbed, and then the spores lie singly between the tubular cells, which at this time change into elaters *.

In the past year M. Klotzsch has described a series of Fungi, and accompanied his descriptions with excellent delineations†; in this work (to plate 473) we have a division of the *Hymenomycetæ* according to the new observations on the structure of the hymenium. The *Hymenomycetæ* may be divided into two groups: *Exosporæ*, with free stalked spores, and *Entosporæ*, with enclosed unstalked spores. The first division is resolved into the *Tetrasporidei*, where the straight

* The plant used for the above observations was the so-called *Trichostylium arenarium*; but I have convinced myself that Corda's genus *Trichostylium* is the same as *Aneura*, for the small column which occurs in *Trichostylium* also belongs to *Aneura*.

† Aeb. Dietrichs Florades Königreichs Preussen, vii., Berlin, 1839, tab. 457-476.

spores are developed in fours, and only by way of exception in twos, threes and sixes; and the *Monosporidei*, where the long bent spores are always developed singly on spike-formed supports: the genus *Enidia* belongs to this group.

Interesting is the information that many tuberose Fungi, as, for instance, the genera *Gauteria*, Vallad., *Hydnangium*, Wallr., and *Hymenangium*, Kl. (*Tuber album*, Bull.), belong to the true *Hymenomycetæ*, and indeed to the *Exosporæ*; in these Fungi the hymenium covers the surface of the cavities which are found in their fleshy substance.

In describing the *Moschella esculenta*, M. Klotzsch calls the paraphyses of authors anthers; and of *Sphærosoma* (*fuscescens*) he says, that the anthers, when they appear in the Octosporidei, always project above the surface of the tube-skin (Schlauchkant), and therefore he does not reckon the paraphyses of *Sphærosoma fuscescens* (plate 464) as anthers, inasmuch as they do not project above the surface. I must here call to mind Carus's notice of a difference of gender in *Pyronema Marianum*, where the yellow colour of the whole surface of the fungus is derived from the contents of the paraphysæ, or anther-like organs.

Dr. Redmann Coxe has sent to the Linnæan Society his 'Observations on some Fungi or Agarici*,' which by deliquescence forms an inky fluid, drying into a bistre-coloured mass, capable of being used as a water-colour for drawings, and of a very indestructible nature, by means of common agencies.

M. Morren † has communicated some observations on the structure and colouring of *Agaricus epixylon*, DeC. As regards the colour, he says that the colouring substance is formed quite differently in Fungi to what it is in other plants; in the above-mentioned *Agaricus* the blue colour of the pileus is produced by a few spherical globules contained in the tubes of the tissue. These globules are not changed by iodine. In the deeper-seated layers of cells the globules are less numerous, and in the tubes of the white flesh of the mushroom they are not to be found. The tissue of the above-mentioned fungus is said to consist solely of anastomosing vessels, which have sometimes nodular swellings, and are generally forked, but seldom triramified: these vessels are long, cylindrical, anastomosing tubes; they contain a fluid and globules, and have here and there partitions. The tubes are of great length, and form a woolly tissue, and cannot there-

* Annals of Natural History, June 1839, p. 258.

† Notice sur l'histologie de l'Agaricus epixylon. Bulletin de l'Académie Royale de Bruxelles, vi, No. 1.

fore be reckoned to the parenchym; they appear most similar to the lacteous vessels, and form a true vascular tissue. One might place this fungous tissue together with the lacteous vessels (to which M. Morren has given the name of Cinenchyme, κινησις); but as it differs from these in the want of the circulation, as well as in its woolly interwoven appearance, M. Morren has called it Dædalenchyme.

I cannot agree with M. Morren's views of the nature of the fungous tissue: I consider it as cellular tissue, and have already described it (Phytotomy, 30, p. 138) as a peculiar form of irregular cellular tissue under the name of Felt-tissue. The cells are often long and branched, but the partitions which change these tubes into cells cannot be overlooked. Several kinds of regular cellular tissue are found in Fungi. M. Morren observed a spontaneous motion in the spores of *Agaricus epixylon* as soon as put into water. [This motion has however been already observed, and has been seen even in dry fungus-spores.—*Meyen.*]

In the foregoing Reports we have often made mention of a fungus formation which of late years has attracted so much attention, viz. Fermentation fungus: I have often attempted to prove that it is improbable that this fungus should be the cause of fermentation, although always found in fermenting liquids; but the fact of their being plants appears, to me at least, to have been fully proved by the observations on their increase and growth. However, M. Liebig*, in a treatise on Fermentation, etc., has declared those statements of the vegetable nature of the fermentation formations to be a delusion; and considers that gluten and albumen, which, during the fermentation of beer and vegetable saps, are separated in a changed state, appear in the form of globules, which swim about either singly or several together, and that these globules have been mistaken by natural philosophers for Infusoriæ and Fungi. Indeed, says Liebig, the idea that they are animals or plants disproves itself, for in pure sugar-water the seeds of the plants disappear during fermentation; the fermentation takes place without the appearance of a development or reproduction of the seeds, plants or animals which have been regarded by philosophers as the cause of the chemical process.

I am not aware upon whose observations Liebig grounds these latter statements; probably they are his own, which, however, must evidently give way to the more correct ones of his predecessors.

* Uber Gährung Fäulniss und Verwesung und ihre Ursachen. Annalen der Pharmacie, 1839.

M. Balsamo Crivelli has published some new observations on the origin and development of *Botrytis Bassiana**, and of another parasitic kind of mould, a subject which was treated of in our Report for 1836 (Berlin, 1837, p. 107). M. Crivelli found that the vesicles of which the fat consists can pass into *Botrytis*, and he convinced himself that the "corps vésiculaires" of M. Audouin were nothing more than swimming fat globules. A cut was made in the side of a fat caterpillar, and the exuding sap exhibited the supposed vesicular bodies of Audouin, which were certainly nothing but globules of fat. The following morning the interior of the caterpillar was covered with *Ascophora mucedo*. The spores of *Ascophora* were introduced into the bodies of four chrysalises, and three days afterwards the grains of fat could be seen full of vegetating filaments. Finally, M. Crivelli retains his idea, that in the fat of the silkworm there can take place such changes as to render its component parts capable of spontaneously producing mould, which property the fat may then impart to healthy caterpillars.

M. Turpin† explains why butter which has been melted and allowed to cool becomes so seldom mouldy: the treatise is of great length, for he mentions a number of cases in which mouldiness was observed without being able to assume that the seeds proceeded from the air; also the microscopical structure of butter, both before and after its fusion, is most circumstantially described. The following points may be mentioned: the mould which, in common butter, is produced from the lacteous globules contained therein cannot be produced in melted butter, because these globules are then covered with the oil of butter. M. Turpin remarks, that the explanation of the production of mould on the surface of organic matter by a continual 'rain' of seeds of all kinds of mould must at present appear ridiculous; but that the explanation by 'generatio spontanea' must be very limited, and also more clearly defined. Nature produces the mould in two ways: either directly out of the globuline of organic matter when this has ceased to be under the influence of vitality, or from spores which it produces itself.

M. Hanover‡ has made 'Observations on a Contagious Conferva Formation on the Water Salamanders;' he saw the

* Communicated by Freiherr von Cesati in the Linnæa of 1839, p. 118-123.

† Sur le singulier caractère physique et microscopique que prend le beurre, etc Comptes Rendus du 9 Dec., p. 748-762.

‡ Müller's Archiv für Anatomie, 1839, Heft 5.

production of Conferva on an anatomized specimen of 'Triton punctatus' while under water. Similar formations were observed on a dead salamander, a dead fly, and on the surface of several wounds which were made on living salamanders; sometimes the formation took place without there being any injury, *e. g.* on the toes, by which the toes attacked were destroyed.

[The plant observed by M. Hanover is the *Achlya prolifera*, Nees v. Esenbeck; and if, as M. H. says, M. Carus's figures do not agree with his plants, perhaps those will which I gave to Göthe's 'Mittheilunger aus der Pflangenwelt' (S. Nova Acta Acad. C. L. C. tom. xv. pt. ii. p. 374, etc. tab. i. xxix.), and in other places. I have seen this fungus under similar circumstances on flies, spiders, earthworms, Planariæ, dead frogs, and even on putrifying *Viscum album*; and have shown, in Wiegmann's Archiv, etc., 1835, ii. p. 354, that the little fungus which is formed about autumn on the body of the common house-fly has spores which germinate, and in water grow out into *Achlya prolifera*. The seed-formation and the germination of the *Achlya* spores were observed and represented in the above plate, as also in my 'Physiology,' iii. tab. x. fig. 18 and 19.—*Meyen.*]

M. Hanover inoculated the above plant on the back of a healthy animal, and saw that the formation of Conferva had commenced at the end of sixteen hours, but fell off with the epidermis. The experiments were frequently repeated, but it was always found that the development of the plant was not injurious to the life of the animal. Moreover, M. H. remarked that the inoculation succeeded better with unripe than with ripe Confervæ.

As I have occupied myself very considerably with this subject, I may be allowed to mention my observations without prejudice.

The inoculation effected by M. Hanover is nothing more than a common propagation; the ripe plants afforded seeds, out of which other plants were produced, and the so-called unripe Confervæ increased their single threads, as is done by the order *Achlya* among the water Fungi, and by *Vaucheria* among the Confervæ. The growth of the fungous threads from the mucous surface of the *Tritoniæ* cannot be injurious; they grow like mould from dispersed spores. But just as the lower moulds are produced not only from spores, but also in a manner as yet unknown to us, so it is the case with *Achlya prolifera* and the *Isariæ*; they are moulds, which are developed as a product of a sickly state of the animal; the disease itself is deep-seated, for the animals generally die of it. When this mould is once formed, it propagates itself by spores. Such diseases are probably not rare, and only of importance to the animals. I have lately observed a disease of the Vibrio, out of whose body a very beautiful but small microscopical mould was developed, from which they died; the animals twist themselves in all directions, and try to get rid of the diseased product, but in vain; at length they become quiet and die.

[To be continued.]

## XLII.—*On the* Urari, *the Arrow Poison of the Indians of Guiana; with a description of the Plant from which it is extracted.* By ROBERT H. SCHOMBURGK, Esq.*.

MORE than two centuries have elapsed since the curiosity of Europe was raised to become acquainted with the plant from the juice of which the Indians make their celebrated Urari poison; and as the preparation has been enveloped in great mystery, all the attempts hitherto made have only added considerably to the wish of the learned in Europe to be able to sift the true from the fabulous accounts.

Raleigh appears to have been the first who heard of this substance, with which the Aborigines poisoned their arrows for war and the chase; and Father Gumilla observes, that "its principal ingredient was furnished by a subterraneous plant, a tuberose root, which never puts forth leaves, and which is called the *root* by way of eminence, *raiz de si misma*; that the pernicious exhalations which arise from the pots cause the old women to perish who are chosen to watch over this operation; finally, that these vegetable juices never are considered as sufficiently concentrated till a few drops produce at a distance a repulsive action on the blood. An Indian wounds himself slightly, and a dart dipped in the liquid Curare is held near the wound; if it makes the blood return to the vessels without having been brought into contact with them, the poison is judged to be sufficiently concentrated." Not less eccentric are the accounts which we receive from Hartzinck†, who was informed that, in order to try whether the poison be good, a poisoned arrow is shot into a young tree; if the tree shed its leaves in the course of three days the poison is considered strong enough. He observes further, that in the last rebellion of the Negroes in Berbice, a woman

* Communicated by the Author.

† Beschryving van Guiana, door J. J. Hartzinck, etc. Amsterdam, 1770, vol. i. p. 13.

who carried her child on her back was shot with a poisoned arrow, and though the child was not wounded, it began to swell, and died a short time after.

At the commencement of the 19th century Baron de Humboldt gave an authentic account of the preparation of that poison and its effects; but later travellers, not contented with the simple method of its preparation, covered it anew with the veil of mystery, and it was thought that "the vegetable extract was merely the medium through which the poison is conveyed—the common Wooraly owing its poisonous quality to the infusion of the large ants, called Muneery, and the stronger kind from the fangs of venomous reptiles, particularly the Coony Coochy, which is the most venomous of all known snakes*." The author of 'Wanderings in South America,' Mr. Charles Waterton, gives a similar account of its preparation. He says, "a day or two before the Macoushi Indian prepares his poison, he goes into the forest in quest of the ingredients. A vine grows in these wilds, which is called Wourali. It is from this that the poison takes its name, and it is the principal ingredient. When he has procured enough of this, he digs up a root of a very bitter taste, ties them together, and then looks about for two kinds of bulbous plants, which contain a green and gelatinous juice. He fills a little quake which he carries on his back with the stalks of this, and lastly ranges up and down till he finds two species of ants. One of them is very large and black, and so venomous that its sting produces a fever: it is most commonly to be met with on the ground. The other is a little red ant which stings like a nettle, and has its nest under the leaf of a shrub. After obtaining these, he has no more need to range the forest. A quantity of the strongest Indian pepper is used, but this he has already planted round his hut. The pounded fangs of the Labarri Snake, and those of the Conna Couchi, are likewise added. These he commonly has in store; for when he kills a snake, he generally extracts the fangs, and keeps them by him†." This is the adorned story of the ingredients for the preparation of the Urari, and rests upon the fictitious accounts which these travellers may have received, but surely not upon personal experience.

These various accounts, so contradictory as regards the mode of preparation and the origin of the poison, were well calculated to raise in me the desire of removing the mystery connected with it; and I was fortunate enough to accomplish my wish during my first expedition in the interior of British

* Montgomery Martin's 'History of the British Colonies,' vol. ii. p. 17.

† 'Wanderings in South America,' by Charles Waterton, Esq., p. 55.

Guiana. I collected at Pirara, the largest Macusi village I ever visited, every information on the subject, and the result was, that the plant grew on the Conocon or Cănuku mountains. On our return from the cataract of the Rupununi, I ascertained at a settlement of Wapisiana Indians on the eastern bank of the Rupununi, in 3° north latitude, that a journey of one day and a half would bring me there.

After I had engaged some guides, I started, accompanied by Lieut. Haining of the 65th Regiment, in the morning of the 25th of December, in search of the mysterious plant. Our way led us first to the south, over pathless savannahs, until we met with a place in the Rupununi where we could ford it. As the mountains stretched their foot to the river's bank, we expected that the ascent would immediately commence. Our guide, however, led us through a mountain-pass, and before us was a large arid savannah. We turned now to the north, meeting with plains covered with wood, or low shrubs and coarse grass, bounded on both sides by the mountains; it was a wild road, crossed frequently by streams, some of which were dried up and others ran turbulently over numerous rocks: their banks were clothed with creepers and twiners, of the extensive families of *Convolvulaceæ*, *Bignoniaceæ* and *Eupatoriæ*: a beautiful reed raised its panicle high above the creeping plants; it was the *Gynerium saccharoides*, which the Indians use for their arrows.

At last, after we had walked more than five miles, the extent of the valley from the place where we entered it, the ascent commenced. It was by no means an easy matter: the path, Indian-like, quite narrow, led over fallen trees, between boulders of granite, and was often so steep that we had to use hands and feet. I wondered only how the Indians, with their burthens, could climb up. Mountain-streams had made their way over shelves of granite, forming frequent cascades, which during the rainy season must be grand indeed; at present, the water only trickled down the rugged sides, and was lost among numerous plants of the genera *Pothos*, *Heliconia*, *Gesneria*, *Peperoma* and *Canna*, which, favoured by the moisture, grew most luxuriantly. A *Justicia* with scarlet flowers, the beautiful *Petrea macrostachya* (β.), and the *Duranta* with its violet blossoms, added considerably to the beauty of the spot.

At three o'clock in the afternoon, after a most fatiguing march of eight hours and a half, we reached a few huts on Mount Mamesua, inhabited by Wapisianas, where we intended to rest for the night. We continued our inquiries, and learned from our host Oronappi, an old acquaintance, whom we had met a few weeks ago in the valley, that he himself knew how to prepare the poison, and that he would willingly accompany our guide and bring the plant for our inspection.

This proposal did not agree with my plans. I was anxious to see the plant in its native growth, and when we gave him to understand that it was our intention to accompany him, he attempted by signs to make us desist from going with him. He told us that the path was very bad, and that it was so far that we could not reach the place till afternoon, and that we would have to sleep on the road; he repeated the same story in the morning, and as he observed that we were determined to insist on our first plan, he made a sour face and did not speak for a length of time. Whether he thought that we were not able to stand the fatigues, or whether he wished us not to learn the place where the plant grew, I know not: enough of his stories—we found the first only true; the path was wretched; all traces of it were frequently lost, and an Indian only could have guided us; and he directed his course mostly by broken branches, or marks cut in the trees, sometimes standing still for some moments to consider in which direction to turn.

Our path was over "hill and dale," mostly in a N.N.W. and N.W. direction. It became every moment wilder: we had to cross several mountain-streams, which flowed in deep beds, precipitating at their banks a ferruginous matter; underbush became scarce; it appeared as if Nature here delighted only in gigantic forms. Our Indians thought they had mistaken the track; but as we arrived at a stream which ran rapidly over the sloping ground, exhibiting granitic shelves, we observed that several paths united; and crossing the brook our guides stopped, and pointing to a ligneous twiner which wound itself snake-like from tree to tree, they called out "Urari," the name of the plant in the tongue of our guides*.

* Sir Walter Raleigh, in his table of names, rivers, etc. discovered in his second Guiana Voyage (Hakeluyt's Voyages, ii. 692), mentions even then, among the poisons used by the Indians of the Orinoco, the Ourari; and by that name it is almost exclusively called by the Indians of Guiana. The Caribs in pronouncing the *r* frequently exchange this letter with *l*, and it may thus have happened that the name Wurali has crept in. The Macusis, who are acknowledged to be the best manufacturers of this remarkable substance, call it decidedly Urari. The same name it bears among the Tarumas, Wapisianas, Aricunas, Woyawais, Atorais, and various other tribes of the interior whom I have visited. The substitution of the corrupted name Wourali is therefore, to say the least of it, gratuitous, and ought to be rejected. Von Martius and Von Spix, in their 'Travels in Brazil,' observe that, during their exploring tours up the Amazon, Yupura, Rio Negro, etc., they heard it pronounced Urari, but never Wurali. (See Reise in Brasilien München,

My wish was thus realized; and that plant which Baron de Humboldt was prevented from seeing, and which was one of the chief objects of Mr. Waterton's 'Wanderings,' but without success, I now saw before me. Baron de Humboldt, with his usual sagacity, observes, "The danger of the Curare, as of most other *Strychneæ* (*for we continue to believe that the Mavacure belongs to a neighbouring family*), results only from the action of the poison on the vascular system*."

Though I did not find the plant in flower, it was bearing fruit, and their inspection assured me that, as Von Humboldt suspected, the plant belongs to the genus *Strychnos*†. It forms No. 155 of my Guiana plants, and is thus characterized by Mr. Bentham:—"*Strychnos toxifera*, Schomb., Hook. Ic. Pl. t. 364 and 365; ramis scandentibus cirrhisque pilis longis patentibus rufis dense obtectis, foliis sessilibus ovali-oblongis acuminatis membranaceis trinerviis utrinque pilis longis rufis hirsutis, floribus . . . . . . fructibus maximis globosis.—Folia 3—4-pollicaria."

The *Strychnos toxifera*, as I have called it, the Urari of the Macusi and Wapisiana Indians, is a native of South America, and a sporadic plant; and, as far as known to us, has been hitherto found only in the granitic mountains of Canuku or Conocon, in latitude 3° 10′ N., a group of mountains which border the extensive savannahs of the rivers Rupununi, Mahu and Takutu. It is a ligneous twiner: at its root, of the thickness of a man's arm, and covered with a rough ash-coloured bark, marked with fissures; winding itself to the neighbour-

1831, vol. iii. p. 1155.) The compound terms Uraricapara and Uraricuera (Parima), two rivers, the former the tributary of the latter, and which we find under these names in the oldest maps we possess of these regions, is another argument in favour of Urari. The arrow poison is generally known in England under the name of Wouraly, a name by which Mr. Waterton, in his 'Wanderings,' has described it; but interesting as his description may prove to the general reader, and however delightful the picture he draws of his various exploits, it is a work which never will be consulted as authority in scientific questions.

* Personal Narrative, vol. v. part ii. p. 527.

† The chief ingredient of the arrow poison of the Indians of the Yuppura is, according to Von Martius, the bark of a slender tree, which, in the Tupi tongue, is called *Urari-iwa*, the *Rouhamon guianensis* of Aublet. A plant which forms one of the ingredients in the preparation of the Macusi poison, and which, in many respects, agrees with Aublet's figure, has been named by Mr. Bentham, in the enumeration of my Guiana plants, *Strychnos cogens*. However, the Urari plant of the Macusis, although belonging to the same genus, differs in numerous specific points. (Compare Von Martius, Reise in Brasilien, vol. iii. p. 1237.) I have little doubt, that the plant of which the Indians by Esmeralda prepare their poison, is Aublet's *Rouhamon*, and in this I am confirmed by a conversation with Dr. Kunth in Berlin, who, as is well known, determined Von Humboldt's plants.

ing trees, and reaches often a height of thirty to forty feet before it divides into branches. The latter are rounded and opposite, the branchlets densely covered with ferruginous hair. Between the branches and likewise between the leaves there appear spiral tendrils, mostly single, but sometimes divided. The branchlets prove sometimes abortive on one side, and are then replaced by the cirrhus, which in that case becomes leaf-bearing. Organs of a peculiar structure, apparently gemmulæ, are found below the base of the branchlets as well as on the branch itself; on the outside they are closely set with hair, on the inside smooth and coriaceous and of a spatulate form. They are not peculiar to every branch, but mostly to be found on the branchlet by which it is terminated. The leaves are opposite, ovate-oblong, acuminate, short-petioled, entire, three to five-nerved, ciliate, membranaceous, and covered with ferruginous hair, which is thicker set between each pair of petioles; the leaves differ in size from one inch and a half to four inches and a half, and are from one to two inches broad, the stalk being only two lines.

As already observed, the plant was not in flower in December, and had just begun to drop its fruit, which were on long stalks; and the rudiments of a five-cleft calyx and an inferior corolla were easily perceptible.

The fruit is a berry of the size of a large apple, being frequently twelve inches in circumference; it is globular, and covered with a smooth hard rind of a bluish green colour and filled with a soft jelly-like pulp, in which the seeds, ten to fifteen in number, are immersed. They are round, concavo-convex, about an inch in diameter, and five to six lines thick; from the circumference five rays extend towards the prominence in the middle. They are of a grey colour and rough; the internal kernel is a yellowish white, and tough, like horn. This substance, according to Indian information, possesses intense bitter and medicinal properties; it is used by the Indians against pain in the stomach, dysentery, and as a tonic.

We observed many heaps of the cut wood covered with palm-leaves, which we were told had been left by the Macusis, who come to this place from a great distance, as the plant is known to grow only in two or three situations at the Canuku mountains; they are therefore resorted to by the Indians from all quarters.

The Wapisianas and Macusis are generally acknowledged to be the best manufacturers of the poison; and from the corroborative testimony of these tribes, I have gathered the following particulars respecting its preparation.

It is only the bark of the woody parts and its alburnum which are considered to possess the poisonous principle in the highest degree. The stem of the plant is therefore cut into pieces about three feet in length, of which the bark is stripped, and after having been pounded it is steeped in water, for which purpose a new earthen vessel is used; here they allow it to remain for some time, well covered, until the water is of a yellowish colour, when it is filtered through a funnel-shaped matappa lined with plantain-leaves. Several other plants have been meanwhile procured, and after their juice has been extracted in a similar manner, this extract is kept ready to be added to the former at the moment it has been concentrated on a slow fire to the consistency of a syrup. The addition of that juice gives a darker colour to the Urari, which, from the time of its becoming concentrated, has the appearance of tar: it is now put into small calabashes, which are covered with leaves to prevent the poison from coming in immediate contact with the air. The Indians pretend, that if it be well preserved it will keep its strength for a couple of years. If it is to be used, the quantity required is put into a separate calabash, and a little juice of the Cassada is added to it to make it more pliable. I was told that the addition of Cassada-water (as the expressed juice of the poisonous root of the *Jatropha manihot* is termed) reawakens the slumbering powers of the poison. After that juice has been added to it, the Indian buries the calabash with the poison for a day or two under ground.

This is the unadorned account of the preparation of the Urari, and the method which is followed by the Macusis at and about Pirara, and the Wapisianas of the Canuku mountains, where the plant grows. There appears to be no danger whatever in the preparation, and the vapours which are disengaged are entirely innocent; but the circumstance that it requires several days to watch the pot closely on the fire and to take off the scum, etc. before it is properly concentrated, as well as the superstitious customs with which the poison-maker, for his own advantage, surrounds the preparation of it, prevent the Indian, with his natural indolence, from making it more than once or twice a year.

I undertook in 1837 another expedition in the interior of Guiana, and found opportunity to revisit the regions which, in consequence of the arrow poison, had been previously of interest to me. That interest had not been abated—nay, it was increased. The belief continued to prevail among the colonists of Demerara, that the active poison of the Urari was "snake-teeth and stinging ants;" and my assertions, that the vegetable juice of the plant employed produced the fatal effect, and that it contained no animal principle, were doubted. It became evident that the more mysterious accounts of former authors had taken too firm a root to give my plain tale a chance of finding credit. It was certainly true I had not been present at the time of preparation, and although in my own mind I doubted not the Indian's information, I could not implant that faith into others. During our stay in Pirara, a Macusi village on the classical soil of Raleigh's and Keymis's El Dorado, I ascertained that an Indian lived in the vicinity, who was far-famed for the preparation of the Urari poison. I induced him by presents of some consideration to prepare it in my presence, and he promised to do so. I accompanied him for that purpose to the Canuku mountains, partly with the object of being present at the gathering of the chief ingredient, and partly to see whether I might be fortunate enough to find the plant which is called Urari in blossom. In the latter object I was disappointed: I found it again, as during my first visit, fruit-bearing.

The mountain Ilamickipang had been named as the place nearest to Pirara where the plant grew, being about eighteen miles distant in a south-eastern direction from the spot where we collected it in 1835. We ascended the mountain for about 1500 feet, and though we observed numerous Urari plants at a less height, our sapient chemist, after having tried different pieces of the stem, pronounced it not to be in a state fit for preparation. After we had reached a saddle of the mountain, a spot was selected, where, with the assistance of our Indians, we built a hut of palm-leaves; and from hence short excursions in different directions were undertaken, to collect such plants as possessed the sap in a high degree. They were found generally in rocky places or glens, among heaped-up boulders of granite, places well selected by a plant which is so fatal in its effects. The branches and ligneous stems, which were in thickness less than the human wrist, were chosen and carried into the hut, where they were scraped, and the bark was preserved in small baskets made for that purpose. Three such baskets were filled, when our chemist considered that he had enough, and the baskets were delivered up to me, and we returned to Pirara. The manufacturing of the poison was however delayed for some days, for the object, as I was told by the chemist, of observing previously a rigid fast, in order to prepare himself for the important business. Meanwhile Kanaima, an influential Macusi chief from the Rupununi, arrived on a visit in Pirara, and for what purpose I know not: it is enough to state, that he knew how to prevail so far upon the manufacturer of the poison that he retracted his promise, and refused to prepare it in my presence. However, the bark was in my keeping, and as I had paid for it, I considered myself to have a full right to it; and although he demanded it back, it was now my turn to refuse him. We were at that period so near our departure for Fort San Joaquim, that I was prevented from engaging a more willing concocter, and with the pure bark in my possession we departed.

The dreary "winter season," as the time when the tropical rains descend in torrents is called by the Brazilians, gave me sufficient leisure to enter into further inquiries with regard to this poison, and I resolved to make some experiments how far the pure bark of the Urari plant, *Strychnos toxifera*, unmixed with any other substance, might prove fatal to animal life. I took, therefore, two pounds of the bark shavings, and having poured a gallon of water on it, allowed it to remain in that state for twenty-four hours. Half of it was filtered off, and keeping a steady but gentle coal fire, it was boiled in a new pot, adding from time to time more of the infusion. After having concentrated it by boiling to the consistence of thin syrup, and having allowed it to cool, two arrows were poisoned with this substance, and two fowls wounded, one in the thigh and the other in the neck. The effects became apparent after five minutes: the first died in twenty-seven minutes after the wound had been inflicted; and the latter, which had been wounded in the neck, after twenty-eight minutes. The gentleman who accompanied me on my expedition, and Senhor Pedro Ayres, who had been sent by the commander of the district to welcome us at the Brazilian boundary, were present during these experiments, and it is therefore established beyond doubt, that the Urari plant alone, without any assistance of Indian charlatanism, or the addition of extraneous substances not likely to add to its efficacy, produces the fatal effect. The boiling process was finished in less than seven hours, while the Indians employ more than forty-eight hours for that purpose; and as it required a period rather longer to produce death in the fowls wounded with it than would have been necessary with good Macusi poison, this must be ascribed to our decoction being not sufficiently concentrated. The poison which I had thus prepared was of a brownish colour: good Macusi poison is jet-black, and I have no doubt that it receives this appearance from one of the ingredients which the Indians add to it.

When I left Pirara, foiled in my purpose to see the poison prepared by the Macusi, I arranged with the Rev. Thomas Yond, who laboured then as missionary of the episcopalian church in that village, to try if he could induce any of the famed poison-makers to boil it in his presence; and although, on my return to Pirara in 1839, I had at last an opportunity of witnessing the preparation of the poison by my former recreant Macusi, I nevertheless prefer inserting here Mr. Yond's letter, as it is an additional evidence for henceforth rejecting "snake-teeth, stinging ants," etc. as component parts of the Urari poison.

"*To Robert H. Schomburgk, Esq.*

"Pirara, 4th October, 1838.

"My Dear Sir,

"Knowing as I do that your object in visiting these wilds is that of making general research, for the information and benefit of society at large, I take the present opportunity of presenting you with the promised statement of the manner how, and the ingredients from which, the much-famed Urary poison is made, of which there has been so much conjecture and erroneous accounts given in time past.

"Since the time that I have come to reside amongst the Macusi Indians as missionary, curiosity has led me to go to a little expense in procuring one of the Indians from the Canuku mountains, who is noted for his being able to make powerful poison, whom I prevailed upon to boil a quantity before me at the Mission House. I was fortunate enough in purchasing a quake or basket of Urary bark, as also a quantity of Arimāru, Tarireng, and Tararemu; the rest my Urary-maker procured in the space of three days. The ingredients being already procured, the next movement in course was the erecting of my tent, and enclosing three parts of it round with palm-leaves, which for the time being was called the Indians' Urary House. This temporary house was erected in the front enclosure, opposite the door, that I might see every movement. A buck-pot*, that would hold a little more than a gallon, and that had never been used, was then brought, as also four shallow plates: the first was to boil the ingredients in, and the others to expose the Urary liquid to the sun when boiled, in order to reduce it to a jelly.

"One large gooby †, stopped at the mouth or stall-end with loose cotton, was opened at the head-end sufficiently wide for admitting the contents of the Urary-pot through when poured out. A second small gooby was made, in the shape of a funnel, and stopped with silk grass, in order to pour the Urary through when moving it from one drying-plate to the other, that the scum which rises on the top during the time of drying might be kept back. The last receptacle is a small calabash ‡, that will hold half a pint, into which the whole

* The earthen pots in which the Indians prepare their food, and which they manufacture themselves, are called in the colony buck-pots, buck being among the colonists a cognomen for Indian.—S.

† Gooby, the fruit of a species of pumpkin, which, after having been scoured out, is used in lieu of a flask.—S.

‡ The bowls prepared of the fruit of the *Crescentia cujete*, or calabash-tree.—S.

of the Urary is poured by degrees through the small funnel, after it has been brought to the consistency of thin starch. As soon as all things were set in order, and the wood split up in readiness for making the fire, the man set off in search of I could not conceive what, and therefore I asked one standing near me why the man had gone away. He said, 'He is gone to fetch his tinder-box, to make fire, for he will not take a light from any person's fire; you will see he will make his own.' I waited awhile, and then he came with a tinder-box and steel in his hand. I looked at the box and tinder, to see if there was anything remarkable in it, but found it to be simply a roll of loose cotton wound round with thread, about an inch in diameter, and seven in length, having for its case a piece of bamboo of the same length, which aids in protecting the cotton from getting damp, and also serves as an extinguisher to the burning tinder when put downwards in the bamboo-case. Mulatto then took his red flint-stone, such as the Indians commonly use, which is found in some of the distant mountains, and seems to be just as good as our flint-stone at home for such a purpose*, and struck several times, but the cotton having by some means got rather damp, he could not succeed in getting a light: he then went to my kitchen and lighted his cotton-roller. Now I thought I should find that he would make his fire from this burning tinder, that had certainly got its spark from my kitchen fire; but no, instead of this he pushed it into his bamboo extinguisher, and let it remain there until every spark was put out. He then struck a light from his own flint, and so began making a fire. Other fire than that made by the Urary-maker is not allowed to come under the roof of the Urary-house, lest the whole should be defiled. Neither may any water be used in drawing or cooking the Urary but that which is procured by the Urary-maker, and even that must not be put in any vessel, save his own sacred goblets.

"Mulatto began boiling the Urary about eleven on Friday the 19th of September, 1838. The ingredients used are as follows:—

| | |
|---|---|
| Urary† bark from a vine | 2 lbs. |
| Arimāru bark‡, vine | $\frac{1}{4}$ — |
| Tarireng | $\frac{1}{4}$ — |
| Yakkee | $\frac{1}{4}$ — |
| Wokarimo | $\frac{1}{4}$ — |
| Tararemu $\frac{1}{2}$ oz., from the root of the Tarireng vine | $\frac{1}{2}$ oz. |
| Muramu§, a bulbous root, not boiled, but soaked in the half-cooked Urary, and the slime is squeezed from it, to congeal the whole | $1\frac{1}{4}$ lb. |
| Manuca‖, the bark of a large tree, four small pieces. | |

* The red flint-stone here alluded to is compact quartz (jasper), which is found in the vicinity of Mount Roraima, and along the banks of the rivers Coko and Cukenam.—S.

† Urari, or *Strychnos toxifera*, Schomb.—S.

‡ Arimaru, *Strychnos cogens*, Bentham.—S.

§ Muramu, a species of *Cissus*. I brought some of these roots with me, which have been planted with success at Messrs. Loddiges and sons, and at the Botanic Garden in Berlin.—S.

‖ Manuca, or Manica, an intensely bitter bark of a tree which I conceive

"Of these, however, he had to make two separate boilings, on account of his pot being too small to contain the quantity of bark necessary at once, for each of which he took a day,—for the first almost the whole of Friday, and the second the greater part of Saturday. The Urary was the first ingredient that was put in the pot, and the rest he every now and then kept adding by little and little, until the whole was used. He kept but a slow fire during the whole time of cooking, just sufficient to keep the liquid in a simmering state, which seemed to suck the virtue out of the bark well. Upon each additional handful of bark that he put in the pot during the time of cooking, he took special care to blow, informing me that that would give virtue to the Urary and make it strong. Of course I did not deem that to be a proper time for giving my opinion as to its real value or not, knowing that a little opposition would soon make him leave his work altogether, and I should be left with the ingredients unboiled, to muse over my own folly; I therefore told him he was welcome to do as he pleased, my only desire being to see everything that was done, and that the Urary should be strong, or painful as they term it. The whole of these two days (Friday and Saturday) had simply been to draw the poison out from the mixed quantity of bark, so as to form the Urary liquid, which in appearance was not unlike strong-drawn coffee. The whole liquid, consisting of a gallon and a half when first drawn, by this time had been reduced to about a quart, which was then poured into a gooby, the head of which had been cut out, and the tail-end stopped up with loose cotton, sufficiently tight to stop any thick sediment from passing through, acting as a sort of strainer, through which it passed into a large shallow plate and the pot which he had been using, in order to be exposed to the sun. This was on Monday morning. In course of two or three hours after the Urary had been exposed to the sun, I observed the powerful effect which the slime from the bulbous root Muramū* had in perceptibly congealing the liquid to a jelly. On Tuesday Mulatto began to pour the Urary into the more shallow plates, where it remained still exposed to the sun, until brought, as already stated, to the consistency of thin starch, and was from thence removed to the last receptacle, a small calabash, capable of containing near half a pint, to which small quantity the whole was brought.

"This process of drying continued from Monday until Thursday following, when Mulatto gave it over to me. Mulatto then asked me to come and see him try its strength, informing me that the first creature upon which it must be tried was a Tāpooya (a species of lizard found amongst the grass in the savannahs); for if it quickly

to belong to the *Xanthoxylaceæ*. It is said to have the quality of salivating when taken internally, and the inhabitants of the Rio Negro and the Amazon use it therefore in syphilitic complaints.

It is remarkable that all the ingredients which the Macusis use for the preparation of their poison are of an intense bitter. This may be the reason that it is used as a tonic. I am however unacquainted with the plants which they call Tarireng, Yakkee, and Wokarimo.—S.

* *Cissus* species?—S.

kills that the Urary must be strong, because of its being hard to kill, having but little blood. I was at a loss to know how he would catch such a swift little creature in so awkward a spot, and how he would find them at all; but the mystery soon was revealed, for, having taken a torch in his hand, he set fire to the dry grass, which spread abroad and made the poor Tāpooyas fly from their retreat, to hide in some distant tuft of grass or brushwood, which Mulatto keenly observed, and slily pounced upon and secured them. He then took a small piece of wood, about the thickness of a stocking-needle, poisoned it at the pointed end with a little of the new-made Urary, and then stuck it in one of the hind legs of the lizard. He then let it loose, when it ran a few yards; then, panting, lay down and died. A second and third he pierced in the tail, upon which it had much the same effect; they both died in a few minutes. A rat was then brought in by one of the Indians, and its thigh was slightly pierced with a needle-like arrow, which had such an effect upon the poor creature as scarcely to allow it to move ten feet before it lay down and expired. I then proposed, as I was about having a fowl killed for dinner, to have it slightly touched with Urary on the leg: to this Mulatto made some objection, saying he never tried his Urary on fowls, and to do so would spoil the whole; but as I pressed it, he said, 'Then let it be done.' Mulatto then made a small arrow on purpose, drying it a little over the fire; for, said he, 'the Urary is yet soft, and it will strip off from the arrow as soon as it comes in contact with the skin; but if it be dried it will not, and will get to the blood.' The noble cock was then shot in the thigh, when it ran for ten or twelve yards, then walked across the road, of twenty yards wide, and lay down in the grass, when its head fell as though its neck had been broken, and he soon after died.

"I wished to have tried the effects of the Urary on a deer, or some other wild animal, but have not yet had an opportunity; however I doubt not, from what I have seen, of its being sufficiently strong to destroy any animal with which we are acquainted in a short time. Having heard in time past that snake-teeth were a necessary ingredient of the Urary, I asked Mulatto whether they were not (happening to have a few by me that had been taken from the head of a large rattle-snake that had been taken a few days before, which were at his service), but he said they were not at all necessary, that he never used them, nor would they assist much in making the Urary strong, since the Urary poison did not depend either upon them or the stinging-ant, and that for himself he used neither. Mulatto did not fail to act according to their superstitions, in abstaining from meats; also in requesting me not to eat or drink sugar when I came to see him*, and that no person or woman especially might come near the Urary-house; and even on the Lord's day would he not altogether cease to boil the Urary, but kept a few sparks alive under the pot, notwithstanding my request that he should do nothing during the sabbath. He would not as usual come into

* This superstition no doubt arises from their believing sugar to be an antidote to the Urari poison.—S

the chapel, but sat without, considering, as I suppose, that he would become defiled by congregating with the people, and thereby destroy the power of the Urary.

"I must now conclude, and beg your acceptance of the above observations, as coming from one who wishes you every success in your arduous undertaking, as also your welfare in general, both of soul and body.

"Remaining ever yours,

"T. Yond."

Bancroft, in his 'Natural History of Guiana,' gives us a description of the manner in which the Acawais prepare the "Woorara," as he calls it, which, in its general mode, agrees with Mr. Yond's and my own observations. He distinctly says, "the ingredients are all 'nibbees*' of different kinds." There is no doubt that different nations prepare their Urari in different modes, but the active principle subsists in one or the other species of *Strychnos*.

I have already alluded to Humboldt's account of the mode of preparation at Esmeralda, at the time of his journey the place most famed at the Upper Orinoco for making the arrow-poison. Von Humboldt's narrative is too generally known to demand a recital of his graphic account. However, Esmeralda is no longer what it was forty years ago; and when I visited it in 1839 I found it merely inhabited by an Indian patriarch and his family, who, on my inquiries, informed me that he bought his poison from the Indian tribes who inhabit the banks of the rivers Paramu and Ventuari, namely, the Guinaus and the Maiongkongs. These tribes, who were known to the Spaniards under the name of Maquiritares, call their poison Cumarawa and Markuri, and distinctly make a difference between it and the Urari, which they gladly prefer in consequence of its superior quality, and which they barter from the Macusis and Arecunas, giving in return the Curata, that admirable reed, sometimes sixteen feet long without an internode, and of which the celebrated blow-pipes or Sarbacans are made†. From what I learned when amongst these

* Lianas, or ligneous twiners, are called nibbees or bushropes by the colonists.—S.

† Vide Annals of Natural History, vol. v. p. 44, and Linnæan Transactions, vol. xviii. p. 557.—It is very remarkable that the plant of which the poison is made, and the reed which forms such an important part in the construction of the blow-pipe, with which the poisoned arrows are propelled, are plants not equally dispersed over these regions, but grow merely on isolated spots. The *Arundinaria* (*Arundinaria Schomburgkii*, Bennett), which furnishes that remarkable reed, appears to be limited to the chain of sandstone mountains which extends between the second and fourth parallel of north latitude. The only localities which I ascertained were Mounts

tribes, the chief ingredients for the preparation of their poison is either *Strychnos Ronhamon* or *Strychnos cogens* (B.), and although it resemble the Urari in appearance, we soon found that it was of inferior strength. The Curare of Esmeralda was prepared by Indians either related to or of the same tribe as the Guinaus and Maiongkongs; and when I showed them a specimen of the *Strychnos toxifera* from my herbarium they appeared to be entirely unacquainted with it, while they recognized the specimen of *S. cogens* as that plant of which they made the Cumarawa. I have already alluded to the similarity in general appearance between *Strychnos cogens* and *Strychnos Ronhamon*. It is therefore more than probable that the Curare and Cumarawa are prepared in a similar manner.

Von Martius relates the mode of preparation of the Urari as practised by the Juris, Passes, Miranhas and Ticunas, Indian tribes of the Amazons and Yupura (vide 'Reise in Brasilien,' iii. pp. 1155 and 1235); and as he had opportunity to be present at the preparation while among the Juri Indians of the river Yupura, I insert here his remarks. "The chief ingredient of the arrow-poison of the Indians of the Yupura is furnished by a slender tree, the *Ronhamon Guianensis*, Aubl. (a *Strychnos*, L.), which in the Tupi tongue is called Urari-iwa. The bark, after having been immersed in water, is pressed out by the Juri-Taboca with his hands, and the yellowish juice is concentrated in a flat plate, over a gentle fire, and other infusions extracted in a similar manner from the root of a pepper-shrub (*Piper geniculatum*); from a tree unknown to me, called Taraira-moira, that is, tree of the fish Taraira; the bark of a Cocculus plant (*Cocculus Juime*, M.), and a twining *Ficus*, are added in equal quantities. This compound extract, of the consistence of a thick syrup, had acquired over the fire a dark brown colour, when it was poured into small vessels, each containing about two ounces, and allowed to cool in the shade of the cabin. Previously, the Indian added to every vessel a small fruit of capsicum (Kiynha-avi), and with this the preparation of the Urari was finished. The Indians revive its strength when it has become weak, chiefly by adding the fruit of capsicum and the root of *Piper geniculatum*. There is little doubt that the extract of the four plants which have been named as additions are of less importance, and their place might be supplied by others. According to the information which I received from several Brazilians, other ingredients are added, namely, the milk of *Euphorbia*

Mashiatti, Marawacca, and Wanaya, on the rivers Ventuari, Paramu, and Orinoco.

*cotinifolia, Hura crepitans,* or the astringent fruits of *Guatteria veneficiorum,* M.; and superstitious Indians add the first frog which they hear croaking that day, the great black ant, or teeth of poisonous snakes." The addition of the teeth of poisonous snakes and the great black ants, rests here, again, not upon personal experience, but merely on the information of Brazilians, no doubt equally inoculated as our colonists with the wish to see through the mystic veil. Dr. Pöppig, in his 'Reise in Chili, Peru, und auf dem Amazonenstrome,' Leipzig, 1836, vol. ii. p. 456, observes, with respect to the arrow-poison of Peru, "The supposition occasionally met with in Peru, that animal poisons were mixed in the composition, has not met any confirmation."

M. Orfila, in his work on General Toxicology, M. Emmer ('De Effectu Venenorum veget. Americ.'), and others, have published able treatises on the effect of this poison. The results are, that when inspissated it may be rendered liquid by heat, and is soluble in water, in alcohol, in muriatic acid, and in volatile alkaline spirit. It unites with acids without emotion or change of colour. If it be mixed with alkalis, no ebullition is observable, but it changes its colour from a dark brown to a yellowish brown. "A few grains, mixed with as many ounces of human blood, warm from the veins, entirely prevents a separation of serum and crassamentum, and the whole mass continues in a state of fluidity similar to that in which it is drawn, until, after some days, it putrifies." (Bancroft.) The poison affects chiefly the nervous system. Its effect of destroying the vital functions is considerably quicker, as I have found by experiments, if it be brought in contact with a vein; and I am of opinion that no sure remedy is known as yet to counteract its effect, if it have entered the blood in sufficient quantity. I have seen the deer arrested in his fleet course, wounded by the poisonous arrow; I have seen the tapir, while swimming across the Rupununi, so slightly wounded that the spike had just penetrated through the thick skin; nevertheless it took effect, and the animal expired. Numerous are the birds of larger and smaller size which I have seen thus secured.

As much as I had heard of this fatal poison, I nevertheless cannot abstain from noting the astonishment by which I was seized when I saw it used for the first time. We travelled over the savannahs girt by the Pacaraima mountains; a deer was discovered browsing in the high grass before us. Lieutenant Haining, of the 65th regiment, my faithful travelling companion, was too far behind with his gun for us to await his coming up, and one of the Macusi Indians took a poisoned spike from his sarima* and fixed it to his arrow. Cautiously he stole upon the unsuspecting deer, and shot the arrow into its neck; it made a jump in the air, fled with the speed of the wind over the savannahs, but it had scarcely run forty yards when it fell panting to the ground, and expired. Von Humboldt has already related that its effect is more or less sudden upon different animals. If the poison be good and the arrow has entered a sufficient depth, it has effect upon the strongest bull in four to five minutes, while a fowl may resist it double that time. The Indians say that monkeys and jaguars are easier killed with it than any other animal.

The poison keeps its efficacy for a length of time. I brought with me at my return to Europe in 1839 a small calabash of the Urari, which had been made in May 1839 in my presence. I made several experiments with it in August 1840, and I found that it killed a rabbit in four to five minutes. Mr. Sewell, veterinary surgeon in London, whom we thank for several experiments to apply the Urari as a remedy in tetanus of horses, received through me some of the same poison, and found it effective. While in Potsdam I gave a small quantity to M. Desenis, who wounded several animals with it, and found that it deprived of life a rabbit in eight minutes, a cat in four and a half, and a pigeon in six minutes†. On dissecting the animals which had been killed by means of the Urari, it will be generally found that there are no signs of inflammation either in the lungs, stomach, or any other part, which, with regard to medical jurisprudence, proves this poison to be the more dangerous, as, should it be employed for sinister purposes by man against his fellow-creature, it would be difficult to say by a *post mortem* examination of what the victim died. In some of the rabbits on which I tried experiments, Dr. Franz found a large quantity of blood in the brain and the spinal cord.

I have already alluded to Mr. Sewell's experiments, who, viewing the lock-jaw in horses as the result of irritation, conjectures that "if a horse in tetanus were destroyed by poison, which acts by suppressing nervous power, and life were then to be restored by artificial respiration, the nervous system, on reanimation taking place, might possibly be free of the original morbid irritation." Reasoning thus, Mr. Sewell tried the following singular practice: "A horse suffering from a

* Sarima, a small case made of bamboo, and covered with tapir- or deer-skin, and in which the Indian keeps the poisoned arrows until he stands in need of them. It is generally worn round the neck.

† I presented the small calabash with the remaining poison to the Berlin Museum.

severe attack of the tetanus and lock-jaw, the mouth being too firmly closed to admit the introduction of either food or medicine, was inoculated on the fleshy part of the shoulder with an arrow-point coated with the Wourali poison; in ten minutes apparent death was produced. Artificial respiration was immediately commenced, and kept up about four hours, when re-animation took place; the animal rose up, apparently perfectly recovered, and eagerly partook of hay and corn. He unluckily was too abundantly supplied with food during the night. The consequence was over-distention of the stomach, of which the animal died the following day, without however having the slightest recurrence of tetanic symptoms." ('Outlines of Human Pathology.') From this experiment, which has been repeated, it was considered that it might be successfully applied in hydrophobia; and in a distressing case, where Inspector Phelps, of Nottingham, was suffering under this dreadful disease, Mr. Waterton, of Walton Hall, was requested to attend for the purpose of directing the operation. He came too late, as Mr. Phelps had expired before his arrival: but, for the advancement of general information, he, with his usual kind feelings, agreed to exhibit the experiment upon animals. The proceedings which were carried on before the surgical and medical profession at Nottingham have been detailed in the Nottingham Journal of 12th April, 1839, and have been since likewise printed in several periodical journals, where they may be referred to by those who feel interested in it. It was attempted during these experiments to restore by artificial respiration two asses, after they had been wounded with the Urari poison. The one first operated upon, although apparently recovered from the effects, died four days afterwards of debility: with the fate of the second I am not acquainted. However this may be, it becomes evident, that the Urari, in the present state of our knowledge of its effects, could only be resorted to in the greatest extremity as a remedy against hydrophobia, and where there is no hope of recovery.

The poison has been hitherto only to be procured with difficulty, as the Indians who manufacture it are not easily induced to part with it; but as I have fully ascertained that the effective principle is the bark of the *Strychnos toxifera*, and that the additional herbs are of less importance, and no doubt serve merely to mystify its preparation, it will become easy to any one to prepare the Urari, provided the bark be in his reach. It will likewise assist to draw the attention of the faculty to the chemical properties of the genus *Strychnos*.

According to M. Chevreul, the *Strychnos nux vomica* consists of acidulous malate of lime, gum, vegeto-animal matter, bitter matter, fixed oil, colouring matter, (which was yellow and probably starch, and which could not be directly extracted on account of its desiccation,) earthy and alkaline salts, woody hairs and wax, which latter appears to preserve the perisperm from humidity*. MM. Pelletier and Caventou have since discovered two vegetable alkalies, Strychnine and Brucine, in it.

It is known that where the Urari has not produced death, it has been followed by torpor and paralytic fits; and where it has taken effect, the victim dies under convulsions. It appears, when brought in contact with the blood, to have a direct power over the spinal cord. The same effect is produced by the nux vomica when taken internally. M. Orfila observes, "A person swallowed in the morning a scruple of nux vomica in powder, and drank afterwards a few glasses of cold water in order to diminish the bitterness occasioned by this substance. Half an hour after he appeared to be drunk; his limbs, especially his knees, were stiff and tense: his walk was staggering, and he was afraid of falling. He took some food and the symptoms disappeared. The administration of nux vomica and of the root of gentian to a woman affected with ague was followed by convulsions, cold and stupor, and almost every part of the body was torpid." (Scutter's Dissert.†)

It is remarkable that the poison proves innocent when taken internally, and is even recommended as a remedy in gastric disorders. While, during my late expedition in the interior of Guiana, I was suffering under all the horrors of a tertian ague, and our quinine had fallen short, I took frequently the Urari in doses of about as much as I could get on the point of the knife. After having taken it I felt generally a slight head-ache, but it did not remove the fever; and fearing there might be an excoriation of the tongue or throat, or bleeding of the gums, without being aware of it, my companions induced me to desist from the dangerous experiment. The Indian when he purchases the poison tastes it, in order to judge of its genuineness. It is well ascertained, also, that animals shot with the Urari are more savoury when prepared for food, and the meat is quite innocent. Generally, the game which we received from the Indians was killed with the poisoned arrow, and we never hesitated to eat of it. Dissection of those who have died of the nux vomica shows no organic lesions, which is likewise the case where death has been produced by the Urari coming in contact with the blood. The first is proved by numerous experiments of M. Orfila; the

* Medical Botany, etc., London, 1831, vol. ii. part lii. † *Ib.* part lii.

latter by those of Mr. Waterton in England, and several physicians in Demerara. The juice of the *Cassada* becomes innocent by being boiled, that of the Urari becomes poisonous after it has been concentrated by the action of fire: should the poisonous principle of the *Jatropha manihot* be entirely volatile? The Cassaripe is the concentrated juice of the *Jatropha manihot*, and is used as fish-sauce and for many culinary purposes, while in its pure state it proves poisonous to animal life; what then can cause the difference? I am not aware whether experiments have been made by inoculating animals with the juice of the nux vomica in its pure state, and likewise after having been concentrated.

Sir Walter Raleigh says, in his second Guiana voyage, "There was nothing whereof I was more curious than to find out the true remedies of these poisoned arrows..... And it is more strange to know that in all this time there was never Spaniard, either by gift or torment, that could attain to a true knowledge of the cure, although they have martyred and put to invented torture I know not how many of them." Raleigh recommends garlic as an antidote where the wound has been inflicted with an arrow of the ordinary poison, and advises them to abstain from drink, "for if they take any liquor into their body, as they shall be marvellously provoked thereunto by drought, I say, if they drink before the wound be dressed, or soon upon it, there is no way with them but present death." Irai, a Carib chieftain of the Rupununi, and the last descendant in direct line of the Cacique Mahanarawa, so far confirms Raleigh's account, that the thirst which ensues after a wound has been inflicted is intolerable. He pretended that the infusion from the root of a species of Wallaba (*Dimorpha*, W.), mixed with sugar, or the juice of sugar-cane, was an antidote. There is not much dependence to be placed on this remedy. While in Curasawake in 1838, we secured several Kings of the Vultures (*Sarcorhamphus Papa*) alive. A female which we had for several weeks succeeded in escaping out of the place where she was kept, and flew to a neighbouring tree. I was loath to lose her, and resolved to shoot her with weakened Urari poison. It took effect, and she fell from the tree. We immediately applied juice of the sugar-cane, but without avail; and after having lingered for half an hour, she died under convulsions. Humboldt observes, that an application of salt internally and to the wound would be found of importance; and Mr. Waterton informs us, that an ass which was poisoned by Wourali recovered by inflating his lungs with a pair of bellows*. In the 'Annals of Philosophy,' vol. xv. p. 389, we

* Waterton's 'Wanderings,' p. 83

are informed that M. Drapiez has ascertained by numerous experiments that the fruit of the *Feuillea cordifolia* is a powerful antidote against vegetable poison. The genus *Feuillea* is common to South America, and the subject is of such interest that it deserves a trial.

EXPLANATION OF THE FIGURES.

PLATE XII. Branch of the Urari plant, *Strychnos toxifera*, Schomb., less then natural size.

PLATE XIII. *Fig.* 1. Fruit of the Urari plant, natural size.
*Fig.* 2. Do. cut transversely, natural size.
*Fig.* 3. Seed of do., natural size.

## XLIII.—*A List of the Fossil Shells found in a Fluvio-Marine Deposit at Clacton in Essex.* By Mr. J. BROWN*.

GENTLEMEN,

THE fossils named in the accompanying list were obtained by searching the beds which compose the fluvio-marine deposit at Clacton, on the eastern coast of Essex, a section of which is given in the 'Mag. Nat. Hist.,' vol. iv. p. 199, N. S., with a description of the geological features of that formation.

In a note appended to that article, which accompanies the above-mentioned section, a promise is held out to the readers of the Magazine, that a list of the fossils, which have excited a peculiar and lively interest in the Clacton deposit, would at some future opportunity be furnished.

It is intended by the present communication to supply that deficiency; and as the greater number of the fossil shells, both of marine and freshwater species, collected from those beds, have been very recently submitted to the notice of Mr. J. D. C. Sowerby, the list is offered with the greater confidence.

*Fossils of the Bed No.* 4. *in Section fig.* 9. Mag. Nat. Hist. vol. iv. p. 194, N. S.

*Marine.*

1. *Balanus ovularis*? Lam.
2. *Tellina solidula.*
3. ——— *tenuis.*
4. *Mactra ovalis*, Sow. A crag fossil.
5. *Mytilus edulis.* Mostly very young.
6. *Cardium edule.*

* Vide Mag. Nat. Hist. vol. iv. p. 197, N. S.

7. *Littorina Ulvæ.*
8. *Flustra.* Encrusting shells and pebbles.

*Freshwater Shells, etc. of No.* 4.

9. *Pisidium amnicum*, Gray.
10. *Paludina impura ; Bithinia tentaculata*, Gray.
11. ——— *thermalis* ?
12. *Valvata piscinalis*, Gray.
13. ——— *cristata*, Gray.
14. *Cypris Faba.*
15. *Chara hispida* ?

*Fossils of No.* 6. *Section fig.* 9. *descending series.*

Marine and Freshwater, the same as in No. 4.

*Freshwater Fossils found in Bed No.* 7. *Sec.* 9.

1. *Limneus auricularius*, Gray.
2. *Paludina impura ; Bithinia tentaculata*, Gray.
3. ——— *minuta.*
4. *Valvata piscinalis*, Gray.
5. ——— *cristata*, Gray.
6. *Planorbis imbricatus.*
7. ——— *lævis.*
8. ——— *helicoides.* A new species. Sowerby.
9. ——— *marginatus.*
10. ——— *contortus.*
11. *Ancylus fluviatilis.*
12. *Pisidium amnicum*, Gray.
13. ——— *Henslowianum.*
14. ——— *pusillum*, Gray.
15. *Cypris Faba.*
16. *Cypris.* A larger species.
17. Vertebræ of small fish.

*Land Fossil Shells, etc. from Bed No.* 7. *Sec.* 9.

18. *Helix paludosa ; H. pulchella*, Gray.
19. ——— *rufescens.*
20. ——— *radiata ; Zonites rotundatus*, Gray.
21. ——— *alliaria.*
22. ——— *umbilicata ; Zonites umbilicatus*, Gray.
23. ——— *conoidea.* A new species. Pl. II. f. 4, 5.
24. *Pupa edentula.*
25. *Clausilia.*
26. *Bulimus lubricus.*
27. *Carychium minimum.*
28. Molar tooth of a Rodent, probably a Water Rat.
29. Seeds of *Chara.*
30. *Triloculina inflata* (Deshayes), figured in Lyell's 'Prin. of Geol.' vol. iii. This minute fossil occurs both at Clacton and Walton: it is the only marine shell in this bed.

Stanway, April 15th, 1841. JOHN BROWN.

The following are descriptions of the two new shells found in this deposit :—

*Planorbis helicoides.* Lenticular, shining, above slightly convex and minutely umbilicated ; edge obtuse ; whorls two and a half, concealed, the outer one large; beneath convex, a little depressed in the centre, where the whorls are visible.

Diameter about one-tenth of an inch. It resembles somewhat *Zonites* (*Helix*) *radiatulus*, but is flatter, having more the form of *Segmentina* (*Planorbis*) *lineata*, but wanting the septa.

*Helix conoidea.* Short, conical, finely striated ; whorls about six, convex ; base largely umbilicated, convex ; aperture oblong-ovate, its upper half deeply impressed by the preceding whorl ; its peristome confined to the lower half, prominent and straight.

This differs from *H. rufescens* in being regularly conical, and having a more elevated pointed spire. See Plate II. figs. 4, 5, in this volume.

## BIBLIOGRAPHICAL NOTICES.

*On the Relation between the Holy Scriptures and some Parts of Geological Science.* By J. Pye Smith, D.D. 12mo. London, 1840. 2nd ed.

*The Certainties of Geology.* By W. Sidney Gibson, F.G.S. 8vo. London, 1840.

No two subjects would appear at first sight to be more disconnected than those of Geology and Revealed Religion. The one is engaged solely in examining the structure of the earth, and in thence deducing conclusions as to the physical causes which have brought it into its present condition ; the other treats of the moral history of man, his relations to his Creator and to his fellow-creatures, and the whole sphere of his duties and his destinies. So wholly distinct indeed are these two studies, that they cannot be said in the slightest degree to aid each other. A geologist may reason with precisely the same accuracy on the facts of his own science, even should he unfortunately be a disbeliever in Revelation ; and it is equally certain that a knowledge of the discoveries of modern Geology is not (except as connected with Natural Theology) in the remotest degree conducive to the all-important studies and devotions of the Christian. There seems, therefore, no reason why the two inquiries should not be successfully prosecuted without encroaching on each other's domain. The fact however is otherwise : Geology and Revelation have been very unnecessarily brought into collision by persons who seem to have but an imperfect notion of the true limits and ends of each. Volumes have been written accusing geologists as a body with being inimical to religion, and denouncing the science itself as a delusive and pernicious study. The geologist is hence compelled in self-defence, however unwilling he may be to desert the legitimate fields of his inquiries, to arm himself against these well-meaning, though too often intolerant opponents, with the weapon of rational and temperate argument.

It is on these grounds that geologists may feel grateful to the authors of the two treatises which are under our notice. We trust they will have the effect of rescuing geology from the calumnies which have been cast upon it, and of allaying in the mind of the sincere believer any misgivings on the subject which may have arisen from the intemperate language used by some of the opponents of the science.

Dr. Pye Smith's little volume is written in a strain at once pious and philosophical. He has bestowed much diligence in consulting authorities, and in applying the resources of criticism to the elucidation of Scripture; and to these requisites he has superadded an element which is often wanting in the writings of those who have attempted this subject,—a complete practical knowledge of the details of geological science. Devoted to the truths of Revelation no less than to those of Science, and regarding them both as proceeding from the same Divine Source, he will allow of no compromise, distortion, or subterfuge, with respect to either.

The points at issue in this controversy may be thus stated. After a most extensive induction of facts collected in all parts of the globe by a numerous body of laborious and diligent observers, the more philosophical geologists have deduced from them a mass of new and most extraordinary results, all tending to prove the power and providential care of the Deity from the Creation to the present day, and thus widely extending the field of Natural Theology. Among the generalizations thus arrived at, there are two or three points on which nearly all geologists are agreed, but which are inconsistent with the *generally received interpretation* of certain passages in the book of Genesis. Now it is important to observe two things: first, that these apparent discrepancies relate to points wholly unconnected with the essential objects of Scripture, namely, the moral history and duties of Man; and secondly, that they refer to events long anterior to the commencement of written history. Subsequent to that period there is not one single circumstance recorded in Holy Writ which can in any way be brought into connexion either favourably or otherwise with the discoveries of modern geology. If then the passages in question relate to points foreign to the objects of the author of Genesis, and were compiled from local traditions or very ancient writings, even though secured by direct inspiration from the possibility of actual error, yet it is plain that there is a greater liability to obscurity of language and consequent erroneous interpretation in this portion of Scripture than in those later narrations which were recorded by eye-witnesses and contemporaries. And it is further evident that a very large allowance must be made for the necessity of adapting the language of Genesis to the people to whom it was addressed. Moses wrote indeed *prospectively* for all mankind, but *immediately* for the Jews, a nation just released from slavery, and in a state of mental advancement little superior to that of children. The utmost *condescension* of language was therefore necessary before the sublime truths of religion could be brought home to the comprehen sions of such a people—a point which is admirably elucidated by Dr. Pye Smith in his seventh Lecture.

The only points in which the discoveries of modern geology are at variance, not with the truths of Revelation, for that they never can be, but with the prevailing interpretations of the Pentateuch, are the three following: viz. the antiquity of the world; the existence of death before the fall of Adam; and the partial extent of the deluge. The facts unfolded by modern science unquestionably demonstrate that the earth is of far greater antiquity than the 6000 years usually assigned to it, and they prove with equal certainty that animal life was subject to death during periods long prior to the creation of Man; there are reasons also, though not of the same demonstrative nature as those above mentioned, yet hardly less convincing to a geologist, for supposing that the Noachic deluge, instead of covering the whole globe as is commonly believed, was confined to that portion of it which was then inhabited by man. Those friends to Revelation, therefore, who are not content to rest satisfied in the opinion of Dr. Paley, that Christianity ought not to be made answerable for the statements and opinions of every writer in the Old Testament*, will be anxious to seek for such an interpretation of the sacred text as will accord with the facts on which these conclusions of science are built.

Dr. Pye Smith, after reciting at considerable length and in a most candid spirit the various speculations of other authors on this subject, concludes with explaining his own views of the question.

* "To make Christianity answerable for the circumstantial truth of each separate passage of the Old Testament, the genuineness of every book, the information, fidelity, and judgment of every writer in it, is to bring, I will not say great, but unnecessary difficulties, into the whole system."—*Paley's Evidences of Christianity*, part iii. ch. 3.

"Our Scriptures afford a valuable testimony to those of the Jews. But the nature of this testimony ought to be understood. It is surely very different from, what it is sometimes represented to be, a specific ratification of each particular fact and opinion."—*Ib.*

Dr. Paley's view is in accordance with that of other distinguished theologians, as will appear from the following extracts:—

"To rectify men's sentiments in natural, historical, or chronological matters; to mend their logick or rhetorick where it was defective, but had no ill influence on piety, was not at all the business of Revelation."—*Bishop Chandler's Defence of Christianity*, p. 272.

"The Natural Philosophy of the Pentateuch ought not to induce us to reject it. It is not at all likely that God, in order to enable a man to be a lawgiver of the Jews, should reveal to him all the causes of the phænomena of nature."—*Lectures in Divinity, by Dr. Hey, Norrisian Professor, Cambridge*, vol. i. p. 196.

"Many serious and thinking Christians have judged that the first part of Genesis is not a literal description of fact, but allegorical."—*Ib.*, vol. iii. p. 152.

"Whether the beginning of Genesis is to be understood in a literal or an allegorical sense? Whether the book of Job be a history, or a parable? being points disputed between Christians, an infidel can have no right to argue from one side of the question in those and the like cases."—*Bishop Berkeley's Minute Philosopher, Dialogue* vi. § 29.

He meets the difficulty respecting the antiquity of the earth by supposing that all the geological formations discovered by modern science were deposited *after* the original creation of matter asserted in the first verse of Genesis, but *before* the particular series of events narrated in the rest of the chapter. These vast geological periods, being unconnected with human history, are wholly omitted by Moses. The narrative which follows he supposes to refer, not to the whole earth, but to a particular region, probably in Central Asia, which he considers to have been reduced by volcanic or other agencies to the state of darkness and desolation described in the second verse. The rest of the chapter relates, in the most simple and condescending language, the gradual restoration of this region to a state of fertility, and the consummation of the six days' work by the creation of Man. This hypothesis is perfectly consistent with geological facts, and may surely be considered as being calculated to give satisfaction to the mind of the Christian philosopher.

The question as to the existence of death before the fall of Adam is easily disposed of. When we are told that "by man sin entered into the world, and death by sin," it is evident from the whole context that it is only the death of man, not that of the inferior animals, which is spoken of. The testimony of geology as to the existence of animal death from the earliest times is corroborated by the voice of comparative anatomy no less than of common sense.

Dr. Pye Smith proceeds to show, that the objections which have been raised on geological grounds to the supposed universality of the deluge may be set at rest by assuming the Noachic flood, like the Adamic creation, to have been confined to a limited district. He quotes many texts in which the phrase "all the earth" is used figuratively for a particular region, and hence it is easy to suppose, that in the case of the deluge the same expression may have a similarly restricted meaning. And it is a remarkable fact that there is a vast region on the shores of the Caspian which is at least 100 feet below the level of the sea, an irruption of which would at this day inundate many thousand square miles and destroy millions of lives.

Dr. Pye Smith conjectures, that by volcanic disturbances the Indian Ocean gained access to this depressed region, where, aided by vast torrents of rain, a deluge was produced sufficient to destroy the human race of that period. The ark, containing a few favoured survivors, might thus easily be drifted, not indeed to the frozen summit* of the Armenian Ararat according to the common tradition, but to some of the lower ranges of hills connected with that mountain. This hypothesis of our author has certainly great plausibility, and we will only suggest as an amendment, that the tract in question was more likely to have been inundated from the Euxine than from the Indian Ocean. The Euxine and Caspian Seas are separated by a very low tract of land in South Russia, and if the Bosphorus were now to be blocked up by a volcanic eruption, the waters of the Euxine would rise to the height of 576 feet, and those of the Cas-

* Mr. Beke, however, contends that it must have been upon the highest point: see his 'Origines Biblicæ,' 1834.

pian to 677 feet above their present level, before they would find a vent over the lowest point of the Balcan range. An elevation of water to this extent would inundate the whole lower basin of the Danube, the South of Russia, Georgia, Bokhara, and a vast extent of Tartary, and a removal of the barrier would cause the waters speedily to subside. That such an event ever actually occurred it would be rash to assert; but it is certainly a remarkable fact, that both shores of the Bosphorus, where it joins the Euxine, *are* occupied by masses of volcanic rocks, and traditions of the damming-up of the Black Sea and the bursting of the barrier were current among the ancients, and are recorded by Diodorus Siculus and Strabo*.

We are conscious that justice is not done to Dr. Pye Smith's arguments by this brief abstract of their results, and we therefore the more strongly recommend his work to the profound attention of the philosophic theologian no less than of the Christian geologist. It is a work calculated to be eminently conducive to the best interests both of religion and of science at the present moment.

Mr. Sidney Gibson's work goes over the same ground as that of Dr. Smith, and arrives at nearly the same conclusions. Although not illustrated to the same extent with the treasures of learning, it is marked throughout by candour and sincerity no less than by soundness of reasoning. Like Dr. Pye Smith, he explains the antiquity of the earth by supposing a vast lapse of time between the *universal* and the *Adamic* creation, but to this assumption he superadds that of the six "days of creation" having been six indefinite periods. Many writers have had recourse to the same hypothesis; but if it should be thought right not to depart further from the strict letter of Scripture than the facts of the case require, it may be observed that these are already satisfied by the explanation given by Dr. Smith, as above announced.

Our space prevents us from noticing Mr. Gibson's work in greater detail, but we cordially recommend it as an excellent coadjutor to that of Dr. Smith in the laudable office of rendering science and religion mutually confirmatory of each other. And should there be any who may still entertain doubts with regard to the hypotheses proposed in them, we would again direct their attention to the opinion of so able a reasoner and so eminent an expositor of the evidences of Christianity as Dr. Paley.

### *Linnæa, ein Journal für die Botanik*, etc. 1840.

[Continued from vol. vi. p. 118.]

PART I.

Scholium to Hampe's Prod. Floræ Hercyn.—Schlechtendal on Schiede's and Ehrenberg's Mexican plants.

PART II.

On *Tetradiclis*, Stev.; by Dr. A. Bunge.—On *Conferva Lehmanniana*; by Dr. Lindenberg.—On the structure of the stem of *Isoetes*

* Respecting the Greek traditions of the Deluge, see Mr. Kenrick's dissertations in the 'Philological Museum,' vol. ii., and in the 'Philosophical Magazine,' N.S. vol. v.

*lacustris*; by Prof. Mohl.—On the Dry Rot; by Schwabe.—Synopsis of *Desmidia*; by J. Meneghini.

PART III.

On the proper systematic place of certain families of Plants.—On some *Diatomaceæ*; by Lobarzewski.—On a true circulation in *Closterium Lunula*; by Lobarzewski.—Plants on sale from Bahia; by Luschnath.—Botanical Observations; by Schlechtendal.

PART IV.

Decades of new *Compositæ*; by Walpers.—Supplement to Prod. Fl. Herc.; by Hampe.—On the *Carices* of Thunberg's Flora Capensis; by Schlechtendal.—On a monstrosity in the leaves of *Trifolium repens*; by Walpers.—Four new *Mammillariæ*; by Ehrenberg.—Mexican Plants of Schiede and others; by Schlechtendal.

PART V.

Synopsis Thymelearum, Polygonearum, et Begoniarum Africæ australis; by Meisner.—Decade of new *Compositæ*; by Walpers.—Mexican Plants of Schiede and others; by Schlechtendal.—Observations on passages in Endlicher and Martius's Fl. Braziliensis; by Schwægrichen.

PART VI.

Scholium to Hampe's Prod. Fl. Hercyn.

*Icones Fungorum hucusque cognitorum.* Tomus 4. A. C. I. Corda. Pragæ, 1840.

Our object in noticing the present number, which in point of execution exceeds even the two preceding, is to call attention to the admirable figure of *Puccinia graminis*, or mildew. It is far more complete than that so often referred to of Bauer. Among the points elucidated in the present number, is the very interesting one that *Asterophora* is a mere parasite of the second order, its matrix having perfect sporidia. The author does not seem to have access to many well-known journals, or he would not have published as *Sporocybe Desmazierii* a plant altogether unlike that figured under that name in the 'Annales des Sciences Naturelles;' neither would *Sphæria Robertsii*, Hook., of which an admirable analysis is given, appear as an undescribed species, *Sp. Hügelii.*

## PROCEEDINGS OF LEARNED SOCIETIES.

### ENTOMOLOGICAL SOCIETY.

January 4th, 1841.—The Rev. F. W. Hope, F.R.S., President, in the Chair.

The President stated, in reference to Mr. Schomburgk's memoir, read at a previous meeting, that migrations of butterflies to a very great extent had been repeatedly observed in South America, instances of which had been recorded in Helme's account of Buenos Ayres.

Mr. Westwood corrected an error which had occurred in the printing of a memoir relative to the *Pediculus Melittæ* of Kirby, or the larva of *Meloe*, in the Transactions of the Society, in which it had been stated that the specimens which he had found at large and dissected were identical with some reared by the Rev. L. Jenyns from the *larvæ* of the *Meloe*, whereas the latter had been reared from the *eggs* of that insect. This correction was especially required, because in the volume upon insects in the Cabinet Cyclopædia it had been suggested by Mr. Shuckard that the two insects were not identical.

A memoir was read by Mr. Westwood on the nomenclature of the genus *Chlorion* of Latreille (*Ampulex*, Jurine). From a review of Latreille's various works it appears, that although at the first he gave the *Sphex lobata*, Fabr. as the type of the genus, yet its characters were not derived from that insect, but agree with the *Sphex compressa*, Fabr. Fabricius, however, adopted and characterized the genus *Chlorion* from the former of these two species, but included in it also *Sphex compressa*. Jurine, however, finding the latter species not to agree generically with the former, proposed the name of *Ampulex* for the *Sphex compressa*, and figured an European species as an example, which however does not precisely agree with *S. compressa*. Under these circumstances the author considers that the name of *Chlorion* ought to be applied to the genus typified by *Sphex compressa*, that the *Chlorion* of Fabricius requires another name, and that the name *Ampulex* is strictly synonymous with *Chlorion*, the same species being the true type of both generic names. In allusion to the employment of synonymical names of genera, Mr. Yarrell stated that a calculation had been made by Messrs. Agassiz and DeCandolle, by which it appeared that no less than 300 generic names of plants and 800 names of zoological genera required changing, having been previously used in other branches, and it was insisted upon by several members that the inconvenience which would necessarily result from the change in such a number of names would far overbalance the occasional slight inconveniences at present felt in cases of such "double emploies," as the French term them. It was further suggested by Mr. Waterhouse, that as Latreille had erred in the first instance in giving as the type of *Chlorion* an insect which did not accord with the generic characters which he had detailed, we ought to adopt the nomenclature of Fabricius, who had given the real characters of the insect which Latreille had mentioned as its typical species.

Anniversary meeting, January 25th, 1841.—The Rev. F. W. Hope in the Chair.

At this Meeting the ordinary business of the annual meeting took place. W. Sells, G. R. Waterhouse, S. Stevens, and W. Bennett, Esqrs., were elected into the Council in the room of E. Charlesworth, W. E. Shuckard, J. F. Stephens, and F. Walker, Esqrs., and W. W. Saunders, Esq., F.L.S., was elected President, W. Yarrell, Esq., Treasurer, and J. O. Westwood, Secretary for the ensuing year.

In the address delivered by the Rev. F. W. Hope, after favourably commenting upon the character of the Society's Transactions, he suggested the propriety of members taking up the old theses of Linnæus and bringing down the subjects therein treated upon to the present state of the science. The injurious effects of insects upon agricultural and horticultural productions ought also to engage the attention of the members. He would also recommend the formation of committees, taking up and annually reporting upon the entomology of the various geographical districts: and he alluded to the great loss the Society and science had sustained by the deaths of Dr. Goodall, Mr. Vigors, and Major Gyllenhal.

It was announced that the caterpillar of one of the *Noctuidæ* which devours the roots of turnips should be again proposed as the subject of the essay for the prize of ten guineas, offered by the Society in conjunction with the Saffron Walden Agricultural Society.

The Rev. F. W. Hope also announced his intention of giving a prize of £10 for the best essay on the insects which attack apple and pear trees, with the best remedy for their destruction.

## LINNÆAN SOCIETY.

March 2, 1841.—Mr. Forster, V.P., in the Chair.

Read a "Note on the Preservation of Specimens of Natural History." By Hyde Clarke, Esq., F.L.S.

Mr. Clarke suggests the application of Payne's apparatus for the preservation of animal substances for domestic purposes, to the preservation of objects of Natural History. The apparatus consists of an iron cylinder, in which the subject for preparation is placed, and the air-tight cover screwed down. The air is then exhausted by means of an air-pump, and when a sufficient exhaustion has been effected, a cock is opened communicating with a vessel containing the antiseptic fluid, which, on being admitted, thoroughly penetrates the object to be preserved, impregnating even the marrow of the bones. He adds, that the proccss is useful not only for the prevention of putrefaction, but also in arresting its progress, the gases generated during putrefaction being expelled from the receiver along with the air, and their place supplied by the antiseptic.

March 16.—Mr. Brown, V.P., in the Chair.

Read "On an edible *Fungus* from Tierra del Fuego, and an allied Chilian species." By the Rev. M. J. Berkeley, M.A., F.L.S.

Mr. Berkeley describes these two species as constituting a new genus, which he characterizes as follows:—

CYTTARIA.

*Receptacula* carnoso-gelatinosa in stroma commune subglobosum, epidermide crassiusculâ vestitum, aggregata; basi stipitiformi granulatâ. *Cupula* peripherica, primò clausa, gelatinâ distenta, demùm epidermide ruptâ aperta. *Hymenium*, margine excepto, separabile. *Asci* ampli, demùm liberi, paraphysibus immixtis. *Velum* persistens, demùm ruptum, margine plùs minùs reflexo. *Sporidia* pallida.

Genus *Bulgariæ* affine, sed stromate pulvinato ex variis individuis composito *Sphæriam concentricam* quodammodo referens, et hymenio separabili valdè diversum. Certè ad seriem *Pezizarum* pertinet, perithecio spurio non obstante. Confer *Sphæriam monocarpam*, Schum. ad *Pezi-*

*zam rhizopodam* a clar. Friesio ascriptam. Nomen dedi a κυτταρος, ob superficiem fungi alveolatam.

1. *C. Darwinii*, vitellina globoso-depressa, cupulis parvis ore irregulari demùm apertis.

*Hab.* in *Fagum betuloidem* in Tierra del Fuego, Dec.-Jun.

2. *C. Berteroi*, pallidior irregularis, basi subelongatâ, cupulis majoribus; ore pentagono; margine fisso reflexo.

*Hab.* in Chili in *Fagum obliquam*, vere et æstate.

The first species is noticed by Mr. Darwin (from whom Mr. Berkeley obtained his specimens of both) at p. 298 of his 'Journal and Remarks,' forming the third vol. of the 'Narrative of the Voyages of the Adventure and Beagle'; and Mr. Berkeley gives from Mr. Darwin's MS. notes a more detailed account of his observations made upon the spot. The second species is referred to in a posthumous list of the plants collected by Bertero (originally published in the 'Mercurio Chileno,' and translated in Silliman's 'North American Journal,' vol. xxiii. p. 78), as forming, perhaps, "a new genus approximating to the *Sphæriæ*." A further account of this species also is extracted from Mr. Darwin's notes: it seems to be less eatable, and less frequently eaten than the first, which Mr. Darwin describes as forming a very essential article of food for the Fuegian.

Read also a "Letter from Joseph Woods, Esq., F.L.S., to Mr. Kippist, on *Crepis biennis* and *Barkhausia taraxacifolia*."

Mr. Woods is of opinion that the plant described by Sir James Smith in the 'English Flora' and 'English Botany,' by Sir W. J. Hooker in the 'British Flora,' by Mr. Babington in the Society's 'Transactions,' vol. xvii. p. 456, and by Mr. Mackay in his 'Irish Flora,' as *Crepis biennis*, is in reality *Barkhausia taraxacifolia*, distinguished especially by the long beak of its achenia, while those of *Crepis biennis* are, in the words of Gaudin, "neutiquam attenuata." The stem of *Crepis biennis* is also less branched and more leafy than that of *Barkhausia taraxacifolia*, the latter rarely producing a leaf except where there is a branch. Mr. Woods adds, that it is almost certain that we have the two species in England, though the difference has not been noticed. *Crepis biennis* grows in Kent and Surrey.

In a "Note" appended to Mr. Woods's letter, Mr. Kippist states that the authentic Linnean specimens of *Crepis biennis* from Scania, although too young to have ripe seeds, appear to confirm Mr. Woods's idea, the pappus being quite sessile even in those most advanced, and the stem moderately branched in the upper part, and very leafy below. The two specimens in the Smithian Herbarium, one from Mr. Crowe's garden and the other from Mr. Rose's Herbarium, have the stem much branched, and the pappus apparently sessile, but the achenia are immature.

The only developed specimen in Mr. Winch's herbarium is from Dartford in Kent, and has the pappus very decidedly stalked, the stem much branched in the upper part, and only a few scattered leaves in the lower, a branch being produced from the axilla of each cauline leaf with the exception of one or two of the lowermost.

Other specimens, gathered near Cobham and Ramsgate, in the same county, and near Moulsey in Surrey, agree with Mr. Winch's plant in their stalked pappus and branched stem, and probably therefore belong to *Barkhausia taraxacifolia*. The only British specimens in the Society's possession that Mr. Kippist believes to be referrible with certainty to *Crepis biennis* are two in the Hortus Siccus of Mr. Woodward, with ripe achenia and perfectly sessile pappus; the habitats of the plants are not given, but in all probability they were gathered either in Suffolk or Norfolk.

Read also an "Extract from a Letter to John Miers, Esq., F.L.S., from George Gardner, Esq.," dated Rio de Janeiro, Dec. 16, 1840, in which Mr. Gardner gives some account of his journeys in the interior of Brazil, and of the collections made by him subsequent to May last.

April 6.—Mr. Forster, V.P., in the Chair.

Read, an Extract of a Letter from J. Burnham, Esq., to Hyde Clarke, Esq., F.L.S., on a supposed new British *Juncus*.

Read also the commencement of "An Appendix or Supplement to a Treatise on the *Œstri* and *Cuterebræ* of various Animals." By Bracy Clark, Esq., F.L.S., Corresp. Memb. of the French Institute.

April 20.—Mr. Brown, V.P., in the Chair.

His Grace the Duke of Northumberland, F.L.S., sent for exhibition a specimen of the fruit of *Chrysophyllum monopyrenum*, Sw., from his living collection at Syon House.

W. Felkin, Esq., F.L.S., sent for exhibition specimens of Sea-Island Cotton grown in a cotton-mill situate in the centre of Manchester, accompanied by a Notice of the circumstances under which the experiment was made. The details have been given in the Transactions of the British Association.

Read the conclusion of Mr. Bracy Clark's "Appendix or Supplement to a Treatise on the *Œstri* and *Cuterebræ* of various Animals."

The first memoir to which this paper is intended as an Appendix appeared in the third volume of the Linnæan Transactions, published in 1796. This memoir was republished by the author with considerable additions in 1815, and a Supplement was added in the following year. Since that period much has been published on the subject, and Mr. Clark is desirous in consequence of making some additions and corrections to his former publications.

After adding to and modifying some of the passages contained in them, he examines the validity of several species of the genus *Œstrus* proposed by writers. He suspects *Œ. Trompe* of Modeer and *Œ. ericetorum* of Leach to be severally the males of *Œ. Tarandi* and *Œ. Bovis*. He believes *Œ. Pecorum* of Fabricius to be only a dark-coloured variety of *Œ. nasalis*, L. (*Œ. veterinus*, B. Cl.); and is satisfied by an examination of the original specimen, that Dr. Leach's *Œ. Clarkii* is nothing more than a very light-coloured variety of the same species. He also regards *Œ. lineatus* of Villars as synonymous with *Œ. Bovis*.

Referring to Latreille's account of the genus in Cuvier's 'Règne

Animal,' he points out some omissions with regard to the habits and œconomy of *Œ. Equi* and *Œ. hemorrhoidalis*, and objects to the statement that the eggs of the latter are deposited on the verge of the anus of the animal attacked. He strongly deprecates the opinion of Pallas and Latreille, that there exists a proper human *Œstrus*, which he regards as altogether founded in error; and believes the larva figured in illustration of a supposed case of the kind published by Mr. Howship, to be that of *Œ. Bovis*.

Lastly, he describes three species, added to the genus *Œstrus* since the publication of his Treatise, viz. *Œ. pictus* of Megerle, *Œ. Libycus* of Rüppel, and *Œ. Clarkii* of Shuckard. The following are the characters of the latter species, figures of which, and of *Œ. Libycus*, accompany the paper:—

*Œ. Clarkii*, cærulescenti-fuscus, alis obscuris anticè sinuatis basin versus atro-bipunctatis.

*Hab.* ad Caput Bonæ Spei.

He adds also a description of a new species of his genus *Cuterebra*, with the following characters:—

*C. fontanella*, thorace atro lateribus albis, abdomine violaceo: segmentis ultimis albis nigro-punctatis.

*Hab.* in Illinois Americæ Borealis, cuniculis præcipuè infesta.

May 4.—Mr. Brown, V.P., in the Chair.

Read the commencement of "Remarks on some new or rare Species of Brazilian Plants." By Charles James Fox Bunbury, Esq., F.L.S.

May 24.—The Bishop of Norwich, President, in the Chair.

This day, the Anniversary of the birth-day of Linnæus, and that appointed by the Charter for the Election of Council and Officers, the President opened the business of the Meeting, and stated the number of Members whom the Society had lost during the past year. The following is a list of the Members who have died within that period, acccompanied with notices of some among them.

*Francis Bauer, Esq., F.R.S., &c.*, was born at Feldsberg, in Austria, on the 4th of October, 1758. His father, who held an appointment as painter to Prince Lichtenstein, died while he was yet a boy, and the care of his education devolved upon his mother. So early was his talent for botanical drawing manifested, that the first published production of his pencil, a figure of *Anemone pratensis*, L., is appended to a dissertation by Störck 'de Usu Pulsatillæ nigricantis,' which bears date in 1771.

In 1788 he came to England in company with the younger Jacquin, and after visiting his brother Ferdinand, who was then engaged in completing the beautiful series of drawings since published in the 'Flora Græca,' was about to proceed to Paris. But the liberal proposals made to him by Sir Joseph Banks on the eve of his intended departure, diverted him from this resolution, and induced him to remain in England and to take up his residence in the neighbourhood of the Royal Garden at Kew, in which village he continued to dwell until the termination of his life. It was the opinion of Sir Joseph Banks, that a botanic garden was incomplete without a draughtsman permanently attached to it, and he accordingly, with the sanction of His Majesty, fixed Mr. Bauer in that capacity at Kew, himself defraying the salary during his own life, and providing by his will for its continuance to the termination of that of Mr. Bauer. In fulfilment of this engagement with Sir Joseph, Mr. Bauer made numerous drawings and sketches of the plants of the garden, which are now preserved in the British Museum. A selection from his drawings was published in 1796 under the title of 'Delineations of Exotick Plants cultivated in the Royal Garden at Kew,' and this was intended to be continued annually; but no more than three parts, consisting wholly of Heaths, and containing thirty plates, were published.

In the early part of 1801, Mr. Bauer made for Mr. Brown, who had then been for some years engaged in a particular study of the Ferns, drawings of many genera of that family which Mr. Brown regarded as new. His drawings of *Woodsia*, made some years afterwards, were published in the 11th volume of our Transactions, in illustration of Mr. Brown's paper on that genus. At a later period he again directed his attention to that tribe of plants, his labours in which have within these few years been given to the world in Sir William Jackson Hooker's 'Genera of Ferns.' The 13th volume of our Transactions is enriched with his elaborate drawings accompanying Mr. Brown's memoir on *Rafflesia*; and the part published last year contains a paper by Mr. Bauer 'On the Ergot of Rye,' from materials collected between the years 1805 and 1809.

The plate which accompanies the last-mentioned paper is derived from drawings which form part of an extensive series in the British Museum, illustrative of the structure of the grain, the germination, growth and development of wheat, and the diseases of that and other *Cerealia*. This admirable series of drawings constitutes perhaps the most splendid and important monument of Mr. Bauer's extraordinary talents as an artist and skill in microscopic investigation. The subject was suggested to him by Sir Joseph Banks, who was engaged in an inquiry into the disease of Corn known under the name of "Blight," and the part of Mr. Bauer's drawings which relates to that disease was published in illustration of Sir Joseph's memoir on the subject, and has been several times reprinted with it. Mr. Bauer has himself given, in the volume of the 'Philosophical Transactions' for 1823, an account of his observations on the *Vibrio Tritici* of Gleichen, with the figures relating to them; and another small portion of his illustrations of the Diseases of Corn has since been published by him in the 'Penny Magazine' for 1833. His figures of a somewhat analogous subject, the Apple-blight and the Insect producing it, accompany Sir Joseph Banks's Memoir on the Introduction of that Disease into England, in the 2nd volume of the 'Transactions of the Horticultural Society.'

Before the close of the last century Mr. Bauer commenced a series of drawings of *Orchideæ*, and of the details of their remarkable structure, to which he continued to add, as opportunities offered, nearly to the termination of his life. A selection from these, which form one of the most beautiful and extensive series of his botanical drawings, was lithographed and published by Professor Lindley between the years 1830 and 1838, under the title of 'Illustrations of Orchidaceous Plants.'

His other published botanical works are: 1. The first part, published in 1818, of 'Strelitzia Depicta,' a work intended to comprise figures of all the known species of that magnificent genus; 2. 'Microscopical Observations on the Red Snow' brought from the Arctic Regions by Capt. Ross, the globules contained in which, by some regarded as an *Alga*, he described in the 7th volume of the 'Quarterly Journal' of the Royal Institution as a species of *Uredo*; 3. 'Some Experiments on the *Fungi* which constitute the colouring matter of the Red Snow,' published in the 'Philosophical Transactions' for 1820; and 4. The Plates to the Botanical Appendix to Captain Parry's first Voyage of Discovery, published in 1821. One of the last productions of his pencil, illustrating the structure of a plant growing at Kew which produces perfect seeds without any apparent action of pollen, will appear in the forthcoming part of our Transactions.

In the year 1816 he commenced lending the assistance of his pencil to the late Sir Everard Home in the various anatomical and physiological investigations in which that distinguished anatomist was engaged; and in the course of ten or twelve years furnished, in illustration of his numerous papers in the 'Philosophical Transactions,' upwards of 120 plates, which were afterwards reprinted with Sir Everard's 'Lectures on Comparative Anatomy.' These plates, which form together the most extensive series of his published works, embraced a great variety of important subjects, chiefly in microscopic anatomy, and afford abundant evidence of his powers of observation and skill in depicting the most difficult objects.

It is this rare and previously almost unexampled union of the observer and the artist that has placed Mr. Bauer foremost in the first rank of scientific draughtsmen. His paintings, as the more finished of his productions may well be termed, are no less perfect as models of artistic skill and effect, than as representations of natural objects. Of all his predecessors, Ehret alone approaches him in these particulars; among his contemporaries, none but his brother Ferdinand can be regarded as his equal.

Mr. Bauer became a Fellow of the Linnean Society in 1804, and of the Royal Society in 1820. He died at his residence on Kew-Green on the 11th of December last, in the 83rd year of his age; and was buried in the church-yard of that parish on the 16th of the same month. [See also p. 77 of the present volume.]

*Sir Anthony Carlisle, Knt., F.R.S., &c.*, a distinguished surgeon and physiologist, was born at Stillington, in the county of Durham, on the 8th of February, 1769, and received his early professional education partly at York and partly at Durham. He afterwards came to London, entered himself as a student at the Hunterian School under Cruickshank and Baillie, and became a resident pupil to Watson, whom he succeeded as one of the Surgeons of the Westminster Hospital in 1793. On the retirement of Sheldon, in 1808, he became Professor of Anatomy to the Royal Academy, and retained that office until 1824. He was also a member of the Council and of the Court of Examiners of the Royal College of Surgeons, of which College he was twice President. At the accession of George the Fourth he was knighted as a mark of acknowledgment to his professional skill. He died at his house, in Langham Place, on the 2nd of November last, and was buried in the Cemetery at Kensal Green.

Mr. Carlisle became a Fellow of the Linnean Society in 1792, and of the Royal Society in 1804; and his most important contributions to Natural Science are contained in the Transactions of these Societies. His paper on the Structure and Œconomy of *Tæniæ*, in the second volume of our Transactions, is probably the first attempt to illustrate the structure of *Entozoa* by artificial injections, and established, among other points, the non-existence of an anus in the *Tæniæ*. At this early period, Mr. Carlisle anticipated M. Virey's idea of the state of the nervous system in the lowest animals, on which the chief character of Mr. MacLeay's *Acrita* is founded, ascribing to the *Tæniæ* a diffused condition of the nervous substance, and referring to John Hunter as having, in his lectures, applied that character to many of the lower tribes of animals.

Of his papers in the 'Philosophical Transactions,' the first in importance and originality is the memoir 'On the peculiar arrangement of the Arteries in Slow-moving Animals;' and it is on the striking discovery detailed in it that his memory as a comparative anatomist will chiefly rest. His paper on the Physiology of the Stapes, published in the volume for 1805, affords a good example of the application of Comparative Anatomy to the elucidation of a difficult physiological question; almost all the facts contained in it relating to the form and structure of the stapes in various animals were new. The Comparative Anatomy and Physiology of the Organ of Hearing formed the subject of his Lectures at the College of Surgeons in 1818.

His Lectures on Extra-vascular Substances, also delivered at the College of Surgeons, but of which an abstract only of a small portion was published in the 'Annals of Philosophy,' are alluded to in high terms by Mr. Lawrence. In 1820, and again in 1826, he delivered the Hunterian Orations at the College. The latter of these, containing the Anatomy of the Oyster, has been quoted in reference to the observations which indicate the sensibility of the Oyster to light. He also spent much time in experiments on the growth and reparation of Shell. In the prosecution of his various inquiries he enriched the Museum of the College with some unique examples of his peculiar anatomical skill.

Besides these contributions to Comparative Anatomy and Animal Physiology, Mr. Carlisle communicated to the Horticultural Society a memoir 'On the connection between the Leaves and Fruit of Vegetables, with other Physiological Observations,' and another paper published in the 2nd volume of the Transactions of that Society.

*The Bishop of Chichester.*

*Lord Henry John Spencer Churchill.*

*Sir John William Lubbock, Bart.*

*The Rev. Thomas Rackett, M.A., F.R.S., &c.*, during a long life successfully cultivated various branches of Natural Science and the liberal arts. Associated in his school-days with Hatchett, and afterwards with Maton, Pulteney and Cavallo, he became attached to the pursuits by which his friends were distinguished, and assisted warmly in the promotion of their views. In the years 1794 and 1796, he accompanied the two former in the tours which Dr. Maton subsequently published under the title of 'Observations relative chiefly to the Natural History, Picturesque Scenery, and Antiquities of the Western Counties of England,' and furnished with his pencil the embellishments of that work, which was inscribed to him in a friendly and grateful dedication. In conjunction with Dr. Maton, he published in the 7th volume of our Transactions 'An Historical Account of Testaceological Writers,' and in the 8th 'A Descriptive Catalogue of the British Testacea.' These works may be justly characterized as manifesting extensive research, careful comparison, and accurate observation: the latter long continued to be the textbook of British Conchologists. Dr. Maton and himself also published in our 8th volume 'An Account of some remarkable Shells found in cavities of a Calcareous Stone, called by the stone-masons *Plymouth-Rag*;' and he subsequently contributed to the 11th volume 'Observations on *Cancer salinus*,' and to the 12th, 'Observations on a Viper found in Cranborne Chace, Dorsetshire,' which he presumed to be *Coluber Chersea*, L. In addition to his skill in the use of the pencil, he was an accomplished musician, and devoted much of his time to antiquarian research, as well as to the prosecution of Natural and Experimental Philosophy.

Mr. Rackett became a Fellow of the Linnean Society in 1795, and of the Royal Society in 1803. In the year 1780 he was instituted to the Rectory of Spettisbury and Charlton, in the county of Dorset, and died on the 29th of November last, at the advanced age of 85, after an incumbency of more than sixty years.

*The Rev. John Revett Sheppard, M.A.*

*Lord Viscount Valentia.*

*Nicholas Aylward Vigors, D.C.L., F.R.S., M.R.I.A., &c.*, one of the most eminent ornithologists of the present day, was born in 1787 at Old Leighlin, in the county of Carlow, where his family had long been settled. He was educated at Trinity College in the University of Oxford, and gave early proof of the diligence and success with which he pursued his classical and literary studies, by publishing in 1810 'An Enquiry into the Nature and Extent of Poetick Licence.' Towards the close of 1809 he purchased an Ensigncy in the Grenadier Guards, and was severely wounded in the action at Barrosa, in the early part of 1811. On his return to England in the same year he quitted the army, and for the next twenty years devoted himself to the study of Zoology, and especially of birds and insects. In both these departments he formed extensive collections, and at a subsequent period liberally presented them to the Zoological Society, of which he was the first Secretary and one of the most zealous and active promoters. On the death of his father he succeeded to the family estate, and in 1832 became the representative in Parliament of the borough of Carlow, for which, or for the county of the same name, he continued to sit until the termination of his life on the 26th of last October.

Mr. Vigors became a Fellow of this Society in 1819, and is author of an important paper in the 14th volume of our Transactions, 'On the Natural Affinities that connect the Orders and Families of Birds.' In this elaborate memoir he applied to the whole Class of Birds the principles of the quinary arrangement propounded by Mr. W. S. MacLeay in the 'Horæ Entomologicæ,' of which he continued through life to be one of the most ardent supporters. In the succeeding volume he published, in conjunction with Dr. Horsfield, the first part of 'A Description of the Australian Birds in the collection of the Linnean Society, with an attempt at arranging them according to their Natural Affinities,' in which the same principles were further developed and applied to the illustration of the Raptorial and Insessorial Orders. His only other contribution to our Transactions consists of a 'Description of a new Species of *Scolopax* lately discovered in the British Islands; with Observations on the *Anas glocitans* of Pallas, and a description of the Female of that Species,' contained in the 14th volume.

The first of his papers in the 'Zoological Journal' appeared in 1824; in 1827 he became its principal editor, and so continued until its termination in 1834. Of his numerous ornithological memoirs published in that work, perhaps the most important is his 'Arrangement of the Genera of Birds;' which, although scarcely more than a bare enumeration of names, contains the most complete outline of his views on the subject of classification. Some of his notices in the 'Zoological Journal' are on Entomological subjects; and several valuable papers, written in conjunction with Dr. Horsfield, are descriptive of new or rare Mammalia in the collection of the Zoological Society. For several years before his death the active part which he took in politics precluded his paying much attention to Zoology, but he retained to the last a considerable interest in his former pursuits, especially in connexion with the Zoological Society. He contributed many valuable notices to the 'Proceedings' of that Society.

*Major-General Viney.*

*Robert Montague Wilmot, M.B.*

*Rev. William Wood, B.D.*, and

*Francis Boucher Wright, Esq.*

Among the *Associates*

*Henry Woods, Esq.*, a surgeon, formerly resident at Bath, and subsequently at Camden Town, near London, who was well versed in the study of the Mammalia, a 'Natural History' of which he was for many years engaged in preparing for the press. This work, which was intended to be on a very extensive scale, has never appeared. He was author of 'An Introductory Lecture on the Study of Zoology,' of a memoir 'On a new Species of Antelope,' in the 5th volume of the 'Zoological Journal,' and of one or two notices in the 'Proceedings of the Zoological Society.' A few years before his death he quitted the neighbourhood of London and returned to Bath, where he became Secretary to the Literary Institution, and died on the 18th of August last, at the age of 46.

## MISCELLANEOUS.

*Third Meeting of the Men of Science of Italy.*—The men of science of Italy have selected Florence as the place of their third meeting, as well from its being the place which, after having given birth to the revival of literature and the arts, was the cradle of experimental philosophy, as from its being the royal seat where was first entertained the thought of this new and great institution, and in which a high-minded prince has raised to the divine Galileo a temple wherein his manuscripts and apparatus will be preserved as a large part of the glorious inheritance of Italy.

It occurred to every one that the friends of science assembled in Florence, in the midst of such numerous splendid monuments of art and science of past and present times, would feel incited by these recollections to pursue the course gloriously opened by our forefathers, and by so doing would pay the deserved tribute of their gratitude to the prince who encouraged the progress of the sciences, and promoted the honour of his country.

It is satisfactory to announce, that the Grand Duke, our sovereign, approving the selection of his capital for the place of the third meeting of the Italian Savans, and having promised to aid its objects in every manner with his royal bounty and patronage, permits that the meeting should commence the 15th of September, 1841, to continue to the end of that month.

The regulations determined on at the first meeting in Pisa have conferred the right of taking part in the scientific meeting on the Italians belonging to the principal academies or scientific societies for the advancement of natural knowledge; the professors of the physical and mathematical sciences; the directors of the higher branches of study, or of the scientific establishments of the various states of Italy; and the chief officers of the corps of engineers and artillery. Foreigners coming under any of the above descriptions will be also admitted to the meeting.

We feel sure that our brethren who enjoy the privilege of attending the meeting will gladly avail themselves of it, and thus contribute to the great advantages which it confers upon the whole body of speculative and practical sciences It is hoped that the invitation to scientific foreigners will prove not less effectual, as the estimation in which they hold Italian science is a pledge that they will be anxious to witness all that Italy has done and is doing, and to afford their cooperation in the noble undertaking.

A future advertisement will announce the final and special arrangements for the meeting and for the accommodation of those who may attend it. In the mean time, it is satisfactory to state that there have been elected to the office of Assessors, Prof. Gaetano Georgini, Superintendent of the Studies of the Grand Duchy, and Cav. Giuseppe Gazzeri, Prof. in the University of Pisa.

Florence, Dec. 28, 1840.

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| The President General, | The Secretary General, |
| Marchese Cosimo Ridolfi. | Cav. Ferdinando Tarturi. |

*Dr. Lush on the Madi, or Chili Oil-seed,* Madia sativa.—"We insert a paper by Dr. Lush, of the Medical Establishment of this Presidency, which brings to notice a new seed, called the 'Madi, or Chili Oil-seed,' which promises to be a valuable adjunct to the plants of that class in this country. It appears to flourish in a high and dry land, and will probably succeed in the Deccan and Southern Mahratta country. Dr. Lush has presented it to the Agricultural and Horticultural Society in Bombay, by whom it will be tested and its uses fully developed.

"The demand which now exists for oil-seeds from British India has caused much attention to be drawn towards such products as may be raised in sufficient quantities, and at such a price, as may ensure them a permanent place among Indian exports to England. On the western side, or the districts under Bombay, we find, that for field produce as oil-seeds we must look out for such articles of cultivation as will not require irrigation, seeing that the sesamum, the kerday, the linseed, and the castor-oil are all produced in different districts of our Presidency as dry crops. Besides those already mentioned, we find a quickly-growing plant in the Deccan, sown usually with the ordinary crops of bajree and pulse, viz. the *Verbesina sativa* (since called *Guizotia oleifera*), or Black Til. This plant is valuable to the natives from its quick and hardy growth in a dry climate and scanty monsoon; but from the small quantity of oil in proportion to the bulk, and the inferior quality of that oil, it is not a plant likely to attract attention beyond local wants.

"The Madi (*Madia sativa*) is a plant of the same habit, and allied in botanical characters to the *Verbesina.* It has lately been grown in England by one or two experimentalists, in the hope of obtaining an indigenous oil of a superior quality. Professor Lindley, who has grown a portion at the Horticultural Society's garden at Chiswick, is of opinion that the climate of England is too damp and cold for the Madi; and on my requesting to be furnished with seed for trial in the dry parts of India, he kindly sent me a liberal supply (which I have brought here overland), and agrees with me in the opinion that it will stand a good chance in the high and dry lands of the Deccan and other similar districts of India. A plant requiring no more care in the cultivation than the black til of the Deccan, and producing an oil second only to that of the almond and olive, and superior to the sesamum (the common 'sweet oil' of Western India), must prove a valuable addition to the produce of the country, and as such I commit it to the care of the Agricultural and Horticultural Society of Bombay without further recommendation, merely subjoining a notice of what has already been mentioned by authors about this hitherto neglected plant.

"DeCandolle, in his 'Prodromus,' gives a full description of the plant, and notices shortly that the seed is used for making an oil. This oil, however, does not seem to have attracted the notice of commercial persons, and the only account of it I could procure in London was kindly pointed out to me by my friend Professor Don, in a work published in the year 1711 (in the library of the Linnaean Society of

London), 'Histoire des Plantes Médicinales de Perou et de Chili,' by Mons. Feuillée. Of this account the following is a translation :

"'An admirable oil is made from the seeds of this plant throughout all Chili. The natives make use of it not only as a local application to assuage pain, anointing with it the parts affected, but also as a condiment, and besides for burning in lamps. I found it,' says M. Feuillée, 'sweeter and of a more agreeable taste than the greater part of our olive oils ; its colour is the same. There are no olives in Chili, and whatever olive oil is found there is brought from Peru, where a large quantity is made.'

"I beg to present the Society with an original coloured drawing of this plant, made for me in August last at Chiswick, by Mr. Hart, lately draughtsman to the Botanical Register.—CHARLES LUSH, M.D." *Bombay Gazette, 26th November*, 1840.

*Diurnea Novembris*, November Dagger.—Several specimens of both sexes of this insect I have taken in this neighbourhood ; the males fly in quest of the females towards midday. I could only find them in copulation upon the blades of grass, although at other times they rest upon the balls of the oaks. The 11th of October was the time when they first appeared, and continue for three weeks.—ROBERT S. EDSETON.

11 Derby Street, Cheetham, Manchester.

## METEOROLOGICAL OBSERVATIONS FOR MAY 1841.

*Chiswick.*—May 1. Fine : very hot : clear. 2. Very fine : cloudy. 3. Rain. 4. Foggy : cloudy and fine : very heavy fall of rain at night. 5. Rain : cloudy and fine : lightning at night. 6. Rain : cloudy. 7. Fine : rain. 8. Heavy showers. 9, 10. Very fine. 11. Overcast : slight rain at night. 12. Cloudy and fine. 13. Fine. 14—16. Very fine. 17. Cloudy and windy. 18. Fine. 19. Rain with strong wind. 20. Boisterous : showery : cold at night. 21. Dry haze : rain. 22. Showery and mild. 23. Slight haze : cloudy and fine. 24. Fine. 25. Very fine. 26. Hot and dry. 27. Sultry : much sheet lightning at night, with occasionally some of the zigzag and forked kind, together with thunder, and abrupt showers falling in large drops. 28. Sultry : very fine. 29. Very fine : lightning at night. 30, 31. Overcast and very fine.

*Boston.*—May 1. Fine : therm. 66° half-past 2 P.M. 2. Cloudy : rain with thunder and lightning P.M. 3. Cloudy. 4. Cloudy : rain early A.M. 5. Rain. 6. Cloudy : rain early A.M. 7. Cloudy : rain P.M. 8. Rain. 9. Fine. 10. Cloudy. 11. Fine : therm. 72° 3 o'clock P.M. : rain P.M. 12. Cloudy. 13. Fine. 14. Cloudy. 15. Fine : therm. 69° 3 o'clock P.M. 16. Fine. 17. Cloudy : rain P.M. 18. Cloudy. 19. Rain : stormy P.M. 20. Stormy : rain A.M. and P.M. 21. Fine. 22. Cloudy : rain early A.M. 23. Cloudy. 24—27. Fine. 28. Cloudy : therm. 79° 3 o'clock P.M. : rain P.M. 29. Fine. 30. Cloudy. 31. Fine. N.B. This May month has been warmer than any preceding May month since 1834.

*Applegarth Manse, Dumfries-shire.*—May 1. Fair and fine : thunder. 2. Drizzling afternoon. 3. Fair : frosty : hail. 4. Rain all day. 5. Rain occasionally. 6. Fair and fine. 7. Rain for four hours. 8. Rain P.M. : thunder. 9. Fair till night : rain P.M. 10. Fair but cloudy. 11. Wet A.M. : cleared up. 12—15. Fair and fine. 16, 17. Wet nearly all day. 18, 19. Showers A.M., then fine. 20. Showers. 21. Fair and fine. 22. Wet A.M. : fine P.M. 23. Fair but gloomy. 24. Fine summer day. 25, 26. Bright and cool. 27. Parching wind and hot sun. 28. Fine : rained a little. 29. Fair and fine. 30. Soft rain from eleven to four. 31. Fine summer day.

*Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary,* Mr. ROBERTON; *by* Mr. THOMPSON *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. VEALL *at Boston, and by* Mr. DUNBAR *at Applegarth Manse, Dumfries-shire.*

| Days of Month. 1841. May. | Barometer. | | | | | | Thermometer. | | | | | | | | Wind. | | | | Rain. | | | | Dew-point. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | London: Roy. Soc. 9 a.m. | Chiswick. | | Boston. 8½ a.m. | Dumfries-shire. | | London: Roy. Soc. | | | Chiswick. | | Boston. 8½ a.m. | Dumfries-shire. | | London: Roy. Soc. 9 a.m. | Chiswick 1 p.m. | Bost. | Dumfries-shire. | London: Roy. Soc. 9 a.m. | Chiswick. | Boston. | Dumfries-shire. | Lond.: Roy. Soc. 9 a.m. |
| | | Max. | Min. | | 9 a.m. | 8½ p.m. | Fahr. 9 a.m. | Self-register. Max. | Self-register. Min. | Max. | Min. | | Max. | Min. | | | | | | | | | |
| 1. | 30·040 | 29·998 | 29·794 | 29·44 | 29·90 | 29·68 | 57·8 | 67·2 | 47·0 | 76 | 42 | 58 | 65 | 40 | NE. | E. | calm | SW. | ... | ... | ... | ... | 52 |
| 2. | 29·720 | 29·674 | 29·640 | 29·00 | 29·56 | 29·60 | 61·7 | 70·4 | 53·2 | 76 | 45 | 61 | 55½ | 45½ | S. | SW. | calm | SE. | ... | ·25 | ... | ... | 57 |
| 3. | 29·772 | 29·780 | 29·716 | 29·18 | 29·66 | 29·66 | 47·7 | 71·5 | 47·2 | 50 | 43 | 49 | 51 | 32½ | N. | NE. | calm | SE. | ·375 | ·30 | ·36 | ... | 52 |
| 4. | 29·628 | 29·609 | 29·480 | 29·13 | 29·48 | 29·25 | 53·7 | 54·8 | 45·3 | 69 | 50 | 46 | 51 | 40 | E. | S. | SE. | SE. | ·250 | ·70 | ·04 | ... | 49 |
| ○ 5. | 29·464 | 29·571 | 29·399 | 28·85 | 29·15 | 29·25 | 55·4 | 66·0 | 52·0 | 62 | 46 | 53 | 59½ | 49½ | SE. | SW. | calm | SW. | ·719 | ·15 | ·25 | ... | 55 |
| 6. | 29·556 | 29·774 | 29·495 | 28·91 | 29·31 | 29·42 | 57·8 | 61·3 | 53·0 | 65 | 43 | 57·5 | 55½ | 45½ | S. | SW. | W. | S. | ·077 | ·02 | ·08 | ... | 55 |
| 7. | 29·746 | 29·708 | 29·528 | 29·18 | 29·50 | 29·38 | 59·2 | 64·6 | 49·7 | 66 | 47 | 53 | 58 | 45 | S. | S. | calm | SW. | ·019 | ·10 | ... | ... | 56 |
| 8. | 29·548 | 29·581 | 29·491 | 28·92 | 29·38 | 29·55 | 57·5 | 66·6 | 52·5 | 62 | 44 | 54 | 59 | 35 | S. | SW. | W. | SSW. | ·116 | ·16 | ·36 | 0·80 | 54 |
| 9. | 30·094 | 30·097 | 30·008 | 29·44 | 29·75 | 29·80 | 56·3 | 72·2 | 47·3 | 65 | 50 | 56·5 | 55 | 37 | S. | SW. | W. | SW. | ·044 | ... | ·02 | ... | 52 |
| 10. | 30·180 | 30·153 | 30·117 | 29·50 | 29·73 | 29·80 | 60·2 | 63·3 | 53·0 | 65 | 46 | 59 | 56 | 46 | S. | SW. | W. | WSW. | ... | ... | ... | ... | 53 |
| 11. | 30·094 | 30·054 | 30·003 | 29·45 | 29·75 | 29·87 | 62·2 | 63·8 | 51·6 | 77 | 46 | 64 | 56½ | 50½ | S. | S. | SW. | S. | ... | ·01 | ... | ... | 55 |
| 12. | 30·190 | 30·247 | 30·128 | 29·55 | 30·06 | 30·19 | 57·0 | 70·7 | 53·0 | 62 | 39 | 55·5 | 57 | 40 | NNW. | NE. | calm | WSW. | ·019 | ... | ·05 | ... | 56 |
| ☾ 13. | 30·388 | 30·330 | 30·314 | 29·77 | 30·25 | 30·26 | 55·7 | 63·4 | 47·5 | 66 | 36 | 58 | 60½ | 39 | N. | NE. | calm | SW. | ... | ... | ... | ... | 52 |
| 14. | 30·424 | 30·364 | 30·262 | 29·83 | 30·23 | 30·11 | 53·7 | 63·6 | 46·3 | 65 | 40 | 55 | 62½ | 43½ | NE. | NE | calm | SW. | ... | ... | ... | ... | 49 |
| 15. | 30·244 | 30·194 | 30·043 | 29·59 | 30·00 | 29·84 | 59·7 | 69·4 | 48·7 | 74 | 40 | 61 | 59 | 44 | S. | W. | calm | S. | ... | ... | ... | ... | 52 |
| 16. | 29·968 | 29·911 | 29·674 | 29·24 | 29·60 | 29·49 | 53·7 | 66·0 | 49·0 | 74 | 49 | 60 | 56½ | 46½ | SSW. | SW. | W. | WSW. | ... | ... | ... | 0·64 | 50 |
| 17. | 29·664 | 29·632 | 29·518 | 28·93 | 29·20 | 29·10 | 58·3 | 70·0 | 52·3 | 68 | 45 | 55·5 | 56 | 46½ | S. | SW. | SW. | SW. | ... | ·01 | ... | ... | 55 |
| 18. | 29·610 | 29·553 | 29·531 | 28·90 | 29·15 | 29·26 | 57·8 | 63·0 | 49·4 | 66 | 46 | 57 | 56½ | 46 | S. | SW. | W. | SW. | ... | ·02 | ·02 | ... | 54 |
| 19. | 29·406 | 29·674 | 29·280 | 28·77 | 28·98 | 28·85 | 55·3 | 65·7 | 51·3 | 60 | 47 | 52 | 58 | 45 | S. | S. | NW. | S. | ... | ·15 | ·06 | ... | 53 |
| ● 20. | 29·328 | 29·578 | 29·253 | 28·65 | 28·83 | 29·20 | 58·2 | 59·6 | 50·7 | 61 | 39 | 54 | 56½ | 45 | W. | SW. | SW. | W. | ·075 | ·06 | ... | ... | 53 |
| 21. | 29·702 | 29·647 | 29·526 | 29·19 | 29·51 | 29·64 | 58·7 | 67·7 | 48·4 | 69 | 54 | 57·5 | 59 | 43½ | ENE. | E. | calm | SW. | ·044 | ·16 | ·09 | ... | 52 |
| 22. | 29·672 | 29·811 | 29·607 | 29·10 | 29·70 | 29·80 | 59·7 | 65·8 | 56·5 | 68 | 43 | 55 | 61 | 48 | N. | S. | calm | SW. | ·133 | ·01 | ·02 | ... | 54 |
| 23. | 30·040 | 30·159 | 29·994 | 29·45 | 29·90 | 30·05 | 58·3 | 64·2 | 53·7 | 75 | 46 | 56 | 61 | 49 | S. | SE. | calm | E. | ... | ... | ... | ... | 54 |
| 24. | 30·242 | 30·180 | 30·137 | 29·61 | 30·10 | 30·10 | 63·5 | 70·3 | 53·6 | 70 | 51 | 65 | 65½ | 49 | NE. | E. | calm | SW. | ... | ... | ... | ... | 55 |
| 25. | 30·220 | 30·165 | 30·133 | 29·69 | 30·25 | 30·27 | 63·5 | 70·6 | 55·8 | 73 | 54 | 65·5 | 64 | 43 | N. | NE. | E. | E. | ... | ... | ... | ... | 61 |
| 26. | 30·146 | 30·070 | 29·955 | 29·58 | 30·17 | 30·03 | 67·7 | 70·0 | 55·0 | 80 | 58 | 61 | 67 | 46½ | NE. | NE. | E. | E. | ... | ... | ... | ... | 62 |
| ☽ 27. | 29·960 | 29·882 | 29·823 | 29·35 | 29·95 | 29·85 | 71·7 | 79·4 | 62·0 | 82 | 60 | 69 | 78 | 51 | NE. | NE. | calm | NE. | ... | ·03 | ... | ... | 66 |
| 28. | 30·000 | 30·038 | 29·893 | 29·20 | 29·80 | 29·90 | 70·3 | 79·0 | 64·8 | 80 | 51 | 68 | 72 | 50 | SSE. | SW. | calm | SW. | ·116 | ... | ... | 1·80 | 65 |
| 29. | 30·186 | 30·096 | 30·061 | 29·48 | 30·00 | 30·00 | 65·7 | 78·3 | 57·7 | 72 | 54 | 67 | 63 | 52½ | NW. | N. | calm | SW. | ... | ·03 | ·05 | ... | 55 |
| 30. | 30·078 | 30·016 | 29·979 | 29·44 | 30·02 | 29·95 | 61·5 | 71·9 | 58·0 | 74 | 49 | 65·5 | 63 | 42 | NW. | NW. | N. | SW. | ... | ... | ... | ... | 59 |
| 31. | 30·086 | 30·042 | 29·995 | 29·43 | 29·78 | 29·90 | 66·7 | 78·6 | 57·3 | 78 | 49 | 66 | 68 | 42 | S. | W. | W. | SE. | ... | ... | ... | | 62 |
| Mean. | 29·916 | 29·922 | 29·799 | 29·28 | 29·700 | 29·711 | 59·6 | 68·0 | 52·4 | 69·35 | 46·83 | 58·5 | 60·2 | 44·4 | | | | | Sum. 1·987 | 2·16 | 1·42 | 3·24 | Mean. 55 |


1 Coryne squamata. 3.4 Sertularia Margarita
2 Hermia glandulosa 5. . . pumila.

THE ANNALS

AND

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## XLIV.—*On* Gloionema paradoxum. By the Rev. M. J. Berkeley, M.A., F.L.S.

[With a Plate.]

The genus *Gloionema* has been long considered as consisting of productions of a very doubtful nature. Some of its species indeed have been rejected as the ova of insects; but notwithstanding the communication of Roberge* to the Linnæan Society of Paris, who is stated to have proved by repeated experiments that *Gloionema paradoxum* is not a vegetable, the species is still retained by Agardh†. Kützing‡ also, who rejects the other species as ova, though he refers to Agardh's treatise, and therefore must have known of Roberge's experiments, still retains this, and has published it as an alga in his 'Decades.' Kützing, indeed, informs us that he kept his specimens in water for many weeks or even months without obtaining any positive result; and Prof. Nitzsch, to whom he communicated the production, was not more successful.

No detail of M. Roberge's experiments, as far as I am aware, has as yet been published; I have therefore no hesitation in offering to public notice my own observations, made at the end of last May, which completely confirm the report of Roberge, and which must be considered as quite decisive.

I have not indeed had an opportunity of comparing my individuals with authentic foreign specimens, but they agree so completely with Kützing's description, that I have not the least doubt of their identity.

So early as 1825 I found a small patch at Cherry Hinton, near Cambridge, and communicated a sketch to Dr. Greville. The production was however considered of so doubtful a nature that it was not published in my 'Gleanings of British Algæ,' nor is it included in the English Flora. I did not meet with it again till May 25, 1841, when I found a large mass at King's Cliffe, forming a loosely reticulated mass of tortuous, very elastic, yellow-green threads, several inches in extent,

* Linn. Soc. Par. 1827, p. 47.

† Conspectus Criticus Diatomacearum, p. 30.

‡ Bot. Zeit. 1833, vol. ii. p. 513.

suspended near the surface of the water on grasses and aquatic plants. The threads were of considerable length, sometimes invested with a transparent gelatinous sheath, sometimes naked. They contained one or two rows of boat-shaped bodies, $\frac{8}{1000}$ths of an inch long, $\frac{3}{1000}$ths broad, with one extremity a little broader. The broad extremities all pointed the same way, except by accidental circumstances a few had become transverse. The threads, with their gelatinous sheath, measured $\frac{12}{1000}$ths of an inch in diameter, without the coat about $\frac{6}{1000}$ths.

The grains contained a grumous mass, of a yellow-green colour, surrounded by a rather broad pellucid border. The external surface was perfectly smooth, but the border marked with little flexuous lines perpendicular to it, which are in fact seated on a membrane which intimately lines the outer coat of the grain. A portion of the mass was placed in a glass of water, and on the following morning a sensible change had taken place. At one or both ends the contents had contracted, leaving the outer shell at those points perfectly smooth and colourless, while the pellucid border still surrounding the central mass was marked with the above-mentioned lines, which, if I am not mistaken, are composed of very minute longitudinally-arranged granules. Meanwhile the grumous mass appeared more cellular*, with its margin light. In the afternoon of the same day the larger globules were confined to the broader or anterior end, while towards the other end the mass had become paler. Sometimes there were a few large globules, possibly air-bubbles, between the two membranes at the anterior end. On the following morning a dark patch appeared in the centre of the mass, and in some individuals seen laterally this patch was applied to the chord of the granule, while the upper margin was crenulated. In the evening of the same day the crenulations had extended to the dark mass, and the large globules were less visible, while in some individuals the contents were in motion and the parts greatly confused. The membrane was soon burst, and a larva disclosed, most probably belonging to the *Tipulidæ*. The larvæ were about twice as long as the eggs, and the posterior part, when *in situ*, wrapped in a somewhat spiral way, to allow of its being packed in so small a compass. On careful examination of other eggs, I could distinguish the red spots which mark the place of the eyes, but the whole too confused to admit of my making an intelligible figure.

The larva consists of thirteen articulations, including the head, decreasing slightly towards the hinder extremity. The

* This accords with the observations of Dumortier, Pouchet, &c., on the cellular formation of the vitellus.

last articulation, however, is not so strongly marked as the rest. The head is large, ovate, with two red eyes in front, and two short, conical, obscurely-articulated antennæ; the mouth is furnished with two strong maxillæ, which, when the animal is at rest, are completely retracted and out of sight. The first articulation of the body is furnished with two short feet, crowned at their extremities with a few short bristles. Down the centre of this and the following articulations is a dark line, marking the situation of the intestines. The last joint is also furnished with two short conical feet, or appendages crowned with short bristles, and a conical projection in the centre, crowned with about eleven pellucid cilia, which are undoubtedly the temporary lungs. I have frequently seen the animal comb them out with his large maxillæ. On each side of the branchial tubercle is a short conical appendage.

I must leave entomologists to decide the affinities of the little larva, and must beg them to pardon any errors in my description of it. I did not witness any further change, as the larvæ soon died, and the mass became clothed with mucedinous filaments.

EXPLANATION OF THE FIGURES IN PLATE XIII.

*a.* Portions of filaments, with eggs magnified.

1. Appearance of an egg, highly magnified, soon after the specimens were brought home.

2., 3. Ditto on the following morning.

4. Ditto at six o'clock P.M.

5., 6. Ditto the next morning at twelve.

7. Ditto with the articulations strongly marked, and the dark mass (= *vitellus*) which furnishes the intestines.

8. Larva just burst from its shell.

## XLV.—*Supplement to descriptions of Exotic Fungi in 'Annals of Nat. Hist.,'* vol. iii. pp. 322 and 375. By the Rev. M. J. Berkeley, M.A., F.L.S.

Since the publication of the two memoirs cited above on the Exotic Fungi in the collection of Sir W. J. Hooker, the discovery of a packet of Dr. Richardson's Arctic Fungi which had been mislaid, and the publication of Fries's 'Epicrisis,' who had received many of the species from Klotzsch, makes it necessary to give a short supplement. I have also to thank Dr. Montagne for one or two suggestions, of which I have availed myself in the following notes:—

1. *Lentinus villosus*, l. c. p. 322 = *L. fasciatus*, Berk., Hook. Journ. of Bot. v. ii. p. 146. t. 5.

2. *Polyporus vesparius*, l. c. p. 323. The specific name, as Dr. Montagne very properly remarks, is too near that of *Pol.*

*vespaceus*, Pers., equally with which it belongs to the genus *Hexagona*, Fr. I beg therefore to substitute for it *Hexagona Gunnii*.

3. *Pol. dædaleoides*, l. c. p. 325, belongs to the genus *Trametes*, Fr., therefore it will stand as *Trametes dædaleoides*.

4. *Dædalea applanata*, l. c. p. 381 = *Dæd. Palisoti*, according to Dr. Montagne, who remarks that this species and *D. repanda* vary from two inches to a foot in diameter, and have the stem lateral, eccentric, or even central.

5. *Dædalea aspera*, l. c. = *Lenzites aspera*, nob.

6. *Dædalea latissima*, l. c. p. 382 = *D. sinulosa*, Fr. Ep. p. 495.

7. *Dædalea discolor*, l. c. = *Lenzites Klotzschii*, nob. Pileo sessili, suborbiculari, tenui, pluri-zonato, pallide ligneo demum subbrunneo, glabro, sub-nitido, plus-minus ruguloso. Hymenio obscuriore; lamellis tenuibus, rigidis, subintegris, antice furcatis, postice sinuoso-porosis.

Pileus 1—2 inches in diam. On oak. Allied to *Lenzites betulina*. *Dædalea discolor*, Fr., is a true *Dædalea*.

8. *Pol. Wightii*, l. c. p. 383 = *Hexagona Wightii*, Fr. Ep. This is referred in my paper to *Pol. sinensis*, Fr., but it appears erroneously. Fries informs us that the species which I have called *Pol. Klotzschii* is preserved in old Swedish herbaria as *Bol. favus*, L., but according to Klotzsch, *Bol. favus* of the Linnæan herbarium * is *Hex. tenuis*. Dr. Montagne informs me that he has *Pol. Klotzschii* from Cuba, and that he also has regarded it as new. *Pol. Klotzschii*, Berk., must therefore be now considered as *Trametes sinensis*, Fr.

9. *P. sericeo-hirsutus*, l. c. p. 384 = *Hexagona sericea*, Fr. Ep. p. 497.

10. *P. fraxineus*, l. c. p. 389. The only specimen of the species thus marked in Dr. Richardson's collection is certainly not *P. fraxineus*, but I think a young specimen of *P. fomentarius*.

11. *P. obtusus*, Berk. l. c. p. 390 = *Trametes obtusus*, nob.

12. *P. subcinereus*, Berk. l. c. p. 391 = *Pol. adustus*. I am obliged to Dr. Montagne for this correction.

13. *P. biformis*, l. c. p. 392. The two fungi which I regarded as what Klotzsch intended here, are named by Fries *Pol. arcticus* and *P. pergamenus*. Fries, however, had received something else under the name of *P. biformis*, with which I am not acquainted. The short observation added to Klotzsch's characters belongs to *P. arcticus* and *P. pergamenus*.

14. *P. occidentalis*, l. c. p. 393 = *Trametes occidentalis*, Fr. Ep.

* Since the above was in type I have examined the specimen and find that it is named by Sir J. E. Smith; it is therefore no authority for *Bol. favus*, L. It is certainly *Hex. tenuis*.

15. *Nidularia striata*, var. *pusilla* = *N. plicata*, Fr., according to Dr. Montagne.

The following species were not included in the list:—

16. *Trametes stuppeus*, n. s. Apus, suberosus, pileo dimidiato, convexo, azono, stuppeo-villoso, ochraceo-fulvo; intus hymenioque ligneo-pallidus; poris magnis, 5–6 angulatis, dissepimentorum acie tenuissima. Pileus $2\frac{1}{2}$ inches broad, about 1 inch long, clothed with long, dingy, pale, ochraceous tawny, tow-like down. Pores $\frac{1}{6}$th of an inch across, deep behind, shallow in front towards the acute margin.

Carlton House, N. A , Ap. 23. Dr. Richardson. Resembling *Trametes gallica*, but very distinct. The surface of the pileus resembles that of *Pol. leoninus*.

17. *Pol. hyperboreus*, n. s. Ungulatus, durus, ponderosus; pileo glabro concentrice sulcato; disco brunneo, margine obtuso, pruinoso, cervino; intus pallide cervino. Hymenio convexo ætate angustato, umbrino; poris minutis rotundis.

N. A., Dr. Richardson. Allied to *P. igniarius*, *ligneus*, and *australis*, but certainly distinct. The substance is equally hard, but of a much paler hue. Pileus 2 inches long, 4 inches broad, 2 inches deep, marked with a few concentric furrows; the older portion brown, the margin pale fawn-colour. Hymenium growing narrower with age.

18. *Pol. badius*, n. s. Crassus, durus, subponderosus, badius, intus ferrugineus; pileo parce concentrice sulcato, minutissime ferrugineo-tomentoso, demum glabrato; hymenio lævi, poris mediis angulatis, dissepimentis tenuibus.

N. A., Dr. Richardson. A very distinct species, with far larger pores than those of *Pol. igniarius*, with which it agrees in size, and to which it is allied. The surface of the pileus is in parts even and cracked, in parts rough, with small corrugations. The flatness of the hymenium probably arises from the specimen having been fixed by the vertex.

19. *P. lilacino-gilvus*, Berk.

A single specimen found by Dr. Richardson agrees exactly with the species from Van Diemen's Land, but is in a very early stage of growth. I saw this species in M. Desmazières' herbarium, marked "*Pol. versicolor*, var. *incarnata*, reçu par M. Fée du consul de France au Brazil an 1826." It is possibly the same then with *Pol. Feei*, Fr., Linn. v. p. 518.

20. *Pol. varius*, Fr., N. A., Dr. Richardson.

21. *Pol. ferruginosus*, Fr., N. A., Dr. Richardson.

22. *Exidia glandulosa*, Fr., N. A., Dr. Richardson.

23. *Nidularia striata*, Bull., N. A., Dr. Richardson.

24. *Lycoperdon pertusum*, Sow. Br. Fung. t. 412. f. 2. Subglobosum, peridio tenuissimo, membranaceo, furfuraceo-granuloso, demum lacunis plurimis irregularibus pertusum. Capil-

litio pallido. N. A., Dr. Richardson. About the size of a hazel-nut. Sporidia globose, equal in diameter to that of the flocci. Precisely the plant of Sowerby, except that his species is figured with a spurious stem. It is clearly no *Rhizopogon*, as asserted by Fries.

## XLVI.—*A List of Plants collected by* Charles Fellows, Esq., *during his Tour in Lycia and Caria; with descriptions of the New Species.* By David Don, Esq., Prof. Bot. King's College*.

N.B.—*Those to which an asterisk is affixed are new species, and will be found described at the end.*

### DICOTYLEDONES EXOGENÆ.

RANUNCULACEÆ.

Clematis cirrhosa, *L.*
Anemone coronaria, *L.*
—— apennina, *L.*
Adonis æstivalis, *L.*
Ficaria verna, *Huds.*

BERBERIDEÆ.

Bongardia Rauwolfii, *C. A. Mey.*

PAPAVERACEÆ.

Papaver somniferum, *L.*
—— orientale, *L.*
—— Argemone, *L.*
Glaucium flavum, *Crantz.*
Rœmeria hybrida, *DeCand.*
Hypecoum procumbens, *L.*

FUMARIACEÆ.

Corydalis tuberosa, *DeCand.*
Fumaria capreolata, *L.*
—— parviflora, Lam.

CRUCIFERÆ.

Erophila vulgaris, *DeCand.*
Alyssum fulvescens, *Sm.*
Fibigia clypeata, *Med.*
Aubrietia deltoidea, *DeCand.*
Arabis verna, *Br.*
Cardamine hirsuta, *L.*
Diplotaxis tenuifolia, *DeCand.*
Brassica Rapa, *L.*

CISTINEÆ.

Cistus cymosus, *Dun.*
—— salvifolius, *L.*
Helianthemum arabicum, *Pers.*

VIOLARIEÆ.

Viola tricolor α, *DeCand.*

CARYOPHYLLEÆ.

Silene Behen, *L.*
—— vespertina, *L.*
—— orchidea, *L.*
—— linoides, *Otth.*
Dianthus prolifer, *L.*
Holosteum umbellatum, *L.*

LINEÆ.

Linum angustifolium, *Sm.*
—— hirsutum, *L.*

GERANIACEÆ.

Erodium cicutarium, *Sm.*
—— ciconium, *Willd.*
—— gruinum, *Willd.*
Geranium tuberosum, *L.*
—— molle, *L.*
—— lucidum, *L.*

RUTACEÆ.

Ruta bracteosa, *DeCand.*

RHAMNEÆ.

Rhamnus oleoides, *L.*
Paliurus aculeatus, *Lam.*

* From Mr. Fellows's 'Account of Discoveries in Lycia, &c., 1841,' a work of the highest interest for the valuable and original information which it contains upon ancient art, history, and philology, as well as the present state of the country.

EUPHORBIACEÆ.

Euphorbia dulcis, *L.*
—— rigida, *Bieb.*
Mercurialis annua, *L.*
Ricinus communis, *L.*

TEREBINTHACEÆ.

Pistacia Lentiscus, *L.*

LEGUMINOSÆ.

Anagyris fœtida, *L.*
Calycotome villosa, *Link.*
Anthyllis tetraphylla, *L.*
Lotus creticus, *L.*
Melilotus sulcata, *Desf.*
Trifolium fragiferum, *L.*
—— spumosum, *L.*
—— subterraneum, *L.*
—— procumbens, *L.*
Hymenocarpus circinatus, *Savi.*
Medicago orbicularis, *All.*
—— uncinata, *Willd.*
—— minima, *Lam.*
—— marina, *L.*
Psoralea bituminosa, *L.*
Colutea arborescens, *L.*
Coronilla iberica, *Bieb.*
—— minima, *L.*
Faba vulgaris, *Mœnch.*
Vicia onobrychoides, *L.*
—— polyphylla, *Desf.*
—— hybrida, *L.*
Lathyrus Cicera, *L.*
—— angulatus, *L.*
Pisum fulvum, *Sm.*
Lupinus hirsutus, *L.*
Cercis Siliquastrum, *L.*

ROSACEÆ.

Poterium spinosum, *L.*

TAMARISCINEÆ.

Tamarix gallica, *L.*

CUCURBITACEÆ.

Bryonia dioica, *L.*

PARONYCHIEÆ.

Paronychia argentea, *Lam.*

CRASSULACEÆ.

Umbilicus pendulinus, *DeCand.*

UMBELLIFERÆ.

Scandix australis, *L.*
Caucalis daucoides, *L.*
Tordylium officinale, *L.*
Smyrnium perfoliatum, *L.*

RUBIACEÆ.

Asperula arvensis, *L.*
Galium brevifolium, *Sm.*

VALERIANEÆ.

Valeriana Dioscoridis, *Sm.*

COMPOSITÆ.

Tussilago Farfara, *L.*
Inula candida, *DeCand.*
—— limoniifolia, *Lindl.*
Asteriscus aquaticus, *Mœnch.*
Anthemis arvensis, *L.*
—— rosea, *Sm.*
Achillea cretica, *DeCand.*
Chrysanthemum segetum, *L.*
—— coronarium, *L.*
Senecio squalidus, *L.*
Gnaphalium luteo-album, *L.*
Helichrysum angustifolium, *DeC.*
Calendula arvensis, *L.*
Carduus crispus, *L.*
Centaurea montana, *L.*
—— Jacea, *L.*
Tragopogon porrifolius, *L.*

CAMPANULACEÆ.

Campanula drabifolia, *Sm.*

STYRACEÆ.

Styrax officinale, *L.*

OLEACEÆ.

Phillyrea latifolia, *L.*

JASMINEÆ.

Jasminum fruticans, *L.*

APOCYNEÆ.

Vinca minor, *L.*

CUSCUTEÆ.

Cuscuta epithymum, *L.*

BORAGINEÆ.

Myosotis sylvatica, *Hoffm.*
Lithospermum orientale, *Willd.*
Anchusa italica, *Retz.*

Anchusa tinctoria, *L.*
—— undulata, *L.*
Cynoglossum officinale, *L.*
Mattia staminea, *Ræm.* & *Schult.*
Onosma echioides, *L.*
Echium plantagineum, *L.*
—— creticum, *Sm.*

SOLANACEÆ.

Mandragora officinarum, *Bertol.*
Hyoscyamus niger, *L.*
—— agrestis, *Kit.*
—— aureus, *L.*

VERBASCINEÆ.

Verbascum Thapsus, *L.*

SCROPHULARINEÆ.

Veronica cuneifolia*.
—— triphyllos, *L.*
—— grandiflora*.
—— Cymbalaria, *Vahl.*
Linaria pelisseriana, *DeCand.*
Anarrhinum bellidifolium, *Desf.*
Scrophularia peregrina, *L.*
—— canina, *L.*

OROBANCHEÆ.

Orobanche caryophyllacea, *Sm.*

LABIATÆ.

Teucrium regium, *Schreb.*
Lavandula Stæchas, *L.*
Lamium moschatum, *Mill.*
—— purpureum, *L.*
Phlomis lycia*.
Salvia triloba, *L.*
—— Horminum, *L.*

PRIMULACEÆ.

Anagallis arvensis, *α* et *β*, *L.*
Cyclamen persicum, *L.*

PLANTAGINEÆ.

Plantago cretica, *L.*

CHENOPODIACEÆ.

Salicornia fruticosa, *L.*

POLYGONEÆ.

Rumex bucephalophorus, *L.*
——— Acetosa, *L.*

ELÆAGNEÆ.

Elæagnus angustifolia, *L.*

THYMELÆÆ.

Daphne collina, *L.*
—— argentea, *Sm.*
Passerina hirsuta, *L.*

LAURINEÆ.

Laurus nobilis, *L.*

PLATANEÆ.

Platanus orientalis, *L.*

BALSAMIFLUÆ.

Liquidambar orientale, *Mill.*

CUPULIFERÆ.

Quercus Ballota, *Desf.*
—— coccifera, *L.*
—— Ægilops, *L.*

CONIFERÆ.

Pinus Pinea, *L.*
—— carica*.
—— Laricio, *Lam.*
Cupressus sempervirens, *α* et *β*, *L.*
Juniperus communis, *L.*

## MONOCOTYLEDONES v. ENDOGENÆ.

GRAMINEÆ.

Briza maxima, *L.*
Stipa tortilis, *Desf.*
Ægilops ovata, *L.*

MELANTHACEÆ.

Merendera Bulbocodium, *Ram.*

LILIACEÆ.

Fritillaria Meleagris, *L.*
Lloydia græca, *Endl.*
Gagea spathacea, *Ræm.* & *Schult.*
Hyacinthus orientalis, *L.*
Muscari moschatum, *Willd.*
—— comosum, *Willd.*
—— botryoides, *Willd.*
Bellevalia romana, *Lapeyr.*
Scilla bifolia, *L.*
Allium nigrum, *L.*
—— neapolitanum, *Cyr.*
—— triquetrum, *L.*
—— junceum, *Sm.*
Aloe vulgaris, *Sm.*
Ornithogalum umbellatum, *L.*

Ornithogalum nanum, *Sm.*
Myogalum nutans, *Link.*
Asphodelus ramosus, *L.*
Asparagus acutifolius, *L.*

SMILACEÆ.

Smilax aspera, *L.*
Ruscus aculeatus, *L.*

DIOSCOREACEÆ.

Tamus cretica, *L.*

AMARYLLIDEÆ.

Narcissus Tazetta, *L.*

IRIDEÆ.

Iris florentina, *L.*
—— Sisyrinchium, *L.*
—— tuberosa, *L.*
Trichonema Columnæ, *Reichenb.*
Gladiolus communis, *L.*
—— segetum, *Kit.*

ORCHIDEÆ.

Orchis papilionacea, *L.*
—— provincialis, *Balb.*
—— longibracteata, *Biv.*
—— longicornis, *Desf.*
Ophrys fusca, *Link.*
—— Tenoreana, *Lindl.*
—— mammosa, *Desf.*
—— Ferrum-equinum, *Desf.*
Serapias Lingua, *L.*
—— cordigera, *L.*

AROIDEÆ.

Arum Dracunculus, *L.*
Arisarum vulgare, *Schott.*

ACOTYLEDONES v. ACROGENÆ.

LYCOPODIACEÆ.

Lycopodium denticulatum, *L.*

FILICES.

Polypodium vulgare, *L.*
Ceterach officinarum, *Willd.*
Cheilanthes odora, *Sw.*
Adiantum Capillus Veneris, *L.*

LICHENES.

Evernia prunastri, *Ach.*

DESCRIPTIONS OF THE NEW SPECIES.

*Veronica cuneifolia.*

V. glanduloso-pubescens; racemis axillaribus, segmentis calycinis oblongis obtusis corollà brevioribus, ovario suborbiculato scabro, foliis subsessilibus cuneatis inciso-crenatis, caule suffruticoso procumbente.

*Habitat* in Lyciæ rupibus ad Arycandum fluvium.

*Fruticulus* procumbens, ramosissimus, *V. saxatili* parùm major. *Rami* filiformes, purpurascentes, foliosi, fragiles, pube brevissimâ glandulosâ vestiti. *Folia* opposita, brevissimè petiolata, cuneata, inciso-crenata, coriacea, avenia, utrinque pubescentia, scabriuscula, subtùs costâ prominente subcarinata, 2–3 lineas longa, sesqui v. 2 lineas lata. *Petioli* pubescentes, vix lineam longi, latiusculi, suprà canaliculati, subtùs obtusè carinati, imâ basi subconnati. *Racemi* in ramis solitarii, axillares, multiflori, pedunculati. *Pedunculus* folio longior, filiformis, glanduloso-pubescens, purpurascens. *Bracteæ* pedicellis capillaribus longiores; *inferiores* inciso-crenatæ, foliis consimiles; *superiores* subspathulatæ, integerrimæ. *Calyx* copiosiùs glanduloso-pubescens, 4-partitus: *segmentis* oblongis, obtusis; 2 *anterioribus* majoribus. *Corolla V. saxatilis*, cyanea? calyce major: *tubo* brevissimo, violaceo: *limbo* 4-partito: *laciniis* rotundatis, integris, venulosis; *infimâ* duplò angustiore. *Stamina* corollà breviora: *filamenta* filiformia, glabra, violacea: *antheræ* subrotundæ, biloculares, flavæ. *Ovarium* compressum, orbiculare, asperè pubescens, integrum. *Stylus* capillaris. glaber, corollam superans. *Stigma* capitatum, exiguum.

This is a very distinct and well-marked species, with the habit of *V. saxatilis*, but there is none with which it can be confounded, and if introduced to our gardens it would prove an interesting addition to the rock-work. Its cuneiform, deeply crenate leaves, and rough pubescent fruit will serve to distinguish it from *saxatilis*, as well as from every other shrubby species.

*Veronica grandiflora.*

V. annua, erecta, glanduloso-pubescens; floribus solitariis, segmentis calycinis linearibus obtusis, corollà calyce triplò longiore: laciniis rhombeo-ovatis subunguiculatis, foliis inferioribus petiolatis ovatis crenatis; superioribus sessilibus, pinnatifidis tripartitisve.

*Habitat* in Cariâ ad Meandrum fluvium, et prope Mylasam. Floret Martio.

*Radix* fibrosa, annua. *Caulis* erectus, filiformis, simplex v. ramosus, copiosè glanduloso-pubescens, purpurascens, bipollicaris. *Cotyledones* adhuc persistentes, subreniformes, integerrimæ, petiolatæ. *Folia inferiora* brevissimè petiolata, ovata, obtusa, crenata, 3–5 lineas longa, utrinque pilis brevissimis articulatis, at rarò glanduliferis, copiosè vestita: *superiora* sessilia, pinnatifida v. tripartita: *segmentis* linearibus, obtusis, integerrimis; *terminali* majori subspathulato. *Flores* in apice caulis axillares, solitarii, pedunculati. *Pedunculi* capillares, copiosè glanduloso-pubescentes, foliis tripartitis ter longiores. *Calyx* copiosè glanduloso-pubescens, 4-partitus: *segmentis* linearibus, obtusis; 2 *anterioribus* majoribus. *Corolla* omnium maxima, diametro semuncialis et ultrà, cyanea: *tubo* brevissimo, luteo: *limbo* profundè 4-partito: *laciniis* rhombeo-ovatis, obtusis, basi angustatâ luteâ subunguiculatis; *anticâ* minore. *Stamina* corollà multoties breviora: *filamenta* gracilia, glabra, lutescentia: *antheræ* cordato-oblongæ, obtusæ, violaceæ. *Ovarium* subrotundum, glabrum, integrum. *Stylus* corollà longior, capillaris, glaber, supernè incrassatus, subclavatus. *Stigma* parvum, subcapitatum. Capsulam nondùm vidi.

A truly elegant little plant, well deserving of being added to the catalogue of ornamental annuals, from the size and beauty of its flowers. Its deeply pinnatifid and tripartite leaves, with entire linear or spathulate segments, will readily distinguish it from the *V. amœna* of Steven, and from *V. pumila*, from Mount Hæmus, described and figured in the second volume of Dr. Clarke's Travels, at page 559.

*Phlomis lycia.*

P. fruticosa, ferrugineo-tomentosa; foliis cordato-oblongis obtusis, verticillastris plurifloris, bracteis lanceolatis calycibusque mucronato-spinosis densè albo-lanatis, dentibus calycinis uncinatis, filamentis inappendiculatis.

*Habitat* in Lyciæ septentrionalis sylvis montosis.

*Suffrutex* erectus, ramosus, pedalis, pube stellatâ rubiginosâ undique densè tomentosus. *Rami* 4-anguli. *Folia* petiolata, cordato-oblonga, obtusa, crenata, rugoso-venosa, utrinque tomento stellato copiosè vestita, pollicem longa, semunciam lata; *floralia* vix cordata. *Petioli* angusti, 3 lineas longi, suprà canaliculati. *Verticillastri* terminales, pluri- (6–8) flori. *Bracteæ* adpressæ, lanceolatæ, mucronato-spinosæ, lanâ longissimâ molli albâ densè vestitæ. *Calyces* bracteis vix longiores, extùs albo-lanati: *fauce* pilosissimâ: *dentibus* brevibus, subulatis, mucronato-spinosis, apice nudis, uncinatis. *Corolla* subuncialis, calyce vix duplò longior: *tubo* glabriusculo, infernè angustato, supernè parùm dilatato, intùs fasciculis 5 pilorum aucto: *fauce* intùs glabrâ: *limbo* extùs tomento fasciculato-ramoso flavicanti subadpresso vestito; *labio superiore* galeato, margine truncato, emarginato; *inferiore* longiore, trilobo; *laciniis lateralibus* ovatis, obtusis, conduplicatis, suprà glabris; *intermediâ* orbiculatâ, integrâ, suprà glabrâ, margine parùm undulatâ. *Filamenta* compressa, inappendiculata puberula. *Antheræ* glabræ. *Stylus* glaber. *Stigma* bifidum; *lobo superiore* latiore, obtuso; *inferiore* acutiusculo, parùm longiore.

This plant, Mr. Fellows informs me, is common in mountainous woods in the northern parts of Lycia. It is evidently nearly allied to the *P. ferruginea* of Tenore, but its lanceolate, spinously mucronate, woolly bractes, simple filaments, and subulate, spinous, uncinate calycine teeth, essentially distinguish it from that species as well as from *P. armeniaca*.

*Pinus carica.*

P. foliis binis prælongis tenuissimis rectis margine denticulato-scabris: vaginis abbreviatis subintegris, strobilis ovato-oblongis rectis lævigatis: squamis apice rhomboideis depressis truncatis rimulisque radiatis.

*Habitat* in Cariæ montibus.

*Arbor* magna. *Ramuli* scabriusculi, fusci. *Folia* bina, erecta, recta, tenuissima, mucronata, nunc levitèr tortilia, lætè viridia, subtùs convexa, lævia, nitida, suprà canaliculata, margine denticulato-scabra, 6–7-pollicaria: *vaginæ* 2–3 lineas longæ, cylindraceæ, fuscescentes, annulatìm rugosæ, ore subintegro nudiusculo. *Squamæ stipulares* (folia primaria) lanceolatæ, acuminatæ, coriaceæ, spadiceæ, margine filamentoso-ciliatæ, basi diu persistenti. *Strobili* ovato-oblongi, obtusi, recti, lævigati, nitidi, spadicei, 3–4 pollices longi, diametro 2-unciales: *squamis* apice depressis, rhomboideis, planiusculis, transversè subcarinatis, rimulis radiatìm notatis, medio truncatis, areolâ transversè ellipticâ cinerascenti umbilicatis.

I have ventured to propose this as a distinct species, although, from its near relationship to *halepensis*, I think it not unlikely that it may prove to be only a remarkable local form of that species. It is chiefly distinguished from *halepensis* by its much longer leaves and larger cones, the apex of whose scales are broader, and marked with numerous radiating fissures. The leaves are double the length of those of the *maritima* of Lambert, and the cones are larger and more oblong.

## XLVII.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from p. 407.]

In the large and splendid works on Fungi which have been published by M. Corda in the past year, we find some observations which are of interest as regards the physiology of these productions. In describing a mould* called *Gonatobotrys simplex,* he says, that in the lower vegetable orders we often see forms represent a lower form of a more highly developed species; and that in the meeting at Prague (1837) he had directed attention to a considerable number of such types which frequently form parallel series, and endeavoured to show that in the inferior Fungi especially mathematical combinations can be formed if symbols are substituted for the separate organs of the mould or fungus; and that each of the members of the series of combinations produced by the combination of these symbols represents one of those groups of forms which we have hitherto been accustomed to regard as types of genera. M. Corda promises to explain these series, both historically and theoretically as well as practically, in a separate work, and hopes that the moulds of the tropical regions may afford several new groups which will fill up the place of the now missing types. In this work M. Corda has also given a plate with figures of *Syzygites megalocarpus,* and a full description of the formation of the fruit, which, as is well known, is here accompanied by the phænomenon of copulation; he observed that the two pyriform warts from which the fruit is produced not only touch each other, but completely coalesce, so that the contents of both can mix as soon as the partitions between them are absorbed. After the junction of these two branches follows the formation of the fruit; in the middle of these connate branches are formed one or two cells, which represent the sporangiolum, which in a ripe state is covered with large angular warts. This sporangiolum contains a thick fluid consisting of oil-globules, molecules, and from two to five spores. Frequently the two branches do not join, and then a spherical sporangiolum is formed at the apex of one or even of both of them.

* Prachtflora der europäischen Schimmelbildungen mit 25 Tafeln, 1839. A notice of this has been given by us in vol. iv. at p. 200.

M. Corda never saw the sporangium of this curious fungus fall off or open, and the seeds when sown did not succeed.

Finally, M. Corda remarks, that the copulation of these fertile branchlets has been compared to that of certain Confervæ, but that this comparison, on a critical examination of both cases, does not appear to be very correct. I also have compared the copulation of *Syzygites* with that of the Confervæ, and after I have carefully examined all the kinds of copulation which have been observed in Confervæ and Closteriæ, I cannot imagine how M. Corda can make such a statement; it evidently arose from the fact that M. Corda has not examined the phænomena of copulation of the Algæ with as much diligence as he has those of the mould, for, particularly in Closteriæ, the phænomena are quite similar; and in the Spirogyræ I have also seen that the usual spore produced by copulation again appeared as a sporangiolum, and contained several smaller spores, &c.

More important for us are the contents of the third volume of figures of Fungi* which M. Corda has published; we find therein new researches on the genus *Æcidium*, which is not as yet correctly understood. M. Corda refers *Æcidium* to the true Gasteromycetes, on account of its peridium: he sowed the spores of *Æcidium Tussilaginis* on leaves of the Colt'sfoot, which were kept moist, or were immersed in water, and he often succeeded in making them germinate; they developed on the spore-skin, by means of extension, a wart, which became a cellular filament, producing threads in every direction, as is the case with the spores of all Fungi. By degrees a fibrous net, or tissue, is formed out of these threads, similar to that produced by the spores of Fungi, Algæ and Moss; these are said to be true germinative threads, and M. Corda says he has seen them penetrate through the stomata of the epidermis into the parenchym of the leaf, and then commence dividing into branches.

Botanists will readily perceive the importance of these statements: the propagation of the Leaf-fungi has not yet been observed, but a number of hypotheses have been invented to explain it; these will, however, all be done away with, if M. Corda's statement, that the germinative threads of the spores of *Æcidium* pass into the parenchym of the leaf through the stomata, is found to be correct. M. Corda saw, moreover, that the little heaps of *Æcidium*, with their cellular stroma, are fastened on laterally to one of the bundles of vessels in the leaf. These points are illustrated by excellent figures.

The larger half of the volume treats of the *Hymenomycetæ*, to which M. Corda reckons not only the *Helvellaceæ*, *Pezizæ*

* Icones fungorum, &c., tom. iii. Prag. 1839. Noticed by us at p. 115, vol. vi.

and *Tremellinæ*, but also the *Tubercularinæ* and *Coryneaceæ*: however, according to the later observations on the mode of production of the spores, it is absolutely necessary to separate the *Octosporideæ* from the true *Hymenomycetæ* with free spores. It is, however, to be desired that this family of Fungi should receive another name, for the sporangia of the large *Sphæriæ* are also filled with eight spores, and their appearance has much similarity with that of the sporangia of the *Pezizæ*, etc. In speaking of the *Pezizæ* we have a description of the formation of the spores, from which it appears that the spore-skin is formed round the drops of oil which are found with larger and smaller grains in the asci. Here we also have a new theory of the formation of cells, which the spores of the Fungi, according to M. Corda, represent.

M. Corda treats very circumstantially of the structure of the hymenium in the true *Hymenomycetæ*, and he endeavours to show that the honour of the first exact observations on this subject belongs to him; for in the winter of 1833-34 he had sent to the Academy of Sciences of Berlin a treatise 'On the Structure of the Spores of Cryptogamic Plants,' accompanied with many figures, in which both the free quaternate spores, the antheridiæ, the spore-cuticle, the spore-nucleus and the oily globules, are described and delineated. The greater number of the members of the Academy are said to have thought highly of this work, but the greatest microscopical observer of Germany declared these observations to be incorrect: the free quaternate spores were false; the antheridiæ (and partly also the basidia) were, according to his observations, eggs of insects, &c. In the former Reports for 1836, p. 51—55, and 1838, p. 167, I have given a historical view of the observations made in this department, and I mentioned M. Corda's discoveries as published in the 'Flora' of 1833; however, according to the above, M. Corda shortly afterwards published a new work (that read in the Academy), which certainly gives him the justest claims to the confirmation and extension of Micheli's observations; and if his assertions could be confirmed by a member of the above-mentioned Academy, they are certainly to be put before those of M. Léveillé; the latter, however, states that he had communicated his results ten years ago to Persoon and others*.

* [Ascherson appears to have been the first who made any general examination of the naked spores of Hymenomycetes. Insulated figures and observations were made by several who did not understand the full importance of the facts before them. Corda certainly had no general notions on the subject when he figured in 1837 the structure of *Coprinus*. In the same year analyses of several true Agarics are given by him in Sturm's Deutschland's Flora, which repeat still the generally received erroneous notions as to their structure.—Edit.]

In the description of the hymenium the three usual layers are mentioned, and a circumstantial description of the lacteous vessels which are found in some of the *Agaricini* is given; a splendid figure of these vessels, with the whole hymenium of *Agaricus fœtens*, gives the best information on this subject. In *Ag. fœtens*, says M. Corda, there is found between the cells of the two different cellular systems (namely, the layer of tubes and that of spherical cells) a third system, which is interwoven with the others, and which consists of perfect, branched and anastomosing narrow tubes, which have walls proper to them, and contain a milk-like, half transparent, white granular sap, which appears to move slowly in the direction of the tubes. M. Corda believes he may truly say that he first clearly described and delineated this vascular system in the Fungi, for the drawing which M. Schultz has given of *Agaricus deliciosus* is very confused and unnatural. These lacteous vessels pass through all organs and tissues of *Agaricus fœtens*; they are equally distributed, only the gills and the outer layer of the stipes appear to contain more of them. The tubes are clear, almost always of equal thickness, generally serpentine and much branched: and often the cells of the large-celled parenchym are deposited in rays around the lacteous vessels, and surround them for some distance with a cylindrical layer of cells. Where these vessels approach the surface of a gill they send out peculiar, long, blind (closed) branches, which form with their conical ends the outermost layer of the gill and hymenium. The structure and formation of the organs of fructification are then fully described: the female ones are called, according to Léveillé, basidia; they consist of the body, the spore-supporters (Sterigmata of M. Corda, an appellation which has, however, already been used.—M.), the contents and the spores. The formation is the same as given in the former Report, p. 54. "Every sporophore," says M. Corda, "produces always but one spore at once, and afterwards several one after the other, exactly in the same manner as the terminal points of the fertile flocci of the *Hyphomycetæ*." Whether this assertion is grounded on actual observations is not stated; and I must beg leave to doubt that the formation of spores at the point of the spore-bearer is repeated after the first spores have fallen off. The spores consist, according to M. Corda, of a cuticle, a nucleus, and of oily globules, and where the spores are terminal they have a conical, pointed or blunt perforated wart, and this opening has been formerly called Hylus, window, navel, etc. Spores with the hylus at the side are to be called *sporæ pleurotropæ*, and those which have the hylus in the axis, *sporæ trepanotropæ*; and M. Corda promises to show at a future period in what relation an orthotropic ovulum stands to a trepanotropic spore, &c. The oil-globules in the spores are composed, according to M. Corda's analysis, of fatty oil in large quantities and an acrid ætherial oil.

M. Corda also asserts, that in 1833 he pronounced the antheridia of the fleshy Fungi to be anthers, and I have shown in my last Report, that these bodies were first mentioned as generative organs by Bulliard: M. Corda is quite wrong in saying that I stated these organs to be paraphysæ, for such an idea never entered my mind. We have, however, often drawn attention to the curious fact, that the so-called anthers, if they really do effectuate the fertilization of the spores, do not appear more frequently and constantly; and to this M. Corda replies, that there are whole families among the Cryptogams where only spores are found. We may, however, say that this objection does not apply to the Fungi, for we at present know that in those families where male organs have been found, they make their appearance in all genera and all species; in the Fungi on the contrary, and let us only consider the pileiform and fleshy Fungi, these organs do not appear regularly in two very similar species.

M. Corda moreover compares these fungus-anthers with the single pollen-grains of the higher plants, and not with the anthers, a view held probably by most botanists who have written on this subject; he calls them Pollinaria, a denomination which has already been used in quite a different sense. One statement of M. Corda is very remarkable and worthy of further examination, viz. that the *Boleti*, during the development of the anthers, have no trace of the basidia and of the formation of spores, and that these are principally formed when the anthers are almost fully developed. [In *Agaricus* and *Polyporus* I have formerly directed my attention to this subject, but have not observed anything which could lead to this conclusion; and in some species of *Boletus* it is not uncommon to find fully-developed anthers in old, decaying individuals.] M. Corda correctly remarks, that the paraphyses of the *Ascomycetæ* are not to be compared to the anthers of the above-mentioned Fungi. The contents of the anthers are composed, according to M. Corda, of a consistent jelly, which sometimes contains molecules, but sometimes has no distinguishable structure; it is emptied in drops through the point of the cellular sac, and then covers the external surface with a layer of gum, which is often slightly coloured; by means of this substance the spores adhere: whether however, says M. Corda, this fluid fecundates the spore, cannot be ascertained.

Mr. Berkeley* has examined the structure of the fruit-bear-

* Ann. Nat. Hist. Nov. 1839, p. 155.

ing organs in the *Trichogastræ* and *Phalloideæ*, and found that these groups also belong to the true *Hymenomycetæ*. If a young plant of *Lycoperdon* is cut through, the internal fleshy mass is found to be intersected by small, long, retiform, branched and anastomosing cavities, whose whole surface is covered by an hymenium, which is similarly constructed to that of *Boletus* and *Agaricus*, but does not possess a trace of those organs which have been called anthers. Mr. Berkeley thinks that the genera *Geastrum*, *Scleroderma*, *Batarrea*, *Tulostoma*, etc., have a similar structure. In *Phallus* very young individuals must be examined if we wish to find the hymenium; it appears exactly as in *Lycoperdon*, only the basidia appear all of them to carry spores. If there be more than four spores on one basidium the additional ones are placed laterally. Here, as well as in *Lycoperdon*, the basidia collapse and are not to be found at a later period.

In our former Report* we mentioned a treatise of M. Léveillé's which had been laid before the Philomathic Society at Paris in 1837; it is now published†, although apparently a little altered; moreover there are unfortunately no figures, which are absolutely necessary to illustrate M. Léveillé's views. M. Léveillé contends against the idea of Turpin, that the Uredines are produced from diseased Globuline, by which name M. Turpin means all sap-globules of plants, however different they may be in their chemical composition. Moreover M. Léveillé condemns the view of M. Unger according to which the Uredines are produced by a diseased affection of the respiratory organs; for, according to the author's observations, they are true fungi, among which Persoon placed them. When, says M. Léveillé, these productions are observed in a very young state, there are seen under the discoloured epidermis very fine colourless ramified filaments which are interwoven with each other. When a Uredo is formed, there appears in the centre of this woven mass a fleshy spot or point, which may be compared to a *Sclerotium*, &c. &c; one surface of this nucleus reposes on the parenchym of the leaf, the other is in contact with the epidermis, and is covered with pedunculated, or more rarely with sessile spores. As the fungus increases the epidermis is extended and bursts, and the spores are exposed. The *Æcidia*, although possessing a more complicated structure, have a similar process of development, which M. Léveillé describes in that of *Euphorbia*; the peculiar peridium

* Berlin, 1838, pp. 162, 163.

† Recherches sur le développement des Urédinées.—Ann. des Sc. Nat. tom. xi. part. bot. p. 5—16.

distinguishes this genus from *Uredo*, so that they cannot both be comprehended under the name of *Cæoma*. M. Léveillé remarks, that Fries has rightly observed the difference between *Uredo* and *Æcidium*.

M. Leveillé says the granules of *Uredo* are generally considered as spores, but observations to prove this are very rare: M. Prevost was the first who saw that a byssus-like tissue was produced from spores of *Uredo caries*, De C., when exposed to moisture, and M. DeCandolle has made the same observation. [Even if the production of germinal filaments from the vesicles of the bunt [Schmierbrand] has really been observed, which I have as yet not succeeded in doing, still my own observations on the production of the bunt in *Mays* (see Report, 1838, p. 162.) show that it is a diseased formation in the interior of the cells, and may be regarded as a true *Entophyte.*] M. Léveillé also mentions the production of the bunt in *Mays*, and says that it is also produced by ramified filaments which are short and jointed, and from these the brown spores separate themselves, &c. [Did M. Léveillé mention these observations in 1837?]

Finally, there is a division of the Uredines into three smaller families: 1. *Æcidineæ*, with the genera *Ræstelia*, Reb.; *Æcidium*, Pers.; *Peridermium*, Link, and *Endophyllum*, Lév. 2. *Uredineæ* with *Phragmidium*, Link; *Puccinia*, Pers.; *Uredo*, Pers.; *Podisoma*, Link, &c. 3. *Ustilagineæ* with *Ustilago*, Link; *Sporisorium*, Ehr., &c.

Mr. W. Valentine* has laid before the Linnæan Society his observations on the structure and development of the organs of reproduction of *Pilularia globulifera*: they contain much interesting matter, and it is to be hoped the treatise will soon be published with delineations.

M. Alexander Braun† laid before the Meeting at Freiberg his observations on the germination of the spores of *Marsilea quadrifolia*. The fruit of *Marsilea* he considers as a part of the leaf on the stalk of which it is seated. The nervation [Berippung] of this fruit-leaf is pinnate, and on the side-ribs are formed the placentæ which bear the sporangia, which are of two kinds, and each sorus is covered with a closed indusium, &c. According to this view, the formation of fruit in *Marsilea* is similar to that of the Ferns, and these, as well as the *Equiseteæ* and *Lycopodia*, would then bear their sporangia on the leaves, herein differing from the Mosses.

* Annals of Nat. Hist. June 1839, p. 260. Linn. Trans., vol. xviii. p. 483.
† Flora von 1839, p. 297.

M. Braun* has also communicated his ideas on the growth of the *Ophioglosseæ*, particularly with regard to the cellular body from which the leaves are produced. This body is said to surround the centre of formation, and within it the leaves are produced in regular spiral succession until they unfold, which they do in the fourth year in the case of *Oph. vulgatum*. The spike of *Ophioglossum* is axillary. *Botrychium* does not possess this inclosing cellular body, but the leaves have a sheath.

In the Report of 1837†, the observation of M. Martens was mentioned, according to which hybrid forms are found among the Ferns; the new hybrid which M. Martens has observed, was called by Bory de St. Vincent *Gymnogramma Martensii*, and was said to be intermediate between *G. calomelanos* and *G. chrysophylla*. Mr. J. Riley‡ of Nottingham has made an excellent reply to this assumption of M. Martens, although he appears not to know that many botanists believe that the anthers of Ferns have been discovered, a subject which was discussed in the former Report, 1836, p. 104. Mr. Riley considers this supposed hybrid as *G. sulphurea*, Desv., and gives very sufficient reasons for supposing the formation of hybrids in the Ferns as altogether improbable.

Mr. G. Dickie§ has published some remarks on the appearance of amylum in plants; he notices particularly that in the Lichens; but it was unknown to him that many decisive observations have been already made on this subject. Mr. Dickie assumes that all those parts of Lichens which are coloured blue by iodine are amylum, and he found that even the sporangia (thecæ) are coloured blue; he compares the sporangium, with the spores which are produced therein, with the structure of the amylum globules; this however is founded on Raspail's description of the structure of Amylum, which is erroneous.

M. G. Körber|| has chosen as the subject for his inaugural dissertation a very circumstantial description of the green cells of the thallus of Lichens; these are the peculiar cells which Wallroth calls gonidia, and Meyer germinal grains.

The author has given the various statements of the two above-mentioned lichenologists with all possible brevity and clearness, has criticized them, and sometimes added his own views, which are grounded on observations of nature. The *gonidia* were observed in three different stages: 1. as *gonidia*

* Flora von 1839, p. 301.

† See Mr. Francis's translation: London, R. and J. E. Taylor, 1839, p. 81.

‡ Reply to M. Martens's Paper on the Hybridity of Ferns. Proc. of the Bot. Soc. of London, 1839, p. 60.

§ Annals of Nat. Hist. 1839, p. 165.

|| De Gonidiis Lichenum. Diss. Inaug. Berolini, 1839.

*synthetica in statu primario seu primitivo*, that is, when they were still in the thallus in their natural position; 2. as *gonidia synthetica in statu secundario*, i. e. when they have risen above the surface of the thallus and form soridia, the appearance of which in the different genera is described. Finally, 3. the *gonidia* are considered as reproductive organs. What Wallroth and Meyer have observed on this subject is correctly stated to be not satisfactory; and the author describes his own experiments, which were made with great care in order to observe the germination or development of the *gonidia*, which however were all unsuccessful. It is to be hoped that M. Körber will continue his observations, for with the help of our improved microscopes, there is doubtless much in this field which remains to be discovered.

Mr. Valentine* has communicated to the Linnæan Society his observations on the development of the organs of fructification of Mosses; they contain, however, nothing that has not been already made known. Mr. Valentine draws attention to the analogy between the spores of Mosses and the pollen-grains of higher plants.

Dr. Stiebel† has written a treatise on the *Oscillatoriæ* which is full of discoveries. According to his observations, the *Oscillatoriæ* are not only animals, but they possess also perfectly-formed heads; they have a mouth, and when the *Lysogonium*, which Dr. Stiebel has described and delineated, lies on its back, it opens its mouth so that it assumes a triangular form. Out of this mouth there comes a rostrum, which moves rapidly in the water and creates a vortex; it moreover possesses muscles, which spring from the lateral margin of the animal. Generally at one end, or in young animals even at both ends, are seen very peculiar tentacula or feelers which execute a motion like that of oars; they assume different forms for the support of the rostrum and determinate purposes, and exhibit a nerve. In the member which is connected with the head-end is a kind of stomach with black hooks, which are perhaps masticatory organs, and the bag of the stomach is continued on like a rectum. The animal appears to live upon small monads. Moreover the animal has at both ends projecting shining globules with black dots; these are the eyes, which can be turned round like snails' eyes, and have a nerve. The *Lysogonium* did not appear to have two rostra, although

* Annals of Nat. Hist. 1839, p. 456. Linn. Trans., vol. xviii. p. 499.

† Uber den Bau und das Leben der grünen Oscillatorie *Lysogonium tæniodes* Stieb.—Museum Senkenbergianum III. No. I. Frankfurt a M. 1839, pp. 79—90.

it has two heads. The propagation takes place in several ways; sometimes the first joint is as it were vomited (ausgespieen), &c. The description of the muscles of the eyes and feelers, as also of the nervous system, Dr. Stiebel intends to give at a future period.

I have perused the above treatise* several times, but cannot determine whether it is meant as a hoax or in earnest—the former appears most probable; for with any microscopical practice the above observations could certainly not have been made with so excellent an instrument as Dr. Stiebel possesses. Notwithstanding the wonderful description, it is quite evident that *Lysogonium* is only an *Oscillatoria* whose structure M. Stiebel has altogether mistaken; he did not even see the fine rings which lie between the spores like the so-called intercellular substance, and which, when the spores escape, either separate or still adhere to each other. These rings however have led Dr. Stiebel quite astray, even the eyes have arisen out of them. What other philosophers have considered as the head of *Oscillatoriæ* Dr. Stiebel has not seen, for in *Lysogonium*, which appears to be *Oscillatoria limosa*, there is nothing of the kind.

In the Report for 1835 I have already mentioned the genus *Chionyphe* which M. Thienemann has observed in granular snow. We have now a full description of those interesting plants, which must be classed with the *Algæ*, but decidedly belong to different genera†. Three species are described; namely, *Chionyphe micans*, *nitens* and *densa*, and the whole genesis of *C. nitens* is given. The development of this plant is quite similar to that of other jointed Confervæ. M. Thienemann observed at first on the snow simple spherical vesicles, which extended lengthwise and became divided in halves by a partition, after a lively movement of previously invisible atoms had taken place in their interior. The halves of the divided vesicle kept increasing, and constantly when the molecular motion again appeared, another division took place, but subsequently only the terminal cell of each side was divided, while the central ones merely extended themselves.

Finally, a lively molecular motion arises in these terminal cells; the atoms enlarge and appear like vesicles which cause the terminal cell to swell, so that when ripe it forms a head filled with germinal globules. I must remark, that the formation of the partitions during the above-mentioned molecular motion, as well as the production of the spores by the enlarge-

* The figures are very beautifully executed, and can scarcely be altogether imaginative.—Ed.

† Uber ein neues Geschlecht von Schneepflanzen *Chionyphe*.—Nov. Act. Acad. c. L. C. vol. xix. part 1, pp. 20—26.

ment of the atoms in the terminal cells, does not agree with previous observations made on this subject, and that a repetition of them is therefore necessary.

M. Morren* has also observed infusoria in the interior of the bags or tubes of *Vaucheria clavata*; it was *Rotifer vulgaris*, and he therefore believes that the animal formations which M. Unger had also seen in this plant, may also have belonged to the same animal. I may here remark, that the appearance of animals in the interior of the *Vaucheriæ* was first observed by Vaucher; they were the *Cyclops Lupula*, Müll.; and in 1834 M. Wimmer observed living infusoria in *Vaucheria*, which, from the short description, appear to have been Radiatæ; even the eggs of this animal were observed.

How these animals got into the interior of the *Vaucheriæ* has not been observed by any one: indeed M. Morren asserts that his plants were not at all injured; there were no openings in them through which the animal could enter. M. Morren observed the lively motion of the *Rotifer* in the interior; he saw how it ran along the sides, pushing the green matter away from it, &c.; he saw the deposition of eggs and the increase of the animals, and it appeared to him that they then descended in the tubes and remained in the new mass, where they cause, like parasitic bodies, those excrescences on the sides of the *Vaucheriæ*, just in the same manner as insects produce the gall-nuts. Once M. Morren opened the *Vaucheria* and let the animal come out, but it tried to return into its old prison.

M. Wimmer† has continued his observations on the above subject as well as on the development of the spores of *Vaucheria clavata*, and will shortly publish his results.

In the Carlsbad Almanac for the past year there is a paper by M. Corda:—"Observations sur les Euastrées et les Cosmariées." The greater part is full of violent replies to the numerous attacks which Ehrenberg has made on M. Corda in his large work on Infusoria‡. M. Corda is much dissatisfied with the manner in which his systematic labours, his accurate observations, and his accurate drawings, as he denominates them, have been treated by M. Ehrenberg; and he endeavours

* De l'existence des Infusoires dans les plantes.—Bullet. de l'Acad. R. de Bruxelles, VI. No. 4. Ann. Nat. Hist. vol. vi. p. 344.

† Jahresbericht der schlesischen Gesellschaft für vaterländische Kultur, 1839, p. 123.

‡ I must here remark that these *Euastreæ* and *Cosmarieæ* are not Infusoria, as M. Ehrenberg also states, but simple *Algæ*, as I have sufficiently proved in my latest work to all those philosophers who are acquainted with the structure of *Algæ*. M. Corda up to the winter of 1833 also held them to be plants.

to show that Ehrenberg has been guilty of the greatest arbitrariness. In the last nine pages we have a view of the genera which M. Corda has made for his family of the *Euastreæ* and *Cosmarieæ*; and all botanists who have occupied themselves with observations on this subject, will be somewhat surprised at the by no means small number.

[To be continued.]

## XLVIII.—*Descriptions of new or little known* Arachnida. By Mr. Adam White; Assistant in the Zoological Department of the British Museum.

Having been favoured by Mr. Darwin with the whole of the extensive collection of Arachnida, made by him on the voyage of H.M.S. Beagle, I intend describing them occasionally in this journal, as well as several others from Van Diemen's Land, collected by Mr. Gunn. From Mr. Bracy Clarke I have received a collection of spiders made by him in Switzerland during his travels and residence there in 1798, along with MS. notes drawn up at the time; Mr. Swainson, before setting out for New Zealand, also kindly gave me a bottle of spiders from St. Vincent's, collected by the late Lansdowne Guilding. They are all preserved in spirits of wine, as spiders should always be if possible, and, to some of Mr. Darwin's, notes are occasionally added, which I have that gentleman's permission to extract from his copious manuscript journal *. I describe them without any systematic order, but having necessarily numbered each species, intend afterwards giving a classified index: the descriptions are in many instances prolix, and I have in most cases given the *generic* character of each species. I have done this because, at present, I am unwilling to propose new names if I can possibly refer the species I describe to any of the established genera. I need hardly say, that in spiders the colours are so fugitive, that unless notes or even drawings are taken from live specimens, but little dependence is to be placed on the colours assigned in descriptions taken from the best-preserved specimens†. Travellers should be particular in doing this, as well as in taking notes of their habits, whether land or aquatic; whether they hunt for their prey by running after it—jumping upon it—or whether they conceal themselves in holes,

* These notes, there is no use saying, were always made amid the hurry and bustle of a campaign in which annulose animals formed but a small part of the subjects of research. I prefer giving them as I find them, as there is a *freshness* about them which would be *rubbed off* were I to attempt to improve them.

† For an example, see the first description (*Linyphia argyrobapta*).

tubes, or cells made by themselves, and should also describe the nature of these abodes when possible; whether they wander about without any fixed residence, walking or running sideways; whether they make a web or threads for entrapping their prey, or whether they are sedentary, constructing close webs, or extending them with regular geometric accuracy or in irregular large meshes*. Spiders are frequently found in a very perfect state in several of the nests of the fossorial Hymenoptera. Mr. Abbot mentions, in the notes accompanying his unpublished drawings of Georgian *Annulosa*, that *Pelopæi* are the best spider-collectors he ever met with, and save the arachnologist a great deal of trouble, as he has frequently found, in the nests of these insects, species he has been unable to meet with elsewhere,—the specimens in the most beautiful condition, as the Spider-wasps do not kill, but in some way paralyse with their stings the destined food of their young; and were British arachnologists to look into the nests of our native *Pompili*, "rare captures" might often be made. As the note alluded to is very interesting, I transcribe it here *verbatim* from the original in the British Museum. Those who have consulted Walckenaer's first volume, and know how much science is indebted to Abbot for his discoveries of new species of Arachnida, will excuse its length. Drury (Ill. i. pp. 105, 106) and Darwin (Journal of Researches, p. 40) mention similar instances. "*Sphex lunata*, Fab. (*Pelopæus lunatus*, Fab. Syst. Piez.), called in Savannah Black and Yellow Mason, and likewise Dirt-daubers: they make oblong cases of clay, which they plaster in layers to roofs, ceilings, and other convenient places; when finished they lay an egg inside at the end, then fill it with spiders and plaster them up. The worm (larva), by the time it eats them all, is full fed, and spins round itself a thin case like gold beater's skin, in which it changes into chrysalis; it begins to build in May and continues all the summer. What is remarkable, they have the art to embalm these spiders alive, or rather enchant them. Upon opening one, the spiders are alive, but unable to walk or make the least resistance, being just able to move a little, sometimes a leg, and they appear plump and (of a) fresh colour. I imagine they do this by stinging the spiders: this is a wonderful property and provision of nature to provide the worms with fresh and proper food as long as is needful. Upon putting some of these spiders in a box, they continued plump and fresh several days before they began to alter. One

* Remarks of this kind or of a similar nature would often prove extremely interesting, as the Baron Walckenaer has shown that in most cases the family may be ascertained by the habit, and *vice versâ* the habit by the family.

fly continues to build several cells alongside and upon each other: they destroy an amazing number of spiders; they commonly put all, or the most part of one particular species together in one cell, many of them of very rare species, and such I imagine must live chiefly on the tops of branches of the loftiest trees, as I could never afterwards meet with these specimens of spiders. Upon opening several of these cases at once, it affords (as you may judge) a most curious and pleasing sight—such a large number of spiders of the most beautiful colours and rarest species. Could it be possible still to continue to preserve them in their beauty and freshness, they would make a wonderful collection of natural history." It is much to be desired that the other volumes of Baron Walckenaer's elaborate work were published*. I may add, that specimens of all the species here described, unless otherwise intimated, will be found in the collection of the British Museum, and that I have made figures of most of them, which I intend to publish hereafter.

1. *Linyphia* (*Leucauge*) *argyrobapta*, n. s.

Brownish yellow; chelicera darker, at end blackish brown; claws black. Abdomen silvery, with five brownish black (when alive red) longitudinal lines all meeting at the end, the middle one alone taking its origin from the base, and having a lineolet of the same colour extended nearly to the lateral black line, and two small approximating parallel lines directed backwards, arising from about the middle, and extending to the irregular line on each of its sides; the end of the abdomen, where all the lines meet, is brownish black, and there are two distinct silvery spots; the body beneath is brownish black, with a whitish line on each side, and a dot beneath it.

Chelicera vertical, oblong, cylindrical, shining; first joint with one or two teeth at end, upon which the long hooked claw closes inwards; this claw is straight at the base and then hooked.

Eyes eight, on two transverse lines; four placed in the middle, the two posterior further apart; the side eyes of last lines are in pairs.

Maxillæ dilated at end, the outside with a few hairs.

Palpi slender; fifth joint as long as second, ending apparently in a claw, and hairy.

Mentum small, not very distinct from the heart-shaped sternum.

Cephalothorax depressed, narrowed in front, dilated on the side, sinuated behind, with a deep impression beyond the middle, in front of which are two impressed lines directed sideways, and extending forwards to the base of the narrowed part.

* July 2. Since this paper was written the 2nd volume of Walckenaer's work has been published.

Abdomen oblong, smooth, or, at most, only shagreened, with four distinct spinnerets.

Legs, at least first two pairs, very long.

Our specimen, in this respect, was much mutilated: in Mr. Darwin's MSS. I find that the first pair of legs is much the longest, then the second and fourth, and that the third is shortest.

"Web very regular, nearly horizontal, with concentric circles; beneath, but sometimes above, the concentric web, there is an irregular or thin tissue of network; the animal rests in the centre, on the inferior surface: abdomen brilliant; the red colour like a ruby with a bright light behind." The subgeneric name is one proposed for it in Mr. Darwin's MSS.—Brit. Mus.

Hab. near Rio de Janeiro. May 1832. Charles Darwin, Esq., F.R.S., etc.

2. *Linyphia* (?) *leucosternon*, n. s.

Body and sternum shagreened; the sternum and body above grayish white; body beneath grayish black, spotted with white (there are four principal spots in the middle).

Cephalothorax, palpi and legs yellowish, the joints of the latter darker; cephalothorax behind margined with whitish; the sides hairy: claws of chelicera port-wine colour: eyes black.

Chelicera short, swollen, smooth, nearly of equal breadth throughout, with a few (3) teeth inside at the end, and armed with a short strong claw folding inwards.

Eyes eight, not very unequal in size, arranged in two transverse lines, the first bending outwards and shorter than the second; the lateral eyes are the closest and oblique; the two central of each line form nearly a square.

Maxillæ somewhat spatulate.

Palpi with the second and fifth joints nearly equal, the fifth being somewhat hairy at end, and apparently terminating in a short claw.

Mentum semioval.

Sternum cordato-sagittate.

Cephalothorax narrowed and truncated in front, dilated and nearly as broad as abdomen behind; this is of a long, oval shape, overlapping the cephalothorax at the base. The legs are long and slender; first pair the longest, then the second, the third being much shorter than the fourth.

Spinnerets distinct.

Hab. Brazil, near Rio de Janeiro. C. Darwin, Esq.

3. *Epeira* (*Singa**) *leucogramma*, n. s.

Cephalothorax ferruginous; space about the eyes dark brown; body and legs grayish brown, darkest on the sides of the body; body above with three white longitudinal lines proceeding from the base and terminating just before the tip; the middle one

* A subgenus founded by Koch, with the beautiful European *Epeira Herii* of Hahn as the first species. (Uebers. des Arachnidensyst. p. 6.)

somewhat interrupted; all three are margined with black, which is deepest (thickest) at base; beneath with two abbreviated, somewhat distant, longitudinal white lines margined with black; legs ringed with black.

Chelicera vertical, rather longer than they are broad (at base), smooth, somewhat swollen, armed with an incumbent short claw.

Eyes eight, arranged transversely in two lines; the first very short, containing two eyes; the second, with two in the middle, forming nearly a square with those of first line, which square is on a projection of the cephalothorax; the two lateral eyes are so close together that they seem as one; they are placed somewhat behind the middle pair, and are somewhat further removed from them than these are from each other.

Maxillæ short, rounded; base giving insertion to palpi, which are weak, and have the fourth and fifth joints nearly equal; (fifth armed with a minute claw ?).

Mentum short, rounded, distinct from the heart-shaped sternum.

Legs short; last pair the longest; third shorter than the first and second, which are nearly equal in length.

Cephalothorax longish, narrowed in front, and not much more than half the width of the abdomen, which is of a fine oval shape.

Hab. Brazil, near Rio de Janeiro. C. Darwin, Esq.

4. *Tetragnatha bicolor*, n. s.

Legs, cephalothorax and palpi brownish yellow (in some the palpi are dark brown); body shagreneed above, griseous, with three or four indistinct brownish lines; a lighter band on the side, beneath darker; two greenish gray lines run down the middle, parallel to each other till just before the spinnerets, where they somewhat converge; eyes black.

In the male the abdomen is nerved or shagreened with brownish, and is not so distinctly marked beneath; a brownish line, somewhat interrupted, and emitting a few equal, narrow, brown lineolets directed backwards, runs down the middle.

Chelicera large, very prominent, loose, smooth, subcylindrical, as thick at the end as at the base, and only slightly gibbous on the inner edge, which is furnished with a double row of tooth-like processes, upon which the strong and long claw folds inwards; this claw is more than half the length of the first joint, and at base is straight, and then suddenly bent.

Eyes eight, placed on two lunated parallel lines: the two intermediate of the first line smallest and closer to each other than they are to the side-eyes of the same line, while the two intermediate eyes of the second line are somewhat more distant from each other than they are from the side-eyes of the same line.

Maxillæ oblong, somewhat bent outwards at the end, which makes the outer margin sinuated; the inner margin is clothed with a line of short thick-set hairs; the maxillæ approximate by their inner edge.

Palpi slender, with the second joint curved, and rather longer than the fourth and fifth, which are nearly equal; the last joint seems to end in a claw, and is rather hairy: in the male the fifth joint is dilated on its under side; at base there is a smooth, roundish, globular process; sternum longish heart-shaped, sides somewhat irregular.

Cephalothorax of a long, slightly depressed oval shape, which is as broad as the abdomen at base.

Abdomen long (two-and-a-half times the length of the cephalothorax), narrow, subcylindrical; at base somewhat swollen, the swollen part overlapping the end of the cephalothorax; at the end it tapers abruptly, being roundish and slightly recurved: it is covered with close and short hairs.

Legs slender; first pair the longest; second as long, if not a little longer than the fourth; the third pair is very short, half the length of the second; one of the joints is somewhat swollen and curved.

Hab. Van Diemen's Land. R. Gunn, Esq.

Walckenaer figures two species, *argentea* and *zorilla*, both with a longish oval body. Guérin (Encycl. Méth. x. *sub voce*) alludes to two or three other species of this genus, from Africa and America, and Koch describes two others in his 'Uebersicht,' (p. 5); but this is, I believe, the first species described as coming from Van Diemen's Land. As will be seen in the description, there are some characters which would constitute it, at least, another section of Latreille's genus, if not a subgenus.

5. *Eripus heterogaster*, Walck. *Thomisus heterogaster*, Latr. Guérin, Iconogr. Arachn. pl. I. fig. 4.

"Evidently, by its structure and habits on the leaf of a tree, this species is a Laterigrade; it differs, however, most singularly from that tribe, and is, I think, a new genus.

"Anterior eyes red; maxillæ rounded, inclined; mentum thinly arrow-shaped; chelicera powerful, with large aperture for poison; abdomen encrusted with five conical peaks; thorax with one small one; crotchets to tarsi very strong.

"Colour snow-white, except tarsi and half of leg bright yellow; the tops of the abdominal points and line of eyes black: it must, I think, be new. Taken in the thick forests near Rio de Janeiro, May 1832." Darwin's MSS.

*Salticus* (*Homalattus**) *pustulatus*, n. s.

Upper side black, with greenish reflections.

Eyes eight, on short elevations of thorax; may be considered as placed on three lines, two of which are approximate, the third

* *Homalattus*, a new subgenus, now proposed for the first time; the legs are unfortunately destroyed.

being distant; the first line, which is somewhat bent, contains four eyes, placed on the front margin of the cephalothorax at nearly equal distances from each other; the two intermediate eyes are much the largest. The second line contains two very minute eyes, somewhat removed from the edge of the thorax; they are placed rather nearer the outer eye of the first line than the outer is to the intermediate; the third line contains two eyes, one on each side the margin of the thorax, the space between the outer eye and the first line being equal to the distance between the outer eyes of the first line.

Cephalothorax flat, transverse, not so wide as the body, covered like it with papillæ.

Abdomen as broad as long; in front straightish; behind somewhat pointed, the sides rounded; it is flat and compressed, and somewhat convex above.

Hab. Sierra Leone. Rev. D. F. Morgan.—Brit. Mus.

*Pholcus geniculatus*, n. s.

Body above yellowish, with at least twelve blackish brown spots, eight in the centre, arranged in pairs, and decreasing in size as they approach the apex: sternum and broad line down the centre of body: beneath blackish brown: legs reddish yellow; at the first joints ringed with blackish and pale whitish yellow; last joint pale, without two blackish rings.

Maxillæ of a long triangular shape, and almost meeting over the mentum; the palpi proceed from the nearly right angle at base, and have the terminal joint much shorter than the fourth and second, which are almost equal in length.

The mentum seems somewhat square.

Cephalothorax nearly circular, rather broader than long, somewhat truncated behind, and deeply impressed in middle; it is as wide as the longish oval abdomen: legs very long and slender, nearly smooth, except last joint; first longest; third shorter than second and fourth, which are nearly equal.

Hab. Brazil, near Rio de Janeiro. C. Darwin, Esq.

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## XLIX.—*Additions to the Fauna of Ireland.* By Wm. Thompson, Esq., Vice-Pres. Natural History Society of Belfast.

Of the few vertebrate animals treated of in the present communication, one only can be announced with the certainty that is desirable, as Irish: the others are noticed to induce further attention to them, and at the same time to enable any one interested in the subject to form his own opinion respecting the propriety of their introduction, even with doubt, into the Fauna.

### Mammalia.

*Mus messorius*, Shaw? Harvest Mouse. May 12, 1838.—Mr. Adams, gamekeeper at Shane's Castle Park (co. Antrim), mentioned to me what he had heard of a remarkably small kind of mouse and its nest; the description of which would apply to this species. The nest was built nearly as high from the ground as the narrator's knees, and suspended between stalks of wheat, in a field of this grain: the old animals scarcely bent the stalks of wheat when running up them. The observer, a schoolmaster and farmer, resident within a mile of Shane's Castle, related the above to Mr. Adams as an extraordinary fact which had come under his notice last autumn.

## Aves.

*Falco Groenlandicus*, Linn., Hancock. Greenland Falcon. In a letter from John Vandeleur Stewart, Esq., dated Rockhill, Letterkenny, Feb. 3, 1837, I was favoured with a minute description of a bird in his collection, believed to be an Iceland Falcon. At the meeting of the British Association held at Newcastle in 1838, Mr. John Hancock of that town read a paper (admirably illustrated by specimens in various states of plumage) with the view to show that the Iceland and Greenland Falcons are distinct species. This was subsequently published in the second volume of the 'Annals of Natural History.' On referring to the description of Mr. Stewart's bird, I felt certain that, according to Mr. Hancock's views, it must be the *F. Groenlandicus*, and having submitted the description to this gentleman, I had the satisfaction of receiving his testimony to the same effect.

*Pyrrhula Enucleator*, Temm.? Pine Bullfinch. In the manuscript journal of that eminent naturalist, John Templeton, Esq., is the following note.—"December 20, 1819. Yesterday heard from Mr. Montgomery of Belfast [a discriminating ornithologist], that Mr. Bradford had received a specimen of the *Loxia Enucleator* which was shot at the Cave-hill [vicinity of Belfast], and on showing the figure in the Naturalist's Miscellany, he recognised it to be the bird."

*Coracias garrula*, Linn.? Roller. For some years I have had a note from Mr. R. Ball to the effect that—In the middle of September 1831, when he was walking through the demesne at Carton—the seat of the Duke of Leinster—his attention was attracted by a bird pursued by a great number of Rooks, which, instead of flying off to avoid them, continued for a considerable time, or so long as he had patience to remain, to dash in amongst them apparently for the sake only of annoyance. From the size, brilliant plumage, and singular flight of this bird, my friend was satisfied of its being a Roller. Mr. Walker of Granby Row, Dublin, states that one of these birds, shot in the county of Sligo some years ago, was preserved for a relative of his who resides there. Another Roller has been mentioned to me as obtained in the South of Ireland some years since, but as yet no example of the bird unquestionably killed in this island, has to my knowledge come under the inspection of the naturalist.

## Amphibia.

*Lissotriton palmipes*, Bell? Palmated Smooth-Newt. On questioning Mr. William McCalla of Roundstone, Connemara (a most intelligent collector of objects of natural history), respecting the species of Newts observed by him, he replied—"I am positive of there being two species of *Triton* in this country, one of which is the *T. punctatus* of Jenyns's 'Manual,' and the rarer with us; the more common species is by far larger and of a richer colour; it is nearly double the size of *T. punctatus*; the crest is far larger and is not notched; the feet are webbed. To convince you that I have not confounded the young and adult of the same species, I may state that I observed them in the breeding season, and met with females of both species." A fair inference from these remarks, I think, is that *Lissotriton palmipes* is the animal alluded to. My correspondent had not seen Mr. Bell's work on British Reptiles.

PISCES.

*Scomber maculatus*, Couch? Spanish Mackerel. Mr. McCalla having mentioned the occurrence of this fish on the coast of Connemara, replied to my queries as follows:—"The fish which I consider to be this, is found with the Mackerel, and, in some seasons, not uncommonly. It is known by the name of Spanish Mackerel, which was no doubt first applied to it here by the Coast Guard, many of whom have been in the navy. I have not seen any specimens of *S. maculatus* this year (1840), but on carefully looking to the characters given by Couch (Jenyns's 'Manual') am of opinion that it is the above species. I am quite positive that we have two species of *Scomber* on this coast. *Caranx trachurus* has been scarce here this year."

*Silurus Glanis*, Linn.? Sly Silurus. That this species has in a single instance been taken in Ireland I am disposed to believe on the following testimony. On inquiry (October, 1840) of William Blair, who has for many years been fisherman, etc. at Florence Court, whether he had ever met with any rare fish, he described an extraordinary one, of which he could never learn the name, that he took twelve or thirteen years ago in a tributary of the Shannon, near its source, and about three miles above Lough Allen. His description was so graphic and particular, that Lord Enniskillen on hearing it immediately suggested its applicability to the *Silurus*, and on Yarrell's figure being shown to the intelligent captor of the specimen, he at once identified it as in all respects representing his fish, except in the head and mouth not being large enough. Professor Agassiz, who was present, on being appealed to, stated, that these parts were certainly not represented of sufficient size in the figure. The fish was seen struggling in a pool in the river after a flood, and "with the long worm-like feelers from its mouth;" and its general appearance was looked upon as so hideous that the persons who first saw it were afraid to touch it. The specimen was at least $2\frac{1}{2}$ feet in length, and 8 or 9 lbs. in weight. Although unfortunately "lost to science," it, for two or three years, or until the skeleton fell to pieces, adorned a bush near the scene of its death. The species was not known as an inhabitant of any of the neighbouring waters by the persons of the district.

The distribution of the *Silurus Glanis* on the continent of Europe is somewhat anomalous, as I learn from M. Agassiz. In Central Europe it is found in the lakes of Neuchatel, Bienne, and Morat only:—in no other lakes or rivers connected with the Rhine does it occur. It inhabits the rivers flowing into the Baltic and Black Sea.

## Mollusca.

*Tritonia bifida*, Flem., Brit. Anim.

*Doris bifida*, Mont., Linn. Trans., vol. xi. p. 198. t. 14. f. 3. August 25, 1840.—An individual of this species taken by Mr. Getty and Mr. Hyndman, when dredging in Belfast Bay, was brought to me. It agrees critically with Montagu's description, except in the following points. There are just 12 appendages on each side, three of which are larger than the rest, but placed at unequal distances from each other on both sides, and not opposite as shown in Montagu's figure. The colour is better defined than in the figure; the marginal line, whence the appendages issue, is strongly marked and reddish, as they likewise are; foot plain flesh-colour.

The animal is extremely agile, and *planaria-like* is one moment twice the length it is the next; it often moves about with the foot upwards, and in its motions several times had the long tail thrown quite under the head.

*Melibœa fragilis*, Forbes, Malacologia Monensis, p. 4. pl. 1. fig. 4. July 20, 1840. Three examples of this species were taken on *Antennularia antennina*, dredged in Clew Bay (co. Mayo), by Mr. R. Ball, Mr. Forbes, and Mr. Hyndman.

*Eolidia Zetlandica*, Forbes, Athenæum, 1839, p. 647. July 29, 1840. This species was taken by Mr. Forbes and myself between tide-marks at Lahinch, county Clare.

*Euplocamus pulcher*. (See Annals Nat. Hist., vol. v. p. 91. *note*.)

*Tergipes pulcher*, Johnston, Mag. Nat. Hist., vol. vii. p. 490. f. 59.

*Triopa claviger*, Johnston, Annals Nat. Hist., vol. i. p. 124. At the same time with the *Eolidia Zetlandica*, an individual of this species occurred to us.

*Chiton lævigatus*. Obtained in Strangford Lough by Mr. Hyndman and myself. On oysters brought to Belfast market from Carlingford and Greencastle (co. Londonderry), W. T.; Bangor, co. Down, Mr. R. Patterson.

"*Pleurobranchus plumula*. Malbay (co. Clare), very rare," W. H. Harvey, Esq.

*Turritella subtruncata*.

*Turbo subtruncata*, Mont., p. 300. t. 10. f. 1. Of this species a single specimen was obtained at Bundoran (co. Donegal), in 1840, by Mrs. Hancock.

*Rissoa calathisca*. Among shell-sand which I obtained at Bantry Bay in 1834, was an individual of this species.

*Rissoa rupestris*, Forbes, Ann. Nat. Hist., vol. v. p. 107. pl. 2. f. 13. Dublin coast, T. W. Warren, Esq.; North-east coast, Mr. Hyndman and W. T. Not rare.

*Lacuna rufa.* Belfast and Strangford Loughs, Mr. Hyndman and W. T. Rare.

*Brocus striatus,* Brown's Illus., pl. 1. f. 13. Among shell-sand brought from Bantry Bay in 1834, W. T.

*Lima subauriculata.* Two odd valves dredged in Strangford Lough, in Aug. 1837, by Mr. Hyndman and W. T.

*Modiola tulipa,* Lam. A shell so named by Mr. Forbes was obtained in Belfast Bay by Mr. Hyndman.

——— *Gibbsii,* Leach. Obtained by dredging, etc. in Clew Bay (co. Mayo) during an excursion made to the west of Ireland in July 1840, by Mr. R. Ball, Mr. E. Forbes, Mr. Hyndman, and myself.

*Crenella decussata.*

*Mytilus decussatus,* Laskey, Wern. Mem., vol. i. p. 394. pl. 8. f. 17. A few odd valves dredged in Strangford Lough in Aug. 1837, by Mr. Hyndman and W. T. Captain Brown has applied the name of *Crenella elliptica* to this species.

*Mactra cinerea,* Mont. Magilligan and Portmarnock, Mr. Hyndman.

——— *elliptica,* Brown. Portmarnock, W. T.

*Donax rubra,* Mont. In shell-sand from Portmarnock. Bundoran, Mrs. Hancock.

ZOOPHYTA.

*Hydra viridis,* Linn. Obtained at Bandon (co. Cork) by Mr. Geo. J. Allman.

*Actinia viduata,* Mull., Zool. Dan. Observed between tide-marks at Lahinch (co. Clare) by Mr. Forbes and myself. We consider it distinct in species from *A. mesembryanthemum.*

*Anthea cereus,* Johnst. Gærtner, Phil. Trans., vol. lii. p. 78. t. 1. f. 1. In September 1835, I made a note of this species as being the most common *Actinia* at Ballyhome Bay (co. Down), where it was gregarious, forming in some places a continuous fringe round large rock-pools and stones, exposed to view at low water. In such quantity it is not now to be seen there, having become gradually scarcer since the period mentioned. In Dublin Bay and on the western coast this species likewise prevails. It is commonly of a dull ash-colour throughout, but wherever I have remarked it, some few individuals were to be found of a green colour, with the tentacula partially or wholly red. The *A. cereus* is doubtless one of the species mentioned under another name by Mr. Templeton as found at Ballyhome Bay (Mag. Nat. Hist., vol. ix. p. 303.), but in uncertainty which of his should be referred to, I have thought it better to notice the subject again.

*Cellepora ramulosa,* Linn. Johnst., Brit. Zoop., p. 274. pl. 32. f. 4, 5. Obtained at Youghal by Miss Ball; Portmarnock, 1835, W. T.

*Cliona celata,* Grant. "In perforations of the shell of the oyster (*Ostrea edulis*)" taken in Belfast Bay and elsewhere on the north-east coast, W. T.

### Annelida.

*Nemertes gracilis*, Johnst., Mag. Zool. and Bot., vol. i. p. 534. pl. 17. f. 1. Nov. 12, 1840. I received a specimen of this worm taken at Cultra, Belfast Bay. It is larger than Dr. Johnston's, but agrees in every character with his description and figure.

——— *lactiflorea*, Johnst., Mag. Z. and B., vol. i. 535. pl. 17. f. 2. With the last species, two examples of this were procured. The eyes are as described by Dr. Johnston, and consequently the worm would seem to be distinct from *Planaria rosea*, Mull. My specimens when extended are each about two inches in length and of a yellowish flesh colour. The characters are all as given by Dr. Johnston.

*Phylline Hippoglossi*, Lam. Johnst., Annals Nat. Hist. vol. i. 431. pl. 15. f. 1—3.

*Hirudo Hippoglossi*, Mull., Zool. Dan., vol. ii. p. 18. t. 54. For some years past this species has commonly occurred to me on Halibut (*Hippoglossus vulgaris*) brought to Belfast market, and captured on the coasts of Down and Antrim.

*Carinella trilineata*, Lined Worm. Johnst., Mag. Nat. Hist., vol. vi.

*Gordius annulatus*, Mont., Linn. Trans., vol. vii. p. 74. This beautiful worm has been dredged by Mr. Hyndman and myself on different occasions in Strangford Lough and in the open sea at Ballywalter on the Down coast: in every instance it was *free*. Belfast Bay, Dr. Drummond.

*Glossipora tuberculata*, Johnson (J. R.). Neighbourhood of Coleraine, Mr. James Bryce, jun.

### Crustacea.

*Pisa tetraodon*, Leach, Mal. Brit., pl. 20. Mr. R. Ball has in his cabinet a specimen found at Roundstone by Mr. McCalla. This species is given in Mr. Templeton's catalogue of Irish Crustacea, but I have reason to believe by mistake.

*Ebalia Cranchii*, Leach, Malac., tab. 25. f. 7—11. July 1840. A single specimen dredged in Roundstone Bay, Connemara, by Mr. R. Ball and Mr. Forbes. Several since obtained by Mr. Ball, thrown on shore at Portmarnock by a storm.

*Inachus leptochirus*, Leach, Malac., tab. 22. B. A specimen dredged in Clifden Bay, Connemara, about the same time with the last. Belfast Bay, Mr. R. Patterson.

*Athanas nitescens*, Leach, Malac., t. 44.

*Cancer nitescens*, Mont. M.S. A specimen taken between tide-marks at Lahinch, co. Clare, Mr. Forbes and W. T.

*Æga tridens*, Leach. An *Æga* agreeing in the few characters assigned to this species by Dr. Leach is in my collection. It was taken alive on a cod-fish in Belfast market.

## L.—*Description of two new Genera of Irish Zoophytes**. By Arthur Hill Hassall, Esq., Corresponding Member of the Natural History Society of Dublin.

### Order ZOOPHYTA ASCIDIOIDA.

#### Family Alcyonidulæ.

#### Genus Cycloum.

*Character.*—Polypidom fleshy, encrusting, covered with numerous imperforate papillæ: polypi ascidian; *ova in clusters.*

*Cycloum papillosum.*—Polypi with eighteen tentacula disposed in the form of a bell.

This species is almost invariably found investing the frond of *Fucus serratus*, over the surface of which it spreads in patches of from one to two inches in extent, more frequently of one, and seldom exceeding two inches. The crust is fleshy, and rather thick: it is covered with numerous papillæ very closely set together. The polypi do not issue from these papillæ, which are imperforate, but from larger eminences of irregular form and size, in the centre of which a puckered depression is seen. The polypi have eighteen tentacula, describing a cup or bell. The ova lie in clusters, each cluster containing six or seven ova arranged in a circle. The clusters are irregularly scattered through the polypidom, and each is inclosed in a space somewhat larger than is sufficient to contain it, the remainder of the space being occupied by a fluid in which numerous small particles are seen which are kept in constant action by the motion of the cilia on the ova. Each ovum is of a circular form, but is depressed, one side more so than the other: round its edge a fringe of cilia is apparent; these may be seen in motion long before the ova are ready for becoming disengaged. I have discovered in this, as well as in the succeeding and some other genera, a body of a very peculiar nature, but concerning the uses of which I can at present only hazard some conjectures. It is, in this species, and in *Alcyonidium gelatinosum* and *hirsutum*, in which I have also met with it, of an oblong form, and composed of a transparent matter, in which numerous small dark brown granules, circular in shape and not unlike ova, are imbedded. I at first imagined that they were nothing more than particles of lime lodged in a soft jelly-like substance, but this opinion was disproved by the application of hydrochloric acid, which did not cause effervescence. These bodies are far more numerous than the ova, and are not more than one-tenth their size. The most probable conjecture which I have been able to form as to

* Communicated to the Dublin Nat. Hist. Society, Feb. 1841.

their nature is, that they are organs destined to contain the ova until they have arrived at a certain degree of maturity, in fact, ovaries, and if not ovaries, the ova themselves in a very early stage of their formation.

I have been induced to raise this species to a generic rank, principally from the arrangement of the ova in circles, which is, I believe, peculiar to it. Some weeks ago, when at Belfast, Mr. Thompson pointed out this species to my notice, saying, at the same time, that he had forwarded it long since to Dr. Johnston as new; its distinctive characters had however been made out by myself long previous to this interview with Mr. Thompson, and reference is made to it in my Catalogue*.

This zoophyte, as well as the succeeding species, exhibits in a very remarkable degree that "close adhesion to life," the usual accompaniment of a low organization, which renders this class of animals so patient of injuries which would be fatal to beings of greater complexity of structure. I have on more than one occasion seen the polypidoms of this and the following species enveloped in a firm coating of ice; on immersion of either of these in sea-water the coating has become dissolved, and the polypi have protruded their feelers, and have appeared as active as though they had never been exposed to such a very low degree of temperature as would have destroyed the life of more highly organized animals. From this it is apparent that their sensibility cannot be very great.

Dublin bay, on *Fucus serratus*; not uncommon.

We now come to the description of the second genus.

Order ZOOPHYTA ASCIDIOIDA.

Family Alcyonidulæ.

Genus Sarcochitum.

*Character.*—Polypidom encrusting, fleshy, covered with numerous prominences of irregular form and unequal size, from which the polypi issue; ova circular, scattered singly throughout the polypidom; a dark brown body of a *circular* form filled with small round granules is apparent in great numbers through the polypidom.—Polypi ascidian.

*Sarcochitum polyoum.*—Polypi with twenty tentacula.

This species is also usually found investing *Fucus serratus*, the frond of which it sometimes covers to the extent of several inches. The crust is thin and fleshy, and covered with numerous large eminences of irregular form and unequal size, which exhibit a puckered appearance in the centre, and from

* Published in the 'Annals' for Nov. 1840, p. 170.

which the polypi issue; these have twenty tentacula. The polypidom, when found on one side of the weed, is generally also present on the reverse side; and this is somewhat curious, as the crust almost constantly terminates on each side of the weed at some distance from its edge, so that it cannot reach the one side from the other by a continuity of growth.

The ova in this species are exceedingly numerous, and vary in colour from white to yellow; they present much the same form and appearance as those of the preceding genus. If a quantity of the sea-weed, with the zoophyte upon it, be placed in salt-water for a few hours, great numbers of the ova will become liberated, and may plainly be seen with the unassisted eye moving about in almost ceaseless action; now gliding rapidly along the surface of the water, now wheeling round upon their axes; at one time elevating themselves in the fluid, again as rapidly sinking in it:—these elevations and subsidences seeming to depend upon the form of the ovum, which is seen to change with these movements. The facility and rapidity with which these little bodies seem to perform their evolutions is very striking. They may often be seen to run along the water in a straight line for several inches, at a pace which would far outstrip the fleetest Newmarket racer—the relative sizes of the two creatures being taken into consideration;—and it is not a little curious to observe, that no matter how many ova be moving about in the same space, still they never come in contact, appearing to avoid each other as carefully as though they were possessed of eyes.

The thought then occurred to me, that the minute, frail, and delicate ova of these species must have made their way unscathed and uninjured through from twenty to thirty miles of the troubled and stormy ocean, and have fixed themselves to our rocks—the vibratile cilia on their surfaces being mainly instrumental in effecting their transportation.

The polypidoms of this and the preceding species are often so mixed up in their distribution upon the same piece of sea-weed, that it requires a practised eye to distinguish them. I have been induced to consider this species as distinct from the genus *Alcyonidium*, to which it bears a near relation—for the following reasons: 1st. The number of the tentacula, a character which I have found to be constant, it being twenty in this and but sixteen in *Alcyonidium*; 2nd. This species never rises from the surface of attachment in the form of an independent polypidom; it is invariably encrusting, whereas all the species of the genus *Alcyonidium* do form elevated polypidoms; and 3rd. There is a difference in the form of the body or organ to which I have referred in the description of the genus *Cycloum*;—it being circular in this, while it is oblong in the genus *Alcyonidium*.

I have frequently noticed a species of zoophyte lining the interior of old shells of *Buccinum undatum*, and covering the under surface of stones, which I consider to be identical with this. If a portion of the polypidom of this species, in a living condition, be suddenly plunged into spirits, an instantaneous protrusion of the polypi takes place, having their feelers arranged, as in life, in the form of a graceful bell. In this state they may be kept, for a time, for the purposes of future examination. The cause of this protrusion is readily explained. The polypes being already contracted within their cells,—on the application of the irritating spirit are compelled to start outwards;—the only motion of which they are capable when folded up within these cells*.

I have, in conclusion, to acknowledge the assistance I received from the classical attainments of my talented and valued friend, G. J. Allman, Esq. of Bandon, in the naming of the genera.

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## LI.—*Notes on Birds.* By T. C. Eyton, Esq., F.L.S. No. III.

### *Merops Melanura*, Vig. and Horsf.

Tongue long, pointed, but soft at the extremity and without bristles, posteriorly armed with two strong spines on each side, between which there are a few smaller ones.

Œsophagus small, of nearly uniform diameter; proventriculus large, nearly globular, and slightly contracted at its entrance into the stomach, which is somewhat oval and slightly muscular, with the epithelium hardened.

The intestinal canal was much damaged, but appeared to be of rather large diameter. I could not perceive any cæca: liver large, bilobed, right lobe nearly twice the size of the left.

Sternum rather elongated, with a deep keel considerably produced anteriorly, and much rounded on its inferior edge. The posterior margin of the sternum indented on each side with two very deep fissures, the lateral ones deepest, broader posteriorly than anteriorly; the manubrial process not distinct and prominent, but merged into the keel, which is continued forwards between the coracoids.

Os furcatum with the rami much flattened laterally, strong and slightly arched, without any process at the point where it approaches the sternum; coracoids of moderate length and strength, with a very broad articulation to the sternum.

Pelvis very broad; obturator foramen linear, nearly obliterated;

* Drawings of these two genera have been forwarded by myself to Dr. Johnston, and will, I suppose, appear in his Supplement.

ischiadic foramen oval, of moderate size. Cotyloid cavities placed near the centre of the pelvis; os pubis not continued far downwards, with the extremity inclined upwards and inwards.

Scapulars broad, widest near their extremities, which are pointed. The skeleton was too much injured to enable me to make out the numbering of the vertebræ with certainty.

REMARKS.—In the anatomy of the soft parts, as far as I could make them out from a much damaged specimen, and in the skeleton, a great preponderance is shown in favour of the genus *Merops* being classed with the Kingfishers, which indeed might be expected from the external structure; and in those points in which it differs it appears to approach the Humming Birds, a group which I think must also be classed among the fissirostral or volitorial division of birds.

The sternum, in having two posterior fissures on each side, agrees with the Kingfishers, but is altogether longer and has a deeper keel in proportion to its length, and the inferior edge of it is more rounded than in that family, in which particulars it appears to approach the Humming Birds.

The coracoids and humerus are proportionally shorter, although of nearly the same form as among the *Alcedinidæ*: these portions of the skeleton are found remarkably short among the Humming Birds.

In the structure of the pelvinal bones, the os furcatum, and ribs, *Merops* agrees precisely with the typical Kingfishers.

## LII.—*A Catalogue of Fossil Fish in the Collections of the* EARL OF ENNISKILLEN, F.G.S., &c. *and* SIR PHILIP GREY EGERTON, Bart., F.R.S., &c.*

| GENUS and SPECIES. | Formation. | Locality. |
|---|---|---|
| Acanthoderma spinosum . | Black schist...... | Engi. |
| Acanthopleurus serratus . | Do. .............. | Ib. |
| Acanus arcuatus ......... | Do. .............. | Ib. |
| —— oblongus ........... | Do. .............. | Ib. |
| Acipenser Toliapicus ... | London clay | Sheppy. |
| Acrodus Anningiæ | Lias .............. | Lyme Regis. |
| —— Braunii....... | Grés bigarré ... | Deux Ponts. |
| —— Gaillardoti . | Muschelkalk ... | Bayreuth. |
| —— gibberulus . | Lias .............. | Lyme Regis. |
| —— latus.......... | Do. .............. | Ib. |

* This Catalogue has been printed for private distribution by Sir Philip Grey Egerton, to whose kindness we are indebted for permission to insert it.

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Acrodus leiodus | Great Oolite ... | Stonesfield. |
| - minimus .. | Muschelkalk ? ... | Axmouth. |
| - nobilis ..... | Lias .............. | Lyme Regis. |
| Acrolepis asper ............. | Kupfer-schiefer | Mansfeld. |
| —— Sedgwickii .......... | Mag. Limestone | Ferry Hill. |
| Ætobates irregularis ...... | London clay ... | Sheppy. |
| Amblypterus eupterygius ... | Coal formation... | Lebach. |
| —— lateralis .............. | Do. .............. | Ib. |
| —— latus .................... | Do. .. | Ib. |
| —— macropterus ........ | Do. .. | Ib. |
| Amblyurus macrostomus ... | Lias ............. | Street. |
| Anenchelum dorsale ......... | Black schist..... | Engi. |
| —— Glarisianum ........... | Do. ............. | Ib. |
| —— heteropleurum ......... | Do. | Ib. |
| —— isopleurum ........... | Do. | Ib. |
| —— latum ................. | Do. | Ib. |
| Aspidorhynchus acutirostris | Oolite ........... | Solenhofen. |
| —— Anglicus .............. | Lias .............. | Whitby. |
| —— Comptoni ........... | Chalk ?.......... . | Brazil. |
| —— mandibularis ........ | Oolite ........... | Solenhofen. |
| Asteracanthus ornatissimus | Kimmeridge clay | Shotover. |
| —— semisulcatus........... | Great Oolite ... | Stonesfield. |
| Asteroptychius ornatus...... | Carb. Limestone | Armagh. |
| Atherina macrocephala...... | Eocene........... | Monte Bolca. |
| Aulolepis typus ........... | Chalk ........... | Kent. |
| Belonostomus acutus | Lias .............. | Whitby. |
| —— leptosteus ..... | Great Oolite | Stonesfield. |
| —— Munsteri ........ | Oolite ....... | Solenhofen. |
| —— tenellus ........ | Lias .......... | Lyme. |
| Beryx microcephalus ...... | Chalk ....... | Kent. |
| —— ornatus .............. | Do. .......... | Ib. |
| —— radians ................. | Do. ......... | Ib. |
| Blochius longirostris ...... | Eocene....... | Monte Bolca. |
| Carangopsis dorsalis. | Do. .......... | Ib. |
| —— latior ......... | Do. .......... | Ib. |
| Carcharias grossescrratus... | Tertiary beds | Maryland. |
| —— macrodon ........... | Do. ........... | Ib. |
| —— megalodon ........... | Do. ........... | Malta. |
| —— megalotis ............. | Do. ........... | Maryland. |
| —— minor ................ | Do. ........... | Ib. |
| —— polygyrus .............. | Do. ........... | Ib. |
| —— productus ........... | Do. ........... | Malta. |
| —— subserratus ........... | London clay... | Sheppy. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Caturus furcatus | Oolite | Eichstadt. |
| —— macrodus | Do. | Solenhofen. |
| —— macrurus | Do. | Ib. |
| —— maximus | Do. | Ib. |
| —— microchirus | Do. | Ib. |
| —— pachyurus | Do. | Ib. |
| —— pleiodus | Great oolite | Stonesfield. |
| Ceratodus altus | Muschelkalk ? | Aust. |
| —— gibbus | Do. | Ib. |
| —— planus | Do. | Ib. |
| Cheiracanthus microlepidotus | Old Red | Lethen. |
| —— minor | Do. | Stromness. |
| Cheirolepis Cummingiæ | Do. | Lethen. |
| —— Traillii | Do. | Stromness. |
| Chimæra Agassizii | Green sand | Maidstone. |
| —— brevirostris | Galt | Folkstone. |
| —— Colei | Great Oolite | Stonesfield. |
| —— Egertoni | Kimmeridge clay | Shotover. |
| —— Mantellii | Chalk | Sussex. |
| —— neglecta | Great Oolite | Stonesfield. |
| —— Owenii | Do. | Ib. |
| —— Townshendii | Purbeck stone | Garsington. |
| Chomatodus cinctus | Carb. Limestone | Bristol. |
| —— linearis | Do. | Ib. |
| —— truncatus | Do. | Armagh. |
| Chondrosteus acipenserides | Lias | Lyme. |
| Cladocyclus Gardneri | Chalk ? | Brazil. |
| —— Lewesiensis | Do. | Kent. |
| Cladodus mirabilis | Carb. Limestone | Bristol. |
| —— striatus | Do. | Armagh. |
| Clupea Beurardi | Tertiary beds | Lebanon. |
| —— brevis | Black schist | Engi. |
| —— catopygoptera | Eocene | Monte Bolca. |
| —— megaptera | Black schist | Engi. |
| —— minuta | Eocene | Monte Bolca. |
| —— Scheuchzeri | Black schist | Engi. |
| —— tenuissima | Pleistocene | Sicily. |
| Cobitis cephalotes | Tertiary beds | Œningen. |
| Coccosteus latus | Old Red | Stromness. |
| —— oblongus | Do. | Lethen. |
| Cochliodus acutus | Carb. Limestone | Armagh. |
| —— contortus | Do. | Bristol. |
| —— magnus | Do. | Armagh. |
| —— oblongus | Do. | Ib. |
| —— striatus | Do. | Ib. |
| Cœlacanthus gracilis | —— | —— |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Cœlacanthus granulatus ... | Mag. Limestone | Ferry Hill. |
| —— lepturus ............... | Coal shale ...... | Leeds. |
| Cœlopoma Colei ............ | London clay ... | Sheppy. |
| —— læve ..................... | Do. .............. | Ib. |
| Conodus ferox ............... | Lias .............. | Lyme. |
| Cottus brevis.................. | Tertiary beds ... | Œningen. |
| Ctenacanthus brevis......... | Carb. Limestone | Bristol. |
| —— heterogyrus ........... | Do. .............. | Armagh. |
| —— major .................. | Do. .............. | Bristol. |
| —— tenuistriatus........... | Do. .............. | Ib. |
| Ctenolepis cyclus ............ | Great Oolite ... | Stonesfield. |
| Ctenoptychius apicalis ...... | Coal shale ...... | Stafford. |
| —— dentatus .............. | Carb. Limestone | Armagh. |
| —— marginalis ............ | Do. .............. | Ib. |
| —— pectinatus ............ | Coal shale ...... | N. Wales. |
| —— radicans ............... | Carb. Limestone | Armagh. |
| —— sagittatus............... | Do. .............. | Ib. |
| —— serratus ............... | Do. .............. | Ib. |
| Cybium macropomum ...... | London clay ... | Sheppy. |
| Cyclurus minor ............ | Tertiary beds ... | Œningen. |
| Dapedius arenatus ......... | Lias .............. | Lyme. |
| —— Colei..................... | Do. .............. | Ib. |
| —— granulatus ............ | Do. .............. | Ib. |
| —— micans ................. | Do. .............. | Whitby. |
| —— orbis .................... | Do. .............. | Barrow. |
| —— politus ... ............. | Do. .............. | Lyme. |
| —— punctatus.............. | Do. .............. | Ib. |
| Dentex breviceps ............ | Eocene........... | Monte Bolca. |
| Dercetis elongatus ......... | Chalk ........... | Kent. |
| Diodon erinaceus ............ | Eocene........... | Monte Bolca. |
| —— Scillæ .................. | Tertiary beds ... | Malta. |
| Diplacanthus crassispinus . | Old Red ......... | Stromness. |
| —— longispinus ............ | Do. .............. | Lethen. |
| —— striatulus ............... | Do. .............. | Ib. |
| Diplodus gibbosus ......... | Coal shale ...... | Staffordshire. |
| Diplopterus borealis ......... | Old Red ......... | Stromness. |
| —— carbonarius ............ | Coal shale ...... | Leeds. |
| —— macrocephalus......... | Old Red ......... | Lethen. |
| Dipterus macrolepidotus ... | Do. .............. | Caithness. |
| Ductor leptosomus ......... | Eocene........... | Monte Bolca. |
| Enchodus halocyon......... | Chalk ........... | Kent. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Ephippus longipennis ...... | Eocene........... | Monte Bolca. |
| Esox lepidotus .............. | Tertiary beds ... | Œningen. |
| Eugnathus chirotes ......... | Lias .............. | Lyme. |
| —— fasciculatus ........... | Do. .............. | Whitby. |
| —— microlepidotus ...... | Oolite ........... | Solenhofen. |
| —— minor ................. | Lias .............. | Lyme. |
| —— ornatus.................. | Do. .............. | Ib. |
| —— orthostomus ......... | Do. .............. | Ib. |
| —— polyodon ............... | Do. .............. | Ib. |
| —— scabriusculus ......... | Do. .............. | Ib. |
| —— speciosus ............... | Do. .............. | Ib. |
| —— tenuidens ............. | Do. .............. | Street. |
| Eurynotus crenatus ......... | Coal formation . | Burdie House. |
| Fistularia Kœnigii........... | Black schist...... | Engi. |
| —— tenuirostris ........... | Eocene........... | Monte Bolca. |
| Galeus aduncus ............... | Molasse ......... | Soleure. |
| —— appendiculatus......... | Plänerkalk ...... | Stickla. |
| —— falcatus .............. | Chalk ........... | Kent. |
| —— pristodontus........... | Do. .............. | Maestricht. |
| —— semiserratus........... | —— | —— |
| —— serratus .............. | Molasse ......... | Soleure. |
| Gasteronemus rhombeus ... | Eocene........... | Monte Bolca. |
| Glyptocephalus radiatus ... | London clay ... | Sheppy. |
| Glyptolepis leptopterus ... | Old Red ......... | Lethen. |
| Gobio analis ................. | Tertiary beds ... | Œningen. |
| Goniognathus coryphænoides | London clay ... | Sheppy. |
| —— maxillaris ........... | Do. .............. | Ib. |
| Gyracanthus formosus ...... | Coal shale ...... | N. Wales. |
| —— tuberculatus ......... | Do. .............. | N. Shields. |
| Gyrodus angustus ........... | Chalk ........... | Maidstone. |
| —— lævior ................. | London clay ... | Sheppy. |
| —— trigonus .............. | Great Oolite ... | Stonesfield. |
| —— n. s. .................... | Do. .............. | Ib. |
| Gyrolepis Albertii ........... | Muschelkalk ? ... | Axmouth. |
| —— Rankini .............. | Coal shale ...... | Leeds. |
| —— tenuistriatus........... | Muschelkalk ? ... | Axmouth. |
| Gyrosteus mirabilis ........ | Lias .............. | Whitby. |
| Helodus didymus ........... | Carb. Limestone | Armagh. |
| —— lævissimus ........... | Do. .............. | Bristol. |
| —— mammillaris ......... | Do. .............. | Armagh. |
| —— planus ................. | Do. .............. | Ib. |
| —— simplex................. | Coal shale ...... | Staffordshire. |
| —— turgidus ............. | Carb. Limestone | Armagh. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Hemipristis serra ........... | Molasse ........ | Soleure. |
| Holocentrum pygæum ...... | Eocene........... | Monte Bolca. |
| Holoptychius granulatus ... | Coal shale ...... | Rhuabon. |
| —— Hibberti .............. | Coal formation . | Burdie House. |
| —— minor ................. | Coal shale ...... | Leeds. |
| —— sauroides .............. | Do. .............. | Ib. |
| Hybodus acutus ........... | Kimmeridge clay | Shotover. |
| —— carinatus .............. | Lias .............. | Lyme. |
| —— dorsalis...... .......... | Great Oolite ... | Stonesfield. |
| —— ensatus .............. | Lias .............. | Lyme. |
| —— formosus } ......... | Do. .............. | Ib. |
| —— grossispinus } | | |
| —— grossiconus ........... | Great oolite ...... | Stonesfield. |
| —— homoprion } ........ | Lias .............. | Lyme. |
| —— medius } | | |
| —— longiconus ........... | Muschelkalk ... | Bayreuth. |
| —— marginalis ........... | Great Oolite ... | Stonesfield. |
| —— minor ................. | Muschelkalk ? ... | Axmouth. |
| —— plicatilis .............. | Do. .............. | Ib. |
| —— polyprion .............. | Great Oolite ... | Stonesfield. |
| Hybodus reticulatus } ...... | Lias .............. | Lyme. |
| —— curtus } | | |
| —— incurvus } | | |
| —— strictus .............. | Purbeck stone ... | Purbeck. |
| Hypsodon Lewesiensis...... | Chalk ........... | Kent. |
| —— oblongus .............. | London clay...... | Sheppy. |
| —— Toliapicus.............. | Do. .............. | Ib. |
| Isurus macrurus ........... | Black schist...... | Engi. |
| Labrax schizurus ........... | Eocene........... | Monte Bolca. |
| Lamna acuminata........... | Chalk ........... | Sussex. |
| —— contortidens........... | Molasse ........ | Soleure. |
| —— cuspidata } ......... | Do. .............. | Ib. |
| —— denticulata } | | |
| —— elegans ................. | London clay...... | Sheppy. |
| Lates gracilis................. | Eocene........... | Monte Bolca. |
| Lebias cephalotes ........... | Tertiary beds ... | Sinigaglia. |
| —— crassicaudus ......... | Do. .............. | Aix. |
| Lepidotus fimbriatus ...... | Lias .............. | Lyme. |
| —— Fittoni ................. | Wealden ......... | Tilgate. |
| —— Mantellii .............. | Do. .............. | Ib. |
| —— minor ................. | Purbeck stone... | Purbeck. |
| —— notopterus ........... | Oolite ........... | Solenhofen. |
| —— palliatus .............. | Kimmeridge clay | Boulogne. |
| —— punctulatus ........... | Chalk ........... | Kent. |
| —— semiserratus ......... | Lias .............. | Whitby. |
| —— serratulus ............ | Do. .............. | Barrow. |
| —— unguiculatus ......... | Great Oolite ... | Stonesfield. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Lepracanthus Colei ......... | Coal shale ...... | N. Wales. |
| Leptacanthus semistriatus | Great Oolite ... | Stonesfield. |
| —— serratus .............. | Do. .............. | Ib. |
| —— tenuispinus ........... | Lias .............. | Lyme. |
| Leptolepis Bronnii ......... | Lias .............. | Lyme. |
| —— caudalis .............. | Do. .............. | Ib. |
| —— contractus ............ | Oolite ........... | Solenhofen. |
| —— dubius ................. | Do. .............. | Ib. |
| —— filipennis .............. | Lias .............. | Street. |
| —— Knorrii................. | Oolite ........... | Solenhofen. |
| —— latus .................. | Do. .............. | Eichstadt. |
| —— paucispondylus ...... | Green sand ...... | Kelheim. |
| —— polyspondylus ......... | Oolite ........... | Solenhofen. |
| —— pusillus................. | Green sand ...... | Kelheim. |
| —— sprattiformis ......... | Oolite ........... | Solenhofen. |
| —— Voithii ................. | Green sand ...... | Kelheim. |
| Leuciscus gracilis ........... | Tertiary beds ... | Wurtemburg. |
| —— latiusculus ........... | Do. .............. | Œningen. |
| —— macrurus .............. | Papier-kohl ...... | Rhine. |
| —— Œningensis ........... | Tertiary beds ... | Œningen. |
| —— papyraceus ........... | Papier-kohl ...... | Rhine. |
| Lichia prisca ................. | Eocene........... | Monte Bolca. |
| Macropoma Egertoni ...... | Galt .............. | Speeton. |
| —— Mantellii .............. | Chalk ........... | Sussex. |
| Macrosemius brevirostris ... | Great Oolite ... | Stonesfield. |
| Mallotus villosus ........... | Recent beds ...... | Greenland. |
| Megalichthys Hibberti...... | Coal shale ...... | Burdie House. |
| Megalops priscus ........... | London clay...... | Sheppy. |
| Microdon hexagonus ...... | Oolite ........... | Solenhofen. |
| —— radiatus .............. | Purbeck stone ... | Purbeck. |
| Mugil princeps ............... | Tertiary beds ... | Aix. |
| Myliobates angustus ......... | London clay...... | Sheppy. |
| —— gyratus ................. | Do. .............. | Ib. |
| —— marginalis ............ | Do. .............. | Ib. |
| —— nitidus .................. | Do. .............. | Ib. |
| Myliobates Stokesii ......... | —— | —— |
| —— Studeri ................. | Molasse ......... | Soleure. |
| —— subarcuatus ........... | London clay...... | Sheppy. |
| —— Toliapicus.............. | Do. .............. | Ib. |
| —— ——.................... | Crag.............. | Norfolk. |
| Myriacanthus paradoxus ... | Lias .............. | Lyme. |
| —— retrorsus .............. | Do. .............. | Ib. |
| Myripristis homopterygius | Eocene........... | Monte Bolca. |
| —— leptacanthus........... | Do. .............. | Ib. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Nemacanthus brevispinus... | Great Oolite ... | Stonesfield. |
| —— filifer.................. | Muschelkalk ? ... | Aust. |
| Nemopteryx crassus ......... | Black schist...... | Engi. |
| —— clongatus .............. | Do. .............. | Ib. |
| Notagogus Pentlandi......... | Jura Limestone | Torre d'Orlando. |
| Nothosomus octostychius... | Lias .............. | Lyme. |
| Notidanus microdon ......... | Chalk ........... | Kent. |
| —— primigenius ........... | Molasse ......... | Soleure. |
| Odontaspis rhaphiodon...... | Chalk ........... | Maestricht. |
| Onchus plicatus............. | Carb. Limestone | Armagh. |
| —— rectus ................. | Do. .............. | Ib. |
| —— subulatus .............. | Coal shale ...... | Rhuabon. |
| Ophiopsis dorsalis........... | Purbeck stone ... | Purbeck. |
| Oracanthus Milleri ......... | Carb. Limestone | Bristol. |
| —— minor .................. | Do. .............. | Armagh. |
| —— pustulosus ........... | Do. .............. | Bristol. |
| Orodus ramosus ........... | Do. .............. | Ib. |
| Osmeroides Glarisiensis ... | Black schist...... | Engi. |
| —— Lewesiensis ........... | Chalk ........... | Sussex. |
| Osteolepis arenatus ......... | Old Red ......... | Gamrie. |
| —— macrolepidotus ...... | Do. .............. | Orkney. |
| —— major ................. | Do .............. | Lethen. |
| —— microlepidotus ...... | Do. .............. | Orkney. |
| Otodus appendiculatus ... | Chalk ........... | Sussex. |
| —— crassus .................. | —— | —— |
| —— latus .................... | Chalk ........... | Maestricht. |
| —— macrotus .............. | London clay...... | Sheppy. |
| —— obliquus .............. | Do. .............. | Ib. |
| —— —— .............. | Crag.............. | Norfolk. |
| Oxyrhina hastalis ............ | Molasse ......... | Soleure. |
| —— Mantellii .............. | Chalk ........... | Sussex. |
| —— quadrans .............. | Molasse ......... | Soleure. |
| —— xiphodon .............. | Tertiary beds ... | Malta. |
| Pachycormus acutirostris... | Lias .............. | Whitby. |
| —— gracilis ................. | Do. .............. | Ib. |
| —— latipennis .............. | Do. .............. | Lyme. |
| —— latirostris ........... | Do. .............. | Whitby. |
| —— latus .................... | Do. .............. | Ib. |
| —— leptosteus.............. | Do. .............. | Lyme. |
| —— macrurus .............. | Do. .............. | Ib. |
| —— n. s. .................... | Do. .............. | Whitby. |
| Palæoniscus Blainvillei ... | Coal formation . | Muse. |
| —— catopterus ........... | New Red ........ | Roan Hill. |
| —— comtus ................. | Mag. Limestone | Ferry Hill. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Palæoniscus Duvernoy ...... | Coal formation . | Zweibrücken. |
| —— Egertoni .............. | Coal shale ...... | Staffordshire. |
| —— elegans .............. | Mag. Limestone | Ferry Hill. |
| —— Freiesleheni ........... | Kupfer-schiefer . | Mansfeld. |
| —— glaphyrus ........... | Mag. Limestone | Ferry Hill. |
| —— longissimus ........... | Do. .............. | Ib. |
| —— macropomus ......... | Zechstein ...... | Ilmenau. |
| —— macrophthalmus ...... | Mag. Limestone | Clarence Rail- [way. |
| —— magnus .............. | Kupfer-schiefer . | Mansfeld. |
| —— Monensis .............. | Coal shale ...... | Anglesea. |
| —— Robisoni .............. | Coal formation . | Burdie House. |
| —— Vratislaviensis ......... | New Red ........ | Ruppersdorf. |
| | | |
| Palæorhynchum Colei ...... | Black schist...... | Engi. |
| —— Egertoni .............. | Do. .............. | Ib. |
| —— Glarisianum ......... | Do. .............. | Ib. |
| —— latum ................. | Do. .............. | Ib. |
| —— longirostre ........... | Do. .............. | Ib. |
| —— medium .............. | Do. .............. | Ib. |
| —— microspondylum ...... | Do. .............. | Ib. |
| | | |
| Palimphyes brevis ......... | Do. .............. | Ib. |
| —— longus ................. | Do. .............. | Ib. |
| | | |
| Perca Beaumontii ......... | Tertiary beds ... | Aix. |
| | | |
| Petalodus Hastingsiæ ...... | Carb. Limestone | Ticknall. |
| —— psittacinus ........... | Do. .............. | Armagh. |
| —— lævissimus ........... | Do. .............. | Ib. |
| —— rectus ................. | Do. .............. | Ib. |
| | | |
| Pholidophorus Bechei ...... | Lias .............. | Lyme. |
| —— fusiformis ........... | ——.............. | Castellamare. |
| —— Hastingsiæ ........... | Lias .............. | Barrow. |
| —— latimanus .............. | Oolite ........... | Solenhofen. |
| —— latiusculus ........... | Lias .............. | Lyme. |
| —— latus .................... | Oolite ........... | Solenhofen. |
| —— leptocephalus ......... | Lias .............. | Street. |
| —— limbatus .............. | Do. .............. | Lyme. |
| —— macrocephalus ...... | Oolite ........... | Eichstadt. |
| —— minor ................ | Great Oolite ... | Stonesfield. |
| —— onychius .............. | Lias .............. | Lyme. |
| —— radians ................. | Oolite ........... | Eichstadt. |
| —— radiatopunctatus ...... | Do. .............. | Solenhofen. |
| —— Stricklandi ........... | Lias .............. | Barrow. |
| —— Taxis ................ | Oolite ........... | Solenhofen. |
| —— tenuiserratus ......... | Green sand ...... | Kelheim. |
| —— uræoides .............. | Oolite ........... | Solenhofen. |
| | | |
| Phyllodus irregularis ...... | London clay...... | Sheppy. |
| —— medius ................. | Do. .............. | Ib. |
| —— Toliapicus.............. | Do. .............. | Ib. |
| | | |
| Physonemus subteres ...... | Carb. Limestone | Armagh. |
| | | |
| Pisodus ——................ | London clay...... | Hampshire. |
| | | |
| Placodus gigas ............... | Muschelkalk ... | Bayreuth. |
| —— Münsteri .............. | Do. .............. | Ib. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Platax Woodwardii ......... | Crag ........... | Norfolk. |
| Platygnathus paucidens ... | Old Red ......... | Orkney. |
| Platysomus gibbosus ...... | Kupfer-schiefer . | Eisleben. |
| —— parvulus .............. | Coal shale ...... | Leeds. |
| —— striatus ................. | Mag. Limestone | Ferry Hill. |
| Pleionemus macrospondylus | Black schist ... | Engi. |
| Pleuracanthus planus ...... | Coal shale ...... | Leeds. |
| Pleurodus affinis ............ | Do. .............. | Rhuabon. |
| Pœcilodus Jonesii ......... | Carb. Limestone | Armagh. |
| —— obliquus .............. | Do. .............. | Ib. |
| —— parallelus ........... | Do. .............. | Ib. |
| —— sublævis .............. | Do. .............. | Ib. |
| —— transversus ............ | Do. .............. | Ib. |
| Pristis Hastingsiæ ......... | London clay...... | Hampshire. |
| Psammodus cornutus ...... | Carb. Limestone | Armagh. |
| —— porosus.................. | Do. .............. | Ib. |
| —— rugosus .............. | Do. .............. | Ib. |
| Pterichthys cornutus ...... | Old Red ......... | Lethen. |
| —— latus ................... | Do. .............. | Ib. |
| —— Milleri ................. | Do. .............. | Gamrie. |
| —— productus.............. | Do. .............. | Lethen. |
| Pterygocephalus paradoxus | Eocene....... .... | Monte Bolca. |
| Ptychodus acutus ............ | Galt ............... | Folkstone. |
| —— altior .............. | Chalk ............ | Sussex. |
| —— decurrens.............. | Do. .............. | Ib. |
| —— gibberulus ........... | Do. .............. | Ib. |
| —— latissimus.............. | Do. .............. | Ib. |
| —— mammillaris ......... | Do. .............. | Ib. |
| —— polygyrus .............. | Do. .............. | Ib. |
| —— spectabilis ........... | Do. .............. | Ib. |
| Ptycholepis Bollensis ...... | Lias .............. | Whitby. |
| Pycnodus biserialis ......... | Great Oolite ... | Little Gibraltar. |
| —— Bucklandi ........... | Do. .............. | Stonesfield. |
| —— didymus .............. | Do. .............. | Ib. |
| —— discoides .............. | Do. .............. | Little Gibraltar. |
| —— gigas ................. | Jura Limestone | Jura. |
| —— Hügii ................. | Great Oolite ... | Stonesfield. |
| —— latirostris .............. | Do. .............. | Ib. |
| —— Mantellii .............. | Do. .............. | Tilgate. |
| —— obtusus .............. | Great Oolite ... | Stonesfield. |
| —— ovalis ................. | Do. .............. | Ib. |
| —— parvus ................. | Do. .............. | Ib. [do. |
| —— rhombus .............. | Jura Limestone | Torre d'Orlan- |
| —— rugulosus .............. | Great Oolite ... | Stonesfield. |
| Pygæus Coleanus ............ | Eocene ......... | Monte Bolca. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Pygopterus Humboldtii ... | Kupfer-schiefer . | Mansfeld. |
| —— mandibularis ......... | Mag. Limestone | Ferry Hill. |
| Raia antiqua .................. | Crag.............. | Norfolk. |
| Rhacolepis brama ........... | Chalk ?........... | Brazil. |
| —— buccalis .............. | Do. .............. | Ib. |
| —— latus ..................... | Do. .............. | Ib. |
| Rhodeus elongatus ......... | Tertiary beds ... | Œningen. |
| Saurichthys apicalis ......... | Muschelkalk ? ... | Axmouth. |
| Saurocephalus lanciformis . | Chalk ........... | Sussex. |
| Sauropsis mordax ........... | Great Oolite ... | Stonesfield. |
| Sciænurus Bowerbankii ... | London clay...... | Sheppy. |
| —— crassior .............. | Do. .............. | Ib. |
| Scilliodus antiquus ......... | Chalk ........... | Kent. |
| Semionotus rhombifer ...... | Lias .... ......... | Lyme. |
| —— striatus .............. | Do. .............. | Seefeld. |
| Semiophorus velicans ...... | Eocene.......... . | Monte Bolca. |
| Serranus microstomus ...... | Do. .............. | Ib. |
| —— occipitalis.............. | Eocene ......... | Ib. |
| Smerdis micracanthus ...... | Eocene ......... | Ib. |
| —— minutus .............. | Tertiary beds ... | Aix. |
| —— pygmæus .............. | Eocene..... ...... | Monte Bolca. |
| Sparnodus altivelis ......... | Do. .. ........... | Ib. |
| —— macrophthalmus ...... | Do. .............. | Ib. |
| —— micracanthus ......... | Do. .............. | Ib. |
| —— ovalis .................. | Do. .............. | Ib. |
| Sphærodus gigas ........... | Kimmeridge clay | Shotover. |
| —— n. s. .................... | Jura Limestone | Jura. |
| Sphenolepis squamosseus... | Tertiary beds ... | Aix. |
| Sphenonchus hamatus ...... | Lias .............. | Lyme. |
| Sphyræna gracilis........... | Eocene........... | Monte Bolca. |
| Sphyrænodus crassidens ... | London clay...... | Sheppy. |
| —— priscus ................. | Do. .............. | Ib. |
| Spinacorhinus polyspondylus | Lias .............. | Lyme. |
| Strophodus favosus ......... | Great Oolite ... | Stonesfield. |
| —— magnus ............... | Do. .............. | Ib. |
| —— reticulatus ........... | Kimmeridge clay | Shotover. |
| —— subreticulatus ......... | Inferior Oolite... | Dundry. |
| —— sulcatus ............... | Green sand ...... | Maidstone. |
| —— tenuis .................. | Great Oolite ... | Stonesfield. |

| Genus and Species. | Formation. | Locality. |
|---|---|---|
| Tetragonolepis confluens ... | Lias .............. | Lyme. |
| —— dorsalis .............. | Do. .............. | Gloucestersh. |
| —— heteroderma........... | Do. .............. | Lyme. |
| —— Leachii.................. | Do. .............. | Ib. |
| —— leiosomus............... | Do. .............. | Ib. |
| —— monilifer .............. | Do. .............. | Barrow. |
| —— ovalis .................. | Do. .............. | Whitby. |
| —— pholidotus ........... | Do. .............. | Lyme. |
| —— pustulatus ........... | Do. .............. | Ib. |
| —— radiatus .............. | Do. .............. | Ib. |
| —— speciosus .............. | Do. .............. | Ib. |
| —— striolatus .............. | Do. .............. | Barrow. |
| Tetrapterus priscus ......... | London clay...... | Sheppy. |
| Thrissops formosus ......... | Green sand ...... | Kelheim. |
| —— salmoneus ......... | Oolite ........... | Solenhofen. |
| Thyellina prisca ........... | Lias .............. | Lyme. |
| Tinca furcata .............. | Tertiary beds ... | Œningen. |
| Vomer longispinus ......... | Eocene........... | Monte Bolca. |
| Zygæna dubia .............. | Molasse ......... | Soleure. |
| New genus ................. | Eocene........... | Monte Bolca. |
| N. S. ............................ | Chalk .......... | Kent. |
| N. S. ............................ | Tertiary beds .. | Aix. |
| N. S. ............................ | Black schist ... | Greenland. |
| N. S. ............................ | Eocene........... | Monte Bolca. |

## BIBLIOGRAPHICAL NOTICES.

*Natural History as a Branch of General Education.* By Robert Patterson. Belfast. 8vo, 28 pp. 1840.

There are perhaps very few persons who are not sensibly alive to the objects of study which Natural History presents, and yet the proportion of those who pursue any department of it as a science is but small. We may probably find an explanation of this circumstance in the operation of two causes. In the first place, the scientific pursuit of zoology or botany cannot be so profitably applied to the arts by which wealth is accumulated as many other departments of science, amongst which we may mention chemistry and the various branches of natural philosophy. Men of science must live as well as other people; and it is the lot of a few only to be able to pursue science independently of their means of subsistence.

In the second place, Natural History has never occupied a prominent place in the courses of education which have been prescribed in British Universities. Latin and Greek and Mathematics have been the sole passports to Professors' chairs, and the highest prizes that the church has had to bestow have been conferred on the greatest adept in Greek metres or in the abstractions of algebraical analysis. Such a state of things has been long exploded on the continent, and Natural History there occupies a position which it ought always to hold, wherever the true end and aim of science is known and appreciated.

We are, however, differently situated in this country. The changes that may be judged by a few to be desirable cannot be enforced on the many without suspicion of interest; and the prejudices of the few often oppose the enlightened demands of the many. In this state of things all that can be done is to wait patiently till the time come when the advantage and propriety of some change will be recognised by all. In the mean time, we think those naturalists do well who take every opportunity of enforcing on the attention of the public the importance of cultivating a taste for Natural History; and we feel much satisfaction that Mr. Patterson of Belfast has appeared as a labourer in this field, well known as this gentleman is to many of our readers as a popular writer on Natural History, and as an active and efficient member of the Natural History Section of the British Association. The pamphlet before us is an address delivered before the Natural History Society of Belfast, and was printed at the request and expense of the Society.

At the commencement our author meets the humiliating question *cui bono*, which we are so often obliged to hear from quarters where we might least expect it.

"What, it may be asked, is the use of Natural History? And by the word *use*, in such a question, is understood---In what way will Natural History increase a man's profit, protect him from loss, or augment his personal comfort? I pause not here to consider whether or not the question of *cui bono* is not at the present time put too frequently and too pertinaciously; whether we do not sometimes leave the higher regions of science uninvestigated, while we try to wring some practical application out of a partially-revealed truth. The desire of testing the utility of every pursuit by some speedy and profitable result prevails so universally, that it might perhaps be needful to show, that, even on this ground, the study of Natural History is deserving of attention.

"If so, it would only be necessary to quote from published works a few well-authenticated instances of loss, danger, or inconvenience, arising from the want of that information, which even an elementary knowledge of Natural History imparts. Such blunders are but too numerous; and though occasionally they may seem ludicrous, afford on the whole melancholy examples of the evils produced by ignorance, of time and labour misemployed, money uselessly squandered, and, sometimes, a temporary annoyance or loss, increased tenfold by the injudicious effort made for its removal. If to the weight of such evidence we add the fact, that the whole of our food, clothing, and habitations, are of necessity derived from the animal, vegetable, or mineral kingdoms, there will not, it is presumed, be any one hardy enough to deny that a correct knowledge of such things must be both desirable and advantageous."

The whole subject is arranged under four heads :—

1. Effects of the study of Natural History on the mental faculties. We quote the following very just observations which the author makes upon this part of his subject :—

"The study of Natural History, though suitable for manhood, is highly attractive to youth; and bends itself, with easy adaptation, to the varying intellectual capacities of its votaries. To the very young—to children only four or five years old, its objects are perhaps among the most pleasing that can be presented to their notice. At that age, when the observant faculties are in constant action, and the reasoning powers are as yet immature, the flowers, the shells, the birds or quadrupeds, by which the child is surrounded, form naturally the primary subjects of his admiration and inquiry. Those who have had any experience in the management of children will testify with what delight they listen to stories about such things, when the narrator possesses the art of making himself intelligible to the capacity of his auditors. How frequently is he again and again asked for the recital, while each repetition serves only to enhance its charms! Should the teacher be collecting flowers in spring, or gathering the shells which are scattered over the strand, he will find in children his most delighted and zealous assistants, and will mark with what facility they can be taught to discriminate the several kinds, and to recollect the names of those which are the most attractive. And if the same individual—whether a parent or a teacher—be speaking on the subject to the same children some weeks afterwards, he will find, as I have often done, that the facts of which he knew they had been cognisant, were, in truth, but a small portion of those actually observed, and that a whole host of concomitant circumstances, and vivid, though sometimes fantastic associations, had been connected, by the children, with the visible objects to which he had supposed their entire attention had been directed. From such facts it may be fairly inferred, that *Natural History is a study peculiarly well adapted for early youth*.

"By thus directing the attention to various external objects which are regarded with interest, we learn the very useful habit of 'having our eyes about us.' We have all read in our school-boy days the story of 'Eyes and no eyes;' and we all know the difference which exists among educated people, as to the power of observing what is actually before their view. One sees a part only, and that imperfectly; another, at a glance, takes in everything peculiar to the scene, almost by intuition. That prompt perceptive powers are desirable, and that they, to a great extent, are dependent on cultivation, every one will admit. The objects which Natural History embraces are well adapted to call these powers into action, and train them to promptitude and vigour. Hence I rank among its intellectual effects, the *beneficial influence it exerts on the observant faculties*.

"But this influence is not limited to quickness in using our eyes. As we advance a little beyond childhood, it takes in a wider sphere of usefulness. It teaches us to note resemblances among objects; thus enabling us, in some degree, to group them together by their apparent affinities; and it accustoms us also to mark the differences among those which, in many particulars, are alike. On this all classification among external objects must depend: on this must rest the divisions of classes, families, genera, and species, so indispensable to the naturalist. To discover resemblances, to detect differences, are processes totally distinct from the mere power of observing. They are not acts of the perceptive, but of the reflective faculties. They require not merely the exercise of our eyes, but of our powers of comparison and judgment. In other words, *by the study of Natural History we acquire habits of discrimination*.

"The pupil soon, however, discovers that many of his hastily-formed ideas and rapid generalizations are erroneous. He finds that, to draw his conclusions with any certainty, the observations on which they are founded must be perfectly accurate; and not only accurately made, but accurately expressed, otherwise they will convey false impressions to other minds. *It enforces, therefore, accuracy in every particular.*

"And to make knowledge available, it is needful that its facts be systematically arranged. Without arrangement all is a chaos—'*rudis indigestaque moles.*' With arrangement, knowledge becomes at all times ready for service, and each accession enriches, not encumbers, its possessor. Whether he seek to acquire or to impart information, the student of nature is compelled to be methodical; and if he desire to illustrate any department of study by suitable specimens, they must be arranged before they can be rendered available. *Natural History, therefore, directly promotes the formation of orderly and systematic habits.*

"But, in the next place, it benefits the mind, by vesting with new and increasing interest the objects by which we are surrounded; thus furnishing agreeable trains of thought in the hours of relaxation. Time to the naturalist never appears long. He groans not under the load of ennui by which others, in such circumstances, are occasionally oppressed. He finds active, healthy, cheerful occupation for every moment; and still the thirst for knowledge 'but grows by what it feeds on.' *To stimulate a constant desire for improvement, and to foster a buoyant activity of mind and spirit,* no pursuit is more serviceable than that now under consideration."

Mr. Patterson speaks here as one who has truly felt the ennobling influence of the pursuit of science, independent of the lower motives of gain and ambition which may imperceptibly obtain an influence over the mind, and against which the man of science cannot too carefully watch*.

2. Intellectual pleasures derivable from the study of Natural History. These are not peculiar to Natural History, and must be evident to all who take delight in the exercise and cultivation of the intellect.

3. Moral and devotional effects. Under this head the elevating influence of a study of the works of creation is pointed out and enforced. The author well observes—

"But the mental effect is not limited to the production of a transient emotion of pleasure: it is the prelude of a long train of thought, and of the most grateful and reverential feeling towards the Great First Cause. The structural arrangements, admirable as they are, should never be regarded merely as examples of mechanical skill, as evidence of the operations of an Intelligence, as proofs of the existence of a God. They testify not only his existence, but his wisdom, his goodness, and his omnipotence; and should ever be studied with a direct and constant reference to Him. The naturalist who, in this humble and truth-seeking spirit, explores the world around him, will ever feel what the poet has expressed,

> 'These are THY glorious works, Parent of Good—
> Almighty!'

* As an illustration of this subject, we would refer to an essay by Schiller intitled 'The Philosopher and Trader in Science,' translated by Mrs. Austin, in a charming little volume just published, called 'Fragments of German Literature.'

"If viewed in this light, the actions of the inferior animals become elevated into so many manifestations of the Almighty Intelligence, from whom they derive their being. Hence Bonnet says, in a brief but happy metaphor, 'When I see an insect working at the construction of a nest or a cocoon, I am impressed with respect; because it seems to me that I am at a spectacle where the Supreme Artist is hid behind the curtain*.'"

4. Natural History as a branch of education. There can, we think, be little question of the desirableness of early instilling into the minds of the young a taste for those sciences which are capable of contributing so much to their happiness in mature years, and of thus rendering them useful members of society. Some may suppose that great difficulties exist in the way, on account of the want of teachers and books; but let the system be once adopted, and we believe that there will be no lack of those capable of teaching, or of books fitted for the use of the beginner. In botany and geology we have already a good supply of elementary works; and if we are not so well off in zoology, it is only because there has been at present no demand for such works.

The following remarks, although intended to apply to Irish institutions, may be adopted by many in England:—

"To raise Natural History to a higher rank and more prominent station in our Irish colleges would be most desirable. I believe a wish that such should be the case prevails in many influential quarters; and as that wish increases, it will find means and opportunity for its fitting expression. Meantime, I respectfully suggest that something might be done in our own province and in our own town, by directing public attention to the subject. Some of the proprietors of our Royal Academical Institution are sincerely desirous of seeing the course of education there revised and enlarged. Some learned and reverend members of the Presbyterian body are persuaded, that an increase of the term of study at present prescribed to their students would be highly desirable; and, also, that such a change should be accompanied by the introduction of new matter, and a revisal of that at present taught. This would seem, therefore, an auspicious time for bringing forward the views now submitted to your consideration. That a precedent may not be wanting for the change which I hope will in time be effected in the course of college education in Ireland, I may be permitted to refer to the University of London. Botany and Zoology form part of the matriculation examination; and in that for the degree of Bachelor of Arts, a comprehensive outline of Animal Physiology, Vegetable Physiology, and Structural Botany is prescribed."

It gave us pleasure to know, that recently, when the Senate of the University of London were requested by the heads of some College connected with it, to remit that part of their matriculation examination that referred to Natural History, they refused to do so. However little we should wish to see the study of the Classics or of Mathematics neglected, we are convinced that the study of Natural History bears too importantly on the welfare and happiness of mankind to be wisely excluded from the educational institutions of our country.

We conclude our notice with one more extract, referring our read-

* 'Contemplation de la Nature.'

ers to the pamphlet, to which we wish as wide a circulation as possible:—

"If we look beyond the boundaries of Great Britain, and note the practice of our continental neighbours, we shall find it gives, in support of the course here recommended, the unanswerable testimony of *experience*. On this subject we have recently been put in possession of a well-arranged mass of information, in the Report by Professor Bache. This gentleman had been selected by the Trustees of the Girard College of Orphans, Philadelphia, to procure information with respect to the system of instruction pursued in similar establishments in Europe. For this purpose he visited England, Scotland, Ireland, France, Belgium, Holland, Switzerland, Italy, and the principal states of Germany. It was not until two years had been thus spent, and 278 schools of various kinds had been personally inspected, that Dr. Bache prepared his very valuable Report. From it we learn that, in the great majority of the continental schools, Natural History forms a regular part of the course of instruction, and usually occupies from two to four hours in the week. In some places it is connected with physical geography or with physics; in others it stands out as a distinct branch of education, and attention is given to its different departments in successive years. The entire Report gives unequivocal evidence of its good effects in awakening 'habits of observation and reflection;' and also of its being 'eminently calculated to promote early religious impressions.' It also states that the experience of the Prussian Gymnasia may be appealed to 'as proving the entire compatibility of such instruction, with an otherwise sound system; and the entire possibility of accomplishing it without neglecting other more important branches.'"

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## PROCEEDINGS OF LEARNED SOCIETIES.

### ZOOLOGICAL SOCIETY.

August 25, 1840.—W. H. Lloyd, Esq., in the Chair.

Specimens were exhibited of five new species of Kangaroo, forming part of the collection made by Mr. Gould, who had just returned from Australia, after an absence of two years and a half spent in the investigation of the habits and œconomy of the animals of that continent.

The first of these Kangaroos to which Mr. Gould drew attention was a large species, but little inferior in size to the *Macropus major*, inhabiting the summits of the mountain ranges in the interior of New South Wales. Mr. Gould observed, that it is a most powerful animal, and very dangerous to approach. The unusual strength and size of the limbs suggested the specific name of *robustus*, and Mr. Gould accordingly characterized it as

Macropus (Petrogale*) robustus. *Macr. artubus anticis magnis et prærobustis; vellere e fusco cinereo, apud partes inferiores pallidiore; tarsis fuscis; digitis anticè nigris; antipedibus, et carpis, nigris; capite fuliginoso levitèr tincto; utrâque genâ lineâ albescente notatâ; gulâ, guttureque albidis; caudâ supernè fuscâ, subtùs pallidiore.*

* The *Petrogale* of Gray is probably identical with *Heteropus* of Jourdan.

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 47 | 0 |
| ——— *caudæ* ...................... | 25 | 6 |
| ——— *tarsi digitorumque* (sine unguibus).. | 11 | 0 |
| ——— ab apice rostri ad basin auris .... | 8 | 0 |
| ——— *auris* ...................... | 3 | 7 |

Fœmina differt vellere ex argenteo cinereo, corpore subtùs ferè albo. Long. corporis cum capite, 33 unc.; *caudæ*, 26; tarsi digitorumque, 10 unc. 2 lin.

The second species has a remarkably elegant appearance, being of a slender delicate form, and adorned with two white stripes, which commencing at the *occiput*, run down the back of the neck on to the shoulders, where they are recurved. Mr. Gould proposed to designate this species

Macropus frænatus. *Macr. elegans, et gracilis; vellere molli brevi, colore e fusco cinereo; corpore subtùs albo; ab occipite utrinque super humeros lineâ angustâ albâ currente; interspatio obscuro, et apud occiput nigrescente: caudâ tuberculo parvo corneo ad apicem instructo, pilis nigrescentibus abscondito; tarsis, artubusque anticis ferè albis, digitis pilis obscuris paulò adspersis.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 23 | 0 |
| ——— *caudæ* ...................... | 20 | 0 |
| ——— *tarsi digitorumque* (sine unguibus).. | 5 | 6 |
| ——— ab apice rostri ad basin auris .... | 4 | 2 |
| ——— *auris* ...................... | 2 | 3 |

*Hab.* Interior of New South Wales.

The third species is about the same size as the last. The most remarkable character in this animal consists in its having a nail at the tip of the tail: this nail is hidden by the tuft of hair with which the end of the tail is furnished, and greatly resembles a finger-nail, both in texture and form, but is of a black colour. The name proposed for this species was

Macropus unguifer. *Macr. corpore gracili, caudâ perlongâ; vellere perbrevi, et mediocritèr molli: colore fulvo, parte corporis anteriore, et collo albescentibus; capite ferè toto, nec non artubus abdomineque albis: notâ fuscâ longitudinali, apud dorsum; caudâ albidâ, apicem versus, pilis longis et fuscis indutâ, ad apicem cum ungue nigrescente, ferè magnitudinem et figuram unguis exhibente, ut in digito hominis videtur, instructâ.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 25 | 0 |
| ——— *caudæ* ...................... | 26 | 0 |
| ——— *tarsi digitorumque* (sine unguibus).. | 7 | 0 |
| ——— ab apice rostri ad basin auris .... | 4 | 0 |
| ——— *auris* ...................... | 2 | 6 |

*Hab.* North-west coast of Australia.

To the fourth species, having two crescent-shaped white marks on the shoulders, Mr. Gould gave the name of

Macropus lunatus. *Macr. capite brevi, auribus magnis; artubus anticis parvis; tarsis mediocritèr elongatis et gracilibus; colore cinereo, collo humerisque ferrugineo pallidè tinctis; corpore subtùs e cinereo albo; lineâ arcuatâ albâ in utrinque latus, ab humeris extensâ.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 18 | 0 |
| ———— *caudæ* ...................... | 0 | 0 ? |
| ———— *tarsi digitorumque* (sine unguibus).. | 4 | 6 |
| ———— ab apice rostri ad basin auris .... | 3 | 0 |
| ———— *auris* ...................... | 2 | 0 |

*Hab.* West coast of Australia.

The fifth species resembles the Common Hare in size, and in the texture of the fur; so much so, indeed, that a portion of its skin could not be distinguished from that of a Hare. The fore-legs and feet of this animal being very small, Mr. Gould proposed to describe it as

Macropus Leporides. *Macr. pro magnitudine et velleris colore nec non texturâ,* Lepori timido *assimilis; capite breviusculo; antibrachiis pedibusque parvulis; caudâ breviusculâ et gracili; corpore supernè nigro, fusco et flavido variegato; apud latera, et circum oculos colore pallidè fulvo prævalente; abdomine e cinereo albo; artubus anticis ad basin nigris.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 19 | 6 |
| ———— *caudæ* ...................... | 13 | 0 |
| ———— *tarsi digitorumque* .............. | 4 | 9 |
| ———— ab apice rostri ad basin auris .... | 4 | 0 |
| ———— *auris* ...................... | 2 | 0 |

*Hab.* Interior of Australia.

Mr. Gould also exhibited a remarkable spiny Lizard, allied to the Agamas, which he had procured from Swan River.

Mr. Gould then called the attention of the Members to an extraordinary piece of Bird-architecture, which he had ascertained to be constructed by the Satin Bird, *Ptilonorhynchus holosericeus,* and another of similar structure, but still larger, by the *Chlamydera maculata.* These constructions, Mr. Gould states, are perfectly anomalous in the architecture of birds, and consist in a collection of pieces of stick and grass, formed into a bower; or one of them (that of the *Chlamydera*) might be called an avenue, being about three feet in length, and seven or eight inches broad inside; a transverse section, giving the figure of a horse-shoe, the round part downwards. They are used by the birds as a playing-house, or "run," as it is termed, and are used by the males to attract the females. The "run" of the Satin Bird is much smaller, being less than one foot in length, and moreover differs from that just described in being decorated with the highly-coloured feathers of the Parrot tribe; the *Chlamydera,* on the other hand, collects around its "run" a quantity of stones, shells, bleached bones, etc.; they are also strewed down the centre within. Mr. Gould spent much time in observing the habits of those birds, and was fully satisfied that the "runs" were actually formed by them, and constructed for the purposes described.

Sept. 8.—James Whishaw, Esq., in the Chair.

An extensive series of new species of the genus *Cardium* was exhibited by Mr. Cuming, and the following account by Mr. G. B. Sowerby, Jun., of their characters, was read.

CARDIUM SINENSE, Conch. Illustr. f. 35. *Card. testâ rotundatâ, posticè subrostratâ paulò ringente, ad marginem subexpansâ, omninò (anticè præcipuè) minutissimè granulatâ, pallidè fulvâ; costis 23 validis, rotundatis, quarum 8 postremis angustioribus, posticè subangulatis, fimbriatis; margine dorsali inflato; ventrali internè fortissimè dentato.*

Long. 1·55; lat. 1; alt. 1·40 poll.

*Hab.* ad mare Sinense, et ad insulas Philippinas, invenit H. Cuming.

Slightly resembling *C. Asiaticum*, from which it is distinguished by having larger and fewer ribs, and a small fringe on the posterior ribs. Found in sandy mud.

CARDIUM STRIATULUM, Conch. Illustr. f. 16. 45. *Card. testâ tenui, rotundatâ, posticè subrostratâ minutissimè radiatim striatâ; pallidè fulvâ rubro radiatim fasciatâ; intùs albâ, fasciis binis rubris radiatâ; striis postremis denticulatis; epidermide fuscâ.*

Long. 1· ; lat. 0·60; alt. 0·90 poll.

*Hab.* ad Australiam et ad Novam Zelandiam. G. Bennett legit.

The pink-striped bands which give so much brilliancy to this shell when in a young state, are scarcely to be traced in the older specimens. The doubt as to their identity, which this circumstance at first created, was only removed by the most careful comparison.

CARDIUM AUSTRALE, Conch. Illustr. f. 12. *Card. testâ obliquè ovatâ, tenui, albâ, purpureo-rubro fuscoque præcipuè ad umbones maculatâ, purpureo ad latera fasciatâ; umbonibus lævibus; lateribus marginibusque tenuissimè sulcatis; cicatrice ab apice ad marginem posticum decurrente.*

Long. 1·20; lat. 0·85; alt. 1·30 poll.

*Hab.* ad Australiam, et ad mare Sinense.

This species differs from *C. tenuicostatum* and *C. papyraceum* in its proportions, being longest from the apex to the ventral margin; and also from the latter in the narrowness of the posterior ribs, and in having a distinct groove on the posterior side. Since the application of the above name, specimens have been met with in Mr. Cuming's Collection, named *C. sauciatum* by Dr. Beck, who, however, to the best of our knowledge, has not published it.

CARDIUM RINGICULUM, Conch. Illustr. f. 11. *Card. testâ longitudinalitèr ovali, tenui, utrinque hiante; posticè elongatâ, subaspersâ; costis anterioribus angustis, inconspicuis; tribus centralibus latis, planulatis ad marginem valdè dentatis; decem postremis angustioribus, paulò elevatis, ad marginem dentatis.*

Var. *testâ pallidè flavidâ.*

Var. *testâ ad latus posticum rubro tinctâ.*

*Hab.* ad insulam Ceylon.

A pretty little species, differing from *C. bullatum* in the strongly toothed posterior margin.

Cardium Siculum, Conch. Illustr. f. 31. *Card. testâ tenui, subquadratâ, ventricosâ, anticè angustâ, posticè latâ, subangulatâ; albâ, fusco maculatâ; costis numerosis, planulatis, 5 anticis crenulatis; interstitiis angustis.*

Long. 0·50; lat. 0·40; alt. 0·45 poll.

*Hab.* ad mare Siculum.

Cardium Arcticum, Conch. Illustr. f. 26. *Card. testâ ovali compressâ, subæquilaterali; costis 27, angulatis, subcrenulatis; epidermide crassâ, olivaceo-fuscâ, ad umbones ætate erosâ; ligamento elongato; cardine dentibus centralibus obsoletis, lateribus distantibus.*

Long. 1·55; lat. 0·90; alt. 1·40 poll.

*Hab.* ad mare Arcticum.

Differing from *C. Gröenlandicum,* in having ribs, and from *C. Icelandicum,* in being less ventricose and in the ribs being angular.

Cardium paucicostatum, Conch. Illustr. f. 20. *Card. testâ rotundatâ, ventricosâ, subæquilaterali, tenui; albido-flavicante, fusco undatâ; costis* 16, *planulatis, lævibus, distantibus, tuberculis acutis in medio armatis; interstitiis planulatis.*

Long. 1·30; alt. 1·30; lat. 1 poll.

*Hab.* ad mare Adriaticum (Malta).

This species differs from *C. echinatum* in being comparatively smooth, and having very few ribs, with wide interstices.

Cardium multispinosum, Conch. Illustr. f. 38, 38 *a*. *Card. testâ rotundatâ, ventricosâ, tenui, posticè paulò hiante, pallidè fulvâ, ad margines roseâ, intùs albâ; costis* 33 *lævibus, utrinque angulatis; spinis numerosis, acutis; interstitiis granulatis, ad marginem elongatis; margine dorsali tumidâ.*

Long. 2·10; lat. 1·70; alt. 2·20 poll.

*Hab.* ad insulam Mindanao, Philippinarum. H. Cuming legit.

In shape and general appearance, this beautiful shell resembles *C. Asiaticum,* from which, however, it differs widely, in having small spines on the ribs instead of the fringe. Found in sandy mud, at 25 fathoms.

Cardium exasperatum, Conch. Illustr. f. 37. *Card. testâ ventricosâ, rotundato-subquadratâ, albâ, ad margines roseo-tinctâ; tenuiter sulcatâ; inter sulcos spinis numerosis acutis ornatâ.*

Long. 1· ; lat. 0·70; alt. 0·95 poll.

*Hab.* ad oras Australiæ (Swan River).

An extremely delicate and beautifully wrought shell, and quite distinct from others of the group to which it belongs.

Cardium variegatum, Conch. Illustr. f. 57. *Card. testâ ovali, subventricosâ, roseâ, aurantiaco, rubro-fusco-albo-que maculatâ; costis* 48, *quarum anticis rotundatis, crenulatis; posterioribus* *valdè angulatis, lævibus ; postremis subplanulatis, tuberculis obliquis ornatis.*

Long. 1·70 ; alt. 1·80 ; lat. 1·20 poll.

*Hab.* ad insulam Leyte, Philippinarum. H. Cuming legit.

The ribs are much more numerous and close than in *C. muricatum*, and *C. Radula* is described as having the ribs angular on both sides, which is not the case with this species.

Cardium Unicolor, Conch. Illustr. f. 29. 42. *Card. testâ ovali ventricosâ, posticè subelongatâ, paulò emarginatâ, albâ, purpureo obscurè maculatâ, epidermide fuscâ tenui indutâ ; costis numerosis, anticis, mediis, et posterioribus rotundatis, minutè crenulatis ; extremis planulatis.*

Long. 1·50 ; lat. 1·10 ; alt. 1·70 poll.

*Hab.* ad ins. Ticao. H. Cuming legit.

Found in sandy mud, at five fathoms. A slightly mottled variety is brought from the Brazils.

Cardium impolitum, Conch. Illustr. f. 6. 66. *Card. testâ crassâ, cuneiformi, subæquilaterali ad marginem dorsalem angustiore, ad ventralem rotundatâ ; albâ, fusco obscurè maculatâ, posticè purpureo-fasciatâ ; costis 35 impolitis, subcrenulatis ; epidermide fuscâ.*

Long. 1·50 ; lat. 1·10 ; alt. 1·90 poll.

*Hab.* ad mare Sinense.

Remarkable for its wedge-like, nearly equilateral shape.

Cardium oxygonum, Conch. Illustr. f. 9. *Card. testâ ovali, subventricosâ, ad umbones angustâ ; albâ, rubro fuscoque maculatâ, intùs albâ ; costis 35, quarum 18 anterioribus validis, acutangulatis, ad latera antica atque ad angulos crenulatis ; deinde 9 posterioribus acutangulatis ad angulos crenatis, ad latera lævibus ; extremis angustis, lævibus, tuberculis obliquis ornatis.*

Long. 1·20 ; lat. 0·90 ; alt. 1·40 poll.

*Hab.* ad mare Sinense.

This species resembles *C. maculosum* of Wood in form, but in sculpture it more nearly approaches *C. angulatum* of Lamarck, from which, however, it is distinguished by being narrower towards the umbones, less ventricose, and having the ribs more distinctly angulated.

Cardium subelongatum, Conch. Illustr. f. 61. *Card. testâ ovali, subventricosâ, elongatâ, crassâ, posticè paulò hiante ; albâ, fusco rubroque maculatâ, epidermide flavicante indutâ ; costis 32, quarum anticis biangulatis, crenulatis ; mediis lævibus, biangulatis ; posticis rotundatis, lævibus, tuberculis obliquis ornatis.*

Long. 1·85 ; lat. 1·40 ; alt. 2·35 poll.

*Hab.* ad Sanctæ Thomæ insulam (Ind. occidentalis).

The above name has been given, to indicate the near alliance between this species and the true *C. elongatum* of Brug., with which it has been confounded. Our shell resembles some of the figures to which Lamarck refers for his *C. marmoreum*, and which Bruguière quotes for *C. elongatum*. It is much longer and smoother than the former, and does not agree with the description. The true *C. elongatum* is described by Brug., from a specimen in the collection of M. de Lamarck, as an elongated, ventricose shell of 39 or 40 ribs, and attaining a large size. It seems to have been a matter of dispute between the two conchologists, whether the above-named species were identical. We were unable to meet with a shell agreeing with Bruguière's description, until the arrival of Mr. Cuming with fine specimens sufficiently characteristic to set the matter at rest. The present species has fewer ribs and is less ventricose.

Cardium enode, Conch. Illustr. f. 51. *Card. testâ ovali, ventricosâ, posticè subexpansâ, fortissimè dentatâ; pallidè fulvâ roseo fasciatâ, intùs albâ, sub umbonibus flavidâ, ad marginem purpureâ; costis 38, planulatis, anticis leviter crenatis; interstitiis angustissimis.*

Long. 2·30; lat. 1·60; alt. 2·60 poll.

*Hab.* ad insulam Ceylon.

Much more spread than *C. elongatum*, with the ribs flatter, and terminating in very strong overwrapping teeth.

Cardium subrugosum, Conch. Illustr. f. 34. 71. *Card. testâ crassâ ovali ventricosâ, ætate posticè subacuminatâ; costis 33, quarum 25 anterioribus rotundatis, crenulatis; extremis lævibus vix elevatis; epidermide fuscâ.*

Var. *testâ albâ, purpureo maculatâ.*

Var. *testâ posticè albâ, anticè flavidâ.*

Long. 2·30; lat. 1·70; alt. 2·40 poll.

*Hab.* ad insulam Ceylon.

The ribs are not so deep as in *C. rugosum*, and the eight posterior ones are so little raised as to leave the surface nearly smooth.

Cardium alternatum, Conch. Illustr. f. 64. *Card. testâ obliquè ovali, compressâ, posticè subexpansâ, albâ, luteo vel fusco-flavescente fasciato-maculatâ; epidermide fusco indutâ; costis 32, anticis crenulatis, subangulatis; deindè posterioribus angulatis anticè lævibus; extremis muricatis; interstitiis convexis, utrinque sulcatis.*

Long. 2·40; lat. 1·30; alt. 2·60 poll.

*Hab.* Ticao, Philippinarum. H. Cuming legit.

A beautiful pale-coloured specimen of this species has existed for some time in the well-selected cabinet of Miss Saul, who, however, possesses no information as to its locality. With this we have been supplied by Mr. Cuming, who collected some richly coloured individuals from the above-mentioned island: they were found in coral sand, on reefs, at low water.

Cardium attenuatum. *Card. testâ lævi, cuneiformi, compressâ, obliquè elongatâ, posticè subcomplanatâ, omninò obscurè striatâ, ad marginem dentatâ; flavâ, rubro maculatâ, maculis posterioribus validis; intus albâ.*

Long. 1·80; lat. 1·20; alt. 2·60 poll.

*Hab.* ad insulam Ceylon.

A good figure of this species is found in Wood's 'General Conchology,' accompanied by the following erroneous statements: first, that it is *C. biradiatum* of Brug.; and second, that *C. biradiatum* of Brug. is only a variety of the British species (*C. serratum*), which is improperly named *C. lævigatum* by him and some other authors. From the apex to the ventral margin, it measures longer in proportion than any other species.

Cardium Elenense, Conch. Illustr. f. 58. *Card. testâ tenui, lævi, ovali, posticè subacuminatâ pallidè fulvâ, fusco et purpureo minutè maculatâ, intùs fuscâ rubro fasciatâ; umbonibus inconspicuis, purpureo maculatis.*

Long. 0·75; lat. 0·50; alt. 0·75 poll.

*Hab.* ad Sanctam Elenam. H. Cuning legit.

Very nearly resembling *C. Brasilianum*, but not coloured in radiating lines, as in that species, and not so much elongated at the posterior ventral margin. Found in sandy mud, at seven fathoms.

Cardium lyratum, Conch. Illustr. f. 40. *Card. testâ ventricosâ, rotundatâ, subæquilaterali, pallidè fulvâ, epidermide rubro-purpureâ indutâ, intùs aureâ; anticè decussatim plicatâ; costis numerosis; anticis tenuissimis; mediis validioribus; posterioribus distantibus, angulatis.*

Long. 1·70; lat. 1·40; alt. 1·70 poll.

*Hab.* Dumaguete, ins. Negroes, Philippinarum.

The *C. Æolicum* of Born (*C. pectinatum*, Linn., according to Brug.) has a space on the posterior side of the shell entirely free from ribs in either direction. Bruguière describes it as characterised by "trois faces distinctes," of which the first (*the posterior*) is "lisse, sans côtes ni stries," and the figures in Chemnitz represent the same peculiarity. In the shell before us, the whole of the posterior side is covered with radiating ribs, no space being left smooth. In other respects it exactly resembles the "Janus" celebrated by ancient naturalists, and it is now almost as frequently met with in cabinets. The difference between the two species has been long observed, although they have not hitherto been separately described. Mr. Cuming has taken specimens of this species in sandy mud, at the depth of seventeen fathoms.

Cardium parvum, Conch. Illustr. f. 33. *Card. testâ ovali, subquadratâ, posticè subangulatâ, anticè rotundatâ, pallidè fulvâ, fusco rubescente angulatim maculatâ; costis numerosis, subplanulatis; sulcis angustis.*

Long. 0·50; lat. 0·40; alt. 0·43 poll.

*Hab.* ——— ?

Cardium fornicatum, Conch. Illustr. f. 50. *Card. testâ subquadratâ, posticè angulatâ, anticè rotundatâ; albâ, purpureo-maculatâ, intùs aurantiacâ, ad margines purpureo-rufescente maculatâ: costis 35, quarum anteriorum 23 biangulatis, imbricatis, ad latera minutissimè spinoso-crenulatis.*

Long. 1· ; lat. 0·75; alt. 1· poll.

*Hab.* ——— ? Mus. F. J. Stainforth.

A very beautiful shell, in some respects resembling *C. medium*, but not so angular, and having the ribs richly ornamented by vaulted imbrications in the centre, and very minute crenulations raised into points at the sides. Unfortunately, we possess no information respecting the locality.

Cardium imbricatum, Conch. Illustr. f. 48. *Card. testâ crassâ, ventricosâ, anticè rotundatâ, posticè subquadratâ, angulatâ; albâ, intus aurantiacâ, purpureo maculatâ: costis 28, quarum 19 anterioribus valdè imbricatis, postremis sublævibus, subangulatis, imbricatis propè umbones, angulatis, fornicatis, propè marginem ventralem obtusis.*

Long. 1·20; lat. 1·05; alt. 1·30 poll.

*Hab.* ad oras Australiæ (Swan River).

Like *C. medium* in general form, but having vaulted imbrications on the ribs. These are much thicker and larger than in *C. fornicatum*, and the sides of the ribs are not crenulated as in that species.

Cardium subretusum, Conch. Illustr. f. 24. *Card. testâ albâ, obliquè subquadratâ, ventricosâ, posticè subcarinatâ, acuminatâ; anticè subrotundatâ; post angulum complanatâ, levitèr sulcatâ; costis ante angulum sex, tuberculatis; interstitiis punctatis; ante umbones cavernulâ cordiformi, intùs levitèr callosâ.*

Long. 0·90; lat. 1·20; alt. 1·30 poll.

*Hab.*

Thus we have three species presenting the character in common, of having a callosity within a heart-shaped cavity, close under the *umbones*, namely, the true *C. retusum*; the var. "(2.) testâ punctis sanguineis pictâ" of Lam., which has been named *C. auricula* by Forskäll, and the present species, which resembles the original *C. retusum* in general appearance, but it is more elongated and smoother behind the angle, the cavity is not so deep, and the callosity is more strongly marked.

Cardium fragile, Conch. Illustr. f. 68. *Card. testâ rotundatâ, tenui, lævi, subequilaterâ, posticè paulò inflatâ, albâ, fusco-lineatâ, epidermide fulvâ indutâ; intùs albâ ad marginem rubescente; ad umbones flavâ; margine levitèr sulcato.*

Long. 1·05; lat. 0·65; alt. 1· poll.

The only specimen at present known is in the collection of the Rev. F. J. Stainforth. We have no information as to its locality.

Cardium foveolatum, Conch. Illustr. f. 65. *Card. testâ subrotundato-ovali, compressâ, albâ, costis 43, quarum 25 anterioribus rotundatis, crenulatis, deinde posterioribus 10 lævibus, subangulatis, extremis concavis, ad latera crenulatis.*

Long. 1·45; lat. 0·90; alt. 1·55 poll.

*Hab.* ad oras Australiæ (Swan River).

The last ribs on the posterior side are hollow, with crenulations crossing them so as to form little pits. This species belongs to the same section as *C. muricatum*, but it is much flatter and has a greater number of ribs.

## GEOLOGICAL SOCIETY.

Nov. 18, 1840.—Mr. Lyell's memoir "On the Geological Evidence of the former existence of Glaciers in Forfarshire," was read.

Three classes of phænomena connected with the transported superficial detritus of Forfarshire, Mr. Lyell had referred, for several years, to the action of drifting ice; namely, 1st, the occurrence of erratics or vast boulders on the tops and sides of hills at various heights, as well as in the bottoms of the valleys, and far from the parent rocks; 2ndly, the want of stratification in the larger portion of the boulder formation or till; and 3rdly, the curvatures and contortions of many of the incoherent strata of gravel or of clay resting upon the unstratified till*. When, however, he attempted to apply the theory of drifting ice over a submerged country to facts with which he had been long acquainted in Forfarshire, he found great difficulty in accounting for the constant subterposition of the till with boulders to the stratified deposits of loam and gravel; for the till ascending to higher levels than the gravel, and often forming mounds which nearly block up the drainage of certain glens and straths; for its constituting, with a capping of stratified matter, narrow ridges, which frequently surround lake-swamps and peat-mosses; and for the total absence of organic remains in the till.

Since, however, Professor Agassiz's extension to Scotland of the glacial theory, and its attendant phænomena, Mr. Lyell has re-examined a considerable portion of Forfarshire, and having become convinced that glaciers existed for a long time in the Grampians, and extended into the low country, many of his previous difficulties have been removed. There are, nevertheless, facts connected with the ridges of stratified materials resting upon till, which he is unable to explain. He also states, that though he had for years inferred from the evidence of fossil shells sent to him from Canada by Capt. Bayfield, that the climate of North America, in the latitude of Quebec, was far more intensely cold at one period than it is now†, yet, that his thoughts had been diverted from the consideration of a long-continued covering of snow on the Scottish mountains, by the knowledge that the climate of Great Britain, during the several tertiary epochs, was warmer than it is at present. He is of opinion that, during a period immediately antecedent to the existing, several oscillations of temperature may have occurred in the northern hemisphere.

Forfarshire, Mr. Lyell divides geologically into three principal districts: 1st, the Grampians, composed of granite, gneiss, mica-slate, and clay-slate, flanked by a lower range of vertical beds of old red sandstone, associated with trap; 2ndly, the great synclinal trough of Strathmore, occupied by the middle and newer mem-

* See Mr. Lyell's paper on the Norfolk Drift, Phil. Mag., May 1840, and the Abstract of the paper in the Proceedings of the Society, vol. iii. p. 171.

† See Proceedings, vol. iii. p. 119 [or L. & E. Phil. Mag. vol. xv. p. 399].

bers of the old red sandstone; and 3rdly, the anticlinal chain of the Sidlaw Hills, consisting of the inferior or grey beds of the old red sandstone, usually accompanied by trap. He further states, that it represents, on a small scale, both geologically and physically, the portion of Switzerland where erratic blocks are most abundant, the Grampians with their crystalline rocks being comparable to the Alps, the secondary chain of the Sidlaw Hills to the Jura, and Strathmore to the great valley of Switzerland; and that the resemblance is increased by the occurrence in Strathmore and on the Sidlaw Hills of angular and rounded blocks of Grampian rocks.

The superficial detritus of Forfarshire, Mr. Lyell divides into three deposits: 1st, the thin unstratified covering on the Grampians, derived from the disintegration of the subjacent strata, with a slight intermixture of pebbles traceable to rocks at a higher level, not far distant; 2ndly, the unstratified materials enclosing boulders which occur at the base of the hills on both sides of every glen, and not due to taluses formed by landslips, but constituting terraces of transported debris, with a nearly flat top, and sometimes with two steep sides, one towards the river, and the other of less height towards the mountain; and 3rdly, the stratified gravels, sands and clays which overlie the unstratified detritus. Mr. Lyell confines his observations principally to the second and third divisions.

The terraces or lateral mounds very generally increase in width and depth as they descend from the higher to the lower glens, attaining in the latter sometimes a thickness of 100 feet, and occasionally so great a breadth as to leave only sufficient room for the river to pass. The inferior part is always unstratified, consisting of mud and sand, in which large angular and rounded fragments of rocks are imbedded. These boulders are more and more rounded as their distance increases from the hills whence they could have been detached; but they are more frequently flat-sided than pebbles which have been rounded by water; and they become more diversified in character by the junction of every tributary glen. In the upper part the mounds often consist of 40 to 80 feet of the same materials as the lower, but regularly stratified. Mr. Lyell then proceeds to illustrate his subject by describing in detail the phænomena presented by the valley of the South Esk and those of its tributaries.

The South Esk springs from a shallow lake nearly 3000 feet above the level of the sea, and twenty miles from Strathmore. For six miles the river flows through a district composed partly of gneiss, traversed by veins of granite or eurite, and partly of granite. The fragments derived from this high region may be traced downwards continuously for twelve miles to Cortachie; and as a proof that the detritus forming the lateral mounds has followed the same downward course, Mr. Lyell states that it preserves throughout, as well in the main as in the lateral glens, an uniformly grey colour; while the detritus of the lower zone of mica-slate is invariably tinged red, this colour being also imparted to the debris of the still lower portions of the glens, notwithstanding the intermixture of pale brown materials obtained from the clay-slate of that district. Another proof of the detritus not having been drifted upwards, is the absence in the higher portions of the glens of the blocks of pure white quartz which abound in the region of mica-schist, and have been derived from the numerous veins and beds of quartz belonging to that formation. The chief exception to this arrangement is a boulder of conglomerate in the bed of the Proson, evidently derived from hills two miles to the south, but which are considerably above the level of the glen. A few other similar exceptions have been noticed, but the distances to which the stragglers have been traced are inconsiderable. The phænomena exhibited by the lateral mounds, Mr. Lyell states, agree well with the hypothesis of their being the lateral moraines of glaciers; and he adds, that he had never been able to reconcile these phænomena, particularly the want of stratification, with the theory of the accumulations of the detritus during submergence, and the removal by denudation of the central portions of a deposit which had by that means filled the glens. The distribution of an enormous mass of boulders on the southern side of Loch Brandy, and clearly derived from the precipices which overhang the Loch on the three other sides, is advanced as another proof in favour of the glacial theory. It is impossible to conjecture, Mr. Lyell says, how these blocks could have been transported half a mile over a deep lake; but let it be imagined that the Loch was once occupied by a glacier, and the difficulty is removed. Loch Whorral, about a mile to the east of Loch Brandy, is also surrounded on its north, east and western sides by precipices of gneiss, and presents on its southern an immense accumulation of boulders with other detritus, strewed over with angular blocks of gneiss, in some instances twenty feet in diameter. This moraine is several hundred yards wide, and exceeds twenty feet in depth, terminating at the borders of the plain of Clova in a multitude of hillocks and ridges much resembling in shape some terminal moraines examined by Mr. Lyell in Switzerland.

The great transverse barrier at Glenairn, where the valley of the South Esk contracts from a mile to half a mile in breadth, and is flanked by steep mountains, Mr. Lyell formerly regarded as very difficult of explanation. Seen from below, this barrier resembles an artificial dam 200 feet high, with numerous hillocks on its summit. On the eastern side it appears to have been denuded to the extent of about 300 yards by the Esk. Its breadth from north to south is about half a mile. The lower part, 30 feet in depth, laid open in the river cliff, consists of impervious, unstratified mud, full of boulders; but the total vertical thickness of this deposit is stated to be from 50 to 80 feet; and the upper part of the barrier is composed of from 50 to 100 feet of very fine stratified materials. It is not possible, Mr. Lyell observes, to account for the accumulation of this barrier by the agency of water, particularly as no tributary joins the Esk at this point; but if the barrier be supposed to be the large terminal moraine of a receding glacier, then its form and position, he says, are easily to be understood. M. Agassiz, in his work on glaciers, shows, that when these masses of ice enter a narrow defile from a broader valley, the lateral moraines are forced towards the centre, and the mass of transported matter is spread more uniformly over the whole. Such a terminal moraine left by a receding glacier in a defile, Mr. Lyell states, would dam back the waters of the glacier, and produce a lake; and the phænomena presented by the barrier of Glenairn, and the plain which extends in its rear, are fully explicable on the assumption of their having been produced by a glacier. The stratification of the upper portion of the barrier is also shown to be partly in accordance with the effects produced by the formation of ponds of water on the surface of moraines; but Mr. Lyell states, that the accumulation of so great a capping of stratified materials is still the most obscure character of the deposits under consideration.

At Cortachie, about four miles below the barrier of Glenairn, the South Esk enters the country of old red sandstone, and a mile and a half lower it is joined by the Proson, and a mile yet lower by the Carity. In the district in which these streams unite there is a considerable thickness of unstratified matter full of Grampian boulders, and covered for the greater part with stratified gravel and sand. In some cases the latter exhibit the diagonal laminæ common in subaqueous formations; and in others the strata are so contorted, that a perpendicular shaft might intersect the same beds three times. In the latter instances the surface of the subjacent red boulder clay has not partaken of the movement by which the stratified deposit was contorted; and in consequence Mr. Lyell ascribed the effect, when he first beheld it in 1839, to the lateral pressure of large masses of drifted ice repeatedly stranding upon a shoal of soft materials*. In the middle of the tract between the South Esk and the Proson is a dry valley, and to the south of this valley, near the Proson, an excavation was made ten years ago, which exposed extremely contorted beds overtopped by others perfectly horizontal, having been formed by tranquil deposition after the disturbance of strata previously deposited. The phænomena exhibited by the till in this district, Mr. Lyell conceives, might be well accounted for by supposing the union of three or four large glaciers; but he considers it difficult to explain the accumulation of the overlying stratified materials, the top of which must be 600 feet above the level of the sea, and facing the Strath. In following out the narrow ridge which intervenes between the Proson and the Carity, during last October, in company with Dr. Buckland, the latter drew the author's attention to a spot half a mile south-west of the House of Pearsie, where the surface of a porphyry rock was polished, furrowed and scratched. The quarrymen of Forfarshire also state as a general fact, that rocks of sufficient hardness, when first laid bare, are smooth, polished and scored; and Mr. Blackadder has found on the Sidlaw Hills large boulders of sandstone grooved and polished. Another general fact mentioned by Mr. Lyell is, that the unstratified boulder-clay becomes more and more impervious in the lower part of the Grampian glens, not in

* See Proceedings, vol. iii. p. 178.

consequence of the influx of distinct materials, but in the author's opinion of the grinding down by the ice of the mud and other detritus.

Mr. Lyell then describes the phænomena of the second district, or Strathmore. Though this district may be considered as one great strath, yet it is divided into many longitudinal ridges and valleys. The former, sometimes 300 feet in height, are for the greater part parallel to the strike of the old red sandstone, and are generally covered to the depth of sixty or more feet with till and erratics, derived from the Grampians and the subjacent strata. This covering is so general, that the structure of the district can be detected only in the ravines through which the principal rivers pass. The till constitutes invariably the oldest part of the detritus. The boulders which it contains sometimes exceed three feet in diameter: on the north muir of Kerriemuir is a block of trap-rock, six feet by five feet, and near it is a mass of mica-schist, nine feet long by four feet wide and three high. The till has been ascertained by Mr. Blackadder to fill, in many places, deep hollows in the sandstone, which would become lakes or peat-mosses if the till were extracted. This distribution of the detritus, Mr. Lyell observes, may be explained on the supposition that, if the cold period came on slowly, the advance of the glaciers would push forward the detritus accumulated at their termination, and fill up, wholly or in part, the lakes or other cavities which they would encounter in their progress. Along most of the river-courses, and in the lowest depressions of Strathmore, the till is covered by stratified sand and gravel.

One of the most remarkable peculiarities of the transported materials of Forfarshire and Perthshire is a continuous stream, from three to three and a half miles wide, of boulders and pebbles, traceable from near Dunkeld, by Coupar, to the south of Blairgowrie, then through the lowest part of Strathmore, and afterwards in a straight line through the lowest depression of the Sidlaw Hills from Forfar to Lunan Bay, a distance of thirty-four miles. No great river follows this course, but it is marked everywhere by lakes or ponds, which afford shell-marl, swamps, and peat-mosses, commonly surrounded by ridges of detritus from fifty to seventy feet high, consisting in the lower part of till and boulders, and in the upper of stratified gravel, sand, loam and clay, in some instances curved or contorted. The form of the included spaces is sometimes oval, sometimes quadrangular. The finest examples are in the lower tract, which has the Dean for its southern boundary, and the road from the bridge of Ruthven to the south of the grounds of Lindertis for its northern. The Grampian boulders are throughout the same; but there are associated with them masses of actinolite schist, which Mr. Blackadder has ascertained could be derived only from the valley of the Tay. The fragments of secondary rocks belong to the formations of the districts in which they occur. Though the country occupied by these marl-loch lakes is not traversed longitudinally by any river, yet it is so low, that if the transported matter were removed, a very slight depression would cause the sea to flow from

Lunan Bay by Forfar to Blairgowrie and Dunkeld. Mr. Lyell therefore formerly conceived that an estuary might have extended in that direction, and that the till might have been drifted by masses of ice floated from the Grampians and contiguous hills. The overlying ridges of sand and gravel he thought might have been bars formed one after the other, in the same manner as the bar of sand and shingle, which now crosses the mouth of the Tay. The inland ridges of sand with boulders, which Mr. Lyell noticed in Sweden, and certainly produced under the sea, confirmed him in this view. These Swedish ridges are from fifty to several hundred yards broad, but sometimes so narrow on the top as to leave little more than room for a road; they are from fifty to a hundred feet high, and they may be often traced in unbroken lines for many leagues, ranging north and south. In his account of these ridges, in a memoir published in the Philosophical Transactions*, Mr. Lyell states his belief that they were thrown down at the bottom of the Gulf of Bothnia, in lines parallel to the ancient coast, and during the successive rise of the land. They usually consist of stratified sand and gravel, the layers being often at high inclinations; but where they are composed of boulders, no stratification is observable. After a long search, Mr. Lyell succeeded in finding shells in a layer of marl belonging to a ridge in the suburbs of Upsala, about twelve feet below the summit of the ridge, and eighty above the sea. The shells consisted of *Mytilus edulis*, *Cardium edule*, *Tellina Baltica*, *Littorina littorea*, and *Turbo ulvæ*, the most common species in the Baltic, and they constituted the greater part of the layer. On the summit of the ridge, at a short distance, he noticed angular masses of gneiss and granite, from nine to sixteen feet long, which had evidently been lodged when the ridge was submarine.

In Forfarshire Mr. Lyell never succeeded, as in the above case in Sweden, in finding marine shells in the ridges of sand; nor does he remember to have seen in Sweden transverse ridges at right angles to the north and south. The glacier theory, the author states, appears to offer a happy solution of the problem of the marl-loch gravels, the longitudinal banks being regarded as lateral and medial moraines, and the transverse ridges as terminal. The chief objections are the stratification of the upper part of the banks, and the necessity of assuming a glacier thirty-four miles in length, with a fall of only 300 or 400 feet of country.

It has always appeared to Mr. Lyell and Mr. Blackadder remarkable, that the marl-loch gravels at Forfar are nearly 100 feet above the tract of till which separates them from the valley of South Esk, in Strathmore. In the present configuration of the country, water could not deposit the Forfar gravels without extending to the South Esk, the detritus of which is distinct, and separated by a low district of till without gravel. The only explanations of these phænomena Mr. Lyell considers to be either that the till is the moraine of a glacier, or that there has been a local change of relative levels of

* 1835, pp. 15, 16.

lands, by which the gravel of Forfar was uplifted, or the till to the northward depressed.

Another line of stratified detritus ranges at a higher level from the Loch of Lundie, along the Dichty Water, to the sea at Moray Firth, a distance of thirteen miles; and it is stated that many others might be enumerated. It is only on the coast to the east and west of Dundee, at heights varying from twenty to forty feet, that stratified clay and gravel have been found by Mr. Lyell to contain marine shells, all belonging to known existing species, except a *Nucula*. Although these remains prove a certain amount of upheaval subsequent to the deposition of the till, or to the commencement of the glacial epoch, including an equal movement in the interior, still Mr. Lyell objects to a general submergence of that part of Scotland, since the till and erratic blocks were conveyed to their present positions; as the stratified gravel is too partial and at too low a level to support such a theory; and he would rather account for the existence of the stratified deposits, by assuming that barriers of ice produced extensive lakes, the waters of which threw down ridges of stratified materials on the tops of the moraines. With respect to the geological age of the beds containing the marine shells, Mr. Lyell is of opinion that it is synchronous with that of the older of the recent formations on the Clyde, examined by Mr. Smith of Jordan Hill, and Mr. E. Forbes; and with respect to the age of the till and stratified gravel last formed, he is of opinion that it is very modern, because these accumulations constitute exclusively the dams of certain marl-lochs to the very bottom of the sediment formed, in which all the Testacea and skeletons of quadrupeds, as well as the remains of plants which have been found, are of existing species.

The third district, or that of the Sidlaw Hills, claimed Mr. Lyell's attention more particularly on account of the Grampian boulders with which it abounds. This range, whose greatest height is 1500 feet above the sea, is composed of anticlinal strata of grey sandstone, belonging to the old red sandstone, with associated trap. It is covered, as well as the whole of the country between Strathmore and the Tay, with the impervious till, containing Grampian boulders and fragments of the subjacent grey sandstone. The finest instances of erratics observed by Mr. Lyell occur on Pitscanly Hill, 700 feet, and the adjacent hill of Turin, 800 feet above the level of the sea. About forty feet below the summit, on the southern side of the former, is a block of mica-slate thirteen feet long, seven broad, and seven in height above the ground. Four smaller and equally angular masses, from three to six feet in diameter, lie close to its north end, as if severed from it. One of the nearest points at which this gneiss occurs *in situ*, is the Craig of Balloch, fifteen miles distant, on the northern extremity of the Creigh Hill, and between these points intervenes the great valley of Strathmore and the hills of Finhaven. Other Grampian boulders, from three to six feet in diameter, occur on the hills between Lumley Den and Lundie, at the height of 1000 feet; and Mr. Blackadder has found fragments of mica-schist one foot in diameter on the summit of Craigowl, the highest point of the Sidlaw Hills, and exceeding 1500 feet above the level of the sea.

In conclusion, Mr. Lyell offers some remarks on the conditions under which glaciers may have existed in Scotland, and the differences between them and those of the glaciers of Switzerland. He states that the glaciers of the latter country being situated 11° further to the south, they can present but an imperfect analogy with permanent masses of ice in Forfarshire, and that it is to South Georgia, Kerguelen's Land and Sandwich Land that we must look for the nearest approach to that state of things which must have existed in Scotland during the glacial epoch. In those regions of the southern hemisphere the ice reaches to the borders of the sea, and the temperature of summer and winter being nearly equalized, the glaciers probably remain almost stationary, like those of the Alps in winter, and can be diminished by only the first two of the three causes which tend to check an indefinite accumulation of snow in Switzerland; viz. 1st, evaporation without melting; and 2ndly, the descent of glaciers by gravitation, considered by M. Agassiz to be not very influential:—the third cause, the descent of glaciers arising from alternate liquefaction and freezing, he conceives must be wholly suspended in these regions.

As the tertiary strata prove that a warm climate certainly preceded the assumed glacial epoch in the northern hemisphere, and as a mild climate has since prevailed, Mr. Lyell says, there are three distinct phases of action to be considered in studying the supposed glaciers of Scotland: 1st, the coming on of the epoch; 2nd, its continuance in full intensity; and 3rd, its gradual retreat. At the commencement of the first condition, only the higher mountains would send down glaciers to be melted in the plains below, as at present in Switzerland, and in Chili between the 40th and 50th degrees of latitude. The ice would therefore thus be constantly advancing and retreating, but progressively, century by century, gaining ground, in consequence of diminishing summer heat; and pushing its terminal moraines forward, it would fill up lakes and other inequalities, till it finally reached the sea. During the second condition, when the motion of the ice would be very small, there would be, Mr. Lyell states, vast accumulations of snow filling the plains and valleys to a great height, and leaving bare only the higher peaks and precipices of the mountains. From these points, he conceives the erratic blocks were detached and conveyed almost imperceptibly along the surface of the frozen snow to great distances. Lastly, at the breaking up and gradual retreat of the glaciers during the third period, he is of opinion, the boulders were deposited in the various situations in which they are now found, and that moraines, or lateral and transverse mounds, were successively deposited, and lakes formed by which stratified materials were accumulated in certain positions.

## LIII.—*Information respecting Zoological and Botanical Travellers.*

*Mr. Forbes and Mr. Thompson.*—We have just seen Mr. Thompson, who after visiting Constantinople, Smyrna, Athens, &c., has returned from the Archipelago in consequence of the survey of Candia being abandoned for the present year, or until the island becomes more settled. We are happy to hear from him that he left Mr. Forbes very well on the 10th of June at Port Nousa, in the island of Paros, where he had then been for a month most successfully engaged in his researches, especially in marine zoology. Mr. Forbes hopes to be able to visit all the islands composing the Cyclades group during the summer and autumn of the present year.

We have received from him descriptions of some new and very remarkable marine invertebrate animals, which we shall soon lay before our readers.

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*Mr. Schomburgk.*—Recent letters from Mr. Schomburgk, dated Demerara, 12th of April, mention his safe arrival at that place, and that he was about to start on the following day to the westward to the mouth of the Wayina, where would be his head-quarters for a short time. All the party were well with the exception of Mr. Walton the draughtsman, who not finding himself strong enough for a tropical climate was about to return to England. Mr. Schomburgk expected to start for the interior of Guiana about the beginning of August.

*Mr. W. S. MacLeay.*—"As might be expected, the time spent on the long voyage from England to Sydney was not lost; the ocean indeed is a rich domain to the philosopher. Mr. MacLeay mentions having fallen in with the American Scientific Expedition, which left the United States about eighteen months ago, in two corvettes and four schooners. They had visited, when Mr. MacLeay met them, the Cape de Verds, Brazil, Patagonia, Terra del Fuego, Chili, Peru, and the South Sea Islands, and had made extensive collections in all departments of natural history. The following are the scientific men who compose the expedition, and their duties. Titian Peale for mammalia and birds; Dr. Pickering for insects, reptiles, and fishes; Mr. Coulter for mollusca, and Mr. Dana for crustacea, pelagic animals, and geology; Mr. Rich for botany; two gardeners, and two artists, complete the scientific corps. The expedition is creditable to the United States, and we trust will prove highly important to the advancement of science. Extensive collections were making in every department of nature, which were forwarded to Philadelphia as opportunities offered. With regard to Mr. MacLeay himself, it is his intention to remain four or five years in New South Wales, where he thinks he will have occasion to publish some of the results of his investigations without waiting for the remote prospect of his return to England. He had made one journey to the Hunter river; there are bones, he observes, in limestone caves of Wellington valley, which prove to be those of gigantic marsupials, now extinct; but with the exception of these, few fossils have been found in New South Wales. The impressions of a fern and of a fish, some corallines, molluscous shells, and a few radiata, are all that he has yet seen or heard of. No crustacea or annulosa or cirripedous shells have yet been found, nor reptiles or birds. Indeed, he observes, this *new* country is in reality a very old one, if we may judge from the low organization of its fossil remains.

"Mr. MacLeay asks many questions regarding India, which perhaps we shall do better by publishing than by attempting to answer ourselves. He is particularly interested in those fossil remains which, as he himself expresses it, 'fill up gaps in the chain of living nature,' and asks if we have any Trilobites. They occur, he says, at the Cape of Good Hope, and might be expected in Silurian rocks. He is desirous of being informed if leeches abound in the dark damp forests of India, and also if there be any insects parasitical in ants' nests, and whether bees and wasps are infested with parasites in India. He is desirous of having some of the Hymenopterous and Dipterous insects of India, with all the parasitical kinds, and the names of the animals they infest. We had sent a small collection of the commoner insects collected in the cold season, but Mr. MacLeay is now desirous of having some of those which are found on plants of various kinds during the rains; and in making collections during winter, he recommends stones to be turned, and the bark of trees to be removed in search of the rarer sorts. Calcutta is not the most favourable place for making collections of any kind, but we shall procure what we can; we shall also be very happy to forward to Mr. MacLeay any collections that may be entrusted to us for the purpose by friends in the *Mofussil*."—*Calcutta Journal of Natural History*, No. 2.

## MISCELLANEOUS.

*A new Genus of Mexican Glirine Mammalia.*—Mr. John Phillips, who has lately returned from Real del Monte, Mexico, has, at the recommendation of Mr. John Taylor, sent to the British Museum the skins of some very rare and interesting birds, of a *Bassaris*, and of the new animal which I shall now proceed to describe. This animal is very interesting, as having all the external form and colouring of a *Gerboa*; and it is doubtless the American representative of that African genus, though differing from it very essentially, in being provided, like some other American genera, as *Saccophorus*, *Saccomys*, and *Heteromys*, with large cheek-pouches, which open externally on the side of the cheeks. I propose to call it

### Dipodomys.

Body covered with soft hair. Head moderate, with large cheek-pouches opening externally on the side of the cheeks. Ears and eyes rather large: the fore-legs short; the hind tarsus long and slender; the hind feet very long; the soles covered with hair, toes 5—4. The tail much longer than the body, covered with rather short hair, and with a dilated brush at the end; the upper cutting teeth grooved in front. Grinders ——?

This genus differs from all those above cited in the tail being elongated and covered with hair, with a pencil at the ends like the *Gerboas*, and from *Saccomys* in the soles of the hind feet being hairy.

DIPODOMYS PHILLIPII, *Gray.*

Grey-brown, with longer black hairs; sides sandy; side of the nose, spot near the base of the ears, band across the thigh and beneath, pure white; nose, spot at the base of the long black whiskers, and at the base of the tail, black; tail black-brown, with the band on each of its sides and tip white; penis ending in a long spine. Length: body and head 5 inches; tail $6\frac{1}{2}$ inches; hind feet $1\frac{1}{2}$ inch.

Inhab. Mexico, near Real del Monte. John Phillips, Esq.

I may here remark, that *Bassaris*, like the Weasels, has the soles of the feet covered with hair, and appears to be more allied to that genus than to the Gluttons (*Gulo*).—J. E. GRAY.

### ON A NEW EUROPEAN GENUS OF FRESHWATER FISH. BY F. HECKEL*.

If we cast a view on the numerous new species of freshwater fish with which the ichthyologists of England, Scandinavia, Russia, France, Germany, and especially those of Italy, have of late, after careful comparison, made us acquainted, there needs no great foresight to suspect new species also in the western and south-eastern districts of Europe, which, in this respect, may nearly be regarded as *terra incognita*. But if it had been asserted that there might still occur on land or in fresh water in Europe a remarkable vertebrate animal which had hitherto remained unknown which would deserve to form an absolutely new genus, this assertion would have met with no favourable reception, as much too hazardous, and as a phænomenon which, after such great progress in Natural History, might have been expected only in distant regions far removed from all cultivation. But that which was so little to be expected is now established as a fact. An ichthyological journey in Dalmatia which I had occasion to undertake towards the close of last summer, in which it was my chief purpose to examine most accurately all the fresh waters of this highly interesting country, afforded me not only several hitherto unknown species, but, to my great joy and astonishment, an animal so remarkable even in a physiological respect, that it fully claims to be regarded as a peculiar and highly characteristic genus. It occurs near the frontiers of Bosnia, and also in Bosnia, pretty frequently, and belongs to the large family of the *Cyprinidæ*. The principal character by which it is distinguished among the latter, is a fleshy canal which coheres longitudinally with the first ray of the anal fin, and represents an external tubular appendix of the anus, by which the anal

* Translated by Mr. W. Francis from the original, communicated by J. E. Gray, Esq.

aperture terminates at the extremity of this fin-ray or rather at the end of the fin itself. Among all hitherto known fishes, the curious *Anableps tetrophthalmus*, from the rivers of Brazil and Surinam, alone possesses anything analogous. In other respects our fish approaches most nearly in general habit those of the genus *Barbus*, Cuvier, but has decidedly *no* scales. The more complete description of it will appear next spring in my intended work on the freshwater fish of Austria, on which occasion all the new species will be most perfectly and truly represented with the aid of my ichthyometer. In the mean time, I will call this highly remarkable new genus *Aulopyge*, and feel greatly honoured in dedicating the same to my highly honoured Mecænas Baron von Hügel, by giving his name to the only species as yet known.

FORBES'S STARFISHES—ECHINUS LIVIDUS.

Cork, June 25, 1841.

"Upon looking into the above interesting work, I find it stated, in the description of *Echinus lividus*, that the animal bores into limestone *only*. Now I can say that it is by no means confined to that rock, as all those that occur on the coast of the county Clare, south of the Islands of Arran, an extent of several miles, to the mouth of the river Shannon, are imbedded in a transition slate ? much harder than any limestone with which I am acquainted. The specimen which was sent, some years past, to the late Mr. Bennett by my friend J. D. Humphreys here, and described in the 'Linnæan Transactions,' is composed of the same kind of rock.—Samuel Wright."

*Speaking Canary Bird.*—In the notice at p. 238. vol. i. of the 'Annals,' the faculty of imitating articulate sounds was noticed as not having been before observed in the Canary Bird. A similar fact, however, is recorded by Madame Roland in the very interesting memoir of her life. Speaking of the good nun, Sœur Sainte Agathe, from whom she had received great kindness when at the convent school, she says, "Elle m'emmenait quelquefois dans sa cellule, où elle avoit un Serin charmant, familier, caressant, à qui elle avoit appris à parler."

BIRDS OF KENT.

Mr. Mummery has communicated the following notices of Birds lately taken in the Isle of Thanet :—

"May 6th, at Sacket's Hill, about a mile from Margate, I shot a beautiful specimen of the *Oreolus galbula*, or Golden Oreole, a female in fine plumage. On dissection it was found to contain sixteen small eggs. On the same day I shot a beautiful specimen of the *Lanius rufus*, or Wood Chat Shrike. I have also seen at Sacket's Hill a beautiful bird, the *Nucifraga Caryocatactes*, or Nutcracker: I kept in sight of it for about two hours without being able to get a shot at it.

"Several *Limosa rufa*, or Bar-tailed Godwits, have been captured in this neighbourhood, especially at North Shore, near Sandwich. A friend of mine shot fourteen in one shot, the largest number at one time I have heard of. I have shot several, some of them being very splendid birds in full plumage, several of which are in skins for sale.

"I have also shot a very fine *Totanus glareola*, or Wood Sandpiper; and a pair of *Charadrius Cantianus*, or Kentish Plover, male and female, very beautiful birds: the female is in the Margate Museum."

3, Bath Road, Margate, Kent.

Mr. Mummery, who is now on his way to the Orkney Islands, on an ornithological expedition, also informs us that two Porbeagle Sharks, a male and a female, have just been taken at Margate in a mackerel-net, and are designed for the Museum there.

EMBERIZA HORTULANA.

Henfield, Sussex, May 29.

Sir,—As it appears to me that the occurrence of every rare animal ought to be made known to those who take an interest in Natural History, I send you the following notice, thinking that the Editors may probably consider it worthy of insertion in their Magazine.

On the 29th of April a very perfect specimen of the Ortolan Bunting, *Emberiza Hortulana* of Jenyns, 'Brit. An.' p. 132, was shot whilst sitting on the parapet of the viaduct of the Brighton and London Railway, near the Brighton terminus. When first seen it was very restless, flitting about and uttering an incessant shrill chirping note. This specimen, which is now in my possession, agrees in every respect with the descriptions of Mr. Jenyns and of Mr. Yarrell, except that the tail has a portion of the inner webs of *three* of the outer feathers white instead of *two*.

This is, I believe, at most only the sixth specimen which has hitherto occurred in Britain.

I am, Sir, yours obediently,

*Richard Taylor, Esq.* Wm. Borrer, Jun.

*Diluvial Scratches.*—"Large areas of this rock being uncovered for the purpose of quarrying, it is found planished as if by the friction of some heavy body moving over it, and marked by parallel grooves, which are regarded by Dr. Locke as 'diluvial scratches*;' they are found at 'Light's quarry, east of the Miami, and seven miles above Dayton, thus rendered particularly interesting by the discovery in it of 'diluvial grooves,' a circumstance which I had thought probable from the fact of the planishing or grinding down of the strata' first observed at Col. Partridge's quarry, 'where the upper surface, especially at the apex of its convexity, has its roughness nearly worn off, not by corrosion or by decomposition, nor by the attrition of sand and gravel, but by the grinding of a flat surface, making the work, so far as it went, a perfect plane, and leaving the pits of the deepest cavities entirely untouched†.' 'Light's quarry has been 'stripped' of soil, more or less, over ten acres, and the upper layer of stone is

* [They will now, perhaps, be claimed by some of our geologists as *glacial*.—Ed.]

† These cavities are found, where another layer of the rock lies upon this, to answer to salient points in the upper one, and the "natural surface of the stone is within certain limits as rough as can be conceived, there being sharp teeth, an inch long, projecting from one layer and entering the contiguous ..."

in most places completely ground down to a plane, as perfectly as it could have been by a stone-cutter by polishing.' 'In many places, grooves and scratches in straight and parallel lines are distinctly visible, evidently formed by the progress of some heavy mass, propelled by a regular and uniform motion. The grooves are in width from lines scarcely visible to those three-fourths of an inch wide. and from one-fortieth to one-eighth of an inch deep, traversing the quarry from between north 19°, to north 33° west, to the opposite points in lines *exactly straight*, and in fascicles of sometimes ten in number, *exactly parallel*: clearly in compact limestone, without seam or fault of any kind, and in a surface ground down to a perfect plane.' To illustrate these appearances, a portion of the stone was taken, and by the process of 'medal ruling,' a perfect engraving was made by the tracer, and a picture is given in the report (p. 230) of great distinctness. The blue limestone abounds with the *Strophomena* of Raf., while the cliff has few of them. The shell of the fossils is often preserved in the blue, while in the cliff limestone only the cast is found."—*Silliman's American Journal, Jan.* 1841.

*To the Editors of the Annals and Magazine of Natural History.*

"What can we reason but from what we know?"—*Pope.*

*Differences of Neuters in Ants.*—In the account of the Proceedings of the Entomological Society of the 1st of June, 1840, published in the last Number of this Journal, it is said,—"Mr. Shuckard also stated his opinion, that there was never more than one kind of Neuter among the Ants." As this might be understood to imply that I am ignorant of what has been stated by Huber, Lund, and others, of there being different classes of Neuters—viz. Soldiers and Workers—I request to state, that my observation was the result of the careful study of an extensive collection of the Social Heterogyna, in which, with but one exception, and that in a rare genus, I have detected only one description of neuters, for mere differences of size are of no importance, knowing as we do how much most insects vary in this respect. To this I alluded at the time. Where a functional difference exists, we are prepared, from analogy, to expect corresponding structural differences: but not finding these, I apprehend we may more correctly attribute what has been observed either to an enlarged instinct peculiar to certain genera of this tribe of insects, capable of being alternately exercised by all their individuals under certain influences, and not restricted to a certain class, or perhaps to the preoccupied imagination of the observers themselves. It has been said, that the heads of the soldiers are proportionally larger: if such be the case, it is remarkable that describers have not given the descriptions of two kinds of neuters, especially in the European genus *Atta*. The respective types of the two distinct forms of a neuter which I mentioned above as the only exception to the generality of my observation, are the *Formica* (*Eciton*) *hamata*, Latr., and *curvidentata*, Latr.

Under the date of October 5th likewise, in the same Number of this Journal, it is stated that Mr. Smith exhibited *the two* distinct kinds of neuters of *Formica sanguinea*, but it is not said whether any distinction exists beyond differences of size. This I should much like to know, as I was not present at that meeting of the Society.

Obscurity will necessarily involve the natural history of the Social Heterogyna until competent observers pursue its investigation in tropical climates; and it is very much to be regretted that Lund should either not have availed himself of his skill and opportunities, or that their results should still be withheld from the entomological public.—W. E. S.

*Doubtful identity of Miscus campestris and Ammophila sabulosa.*—Under the date of September 7, it is mentioned that Mr. Smith exhibited specimens of *Miscus campestris* and *Ammophila vulgaris*, taken *in copulâ*, whence he was led to consider the former only as a variety of the latter species. From the known interest I take in the Fossorial Hymenoptera, I may be excused for observing that I cannot participate in Mr. Smith's opinion; for notwithstanding the *possibility* of *generic* identity in the two insects, there cannot be the least doubt of their *specific* distinction. I might just as confidently state that *Osmia hirta* and *Chelostoma maxillosa* are identical, because I took them under the same circumstances. Besides, many well-authenticated instances are known of widely dissimilar insects being found in equally suspicious conjunction.—W. E. S.

*Reports of Discussions.*—I wish to remark upon the reports of the discussions that succeed the reading of papers at the Entomological Society, that *vivâ voce* expressions of opinion ought to be submitted, prior to publication, to their several originators to ensure accuracy, and indeed, even if the *report be correct*, a man may not care to have an opinion go forth to the world which was struck out only in the heat of argument. I think the Geological Society acts far more wisely by prohibiting the publication of their *extempore* discussions, as this and other journals present adequate means for all who desire to announce their views.—W. E. Shuckard.

Chelsea, April 22, 1841.

OBITUARY:—C. S. RAFINESQUE.

"Constantine S. Rafinesque-Schmaltz, a Sicilian by birth, first went to North America in the year 1802, where he remained for three years; and returning from his native land in 1815, continued to reside in the United States until his decease in September last (1840). The name of this eccentric, but certainly gifted person, has been connected with the natural history of this country for the last thirty-five years; yet, from the manner of their publication, many of his scattered writings are little known to men of science. It is chiefly as a naturalist that Rafinesque is known, although his attention has by no means been restricted to Natural History; since works on Antiquities, Civil History, Philology, Political Œconomy, Philosophy, and even a poem of nearly six thousand lines, have proceeded from his pen. Botany, however, was his favourite pursuit, and the subject of a large portion of his writings. Our task," says his biographer, "although necessary, as it appears to us, is not altogether pleasing; for while we would do full justice to an author, who, in his early days, was in some respects greatly in advance of the other writers on the botany of this country, and whose labours have been disregarded or undervalued on account of his peculiarities, we are obliged, at the same time, to protest against all of his later and one of his earlier botanical works. * * * * *

"A gradual deterioration will be observed in Rafinesque's botanical writings from 1819* to about 1830, when the passion for establishing new genera and species appears to have become a complete *monomania*. This is the most charitable supposition we can entertain, and is confirmed by the opinions of those who knew him best. Hitherto we have been particular in the enumeration of his scattered productions†, in order to facilitate the labours of those who may be disposed to search through bushels of chaff for the grain or two of wheat they perchance contain. What consideration they may deserve, let succeeding botanists determine; but we cannot hesitate to assert that none whatever is due to his subsequent works."—*Silliman's American Journal, April* 1841.

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## METEOROLOGICAL OBSERVATIONS FOR JUNE 1841.

*Chiswick.*—June 1, 2. Very fine. 3, 4. Fine, with very dry air. 5. Slightly overcast. 6. Very fine: slight rain. 7. Cold and dry: showery and cold. 8, 9. Cloudy and cold. 10. Very fine. 11. Cloudy. 12. Slight rain: clear. 13. Cloudy and cold: clear at night. 14. Very fine. 15. Slight drizzle: cloudy and fine. 16, 17. Very fine. 18. Sultry: rain, with distant thunder and lightning at night. 19. Sultry: rain. 20. Very fine: rain. 21. Heavy showers, with sultry intervals. 22. Very fine: cloudy. 23. Overcast and fine: very heavy rain at noon. 24. Showery: heavy rain at night. 25. Rain. 26. Cloudy. 27. Showery. 28. Rain. 29. Cloudy: showery. 30. Fine.—The mean temperature of the month was about 2° below the average.

*Boston.*—June 1—4. Fine. 5, 6. Cloudy. 7. Cloudy: rain A.M. and P.M. 8. Cloudy: rain early A.M. 9. Cloudy. 10. Fine. 11—13. Cloudy. 14—17. Fine. 18. Fine: therm. 3 o'clock 74°. 19. Cloudy: rain early A.M.: rain P.M. 20. Fine: rain P.M. 21. Cloudy: brisk wind. 22, 23. Fine. 24. Fine: rain, with thunder and lightning P.M. 25. Rain. 26. Cloudy: rain P.M. 27. Fine. 28. Rain: rain P.M. 29. Fine: rain with thunder and lightning P.M. 30. Fine.

*Applegarth Manse, Dumfries-shire.*—June 1. Clear and warm. 2. Bright and cool. 3. Hail-showers: thunder. 4. Cloudy. 5. Cloudy: rain P.M. 6. Fine but cloudy. 7. Dry and cool. 8. Dry and cool: withering. 9—11. Dry and cool. 12. Dry and cool, but warmer. 13. Dry and cool. 14. Slight showers. 15, 16. Dry and droughty. 17. Dry and droughty: cloudy. 18. Fine rain and thunder. 19. Rain P.M. 20. Very warm: rain P.M. 21. Heavy showers. 22. Fair all day. 23. Fair and fine. 24. Fair and fine: thunder. 25. Wet nearly all day. 26. Slight showers: thunder. 27. Fair till 4 o'clock: rain. 28. Showery all day. 29. Showery all day: thunder. 30. Rain P.M.

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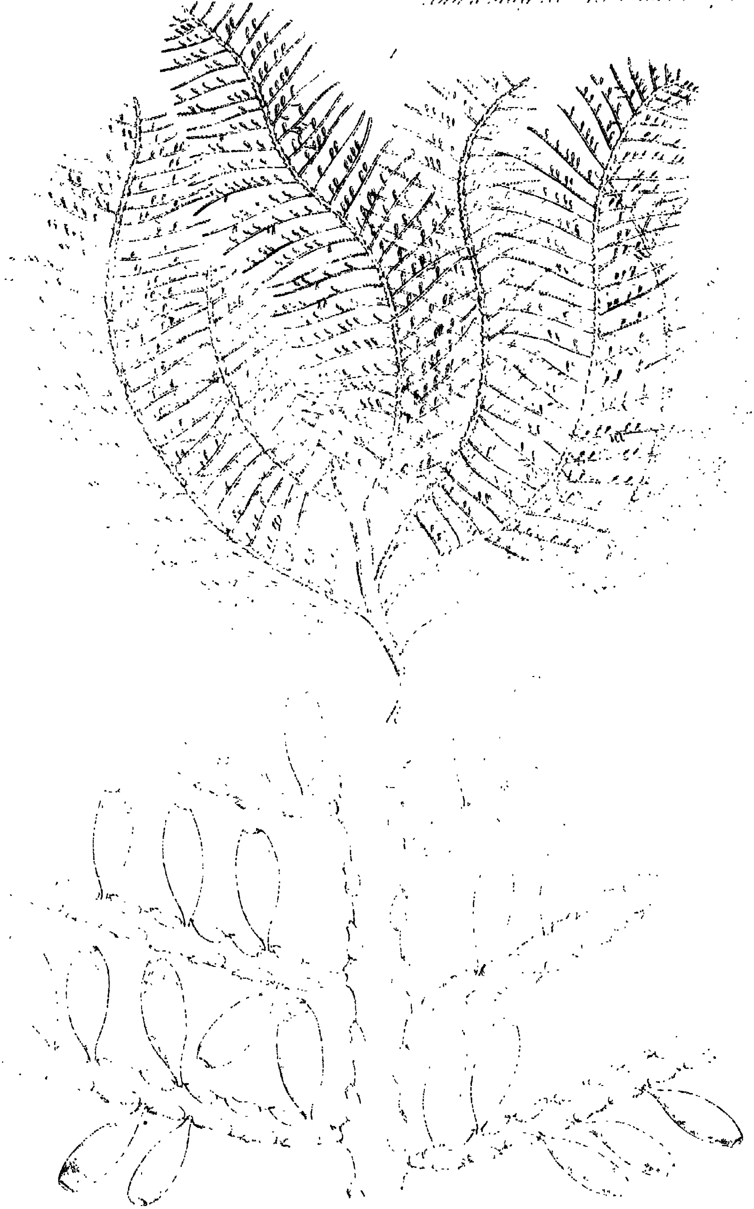
* "It was in this year (1819)," remarks Dr. Silliman, "that I became alarmed by a flood of communications, announcing new discoveries by C. S. Rafinesque, and being warned, both at home and abroad, against his claims, I returned him a large bundle of memoirs, prepared with his beautiful and exact chirography, and in the neatest form of scientific papers. This will account for the early disappearance of his communications from this Journal. The step was painful, but necessary; for, if there had been no other difficulty, he alone would have filled the Journal, had he been permitted to proceed."

† Our readers will find these contained in an article of twenty-one pages in Silliman's Journal.

*Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary,* Mr. Roberton; *by* Mr. Thompson *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. Veall *at Boston, and by* Mr. Dunbar *at Applegarth Manse, Dumfries-shire.*

| Days of Month. 1841. June. | Barometer. London: Roy. Soc. 9 a.m. | Barometer. Chiswick. Max. | Barometer. Chiswick. Min. | Barometer. Boston. 8¾ a.m. | Barometer. Dumfries-shire. 9 a.m. | Barometer. Dumfries-shire. 8¼ p.m. | Thermometer. London: Roy. Soc. Fahr. 9 a.m. | Thermometer. London: Roy. Soc. Self-register. Max. | Thermometer. London: Roy. Soc. Self-register. Min. | Thermometer. Chiswick. Max. | Thermometer. Chiswick. Min. | Thermometer. Boston. 8¾ a.m. | Thermometer. Dumfries-shire. Max. | Thermometer. Dumfries-shire. Min. | Wind. London: Roy. Soc. 9 a.m. | Wind. Chiswick 1 p.m. | Wind. Bost. | Wind. Dumfries-shire. | Rain. London: Roy. Soc. 9 a.m. | Rain. Chiswick. | Rain. Boston. | Rain. Dumfries-shire. | Dew-point. Lond.: Roy. Soc. 9 a.m. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 30·214 | 30·137 | 30·122 | 29·50 | 29·98 | 30·00 | 64·3 | 80·5 | 56·2 | 72 | 47 | 65 | 62 | 51 | s. | NE. | W. | W. | ... | ... | ... | ... | 61 |
| 2. | 30·272 | 30·177 | 30·167 | 29·55 | 29·98 | 30·08 | 65·0 | 82·3 | 55·3 | 75 | 53 | 66 | 56 | 41½ | s. | W. | W. | W. | ... | ... | ... | ... | 62 |
| 3. | 30·250 | 30·254 | 30·157 | 29·62 | 29·98 | 30·05 | 63·0 | 73·4 | 56·5 | 73 | 41 | 63 | 55 | 38½ | N. | W. | W. | SW. | ... | ... | ... | ... | 59 |
| ○ 4. | 30·440 | 30·357 | 30·300 | 29·79 | 30·15 | 30·11 | 62·7 | 73·6 | 52·2 | 72 | 46 | 57 | 56 | 47½ | W. | NW. | NW. | SW. | ... | ... | ... | ... | 53 |
| 5. | 30·250 | 30·210 | 30·004 | 29·65 | 30·00 | 29·92 | 62·2 | 73·6 | 52·9 | 73 | 46 | 58 | 58 | 48 | W. | W. | W. | SW. | ... | ·03 | ... | ... | 54 |
| 6. | 30·036 | 29·981 | 29·923 | 29·55 | 29·95 | 29·92 | 55·3 | 69·0 | 51·3 | 59 | 40 | 51·5 | 61 | 40½ | WNW. | NE. | NW. | N. | ·019 | ·01 | ... | ... | 54 |
| 7. | 29·964 | 29·956 | 29·921 | 29·40 | 30·00 | 30·04 | 51·3 | 60·0 | 45·3 | 57 | 46 | 49 | 56½ | 41 | NW. | N. | NW. | N. | ... | ·02 | ... | 0·06 | 50 |
| 8. | 29·996 | 29·974 | 29·958 | 29·48 | 30·09 | 30·04 | 51·0 | 56·4 | 47·6 | 56 | 46 | 51·5 | 59½ | 43½ | NW. | N. | N. | NE. | ... | ... | ·25 | ... | 51 |
| 9. | 29·970 | 29·947 | 29·911 | 29·47 | 30·01 | 29·95 | 50·3 | 57·2 | 47·4 | 57 | 39 | 51·5 | 61 | 44 | NNW. | NE. | N. | NE. | ... | ... | ... | ... | 47 |
| 10. | 29·838 | 29·815 | 29·669 | 29·27 | 29·87 | 29·69 | 52·3 | 57·6 | 47·8 | 71 | 41 | 57 | 76 | 50 | NW. | N. | N. | NW. | ... | ... | ... | ... | 47 |
| 11. | 29·722 | 29·775 | 29·687 | 29·22 | 29·74 | 29·84 | 50·5 | 68·7 | 49·3 | 54 | 45 | 50 | 59 | 46½ | NW. | N. | N. | NE. | ... | ... | ... | ... | 50 |
| ☾ 12. | 29·850 | 29·973 | 29·807 | 29·37 | 29·89 | 29·88 | 50·7 | 54·7 | 46·8 | 53 | 37 | 50 | 63½ | 41½ | N. | NE. | N. | SW. | ... | ·01 | ... | ... | 47 |
| 13. | 30·064 | 30·040 | 29·944 | 29·53 | 30·00 | 29·96 | 50·2 | 55·2 | 47·0 | 65 | 37 | 57 | 61 | 38 | NW. | SW. | calm | NW. | ... | ... | ... | ... | 47 |
| 14. | 30·100 | 30·047 | 29·906 | 29·47 | 29·93 | 29·78 | 57·3 | 72·6 | 46·7 | 72 | 53 | 59·5 | 54 | 39 | W. | NW. | calm | W. | ... | ... | ... | 0·04 | 48 |
| 15. | 29·940 | 30·097 | 29·895 | 29·25 | 29·81 | 30·00 | 57·4 | 66·0 | 55·6 | 69 | 36 | 57 | 61 | 47½ | W. | NW. | W. | W & E. | ... | ·01 | ... | ... | 53 |
| 16. | 30·274 | 30·208 | 30·111 | 29·65 | 30·02 | 29·97 | 60·5 | 67·8 | 47·7 | 72 | 41 | 59 | 61½ | 44 | s. | s. | calm | SW & S. | ... | ... | ... | ... | 50 |
| 17. | 30·136 | 30·079 | 29·875 | 29·39 | 29·91 | 29·83 | 61·7 | 80·3 | 51·5 | 70 | 41 | 66 | 61 | 52½ | s. | s. | calm | s. | ... | ... | ... | ... | 56 |
| 18. | 29·822 | 29·788 | 29·605 | 29·18 | 29·70 | 29·61 | 64·3 | 76·4 | 53·6 | 80 | 54 | 65 | 59½ | 53½ | NNW. | s. | calm | SE. | ... | ·24 | ... | ... | 56 |
| ● 19. | 29·650 | 29·689 | 29·607 | 29·05 | 29·58 | 29·58 | 60·7 | 75·0 | 58·2 | 69 | 45 | 60 | 63 | 51½ | W. | W. | calm | E. | ·111 | ·08 | ·38 | ... | 59 |
| 20. | 29·842 | 29·759 | 29·724 | 29·22 | 29·58 | 29·40 | 64·3 | 87·0 | 51·2 | 66 | 54 | 63 | 65½ | 52 | s. | SW. | calm | E. | ·027 | ·02 | ·08 | ... | 57 |
| 21. | 29·848 | 29·939 | 29·769 | 29·18 | 29·42 | 29·62 | 64·2 | 71·0 | 56·3 | 71 | 47 | 65 | 61 | 52½ | s var. | SW. | W. | SSE. | ... | ·26 | ·06 | 0·88 | 57 |
| 22. | 30·118 | 30·059 | 29·994 | 29·50 | 29·78 | 29·80 | 61·7 | 70·2 | 53·7 | 73 | 46 | 64 | 61 | 49½ | s. | W. | W. | SSE. | ·366 | ·01 | ... | ... | 56 |
| 23. | 30·030 | 30·028 | 29·812 | 29·42 | 29·81 | 29·75 | 62·0 | 69·7 | 53·4 | 73 | 46 | 64 | 64 | 50 | s. | s. | calm | SSW. | ... | ·40 | ... | ... | 56 |
| 24. | 29·800 | 29·741 | 29·639 | 29·25 | 29·70 | 29·68 | 63·0 | 69·4 | 53·8 | 72 | 54 | 66 | 67 | 46 | E. | W. | calm | SE. | ... | ·49 | ... | ... | 55 |
| ☽ 25. | 29·542 | 29·543 | 29·494 | 29·10 | 29·61 | 29·50 | 55·7 | 68·4 | 56·2 | 70 | 54 | 57 | 54 | 47 | E. | SW. | E. | E & SE. | ·525 | ·04 | 1·08 | ... | 58 |
| 26. | 29·686 | 29·774 | 29·605 | 29·10 | 29·43 | 29·51 | 64·0 | 78·0 | 56·2 | 67 | 52 | 64 | 66 | 48½ | s. | SW. | s. | s. | ·133 | ... | ·32 | ... | 59 |
| 27. | 30·012 | 30·128 | 29·951 | 29·38 | 29·73 | 29·89 | 62·5 | 67·6 | 56·4 | 70 | 52 | 67 | 64 | 49½ | W. | W. | W. | WNW. | ... | ·10 | ·34 | ... | 59 |
| 28. | 30·012 | 29·981 | 29·773 | 29·44 | 29·65 | 29·60 | 58·3 | 68·7 | 55·3 | 62 | 50 | 58 | 57 | 51 | s. | s. | W. | s. | ·430 | ·65 | ·01 | 1·00 | 58 |
| 29. | 29·820 | 29·817 | 29·743 | 29·22 | 29·58 | 29·70 | 61·3 | 67·4 | 52·8 | 69 | 48 | 63 | 64 | 47½ | s. | SW. | W. | E. | ·675 | ·07 | ·30 | ... | 57 |
| 30. | 30·046 | 30·093 | 29·927 | 29·43 | 29·88 | 29·86 | 59·7 | 73·6 | 52·7 | 67 | 52 | 63 | 60 | 50½ | W. | NW. | calm | W. | ·022 | ·01 | ·23 | ... | 56 |
| Mean. | 29·985 | 29·979 | 29·866 | 29·38 | 29·825 | 29·818 | 58·9 | 69·7 | 52·2 | 67·30 | 49·56 | 59·5 | 61 | 47·4 | | | | | Sum. 2·308 | 2·45 | 3·05 | 1·98 | Mean. 54 |



*Thuiaria articulata*

# THE ANNALS

AND

# MAGAZINE OF NATURAL HISTORY.

SUPPLEMENT TO VOL. VII. SEPT. 1841.


## PROCEEDINGS OF LEARNED SOCIETIES.

### ROYAL SOCIETY.

February 18, 1841.—A paper was in part read, entitled, "Memoir on a portion of the Lower Jaw of an Iguanodon, and other Saurian Remains discovered in the strata of Tilgate Forest, in Sussex." By Gideon Algernon Mantell, Esq., LL.D., F.R.S.

When the author communicated to the Royal Society, in the year 1825, a notice on the teeth of an unknown herbivorous reptile, found in the limestone of Tilgate Forest, in Sussex, he was in hopes of discovering the jaws, with the teeth attached to it, of the same fossil animal, which might either confirm or modify the inferences he had been led to deduce from an examination of the detached teeth. He was, however, disappointed in the object of his search until lately, when he has been fortunate enough to discover a portion of the lower jaw of a young individual, in which the fangs of many teeth, and the germs of several of the supplementary teeth, are preserved. The present paper is occupied with a minute and circumstantial description of these specimens, and an elaborate inquiry into the osteological characters and relations presented by the extinct animals to which they belonged, as compared with existing species of Saurian reptiles; the whole being illustrated by numerous drawings. The comparison here instituted furnishes apparently conclusive proof that the fossil thus discovered is a portion of the lower jaw of a reptile of the Lacertine family, belonging to a genus nearly allied to the Iguana. From the peculiar structure and condition of the teeth it appears evident that the *Iguanodon* was herbivorous; and from the form of the bones of the extremities it may be inferred that it was enabled, by its long, slender, prehensile fore-feet, armed with hooked claws, and supported by its enormous hinder limbs, to pull down and feed on the foliage and trunks of the arborescent ferns, constituting the flora of that country, of which this colossal reptile appears to have been the principal inhabitant.

Some particulars are added respecting various other fossil bones found in Tilgate Forest, and in particular those of the *Hylæosaurus*, or Wealden Lizard (of which genus the author discovered the remains of three individuals), and of several other reptiles, as the *Megalosaurus*, *Plesiosaurus*, and several species of *Steneosaurus*, *Pterodactylus*, and *Chelonia*, as also one or more species of a bird allied to the Heron. All these specimens are now deposited in the British Museum.

April 22.—"Remarks on the Birds of Kerguelen's Land." By R. M$^{c}$Cormick, Esq., Surgeon R.N. of H.M.S. Erebus. Communicated by the Lords Commissioners of the Admiralty.

The birds usually met with by the author in this island were petrels and penguins; and besides these, he found two species of gull, a duck, a shag, a tern, a small albatros, and a species of Chionis; and also a remarkable nocturnal bird allied to the Procellaria. Brief notices are given of the forms and habits of these birds.

"Geological Remarks on Kerguelen's Land." By R. M$^{c}$Cormick, Esq., Surgeon R.N. of H.M.S. Erebus. Communicated by the Lords Commissioners of the Admiralty.

The northern extremity of the island is described as being entirely of volcanic origin. The trap rocks, of which the headlands are composed, form a succession of terrraces nearly horizontal. Basalt is the prevailing rock: it assumes the prismatic form, and passes into greenstone, and the various modifications of amygdaloid and porphyry. The general direction of the mountain-ranges inclines to the south-west and north-east, and they vary in height from 500 to 2500 feet. Many of the hills are intersected by trap dykes, usually of basalt. Several conical hills, with crater-shaped summits, are found, evidently the remains of volcanic vents. Three or four very singular isolated hills, composed of an igneous slaty sandstone, occur in Cumberland Bay, presenting very smooth outlines, and consisting of piles of broken fragments, through which the mass protrudes, in places, in prismatic columns. Vast quantities of *débris* are accumulated at the base of the hills, in many places to the height of 200 or 300 feet or more, affording strong evidence of the rapid disintegration this land is undergoing, from the sudden atmospheric vicissitudes to which it is exposed.

The whole island is deeply indented by bays and inlets, and its surface intersected by numerous small lakes and water-courses. These, becoming swollen by the heavy rains, which alternate with frost and snow, rush down the sides of the mountains and along the ravines in countless impetuous torrents, forming, in many places, beautiful foaming cascades, wearing away the rocks, and strewing the platforms and valleys below with vast fragments of rocks and slopes of rich alluvium, the result of their decomposition.

The most remarkable geological feature in the island is the occurrence of fossil wood and coal, and what is still more extraordinary, these are imbedded in the igneous rocks. The wood, which is for the most part highly silicified, is found enclosed in the basalt; whilst the coal crops out in ravines, in close contact with the overlying porphyritic and amygdaloidal greenstone.

A few outline sketches of the rocks and scenery, in various parts of the island, accompany this paper.

## LINNÆAN SOCIETY.

June 1, 1841.—Mr. Forster, V.P., in the Chair.

Read the conclusion of Mr. Bunbury's "Remarks on certain Plants of Brazil, with descriptions of some which appear to be new."

The following are the characters of the species described as new:

*Lasiandra calyptrata*, ramis teretibus ferrugineo-tomentosis, foliis petiolatis ovato-oblongis acutis 5-nervibus subsetoso-hirsutis subtùs dense villosis, racemis terminalibus paucifloris, pedicellis oppositis 1–3-floris, bracteis hispido-pilosis convolutis calyptriformibus, calyce sericeo, filamentis styloque hirsutis.

*Hab.* prope Gongo Soco, in prov. Minas Geraes.

*Clidemia? glabrata*, ramulis subtetragonis glabris, foliis petiolatis oblongo-lanceolatis subcordatis acuminatis serrulato-ciliatis 5-nervibus utrinque glabris: petiolis ciliatis, paniculâ terminali trichotomâ divaricatâ glabrâ, floribus verticillato-aggregatis sessilibus ebracteatis, petalis lanceolatis.

*Hab.* prope Gongo Soco, in prov. Minas Geraes.

*Clidemia deflexa*, ramis subtetragonis petiolis paniculisque setoso-hispidissimis, foliis ovatis acuminatis quintuplinervibus subdenticulatis ciliatis utrinque hispidis, paniculâ terminali elongatâ oppositè ramosâ deflexâ nutante, floribus ad ramulorum apices congestis ebracteatis, lobis calycinis obtusis concavis dorso appendiculatis.

*Hab.* prope Gongo Soco.

*Cremanium? cordifolium*, undique glanduloso-pilosissimum, foliis petiolatis latè cordatis acuminatis inæqualiter denticulatis ciliatis sub-7-nervibus, paniculâ subterminali nutante laxâ oppositè ramosâ, calyce subrotundo-turbinato: lobis subulatis, petalis lanceolatis acuminatis.

*Hab.* prope Gongo Soco.

*Hiræa cinerea*, foliis lanceolatis acutis supernè glabris subtùs fructibusque adpressè sericeo-pilosis canescentibus, paniculâ terminali trichotomâ foliosâ, calycibus eglandulosis adpressè pilosis, fructûs alis semiorbiculatis crenatis undulatis.

*Hab.* in sylvis montis Corcovado prope Rio de Janeiro.

*Tetrapteris mutabilis*, ramis paniculisque velutino-tomentosis, foliis obovato-ellipticis obtusis rugosis utrinque tomentosis: petiolis apice biglandulosis, paniculâ terminali laxâ divaricatâ multiflorâ, alis fructûs inæqualibus.

*Hab.* in sylvis montis Corcovado.

*Abutilon benedictum*, ramis sulcatis petiolis pedunculis calycibusque flocoso-tomentosis, foliis lanceolatis acuminatis basi acutiusculis obtusè serratis rugosis suprà glabris subtùs incano-velutinis, pedunculis axillaribus unifloris folium æquantibus.

*Hab.* in sylvis cæduis (*capoeiras* dictis) prov. Minas Geraes.

*Rubus longifolius*, caule angulato petiolis pedunculisque densissimè glanduloso-setosis aculeatis, foliis quinato-palmatis: foliolis petiolatis oblongo-lanceolatis acuminatis basi subcordatis argutè serratis utrinque glabris, stipulis setaceis, calyce subsericeo-tomentoso reflexo.

*Hab.* prope Gongo Soco.

*Lupinus nitidissimus*, suffruticosus erectus ramosus aureo-sericeus, foliis simplicibus ovatis acutis, stipulis petiolo adnatis breviter acuminatis, racemis subterminalibus elongatis, floribus verticillatis, calycis labiis integris: inferiore elongato.

*Hab.* in campis altis prov. Minas Geraes, prope Capao et Ouro Preto.

*Achyranthes paludosa*, caule herbaceo subramoso fistuloso, foliis obovato-

lanceolatis acutiusculis glabris, pedunculis axillaribus folium subæquantibus, spicis abbreviatis capitatis glaberrimis.
*Hab.* prope urbem Buenos Ayres.

*Desmochæta? sordida*, caule herbaceo prostrato ramosissimo lanato, foliis subrotundis mucronulatis in petiolum attenuatis glabriusculis, capitulis sessilibus axillaribus ovatis, calycis foliolis 3 exterioribus majoribus: interioribus carinatis conniventibus: setis uncinato-barbatis.
*Hab.* ad vias prope urbem Buenos Ayres.

*Schultesia pallens*, culmo erecto subramoso, foliis ovatis ellipticisque acutiusculis: summis lineari-lanceolatis acuminatis, floribus terminalibus subsolitariis, alis calycis dilatatis semiovatis, corollæ laciniis obovato-rhombeis breviter acuminatis integerrimis.
*Hab.* prope Gongo Soco in prov. Minas Geraes.

*Solanum graveolens*, suffruticosum inerme glanduloso-pilosum viscosum, foliis pinnatis: foliolis petiolulatis oblongo-lanceolatis acuminatis membranaceis, racemis longè pedunculatis multifloris subcorymbosis unilateralibus, corollâ quinquefidâ.
*Hab.* prope Gongo Soco.

*Solanum reptans*, herbaceum inerme hispido-hirsutum, foliis pinnatis: foliolis petiolulatis oblongis subacuminatis: petiolis alatis, racemis lateralibus folio brevioribus, caule prostrato radicante.
*Hab.* prope Gongo Soco.

Mr. Bunbury believes *Lasiandra fissinervia*, DeC., to be merely a variety of *L. Fontanesiana*; and *Clidemia urceolata* and *C. biserrata* to be one species. He describes variations in character occurring in *Lasiandra proteæformis*, DeC., *Clidemia urceolata*, DeC., *C. longibarbis*, DeC., *Tetrapteris acutifolia*, Cav., *Bignonia venusta* and *Neurocarpum angustifolium*, Kunth. He thinks it possible, however, that his plant may differ from the latter, as the flowers are resupinate, a character which could hardly have escaped M. Kunth; he therefore proposes for it the following character, should it prove to be distinct:—

*Neurocarpum resupinatum*, frutescens erectum, foliis trifoliolatis: foliolis ellipticis oblongisque retusis mucronulatis suprà glabris subtùs pallidis pilosiusculis, pedunculis subbifloris folio brevioribus, floribus resupinatis.
*Hab.* ad Botafogo, prope Rio de Janeiro.

Specimens of the plants noticed in this memoir were included in a collection presented to the Society by Mr. Bunbury some years ago.

Read also a "Synopsis of the Coleopterous family *Paussidæ*, with descriptions of a new Genus and some new Species." By J. O. Westwood, Esq., F.L.S.

This paper contains a brief enumeration of the species of the remarkable family of *Paussidæ*, with some additions and corrections to Mr. Westwood's Monograph of it, published in the 16th volume of the Society's Transactions.

He proposes to exclude from the family the genus *Trochoideus*, an examination of the cibarian organs having proved that genus to belong to the *Endomychidæ*; and states that he is now acquainted with four, if not five, species belonging to it, viz. 1. *Troch. cruciatus*, Dalm.; 2. *T. Dalmanni*, Westw.; 3. *T. Desjardinsii*, Guér.; 4. *T. Americanus*, Bucqu.; and 5.? *T. Hopei*, Westw. The last-named species he has seen in Mr. Hope's collection: it is from New Grenada, and is possibly identical with *T. Americanus*.

Mr. Westwood gives the following as a synopsis of the genera belonging to the family in its present state:—

| | |
|---|---|
| *Antennæ* quasi biarticulatæ. | |
| *Caput* thorace haud immersum, collo distincto, ocellis nullis. | |
| *Palpi labiales* articulo ultimo elongato ......... | 1. *Paussus.* |
| —— ——— articulis æqualibus ............... | 2. *Platyrhopalus.* |
| *Caput* thorace immersum ocellis duobus ......... | 3. *Hylotorus.* |
| *Antennæ* quasi sexarticulatæ. | |
| *Prothorax* angulis anticis valdè productis......... | 4. *Pentaplatarthrus.* |
| ——— transversus, angulis anticis rotundatis, posticis valdè emarginatis............... | 5. *Lebioderus.* |
| ——— truncato-cordatus ........................ | 6. *Ceratoderus.* |
| *Antennæ* quasi decemarticulatæ....................... | 7. *Cerapterus.* |

1. Paussus, *Linn.*

*Sect.* A. Thorax quasi bipartitus.

a. Antennarum clavâ posticè haud excavatâ.

1. *P. microcephalus*, L. Africa?
2. *P. Jousselinii*, Guér. Rangoon.
3. *P. Linnæi*, Westw. Habitat unknown.
4. *P. Burmeisteri*, Westw. Cape of Good Hope.
5. *P. rufitarsis*, Westw. Habitat unknown.
6. *P. pilicornis*, Donov. Bengal.
7. *P. Turcicus*, Frivaldsk. Balkan Mountains.

b. Antennarum clavâ posticè excavatâ.

8. *P. thoracicus*, Donov. Bengal.
9. *P. Fichtelii*, Donov. Bengal.
10. *P. fulvus*, luteo-fulvus subopacus, elytris magis rufescentibus, antennarum articulo basali thoracis lateribus posticè femoribusque obscurioribus, capite suprà profundè impresso.—*Long. corp. lin.* 3.

*Hab.* in Indiâ Orientali.

11. *P. tibialis*, castaneus nitidus, elytris singulis plagâ magnâ nigrâ, tibiis 4 anterioribus elongatis; posticis multò latioribus compressis, antennarum clavâ posticè profundè excavatâ.—*Long. corp. lin.* 2¾.

*Hab.* in Bengalâ. In Mus. D. Westermann.

12. *P. excavatus*, Westw. Senegal.
13. *P. ruber*, Thunb. Cape of Good Hope.
14. *P. cochlearius*, Westw. South Africa.
15. *P. Klugii*, Westw. Cape of Good Hope.

*Sect.* B. Thorax subcontinuus.

a. Species Africanæ.

16. *P. sphærocerus*, Afzel. Sierra Leone.
17. *P. armatus*, Dej.; *P. cornutus*, Chevrol. Senegal.
18. *P. curvicornis*, Chevrol.; *P. cornutus*, *var.*?, Chevrol. Senegal.
19. *P. Shuckardi*, Westw. South Africa.
20. *P. lineatus*, Thunb. Cape of Good Hope.
21. *P. affinis*, Westw. On the authority of the British Museum Catalogue Mr. Westwood is now enabled to give Africa as the habitat of this species; but he suggests that there may be some mistake as to locality, and that the insect may really be Indian, and not specifically distinct from the following, *P. cognatus*.

b. Species Indicæ.

22. *P. cognatus*, rufo-castaneus nitidus punctatus, elytris singulis plagâ magnâ nigrâ, capite anticè lineâ tenui impressâ: vertice impressionibus duabus semicircularibus, antennarum clavâ subovatâ basi extùs in hamum productâ.—*Long. corp. lin.* 4.
*Hab.* in Bengalâ. In Muss. D. D. Melly et Westermann.
23. *P. Hardwickii*, Westw. Nepaul.
24. *P. Saundersii*, fulvo-rufescens subnitidus punctatus, capite thoraceque obscurioribus, antennarum clavâ oblongo-ovatâ basi extùs in hamum setigerum productâ.—*Long. corp. lin.* 3½.
*Hab.* in Indiâ Orientali. Mus. D. W. W. Saunders.
25. ——— (Sp. ined.), Latr. Isle of France.
*Obs. P. ruficollis*, Fabr., is given by Dr. Erichson as one of the *Malachii*, and as identical with his *Collops* 4-*maculatus*.

2. Platyrhopalus, *Westw.*

1 (26). *P. denticornis*, Westw. East Indies.
2 (27). *P. unicolor*, Westw. East Indies.
3 (28). *P. acutidens*, Westw. Nepaul.
4 (29). *P. Westwoodii*, Saund. East Indies.
5 (30). *P. angustus*, Westw. East Indies.
6 (31). *P. Melleii*, Westw. Malabar.
7 (32). *P. aplustrifer*, Westw. Bengal. Certainly belonging to this genus.
8 (33). *P.? lævifrons*, Westw. Senegal.
9 (34). *P.? dentifrons*, Westw. Senegal.

3. Hylotorus, *Dalm.*

1 (35). *H. bucephalus*, Gyll. Sierra Leone.

4. Pentaplatarthrus, *Westw.*

1 (36). *P. paussoides*, Westw. South Africa.

5. Lebioderus, *Westw.*

1 (37). *L. Goryi*, Westw.

6. Ceratoderus.

*Corpus* oblongum, depressum. *Caput* transverso-quadratum, posticè collo instructum, disco inter oculos bi-impressum. *Antennæ* quasi 6-articulatæ, articulis 4 intermediis transversis planis, ultimo semiorbiculari. *Maxillæ* minutæ, planæ, corneæ, apice acutæ curvatæ, intùs sub apice dente acuto armatæ. *Palpi maxillares* 4-articulati, articulo magno ovato, 3tio 4toque minoribus subcylindricis; *labiales* articulo ultimo præcedente haud multò majori ovato apice truncato. *Prothorax* capite vix latior, cordato-truncatus, trans medium lineâ impressâ notatus. *Elytra* oblongo-ovata, depressa. *Pedes* breviusculi; femoribus tibiisque compressis, his apice haud calcaratis; tarsis distinctè 5-articulatis, articulo basali sequenti longiore.
1 (38). *C. bifasciatus.*
Paussus bifasciatus, *Kollar in Ann. Wien. Mus.* 1836, t. 31. f. 7. a, b; *Westw. in Trans. Ent. Soc.* ii. p. 91. pl. 10. f. 3.
*Hab.* in Indiâ Orientali.

7. Cerapterus, *Swederus.*

1 (39). *C. latipes*, Swed. Bengal.
2 (40). *C. Horsfieldii*, Westw. Java.
3 (41). *C.* 4-*maculatus*, Westw. Java.

4 (42). *C.* (ORTHOPTERUS) *Smithii*, MacL. South Africa.
5 (43). *C.* (ARTHROPTERUS) *MacLeaii*, Donov. New Holland.
6 (44). *C.* (PHYMATOPTERUS) *piceus*, Westw. New Holland.
7 (45). *C.* (HOMOPTERUS) *Brasiliensis*, Miers. Brazil.
8 (46). *C.* (PLEUROPTERUS) *Westermanni*, Westw. Java.

## ENTOMOLOGICAL SOCIETY.

February 1st, 1841.—G. R. Waterhouse, Esq., in the Chair.

The Secretary called the attention of the Meeting to the condition in which the fine painting of the Raising of Lazarus, by Sebastian Del Piombo, in the National Gallery, was stated by Professor Waagen to be in at the present time; the picture having been transferred to canvass, on which it was affixed with *paste*, which material was now attacked by insects, regarded by Mr. Westwood as the *Anobium paniceum*, an insect well known to attack preparations of flour, such as wafers, &c. The plans suggested at a former meeting for the destruction of insects which attack paintings on panel, or the stretching-frames, would be inapplicable to the present case, and it would be very dangerous to saturate the back of the picture with any solution which would affect the paste so as to render it unpalatable to the insects, or to destroy them. Mr. Gutch considered that in the case of so valuable a picture as this is, it would be most advisable to reline the picture with fresh canvass, employing paste in which a little corrosive sublimate had been mixed; he had constantly used that material, and had always found it perfectly effectual in preventing the attacks of insects. Mr. Waterhouse, however, strongly objected to the use of corrosive sublimate, and suggested that an air-tight frame or flat box should be placed behind the entire picture, a space of about an inch being left between the picture and the frame-work; and that the inclosed air should be strongly impregnated with prussic acid, which he had no doubt would destroy the insects.

A letter from the Rev. A. W. Griesbach to the Secretary was read, relative to the Economy of the Pea-beetle (*Bruchus granarius*), which he had found to undergo its transformations within the pea, and not in the earth, as had been stated by Mr. Westwood in an article in the Gardener's Magazine. Mr. Westwood stated that he had himself had several previous opportunities of discovering the error, having received a quantity of peas and other leguminous seeds from Mr. Loudon and Dr. Lindley, some of which contained Bruchi in the perfect state.

The completion of a memoir on the *Evaniidæ* and some allied genera of Hymenopterous insects, by J. O. Westwood, F.L.S., was read.

In this extended memoir, commenced in 1836, the author, after tracing the characters and relations of the family *Evaniidæ*, and noticing the views entertained respecting it by various authors, gives a detailed account (illustrated with numerous figures of the typical species and the generical details) of each of the genera of which it is composed, as well as of some others of anomalous character allied thereto, adding under each species a complete synopsis of all the known species, including also numerous new ones.

In EVANIA (including *Brachygaster*, Leach, *Hyptia*, Ill.) he introduces twenty-four species, amongst which the following are new :—

Evania princeps. *Nigra, facie argenteo-sericea longitudinaliter striata, thorace et petiolo rudè punctatis, alarum anticarum fuscarum vena radiali ad apicem recurva, furca metasterni brevissima.* Long. corp. lin. 7. Nova Hollandia.

Evania Abyssinica. *Rufa, thorace et petiolo abdominali rufis, pedibus piceis, facie punctata, mandibulis nigris, apice piceis, femoribus 4 anticis subtus rufis.* Long. corp. lin. 3¾. Abyssinia.

Evania Tasmanica. *Nigra, capite thoraceque punctatissimis, facie tenuiter longitudinaliter striata, furca metasterni brevi recta, petiolo striato, alis hyalinis.* Long. corp. lin. 4½. Terra Van Diemenii.

Evania Javanica. *Tota nigra punctata, petiolo brevi, obliquè striato, facie rugosa, alarum venis cubitali et discoidali obliteratis.* Long. corp. lin. 3. Java.

Evania (Brachygaster) bicolor. *Ferruginea, abdomine piceo, antennis pedibusque nigris, capite piceo, vertice rufescente.* Long. corp. lin. 2½. In Mus. Brit.

In PELECINUS a full description of the male is given for the first time, and nine species noticed, most of which will be described by Dr. Klug in the next number of Germar's Zeitschrift.

MONOMACHUS, Klug, n. g. *Caput crassum, genis plus minusve dilatatis; mandibulæ intus 1-dentatæ; antennæ ♂ 14-articulatæ, ♀ 15-articulatæ, articulis apicalibus sensim crassioribus; alæ anticæ area unica marginali, duabus submarginalibus; abdomen ♂ clavatum, ♀ valde elongatum, curvatum in medio, subinflectum; oviductus occultus.*

Seven species, all inhabitants of Brazil, including the following.

Monomachus Klugii. *Ferrugineus, abdomine piceo-nigro, pedunculo ferrugineo, alis pallidis cum macula fusca terminali, genis valde dilatatis, antennis fuscis, pedibus rufescentibus.* Long. corp. lin. 10½. Brazil.

Monomachus lateralis, *Klug. ined. Niger, mandibulis luteo-fuscis, pedibus 4 anticis luteo-fuscis, coxis albidis, femoribus in medio obscurioribus, pedibus 2 posticis nigro-fuscis, abdomine luteo-marginato, alis hyalinis immaculatis ♂.* Long. corp. lin. 5½. Brazil.

Monomachus segmentator. *Obscure flavescens, vertice fusco-vario, collare macula sublunata fusca, mesothorace fusco, metathorace nigro, punctato, pedunculo flavido, segmentis reliquis abdominis piceis, flavido-marginatis, abdomine setis tribus minutis terminato, corpore subtus flavido, pedibus posticis fuscis, antennis corpore longioribus ♂.* Long. corp. lin. 4. In Mus. Brit.

The genus Fœnus, Fabr., contains sixteen species, of which the following are described as new:—

Fœnus Esenbeckii. *Piceo-rufus, mesothoracis tergo rugosulo, antennis rufis, articulo $3_{tio}$ fusco, alis lutescenti-hyalinis, areola minuta, discoidali, subconica. Syn. F. affectator var. β Esenbeck.* Germany.

Fœnus Guildingii. *Gracilis, niger, thoracis et abdominis lateribus rufescentibus, oviductu fere corporis longitudine, vaginis et terebra apice albidis, tibiis et tarsis 4 anticis albis* ♂ ♀. Long. corp. lin. 5½. Island of St. Vincent.

Fœnus dorsalis. *Ferrugineus, capite suprà medio mesonoti scutelloque nigris, abdomine piceo, segmentis apice rufescentibus, pedibus piceo-rufis, femoribus tibiisque 4 anticis in medio nigris* ♀. In Mus. Brit.

Fœnus terminalis. *Niger, thorace lævi, opaco, lateribus rufo-piceis, tibiis 4 anticis albis, linea interna nigra, posticis nigris, clavatis, annulo basali albo, tarsis albis apice fuscis, oviductu longitudine corporis, vaginis apice latè albis* ♀. Long. corp. lin. 9¾. Nova Hollandia.

Fœnus unguiculatus. *Niger, rufo-piceo-varius, areola minuta discoidali obliterata, unguibus tarsorum maximis (in pedibus posticis dimidium tarsorum longitudine æquantibus* ♂). Long. corp. lin. 5½. Nova Hollandia.

Fœnus Darwinii. *Piceo-niger rufo-varius, pedibus rufo-fulvis, areola discoidali magna* ♂. Long. corp. lin. 3. Nova Hollandia.

Fœnus rufus. *Totus rufus, capite thoraceque punctatis, alarum areola discoidali mediocri* ♂. Long. corp. lin. 5½. West Australia.

In the genus Aulacus, of Jurine (of which the male as well as the mouth organs are described in detail), fifteen species are introduced, including the following as new:—

Aulacus obscuripennis. *Niger, capite lævissimo, thorace anticè irregulariter striato, posticè rugoso, abdomine medio rufo, alis hyalinis, nubila parva media, fascia substigmaticali apiceque tenui fuscis* ♀. Long. corp. lin. 5¾. Poland.

Aulacus Erichsonii. *Gracilis, niger, antennarum articulo $1^{mo}$ subtus fulvo, petiolo nigro, abdominis dimidio basali rufo, fascia tenui transversa nigra, apice nigro, coxis nigris, pedibus 4 anticis flavido-rufescentibus, femoribus 2 posticis fuscis, tibiis obscuris, apice rufescentibus, tarsis omnibus albidis, alis nubila substigmaticali apiceque parùm fuscis* ♂. Long. corp. lin. 5½. Prope Berolinum.

Aulacus thoracicus, *Klug. ined. Niger, collari et mesothoracis dorso sanguineo, striato, alarum costa, areola marginali et $1^{ma}$ submarginali fuscis* ♂ ♀. Long. corp. lin. 5. Cap. Bon. Spei.

Aulacus Stephanoides. *Niger, capite et antennarum articulo basali luteis, abdomine elongato gracili, oviductu abdomine duplò longiore, terebra rufa, vaginis nigris apice albis, alis apice parùm fuscis* ♀. Long. corp. lin. 7. Brazil.

Aulacus hyalinipennis. *Niger, facie et articulo 1mo antennarum fulvis, alis hyalinis, stigmate nigro, apice fusco, pedibus 4 anticis fulvis, femoribus posticis fuscis, tibiis rufescentibus, tarsis fulvis* ♂. Long. corp. lin. 5. Mexico.

Aulacus ater. *Totus ater, alis pallidè fuscescentibus, areola externo-media plaga parva postica, alteraque minuta cum stigmate connexa fuscis* ♀. Long. corp. lin. 7. Nova Scotia and North America.

Aulacus Abbottii. *Niger, abdomine versus basin rufo, pedibus rufis, alis striga parva versus basin maculaque pone stigmata fuscis* ♀. Long. corp. lin. 7. Georgia.

Aulacus rufus. *Rufus, antennis (basi excepto) et abdominis basi nigris, alarum apice fusco.* Long. corp. lin. 8. Van Diemen's Land.

Aulacus cingulatus. *Rufus, antennis piceis, articulo 7mo albo* ♀. Long. corp. lin. 5¾. Swan River, New Holland.

Aulacus apicalis. *Rufus, capite abdomineque nigris, hoc lunula versus basin flavescente, alarum apice lato nigro* ♀. Long. corp. lin. 5. New Holland.

A detailed description is then given of the genera Megalyra, W., composed of one Australian already described species (*M. fasciipennis*) and *Trigonalys*, both of which, as well as *Stephanus*, are shown to offer a more intimate relation to the preceding genera than to any other family of Hymenopterous insects.

Trigonalys, *W.* (Proceedings of the Zool. Soc. 1835*), is composed of the five following species:—

Trigonalys melanoleuca, *W.* (op. cit.).

Trigonalys obscura. *Nigra, obscura, capite plano, nitido, abdominis segmento 1mo margine postico luteo, alis obscurè fuscis.* Long. corp. lin. 7. Surinam.

Trigonalys Servillei. *Nigra, parte postica thoracis et abdominis basi pallidè luteis, alis immaculatis hyalinis.*

Trigonalys Lepricurii (Seminota Lep., *Spinola*).

Trigonalys Hahnii, *Spin.* (Tr. anglicana, *Shk.*).

The genus Stephanus of Jurine comprises nine species, of which the following are new:—

Stephanus bicolor. *Piceo-niger, capite thoraceque rufis, rugosis, oviductu fascia lata alba subapicali, tarsis posticis brevissimis, crassis, ferrugineis* ♀. Long. corp. lin. 9. Georgia.

Stephanus Indicus. *Niger, gracillimus, antennis basi rufis, facie flavo-lineata, tibiis tarsisque basi albidis, petiolo longissimo, alarum venis discoidalibus obsoletis* ♂. Long. corp. lin. 6½. ♀ *capite rufo.* Malabar.

Mr. Waterhouse exhibited and read detailed descriptions of two

* I consider *Lycogaster pullatus*, Shk., to be the male of another species of *Trigonalys*.—J. O. W.

new Lamellicorn beetles, brought from the Philippine Islands by H. Cuming, Esq. The first is allied to *Scar. longimanus*, but being a female, it does not exhibit the elongated fore-legs from which that species derives its name.

*Euchirus*, applied by Kirby (Introd. to Ent., vol. iv., Index *Coleopt.*), was, I believe, the first name given to this group. M. Laporte applies the name *Porropus*. *Cheirotonus*, Hope, and *Propomacrus*, Newm., are decidedly closely allied to the present insect.

Euchirus quadrilineatus, *Waterh.* *Obscure nigro-æneus; thorace punctulato, elytris lævibus, lineis quatuor fusco-flavescentibus ornatis, corpore subtus pilis fuscis instructo.* Long. corp. 2 unc. 5 lin.; lat. 1 unc. $2\frac{1}{2}$ lin.

Xylotrupes pubescens, *Waterh.* *Nigrescenti-fuscus, supra et infra pilis decumbentibus vestitus, capite cornu ad apicem bifido, paullo recurvo, thoraceque anticè in cornu robusto et elongato antrorsum ducto, ad apicem bifido, armatis.* Long. corp. 1 unc. 9 lin.; lat. 11 lin. Allied to *S. Gideon* and *Oromedon*.

## ZOOLOGICAL SOCIETY.

September 8, 1840.—James Whishaw, Esq., in the Chair.

Mr. Gould read a paper on that most singular and anomalous bird, the Brush Turkey (*Talegalla Lathami*) of New South Wales. The author began by giving the opinions of various ornithologists as regards its affinities, and especially quotes Mr. Swainson's account, in which that author attempts to prove, that the bird in question is a Vulture. Mr. Gould proceeded to detail, from his own observations, some interesting facts connected with its habits. The most remarkable circumstance connected with the bird is, that it does not hatch its own eggs, but employs for that purpose similar means to those now in use for artificial incubation. For some weeks prior to the period of laying, the Brush Turkey collects together an immense mass of vegetable matter, varying from two to four cartloads, with which it forms a pyramidal heap; in this heap it plants its eggs, about eighteen inches deep and from nine to twelve inches apart. The eggs, which are always placed with the large end upwards, being carefully covered, are then left to hatch by the heat engendered by the decomposition of the surrounding matter. The heaps are formed by the labours of several pairs of birds, and frequently contain as many eggs as would fill a bucket. The eggs are white, about three inches and three quarters long by two and a half in diameter, and, having an excellent flavour, are eagerly sought after. A specimen of the Brush Turkey, which Mr. Gould had an opportunity of observing in Mr. MacLeay's garden at Sydney, had formed a heap in a shrubbery similar to that which it would have made in its native woods. Around and over this heap the bird was seen to strut in the same way as the domestic cock; at the same time frequently uttering a clucking noise. The flesh is of a pale salmon colour, juicy and tender. After all he had seen of the bird in a state of nature, he had no hesitation in assigning it a place among the Gallinaceæ, among which it has a nearer alliance to *Cracidæ* than to any other group; at all events, it is in no way allied to the *Vulturidæ*, and is equally distant from *Menura*, with which it has been classed by some writers. Mr. Gould's paper was illustrated by five skins, an egg, and also a skeleton of the bird.

A skeleton of the *Talegalla* was exhibited, and Prof. Owen drew attention to its peculiarities.

"On comparing the osteology of the *Talegalla* with that of other birds," says Prof. Owen, "it exhibits all the essential modifications which characterize the Gallinaceous type, and among the Rasores it most nearly resembles the genera *Penelope* and *Crax*.

"In all the main points the skeletons of these birds agree; their differences are those of proportion only; whereas in the Raptores, and especially in the *Vulturidæ*, the following important differences present themselves. The spines of the dorsal vertebræ are detached; the upper transverse processes of the sacrum are separated by oblique elliptical vacuities; the plough-share bone, which terminates the coccyx, has double the relative vertical extent; the cervical vertebræ are shorter and broader; twice the number of the ribs, as compared with *Talegalla*, give off vertical processes, and these are longer and stronger: but the most striking and decisive differences occur in the sternum; this important bone, in the *Talegalla*, very closely corresponds with that of the two Gallinaceous genera above mentioned; the chief difference occurs in the greater breadth which separates the costal from the external posterior notch. In the Vultures the contiguous margin of the sternum forms part of the same nearly straight line with the rest of the lateral margin of the sternum behind it. In the *Cathartes*, which has the least complete sternum in the tribe of *Raptores*, to which some Quinarian Zoologists have assigned the *Talegalla*, there is a shallow notch and a small foramen in each half of the posterior margin of the sternum; the whole sternum is broader and more convex; the coracoid grooves, and the corresponding extremities of the bones adapted to them, have twice the breadth of those in the *Talegalla*. The *furculum* presents more than six times the thickness of that bone in the *Talegalla* and allied *Gallinacea*; its space is wider, and its superior extremities much more recurved. Equally striking are the differences which the bones of the wing present: in *Cathartes Aurea*, in which the costal and sacral regions of the vertebral column measure five inches, the length of the humerus is five inches and a half, that of the ulna is six inches eight lines, and the bones of the hand are nearly six inches in length: the strength of all these bones is proportionate to their length. The produced angle of the lower jaw is a character which is most conspicuous in the Gallinaceous birds, in some of the species of which, as in the Wood-grouse, it is excessive. Now this process is altogether wanting in the Raptorial birds, and consequently in the *Vulturidæ*; its presence in the *Talegalla* (where its form and size closely agree with those in *Penelope* and *Crax*) coincides with the decisive Gallinaceous characters which are pointed out in the sternum, vertebral column, and bones of the anterior extremity.

"The presence of the *broncho-tracheales*, which alter the length and tension of the bronchial tubes, widen the lateral diameter of the lower larynx, and influence its position, coincides with the observations which Mr. Gould has made respecting the voice of the *Talegalla*; and at the same time establishes another important structural difference between this bird and the *Vulturidæ*, which are precisely those Raptorial birds in which there are no true vocal muscles.

"From all the *Raptores* the *Talegalla* essentially differs, in its gizzard and elongated cæca: in the one we have all the characters of the Gallinaceous structure of that important part of the digestive system: in the form and proportions of the lower appendages—the cæca, the *Talegalla* most closely corresponds with the genera *Crax* and *Penelope*."

Mr. Gould exhibited some new species of birds about to be figured in the forthcoming part of his work on the "Birds of Australia;" and characterized a new and beautiful *Cinclosoma*, from the belts of the Murray, as

CINCLOSOMA CASTANOTUS. *Cincl. lineâ albâ à mandibulæ inferioris basi per genas excurrente: gulâ pectoreque nigris; humeris et uropygio castaneis.*

Total length, 9 inches; bill, 1; wing, $4\frac{1}{4}$; tail, $4\frac{1}{2}$; tarsi, $1\frac{1}{4}$.

A new Halcyon, as

HALCYON PYRRHOPYGIA. *Hal. plumis capitis viridibus, angustè albo marginatis; humeris tectricibusque alarum majoribus cæruleis, uropygio, tectricibusque caudæ flavescenti-rubris.*

Crown of the head dull green, intermingled with white, giving it a striated appearance; a broad black stripe commences at the base of the bill, passes through the eye, and encircles the back of the head; upper part of the back and scapularies green; remainder of the wings bluish green; lower part of the back, rump, and upper tail coverts red; tail green, tinged with blue; throat, a broad collar encircling the back of the neck, and all the under surface white; bill black, the base of the lower mandible flesh white; irides blackish brown; feet dark olive brown.

Total length, unc. 8; bill, 2; wing, 4; tail, $2\frac{1}{2}$; tarsi, $\frac{1}{2}$.

*Hab.* Interior of New South Wales.

A new species of *Rhipidura*, which has hitherto been confounded with the *Motacilla flabellifera* of Latham, Mr. Gould proposed to characterize as

RHIPIDURA ALBISCAPA. *Rhi. nigrescenti-fusca; rectricibus caudæ ad apices, et per scapos albis.*

All the upper surface, ear-coverts, and a band across the chest, sooty-black, slightly tinged with olive, the tail and crown of the head and pectoral band being rather the darkest; stripe over the eye, lunar-shaped mark behind the eye, throat, tips of the wing coverts, margins of the secondaries, shafts, outer webs and tips of all but the two middle tail feathers, white; under surface buff; eyes black, bill and feet brownish black.

Total length, 6 inches; bill, $\frac{3}{8}$; wing, 3; tail, $3\frac{1}{2}$; tarsi, $\frac{5}{8}$.

*Hab.* Van Diemen's Land and the southern coast of Australia.

A new and highly interesting Pigeon as

Columba (Peristera) histrionica. *Col. capite nigro; fronte, spatio circum plumas auriculares necnon notâ semilunari apud gulam albis; corpore supernè e cinnamomino fusco; subtùs cæru-lescenti-cinereo.*

Forehead, a stripe from behind the eye forming a circle round the ear-coverts, and a crescent-shaped mark across the throat, snow-white; the remainder of the head, throat and ear coverts, jet black; all the upper surface, wing coverts, flanks, and two centre tail feathers, deep cinnamon brown; edge of the shoulder dull white; spurious wing bluish gray, slightly margined with white; primaries brownish gray, margined on their outer webs with rufous, at the base of the inner web largely marked with the same, forming a conspicuous patch on the under surface of the wing; and with an oval spot of white at the tip of each feather; secondaries by a beautiful band of deep crimson-bronze on the outer webs near the tip; lateral tail feathers bluish gray at the base, passing into black toward the extremity, which is white; breast and centre of the abdomen bluish gray; under tail coverts light buff; nostrils and bill black; irides dark brown; frontal scales of the legs and feet lilac-red; hind part of the legs flesh-red.

Total length, $10\frac{1}{2}$ inches; bill, 1; wing, 8; tail, $3\frac{1}{2}$; tarsus, 1.

*Hab.* Plains of interior of Australia.

And a Rasorial bird of an entirely new form, about half the size of a Quail, and which, were it not for the presence of a hind toe, might be taken for a diminutive Bustard.

Mr. Gould proposed to make it the type of a new genus, with the following appellation and characters:—

Genus Pedionomus.

*Gen. Char.—Rostrum* tàm longum quàm caput, apicem versus compressum, ferè rectum, naribus valdè elongatis, in foveà basali positis. *Alæ* valdè concavæ, remigibus primo, secundo, et tertio, inter se ferè æqualibus, remigibus tertiariis perlongis, et primarios transeuntibus. *Tibiæ* super suffraginem nudæ. *Tarsi* mediocritèr elongati, scutis undiquè tecti, his, reticulis minutis, sejunctis. *Digiti* quatuor; horum posticus, debilis, et apud partem internam tarsi, sursùm positus.

Pedionomus torquatus. *Ped. vertice et pectore rufis, singulis plumis prope apicem lunulâ nigrâ notatis; collari lato, albo, crebrè maculis nigris guttato.*

Crown of the head brown speckled with black, sides of the head and the neck light buff speckled with black; neck surrounded by a broad band of white thickly spotted with black; all the upper surface reddish brown, each feather having several narrow, transverse, crescent-shaped marks in the centre and margined with buff; tail buff, crossed by numerous narrow brown bars; centre of the breast rufous, the remainder of the under surface buff; the feathers on the breast marked in a similar manner to those on the upper surface, and the flanks with large irregular spots of black; irides straw-yellow; bill yellow, passing into black at the point; feet greenish-yellow.

Total length, 7 inches; bill, $\frac{3}{4}$; wing, $3\frac{5}{8}$; tail, $1\frac{3}{8}$; tarsi, $\frac{7}{8}$.

*Hab.* The plains of the interior of South Australia.

Sept. 22.—William Yarrell, Esq., V.P., in the Chair.

The following paper was read, in which Mr. G. B. Sowerby proceeds with his descriptions of the new species of Shells collected by H. Cuming, Esq., in the Philippine Islands.

Helix Iloconensis. *H. testâ obovatâ, crassiusculâ, lævi, coloribus variis variè pictâ; spirâ elevatiusculâ, obtusâ; anfractibus quinque, rotundatis, ultimo maximo; aperturâ rotundato-subtrapezoidali, intùs albâ; peritremate lato, incrassato, rotundato, reflexo, albo; labio columellari lato, albo, subplanulato, posticè emarginato.* Long. 1·3, lat. 0·9, poll.

*Hab.* in foliis arborum prope Sanctum Nicolam, Provinciæ Iloconis septentrionalis ad Insulam Luçon, Philippinarum.

The varieties of this species, in colour and size, are very numerous; many of them are remarkable for an apparent interruption of their growth, shown by a band of colour darker than the general ground-colour of the individual across the second, third, or fourth volution; the recommencement after which suspension is marked by an apparent want of colouring matter to produce the usual spiral bands.

The following is the enumeration of the varieties which have occurred:—

*a.* Apex reddish brown, softened down into a greenish yellow ground-colour, which becomes more intense, and is speckled with brown on the last volution, particularly toward the aperture; posterior edge of each volution brown, softened down with pink; circumference of the shell with a greenish brown narrow band behind a brownish pink band; columellar band and back of the lip reddish brown. From St. Nicolas.

*b.* Nearly similar to *a.*; anterior circumferential band yellowish. Found on Pandanus Palms at Curimao, in the province of North Ilocos.

*c.* Apex pale reddish brown; ground-colour greenish yellow, speckled on the last volution; antesutural band light reddish brown; posterior circumferential band greenish brown, anterior circumferential band pale yellow; columellar band rose-colour; back of the lip brownish red. From St. Nicolas.

*d.* Apex reddish brown; ground-colour grayish rose; antesutural band and back of the lip reddish brown; posterior circumferential band pale olive-brown, anterior circumferential band pinkish yellow; circumference of the *columella* rose softened into the ground-colour. From St. Nicolas.

*e.* Apex dark brown; ground-colour gray-brown; suture white or yellowish; antesutural band red-brown; circumferential band white at its commencement, but becoming yellowish, and yellowish pink upon the last volution; posterior circumferential band indistinct, olive-brown; circumference of the *columella* red-brown; back of the lip dull red. The lip of this variety has a slight reddish tinge. From St. Nicolas.

*f*. Apex brownish black; ground-colour yellowish olive-brown; posterior circumferential band darker; suture pale, yellowish, or nearly white; anterior circumferential band pale yellowish at its commencement, increasing in intensity until it is nearly lost in the ground-colour near the aperture; columellar band blackish, suffused with pinkish; back of the lip yellowish brown. From Sinait, in the province of South Ilocos.

*g*. Apex brownish black, softened down into the gray-brown ground-colour; sutural band yellow-brown; posterior circumferential band olive-brown; anterior circumferential band whitish at its commencement, then yellowish, and at length grayish; back of the lip yellow; border of the *columella* brownish yellow. From Sinait.

*h*. Nearly similar to *g*, but smaller, and the circumferential bands nearly obsolete toward the back of the aperture. From Sinait, in the province of South Ilocos.

*i*. Apex blackish, softened down into a pale greenish gray; suture white; antesutural band dull and pale yellow-brown; posterior circumferential band of the same colour, and very narrow; anterior circumferential band dull yellowish white; back of the lip pale yellow.

*k*. Apex pale reddish brown; ground-colour pale fawn-colour; sutural band rather obsolete, reddish; circumferential band yellowish white; columellar band rose-colour, and back of the lip duller; last volution speckled. From Saint Nicolas.

*l*. Apex pale reddish brown; ground-colour yellow; antesutural band yellow-brown, pink in front; a very narrow dull greenish band near the circumference; back of the lip brownish red; columellar band rose-colour. This is a small variety from Curimao, in the province of North Ilocos.

*m*. Apex and circumference of the *columella* rose-colour; ground-colour dull yellow, suffused at the posterior part of each volution and toward the mouth with pink; antesutural and circumferential bands yellow-brown. A very pretty small variety from Sinait, in the province of South Ilocos.

*n*. Apex pink; ground-colour yellow-brown, increasing in intensity, darker toward the suture; columellar circumference pink. A small, somewhat lengthened variety from near Sinait.

*o*. Apex nearly black, soon softened down to nearly colourless, and then gradually into the pale grayish green ground-colour; antesutural band rather indistinct, brownish yellow; posterior circumferential band brownish yellow, very slight and indistinct at its commencement, but becoming gradually more and more distinct: the reverse is the case with the anterior circumferential band, which is distinct and nearly white at its commencement, but becomes gradually darker, until it is nearly lost in the ground-colour; back of the lip dull yellow; last volution speckled. From Saint Nicolas.

*p.* Apex very pale pink; circumference of the *columella* rose-colour; ground-colour pale yellow, darker towards the front; antesutural band yellowish brown. A small and very pale variety from Curimao.

*q.* Apex white; ground-colour pale yellow, darker toward the front; antesutural and circumferential bands yellow-brown. Another small variety from Curimao.

*r.* Colours the same as *q*, but altogether paler. This is a large variety, from St. Nicolas.

*s.* Apex white, softened down into a pale yellow ground-colour; antesutural band yellow-brown.

A paper by E. Lewis, Esq., entitled "Desultory Observations on Subjects having relation to Zoology," was also read.

The author in this paper comments on the different systems of classification, and proposes that the various groups of animals should be defined with more simplicity than they at present are; he is of opinion, that although the members of a group may resemble each other in many characters, yet one of these characters should be selected, and used for distinction; "and it is hoped," observes Mr. Lewis, "that divisions thus formed will be found practicable, precise and sufficient; because, as each is formed from a single common character, the necessity of admitting subfamilies and subgenera is obviated; for it is evident the necessity for forming those divisions has arisen from the family or genus from which they have been deducted having been formed from the notice and combination of too many particulars. It may be mentioned as a recommendation of the proposed method of using one character, as essential for distinction of divisions, that it has been in part virtually, if not expressly used, by many eminent zoologists. Linnæus makes use of the organs of manducation for generic distinctions in the class *Mammalia*, and in so doing is followed by most naturalists. The Rev. W. Kirby, in his enumeration of the characters of *Apis* and *Melitta*, mentions the form of the tongue as the one essential character." The cells of the wings has been selected by Jurine in the Hymenopterous insects; and numerous other instances of a single peculiarity having been selected for the definition of a group are mentioned by the author, who asks, "Will it not therefore be better, if only for the sake of uniformity and the advantage of fixing a character, which, from its singleness, can be easily retained in the memory, and therefore always be ready for application, to adopt the same plan throughout?

"The *Vertebrata* and *Invertebrata* may be divided into four stirps; the first will contain the *Hæmatherma* (Latr.), or warm-blooded animals, as the *Mammifera* and *Aves*, and the *Hæmacryma*, or cold-blooded animals, such as the Reptiles and Fishes. The *Invertebrata* may be divided into the *Cephalidea*, containing the Insects and Mollusca, or *Palliata* (Latr.), and the *Acephala* (Latr.), which last are the *Vermes Zoophyta* and *Infusoria* of Linnæus, or '*les Animaux Apathiques*' of Lamarck."

Mr. Gould exhibited a Drawing of the Brush Turkey of New South Wales.

October 13.—James Whishaw, Esq., in the Chair.

A paper by W. J. Broderip, Esq., was read. In this paper the author resumes his descriptions of the new species of shells collected by H. Cuming, Esq. in the Philippine Islands.

Bulinus Fulgetrum. *Bul. testâ ovato-pyramidali, anfractibus 5 subventricosis, ultimo longè maximo, labio et aperturâ ovatâ albis, columellâ callosâ basi subsinuatâ.*

Var. *a. Cinereo-flavescens strigis longitudinalibus albis, nunc rectis, nunc sinuatis, nunc angulatis pulcherrimè strigata.*

*Hab.* ad insulam Negros.

Legit H. Cuming in sylvis.

Var. *b. Castaneo-brunnea, lineis parvulis brevibus haud frequentibus a suturis albo-lineatis anfractûs ultimi et penultimi descendentibus.*

*Hab.* cum præcedente.

Legit H. Cuming.

Var. *c. Tota cinereo-fusca, obscurè et rarò albido-strigata, apice subrubro.*

The brown under covering appears to be overlaid with a dull pale ashy *epidermis*, which sometimes presents the appearance of oblique obscure stripes in the direction of the lines of growth. On the lower part of the penultimate whorl the brown and shining under covering is exposed, so as to produce a basal fillet. The sutural line of the last or body-whorl is obscure white.

*Hab.* ad insulam Guimaras.

Legit H. Cuming in sylvis.

Var. *d. Albida, strigis longitudinalibus sub-flavescentibus, nunc rectis, nunc sinuatis, nunc angulatis, ornata.*

*Hab.* cum præcedente.

In this variety the shining subflavescent under covering appears to be overlaid with a dull chalky-white *epidermis*, through intervals of which the lightning-like stripes of the ground-colour appear. A somewhat obscure deep brown stripe borders the outside of the *columella.*

Var. *e. Brunneo-flavescens, strigis vividè albis conspicua, fasciis suturalibus anfractuum superiorum rubro-brunneis submicantibus, fasciâ suturali anfractûs ultimi albo suturam versus limbatâ fasciâque submediâ haud micantibus.*

*Hab.* ad insulam Negros.

Legit H. Cuming in sylvis.

In this variety the white lightning-like stripes passing over the transverse red-brown bands of the body-whorl have a striking effect. A deep-brown stripe borders the outside of the *columella.*

Var. *f. Flavescens, strigis (in anfractu ultimo frequentibus) albis.*

*Hab.* cum præcedente.

On the penultimate whorl the rudimentary longitudinal stripes are but obscurely seen; on the body-whorl they gradually increase from lines to irregular stripes of a full white. A blackish stripe borders the *columella.*

Var. *g. Brunneo-flavescens albo latè strigata et albido-fucata.*
*Hab.* ad insulam Guimaras.
Legit H. Cuming in sylvis.

Var. *h. Flavescens, albo-strigata, fasciis suturalibus et fasciâ anfractûs ultimi transversâ subpurpureis.*
*Hab.* ad insulam Negros.
Legit H. Cuming in sylvis.

The white stripes passing over the sutural bands give them a tessellated appearance, but these lightning-like stripes are much more widened where they pass over the transverse band of the body-whorl, which is seen through the shell on looking at the aperture. A reddish brown stripe borders the *columella*.

Var. *i. Productior, subflava, fasciis suturalibus rubro-brunneis, strigis irregulariter longitudinalibus latis valdè angulatis albidis, subflavo-limbatis.*
*Hab.* in insulâ Pannay ad Ilo Ilo.
Legit H. Cuming in sylvis montanis, Igbaras dictis.

This mountain-variety, which is longer in proportion, is dashingly marked: in the intervals between the zigzag stripes an ashy pellicle covers the ground-colour. A reddish stripe borders the *columella*.

Var. *k. Productior, subflava cinereo cooperta, fasciis suturalibus rubro-purpureis; fasciâ suturali et submediâ latis, obscuris; strigis longitudinalibus irregularibus, albis, sparsis.*
*Hab.* cum præcedente.

A purplish red stripe borders the *columella* of this curious variety, and the bands of the body-whorl may be seen faintly through the shell on looking into the aperture.

This beautiful and greatly varying species ranges from about 2 inches in length and $1\frac{1}{4}$ in breadth, to very nearly $2\frac{1}{2}$ by $1\frac{1}{8}$ inches.

They were all found by Mr. Cuming on the leaves of trees, and he informs me that they lay soft eggs. Variety *a* was most abundant, and the mountain-varieties *i* and *k* are the longest and largest.

Bulinus Pictor. *Bul. testâ ovato-productâ, anfractibus sex, ultimo cæteros æquante; aperturâ ovatâ, cæruleo-albente, labio rubro-brunneo limbato; columellâ graciliori subrectâ.*

Var. *a. Brunnea strigis longitudinalibus latis vividè albis picta.*
*Hab.* in insula Pannay.
Legit H. Cuming in sylvis.

This beautiful variety will remind the observer of the colouring of *Achatina Zebra.*

Var. *b. Albida, strigis longitudinalibus brunneis.*
*Hab.* cum præcedente.

Both varieties were found by Mr. Cuming at Dingle, in the province of Ilo Ilo.

The length ranges from about $2\frac{1}{8}$ by $1\frac{2}{8}$ inch to $2\frac{3}{8}$ inches in length, and 1 in breadth.

Bulinus nimbosus. *Bul. testâ productâ, elongato-pyramidali, lineis incrementi striatâ, anfractibus sex, gradatim majoribus, ulti-*

*mo maximo sed haud valdè ventricoso, anticè subangulato, columellâ subrectâ, subgracili.*

Var. *a. Brunnea, strigis latis undulato-angulatis, ochraceo-albis nubilosa.*

Var. *b. Brunnea, sparsim lineis ochraceo-albis a lineâ suturali præcipuè descendentibus picta; fasciâ sub-basali nigricante obscuriore.*

Var. *c. testâ totâ brunneâ.*

*Hab.* ad insulam Negros.

Legit H. Cuming in sylvis.

The throat of this species is bluish white, and the lip is bordered with dull pinky-brown.

The largest specimen which I have seen (var. *a.*) is about 3 inches long and $1\frac{1}{2}$ broad.

Var. *d. Subflava, epidermide quasi cretaceâ, lineis angulatis subflavis inscriptâ.* Long. 3 unc. circiter: lat. $1\frac{1}{2}$ unc.

*Hab.* ad Ilo Ilo insulæ Pannay.

Legit H. Cuming in sylvis.

Through the chalky *epidermis* which covers this shell, appear the irregular angulated lines of the light amber ground-colour. An old shell.

Helix (Cochlostyla) sarcinosa. *Hel. testâ ovato-rotundatâ, subdiaphanâ, productâ, anfractibus $4\frac{1}{2}$ ventricosis, ultimo cæteros longè superante, lineis incrementi obliquis frequentissimè substriatâ, columellâ incrassatâ, callosâ, subrectâ, aperturâ albâ.*

Var. *a. Ochraceo-alba fasciis frequentibus castaneo-nigris cincta, labii limbo subrosaceo.* Long. $2\frac{7}{8}$; lat. $2\frac{5}{8}$ unc.

*Hab.* in montibus Tanhay insulæ Negros.

Legit H. Cuming in sylvis.

Var. *b. Brunneo-virescens, fasciis subnigricantibus cincta, albido-ochraceo interruptè tessellato-maculata, labii limbo pallidè subrosaceo.*

*Hab.* ad insulam Negros.

Legit H. Cuming in sylvis.

The size of this variety is about the same as that of the last. Mr. Cuming found it on bamboos as well as on the leaves of trees.

Var. *c. Viridi-brunnea fasciis interruptis ochraceo-albis et nigro-brunneis alternis cincta, labii limbo pallidè subrosaceo.* Long. $2\frac{5}{8}$; lat. $2\frac{3}{8}$ unc.

*Hab.* ———?

A sutural band of ochreous-white, interrupted by the greenish-brown stripes, ornaments the upper part of the penultimate and last whorl.

Var. *d. Flavo-virescens, strigis latis ochraceo-albis longitudinaliter obliquis picta et fasciis brunneo-virescentibus cincta, labii limbo albo.* Long. $2\frac{1}{8}$; lat. $2\frac{3}{8}$ unc.

*Hab.* ad insulam Guimaras.

Legit H. Cuming in sylvis.

Var. *e. Brunneo-virescens, anfractu basali fasciâ obscurè subrubrâ* *tænià subalbidà tessellatim interruptà infernè limbatà cincto, labii limbo subrosaceo.* Long. 3; lat. $2\frac{1}{8}$ unc.

*Hab.* in insulâ Masbate.

Legit H. Cuming in sylvis.

Var. *f. Virescens, anfractu basali fascià supernè subrubrà infernè albido-tessellatà cincta, columellà subrosaceà, labii limbo subrosaceo vix tincto.* Long. 3; lat. $2\frac{1}{8}$ unc.

*Hab.* cum præcedente.

This fine variety is blotched with irregular, obscure, ochraceous-white markings, through which pass narrow greenish fillets. On turning up all the varieties, the space polished by the animal strongly contrasts with the rest of the shell, and in all, the reddish band which girds the body-whorl may be traced at the bottom of the upper whorls. In the two varieties last described this band may be clearly seen through the shell on looking into the aperture. In all the varieties the two first whorls are plain, and not much differing in colour, viz. brownish or yellowish white.

The banded varieties, when deprived of the *epidermis* (in which the other variations of colour reside in all the varieties), appear to me to be *Helix (cochlostyla) sarcinosa* of Férussac. This species is not noticed in the last edition of Lamarck, by M. Deshayes, and indeed I can find no description of it in Férussac, excepting "No. 323, *sarcinosa, nobis; α. spira conica. Hab.* L'Amerique? Com. D'Orbigny." If the habitat be correctly stated, there would be some ground for supposing that the Philippine shells which we have described are of a different species; but the locality is named with a mark of doubt, which the form itself strengthens, whilst the upper figures in Férussac's work (Pl. 109), though the bands are much narrower and paler than in those skinned specimens which I have seen, bear so strong a resemblance to them, that I have preferred the retention of Férussac's name. In Mr. Cuming's skinned specimens the rich reddish-brown, broad, transverse band of the body-whorl, and the basal band of the same colour at the base of the other whorls, contrast strikingly with the pure white which is the ground-colour of the shell. A small rosy fillet runs along the upper edge of the body-whorl, near the suture.

At the bottom of the same plate Férussac has figured another variety with a uniform brown *epidermis*. These appear to have been all the materials upon which Férussac founded his *Helix sarcinosa*.

The latter will form a sixth variety, which I have never seen, but which may be thus characterized:

Var. *g. Tota brunnea* (*Fér. Hist. Nat. Moll. Terr. et Fluv.* Pl. 109. f. 3.).

Mr. Cuming, who found all the shells which I have described, and am about to describe in this paper, on the leaves of trees, informs me that *Helix sarcinosa* deposits a great number of small eggs on the leaves of the trees in the dark forests where he found all the varieties. After the eggs are deposited on the leaf chosen, the animal wraps it round them subconically, so as to resemble in a degree the small paper wrappers in which grocers hand their wares to their customers.

*Obs.* Though it perhaps may be considered that *Helix sarcinosa* may come within the section named *Cochlostyla* by De Férussac, there appears to me to be almost a sufficient difference in the form of the aperture, the shape and termination of the *columella*, and the ventricose character of all the whorls, to justify a separation. The animal I have not seen, and I wait for further information before I decisively make that separation, being anxious to prevent the multiplication of names, which already involve the student in a sufficiently entangled labyrinth. For the present, therefore, I shall merely observe, that if future observations confirm my present suspicions, I would propose for the group the name of *Helico-bulinus*.

Helix turbinoides. *Hel. testâ subrotundâ, subproductâ, diaphanâ, lineis incrementi obliquè longitudinaliter striatâ; apice rubente; aperturâ effusâ magnâ, cæruleo-albente, labii limbo nigro-purpurascente, lato, recurvo.*

Var. *a. Viridis, anfractu penultimo et ultimo tæniis albis nunc tenuibus nunc latioribus cinctis.* Long. $2\frac{1}{8}$; lat. $2\frac{5}{8}$ unc.

Var. *b. Ochraceo-brunnea lineis tæniisque nigris vittata, anfractu basali fasciâ viridi-nigrâ latâ cincto.*

The green colour is beautifully seen where the animal has polished the shell, on turning it up; but when it is in its natural position it would be difficult to suppose that there were any other colours than the obscure ochraceous or whitish brown and the black lines, fillets and band. On holding the shell between the eye and the light, the green hue becomes perceptible on the back of the shell, and the bands seen transparently through it on holding the aperture toward the eye and against the light, have a very pretty effect.

Var. *c. Tota viridis.*

*Hab.* ad Albay in insulâ Luzon.

Legit H. Cuming in sylvis.

All the varieties of this noble *Helix* are about the same size, and at first sight bear no distant resemblance to a *Turbo*. The apex and two upper whorls in the first and last varieties are reddish-brown, and pale brown in var. *b*.

Helix Harfordii. *Hel. testâ rotundatâ, diaphanâ, anfractibus valdè ventricosis, superioribus apiceque complanatis, lineis incrementi frequentissimè striatâ, pallidè brunneâ, anfractu penultimo maculis strigisque angulato-nubilosis vario, anfractu ultimo supernè subalbido maculis nigro-brunneis suturam versus ornato, dehinc usque ad fasciam subcentricam obscurè albidam medio brunneo-tæniatam creberrimè nigro-brunneo tæniato et maculato, infra fasciam brunneo nigricante obscurè albido maculato et tæniato; aperturâ subeffusâ, cæruleo-albidâ, labii limbo angusto subrecurvo, flavicanti-subrosaceo.* Long. $1\frac{6}{8}$; lat. $2\frac{1}{2}$ unc.

*Hab.* in insulæ Negros montibus.

Legit H. Cuming in sylvis.

In honorem viri reverendi Augusti Harfordii hæc species nomen obtineat.

It is almost impossible to describe the varied markings of this fine *Helix*. Only the two last whorls are spotted and striped, the rest being pale brown. The cloudy markings of the penultimate whorl become more distinct, and the colouring becomes deeper as the body-whorl is approached, and there the spots and fillets become more crowded and intense as they approach the subcentral band, till just above it they form a dark-brown zone. The part polished by the animal is of a bright amber hue.—W. J. B. Oct. 12, 1840.

M. Le Baron de la Fresnaye then read his observations on the situation which the genus *Upupa*, in his opinion, should occupy in the classification of Birds, judging from the form of the feet, and from the habits of the species.

Following is a translation of this author's observations:—

"It is surprising, now it is generally known that the classification of species and genera, based solely upon the form of the beak, is often unnatural and vicious, that modern authors should have continued to unite, as did the old authors, the genus *Upupa* with that of *Epimachus* or *Promerops*, and that they should constitute of these genera a little family under the name of *Promeropidæ*.

"It is evident that authors have been guided solely by the structure of the beak in such an association; and if the feet of these genera be compared, we are struck with the enormous difference which exists in their conformation, and consequently, of necessity, with the habits of the species.

"The Hoopoe, in fact, in the shortness of its fore toes, in the almost straight form of the claws, and particularly in the claw of the hind toe, we perceive has evident affinities with the Larks (*Alauda*) and other conirostral ground birds. Like them, also, the Hoopoe seeks its food on the ground, and especially on humid and newly disturbed land. It is often seen in grazing lands, where it searches for its food in the excrement of cattle, in which coprophagous insects abound. Its long and very slender beak is well adapted for pulling out the larvæ of these insects from the small holes in which they live and undergo their transformations: it serves well likewise to divide and disperse the excrement when dried by the sun.

"It is seen that the Hoopoe, with its feet formed like those of the larks, also essentially resembles those birds in its cursorial habits, but that it seeks its nourishment only on the ground, and in moist lands, such as pastures.

"If, on the other hand, we consider the form of the feet of the species of *Promerops*, with which the Hoopoe is usually associated, it will be seen that there exists a very essential difference in these organs. The feet of the *Promerops* are as remarkable for their thickness as those of the Hoopoe (though fitted for walking) are for their slenderness. In the first of these genera the toes are strong; the external toe is elongated, as well as the back toe, as in all those birds which are essentially perchers and which procure their food upon trees, whether it be in the manner of the species of *Melliphaga*, *Paradisea*, or *Dendrocolaptes*.

"As in these genera likewise, the claws in *Promerops* are very strong and much arched. The birds of this genus, in fact, appear to us to be *Cinnyridæ*, but on a large scale.

"The genus *Upupa*, as at present constituted, consists only of two or three species,—one from Europe, an African species, and one from India: in these there is so great a similarity in form, colouring and habits, that upon a cursory view they might be mistaken for one species.

"This genus, therefore, does not, as in most other genera, present certain species which recede from the type and form a transition between it and other genera, with which it is then natural to group them.

"From these considerations, the genus *Upupa* appears to us to be one of those isolated genera, like many others in the class, which cannot be naturally placed in any other group, but which ought to be regarded as constituting by itself a family or subfamily, under the name of *Upupidæ* or *Upupinæ*, its situation being in the section *Tenuirostres*; and if it be only regarded as a subfamily, it is with another subfamily of the cursorial *Tenuirostres* it should be grouped, which division should contain the genera *Upucerthia* of M. Isidore Geoffroy St. Hilaire, and some other genera peculiar to Chili, described by Killitz, and by Mr. Gould in the Voyage of the Beagle, and the species of which, in the form of their beak and feet as well as in their cursorial habits, afford a positive analogy with our genus *Upupa*, from which the genus *Promerops* is so isolated."

Mr. Gould, after reverting to the account given by him at the Meeting on the 8th of September, of that singular bird the Brush Turkey of New South Wales, proceeded to state that he had since received from Swan River another bird, having similar habits and a similar mode of nidification, but from which it differs in inhabiting the open sandy plains, instead of dense and gloomy glens, and in forming the mound for the reception of the eggs of sand, dead grasses and boughs, depending as much upon the sun's rays as upon the heat produced by decomposition to develope the young.

Mr. Gould added, that a most interesting note, detailing these facts, accompanied the specimens, and that an equally important sketch of its range, &c., had been furnished him by Capt. Grey, who has just returned from the north-west coast of Australia. The acquisition of this new species, and the notes here alluded to, are more than ordinarily acceptable, since they materially tend to clear up the long-disputed point as to what group the Brush Turkey should be referred to. Mr. Gould further stated, that the views of those naturalists who have considered it to be closely allied to the *Megapodii* were perfectly correct, and that the Brush Turkey and the new species now exhibited would in fact form part of a large and singular family of birds inhabiting Australia and the Indian Islands, all of which assimilate in their habits and mode of nidification. This new species differing considerably in several of its characters from the Brush Turkey (*Talegalla*), Mr. Gould proceeded to characterize it as a new genus, under the name of *Leipoa*, signifying 'a deserter of its eggs.' The specific term of *ocellata* was suggested by the ocellated character of many of the spots with which its body is adorned.

Genus Leipoa.

*Gen. Char.*—*Rostrum* ferè tàm longum qùam caput; gracile, ad basin tumescens, tomiis undulatis et ad basin incurvatis, naribus amplis, oblongis, operculo tectis, et in foveâ centrali positis. *Caput* subcristatum. *Alæ* amplæ, rotundatæ, concavæ; e remigibus primariis quinto longissimo; tertiariis quàm remiges primarii ferè tàm longis. *Cauda* rotundata, rectricibus quatuordecem. *Tarsi* mediocres, robusti, anticè scutis, posticè squamis rotundatis haud æqualibus, tecti. *Digiti* subbreves; digitis lateralibus inter se ferè æqualibus.

Leipoa ocellata. *Lei. pectore per medium plumas lanceolatas nigras, strigâ centrali albâ ornatas, præbente, plumis corporis supernè albescenti-cinereis, ad apicem guttâ penè ocellatâ, rufâ, nigro marginatâ, notatis.*

Head and crest blackish brown; neck and shoulders dark ash gray; the fore part of the former, from the chin to the breast, marked by a series of lanceolate feathers, which are black with a white stripe down the centre; back and wings conspicuously marked with three distinct bands of grayish white, brown and black near the tip of each feather, the marks assuming an ocellate form, particularly on the tips of the secondaries; primaries brown, their outer webs marked with zigzag lines of darker brown; rump and upper tail-coverts brownish gray, the feathers of the latter transversely marked with two or three zigzag lines near their tip; all the under surface light buff, the tips of the flank feathers barred with black; tail blackish brown, broadly tipped with buff; bill black; feet blackish brown.

Total length, 24 inches; bill, $1\frac{1}{2}$; wing, 12; tail, $8\frac{1}{2}$; tarsi, $2\frac{1}{2}$.

*Hab.* Western Australia.

Mr. Gould next proceeded to characterize the two following new birds:—The first (*Cracticus argenteus*) is from the collection of Capt. Gray, and the second, a new species of *Amadina*, is from the collection of Mr. Dring, of H.M.S. Beagle.

Cracticus argenteus. *Cra. gulâ corporeque subtùs albis; humeris nigris; dorso argenteo-cinereo.*

Crown of the head, ear-coverts, shoulders, primaries, and all the tail-feathers for three-fourths of their length from the base, black; back silvery gray; throat, all the under surface, sides of the neck, some of the wing-coverts and the margins of several of the secondaries, rump, and tips of the tail-feathers pure white; bill horn-colour; feet blackish brown.

Total length, 11 inches; bill, $1\frac{5}{8}$; wing, 6; tail, $4\frac{1}{2}$; tarsi, $1\frac{1}{4}$.

In size this species is directly intermediate between *Cracticus cinereus* and *C. varius*.

*Hab.* North-west coast of Australia.

Amadina pectoralis. *Am. gulâ nitidè nigrescenti-purpureo; pectore plumis ad basin nigris, ad apicem albis, fasciato; corpore supernè cinereo-fusco, alarum tectricibus crebrè guttulis albis adspersis.*

Crown of the head and all the upper surface and wings, delicate grayish brown; the tips of the wing-coverts very minutely spotted with white; tail blackish brown; throat and ear-coverts glossy blackish purple; chest crossed by a band of feathers black at the base, strongly tipped with white; abdomen and under tail-coverts vinous gray; the flanks ornamented by a few feathers, similar to those crossing the breast; bill bluish horn-colour; feet flesh-colour.

Total length, $4\frac{1}{2}$ inches; bill, $\frac{1}{2}$; wing, $2\frac{1}{4}$; tail, $1\frac{3}{4}$; tarsi, $\frac{5}{8}$.

*Hab.* North-west coast of Australia.

Mr. Gould next exhibited and characterized two new species of Kangaroos from Swan River; the first of these is rather less than the *Macropus Bennettii,* and is remarkable for the perfect black colour of the fore part of all the feet, which appear as if they had been dipped in ink or some other black liquid, the black not blending, as usual, with the pale colour of the hind part of the feet, but terminating in an abrupt line. The general tint of the upper parts of the body is deep gray, a tint produced by the admixture of black and white, the hairs being black at the tip, and annulated with white near the tip; the sides of the body, as well as the under parts, are of paler gray, and are tinted with buff-yellow; this yellow tint is almost pure on the abdomen between the hind legs, on the feet and inner side of the ears: the upper surface of the head and muzzle are of a soot-like colour, and the *occiput* and back of the ears, as well as the apical portion in front, are pure black; a yellowish white line is observable on each side of the muzzle, commencing at the tip, and running backwards beneath the eye; the fore half of the hands and feet are pure black, and the greater portion of the tail (which is well clothed with harsh hairs) is of the same colour; at the base, however, it is coloured as the body, and on the upper surface, for a considerable distance from the base, the black hairs are more or less annulated with whitish, producing a grizzled appearance. On the chin is a small black patch.

Mr. Gould gave to this species the specific name *manicatus*: its principal characters may be thus expressed:—

Macropus (Halmaturus) manicatus. *Macr. obscurè griseus; vellere apud partes inferiores pallidiore et flavescente; capite suprà fuliginoso, occipite necnon auribus externè nigris; utrâque genâ lineâ flavescente notatâ; tarsis antipedibusque flavescentibus, anticè nigris; caudâ nigrâ ad basin griseâ.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 30 | 0 |
| ——— *caudæ* ........................ | 26 | 0 |
| ——— *tarsi digitorumque* (sine unguibus).. | 8 | 10 |
| ——— ab apice rostri ad basin auris .... | 5 | 0 |
| ——— *auris* ........... | 2 | 6 |

The second species of Kangaroo to which Mr. Gould drew the attention of the members, is nearly allied to the *Macropus penicillatus* of Mr. Gray, but differs in being of a smaller size, paler colour, in having no black mark on the sides of the body, and the tail less bushy; the ears, moreover, are smaller in proportion, and more pointed. The general colour is gray-brown; the under parts of the body are dirty white, obscurely tinted with yellowish: on each side of the body, near the base of the fore leg, is a dusky patch; a dirty white mark is observable on each side of the head, and there is an indistinct mark on the base of the thigh. The tail is moderately bushy, coloured at the base like the body, but the apical third is dusky black.

Mr. Gould gave to this species the name

MACROPUS (PETROGALE) BRACHYOTIS. *Macr. vellere e fusco cinereo, apud partes inferiores albescente; caudâ floccosâ ad apicem nigrâ; utrâque genâ lineâ albescente notatâ.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 21 | 0 |
| ——— *caudæ* ..................... | 16 | 6 |
| ——— *tarsi digitorumque* (sine unguibus).. | 5 | 0 |
| ——— ab apice rostri ad basin auris .... | 3 | 8 |
| ——— *auris* ....................... | 1 | 11 |

Various specimens presented since the last Meeting were exhibited. These donations consisted of a collection of Birds from Australia, presented by L. Chandler, Esq., and some specimens of Birds and Zoophytes from Gibraltar, presented by Mr. Frembly, R.N., Corresponding Member.

October 27.—William Yarrell, Esq., V.P., in the Chair.

In consequence of the lamented death of N. A. Vigors, Esq., one of the founders of the Society, and during the first years of its existence its active and zealous Secretary, whose reputation and influence had materially increased its numbers, as his liberality augmented its collections, the Society adjourned to November 10th.

November 10.—William Yarrell, Esq., Vice-President, in the Chair.

A letter from the Rev. R. T. Lowe, dated Madeira, August 8, 1840, was read. It stated that Mr. Lowe had forwarded for the Society's Museum two specimens of Snakes from Demerara, and a specimen of the *Ausonia Cuvieri* of Risso, from Madeira. "The *Ausonia*," observes Mr. Lowe, "I scarcely need remark, is one of the most interesting and valuable of my acquisitions, from the obscurity attending it, and its supposed identity with Rafinesque's *Luvarus imperialis*. It has been altogether passed over by Cuvier and Valenciennes in their *Histoire des Poissons*, though the former had previously taken it up in a note in his second edition of his *Règne Animal*."

A letter from Mr. J. Frembly, R.N., dated Gibraltar, September 23, 1840, was read. In this letter Mr. Frembly states that he had forwarded for the Society a living specimen of a Brazilian Pheasant

(*Penelope pileata* of Wagler), and also a skin of the same species from Para. He had likewise forwarded some specimens of Marine Corallines and other Zoophytes, recently obtained during the prosecution of a coral fishery on the coast of Barbary.

A letter from J. Wardrop, Esq., dated Oct. 29, 1840, was next read. It refers to a Fowl brought by W. Wardrop, Esq., from the Island of Lemurs, and presented to the Society. In this Fowl the spur had been removed from its proper place, and engrafted on the head. The letter moreover states, that the natives of the island mentioned often cause the spurs of the cock bird to grow upon its head, and the comb upon its legs.

The following paper, by G. Gulliver, Esq., F.R.S., entitled "Observations on the Blood Corpuscles of the *Crocodilidæ*," was read.

"According to the observations of MM. Prevost and Dumas, Wagner, Schultz, and others, the long diameter of the oval blood corpuscles of the vertebrate animals is never more than one and a half or twice the short diameter; and M. Mandl states that this accords with his experience, except in regard to the blood corpuscles of the *Crocodilidæ*, of which he says that the long diameter is between two or three times greater than the short diameter.

"M. Mandl's observations are published in the *Annales des Sciences Naturelles*, séconde série, tome xii., in which the following remarks occur: 'En prenant dans les globules des chameaux*, oiseaux, reptiles et poissons, le petit diamètre pour unité, le grand varie entre $1\frac{1}{2}$ à 2; on en rencontre une exception dans les *Crocodiliens*, dont le grand diamètre est 2 à 3 fois plus grand que le petit.'

"It appears that this conclusion was deduced from an examination of the blood of a single species only, the *Crocodilus Lucius* of Cuvier.

"In a short paper 'On the Blood Corpuscles of the Snowy Owl and Passenger Pigeon,' read before the Society on the 9th of June, 1840, I showed that the corpuscles of these birds, particularly of the former, were so very long, in relation to their breadth, as to present a peculiarity in this respect which I had not seen in the corpuscles of any other vertebrate animal; and, however singular it might appear, it was shown in the same communication that the blood-discs might differ remarkably in two nearly allied species of the same genus. Hence it will not appear surprising that I have failed to find the same peculiarity in the figure of the blood corpuscles of two other species of the *Crocodilidæ*, as M. Mandl did in the *Crocodilus Lucius*. In the following measurements the common-sized corpuscles are first noted, then those of extremely small and large dimensions, and lastly the average deduced from a computation of the whole; and they are all expressed in fractional parts of an English inch.

* M. Mandl says in a note, "Nous avons examiné le sang du Dromadaire, de l'Alpaca, et du Chameau." I may add that I have examined the blood of the *Vicugna* and *Guanaco*, and found their corpuscles also of an oval shape, thus completing the history of the singular red particles of the *Camelidæ*. See 'Dublin Med. Press,' November 27, 1839, and 'Trans. of the Royal Med. and Chirurgical Society,' vol. 23.

"1. Sharp-nosed Crocodile (*Crocodilus acutus*).

| Long Diameter. | | Short Diameter. | |
|---|---|---|---|
| ·1333<br>·1231<br>·1145 | Common sizes. | 1·2286 | Common size. |
| ·1600<br>·1000 | Extremes. | 1·2666<br>1·2000 | Extremes |
| 1·1231 | Average. | 1·2286 | Average. |

"The average thickness of the discs was about $\frac{1}{8000}$th of an inch.

"The animal was young, and the blood was obtained from the heart after death.

"2. An Alligator from South America (*Champsa fissipes*, Natterer).

| Long Diameter. | | Short Diameter. | |
|---|---|---|---|
| 1·1455<br>1·1333<br>1·1200<br>1·1143 | Common sizes. | 1·2666<br>·2400<br>·2286<br>·2000 | Common sizes. |
| 1·1600<br>1·1000 | Extremes. | ·3000<br>·1895 | Extremes. |
| 1·1259 | Average. | 1·2315 | Average. |

"The animal was young and lively. The blood was obtained from a prick of the foot.

"Thus, as is commonly the case in the oval blood corpuscles of the vertebrate animals, in these two examples the long diameter is not equal to twice the short diameter, and it may therefore be concluded that M. Mandl's remarks on the blood corpuscles of the *Crocodilidæ* are not applicable to the corpuscles of all the species of this family. So far, however, from doubting the accuracy of this physiologist's observation on the blood of the *Crocodilus Lucius*, I am disposed to regard the result of my observations, in connexion with the one which he has made, as establishing a remarkable difference in the blood corpuscles of one family of Reptiles, similar to the peculiarity which I have found in the red particles of the Linnæan genus *Strix*, as well as in those of the *Columbidæ*."

A collection of Birds from Tangiers, presented to the Society by G. W. H. Drummond Hay, Esq., was exhibited, and Mr. Hay furnished the following list, accompanied with observations on the species, which was read.

*Vultur fulvus*, Linn. Arabic name, *Nezer*.

"I shot this bird as he rose heavily from the top of a high rock, near Cape Spartel, on the north coast of Africa, where he had been gorging himself with the body of a dead kid. The species is rare in these parts."

*Neophron Percnopterus*, Sav. Arabic name, *Erhama*. "Common."

*Aquila Chrysaëtos*, Vigors. Arabic name, *El Oukab*.

"Very rare, but two specimens having been obtained for many years past."

*Pernis apivorus.* Arabic name, *Bourreh.*

"This species passes over the country about the beginning of the spring in immense numbers, but is rare at other times."

*Falco Subbuteo*, Linn. Arabic name, *Tier el Hor.*

"A very daring little bird, used by the Sultan for hawking: it is common in the high lands."

*Falco Tinnunculus*, Linn. Arabic name, *Bouamira.* "Very common."

*Circus rufus*, Bechst. Arabic name, *Hedia.* "Rare."

*Alcedo Ispida*, Linn. Arabic name, *Tier Teberni.* "Common about the rivers."

*Caprimulgus europæus*, Linn. Arabic name, *Terref el Aiyal.*

"Very common."

*Merops Apiaster*, Linn. Arabic name, *Liamon.*

"In the grape season this bird is exceedingly abundant; as many as twenty or thirty have been shot at one time from a tree: it is good eating, builds in holes in the ground, and sometimes uses rabbit-burrows for the purpose: feeds upon bees, flying ants, wasps, &c.; has an undulating flight, and does not flap the wings much. Disappears in the winter months."

*Coracias garrula*, Linn. Arabic name, *Characrac*,—a name which has reference to the noise which it makes.

"It is rather rare; comes generally in the spring, and remains about three months."

*Lanius rufus*, Linn. Arabic name, *Raich el Rra.* "Rare."

*Oriolus Galbula*, Linn. Arabic name, *Teir Sofar.*

"Rare: makes its appearance in the beginning of the spring, and leaves at the end of the spring."

*Ixos obscura.* Arabic name, *Chouchou.*

"Very common, especially in the orange plantations; destroys much of this fruit. Seen throughout the year."

*Curruca melanocephala.* Arabic name, *Chorrir.* "Rare."

*Curruca atricapilla*, Bechst. Arabic name, *Chorrir el Quebir.* "Rare."

*Phœnicura Tithys*, Jard. and Selby.

*Phœnicura ruticilla.* "Common."

*Sylvia cisticola*, Savi. Arabic name, *Boussiou.*

"Rather uncommon: builds near hedges."

*Saxicola Stapazina.* "Uncommon."

*Saxicola aurata*, Temm. "Common."

*Saxicola Rubicola*, Bechst. "Common."

*Anthus arboreus*, Bechst. Arabic name, *Koba.* "Common."

*Anthus pratensis*, Bechst. Arabic name, *Koba.* "Common."

*Emberiza Hortulana*, Linn. "Common."

*Serinus flavescens*, Gould. Arabic name, *Chimerees.* "Rare."

*Sturnus unicolor*, Temm. Arabic name, *Garzor Quehal.*

"Rather rare: generally settles in the mosques, where it probably builds."

*Upupa Epops*, Linn. Arabic name, *Hadhud.* "Common: generally seen about dunghills."

*Glareola torquata*, Briss. Arabic name, *Harrak Diad.*

"Lays on the ground in barren situations, and does not build a regular nest, but merely places a few straws, &c., loosely together."

*Cursorius isabellinus*, Meyer. Arabic name, *El-Gueta.*

"Very rare: builds in the desert, in the sand. From the great resemblance between the colour of this bird and that of the sand, it is with difficulty seen, even when flying, since it then keeps very close to the ground."

*Ciconia nigra*, Ray. Arabic name, *Geringa.*

"Rare. The Moors believe evil spirits to exist in this bird, it being black, whilst the good spirits are supposed to inhabit the white birds."

*Platalea Leucorodia*, Linn. Arabic name, *Boucarcaba.* "Rare."

*Ardea purpurea*, Linn. Arabic name, *Said el Meresh*, or Hunter of the Marsh. "Rare."

*Botaurus stellaris*, Linn. Arabic name, *Seba el Meresh*, the Lion of the Marsh.

"Both the *Ardea purpurea* and the *Botaurus stellaris* are exceedingly pugnacious in their habits, and will not allow any other bird to approach them. Even the female dare not approach the male excepting in the breeding-season."

*Ardea Garzetta*, Linn. Arabic name, *Boubliga.* "Very rare."

*Ardea Verany*, Temm. Arabic name, *Tier Abgar.* "Exceedingly rare."

*Ardea Ralloïdes*, Scops. Arabic name, *Grnok el Serreh.* "Rather uncommon."

*Ibis Falcinellus*, Temm. Arabic name, *Maiza del Wad.* "Very rare."

*Limosa melanura*, Leisl. Arabic name, *Chibib.* "Not uncommon."

*Squatarola cinerea*, Gould. Arabic name, *Dorreis.* "Common."

*Charadrias Hiaticula*, Linn. Arabic name, *Couba.* "Common."

*Strepsialis collaris*, Temm. Arabic name, *Charno.* "Rare."

*Totanus fuscus*, Leisl. "Rare."

*Totanus hypoleucos*, Temm. "Rare."

*Tringa variabilis*, Mey. "Rare."

*Tringa subarcuata*, Temm. "Rare."

*Tringa minuta*, Leisl. "Very rare."

*Tringa caruncalata.* Arabic name, *El Gor.* "Common."

*Undina leucocephala*, Gould. Arabic name, *Bugarein.*

"Exceedingly rare. A very excellent diver; will remain under water a long time."

*Anas leucophthalmus*, Temm. Arabic name, *Bourk el Serrer.*

"Rare: a good diver."

*Anas marmorata*, Temm. Arabic name, *Bourk el Biad.* "Rare: a good diver."

*Podiceps cristatus*, Lath. Arabic name, *Bourk el Wad.* "Rare."

*Alca Torda*, Linn. Arabic name, *Bourk del Bahar.* "Rare."

A paper, in which Mr. G. B. Sowerby continues the descriptions of the shells collected by H. Cuming, Esq., in the Philippine Islands, was next read.

Helix annulata. *Hel. testâ obovatâ, crassiusculâ, lævi, plerumque flavâ, fusco-cinctâ; spirâ elevatiusculâ, obtusâ, anfractibus quinque rotundatis, ultimo maximo; aperturâ rotundato-subtrapezoidali; peritremate lato, incrassato, albo roseo tincto; labio columellari lato, crasso, planulato, posticè subemarginato, anticè suprà columellam expanso.* Long. 1·0; lat. 0·8 poll.

*Hab.* in foliis Pandani propè Banqui, provinciæ Iloconis septentrionali ad insulam Luçon, Philippinarum.

This beautiful species bears considerable resemblance to *H. Iloconensis*, but may be distinguished by the dark chocolate colour of the back of the outer lip, which is also narrower, and much less reflected. Five varieties have been found by Mr. Cuming, viz.

*a.* Bright yellow, with a blood-red antesutural band, which becomes darker, and nearly chocolate-brown on the last volution: back of the lip and circumference of the *columella* dark chocolate-brown.

*b.* Bright yellow: antesutural band narrow, blood-red; circumferential band blackish brown: in other respects similar to *a.*, and from the same locality.

*c.* Nearly similar to the last, but having a broader circumferential brown band, and a very narrow brown line between it and the antesutural band. From the same locality.

*d.* Pale yellow: antesutural band nearly obsolete: in all other respects like *b.*

*e.* Shell white: no antesutural band; circumferential band broad, and nearly black; last volution suffused with rose-red near the back of the lip.

Helix balteata. *Hel. testâ subglobosâ, crassiusculâ, lævi, coloribus variis cinctâ; spirâ elevatiusculâ, obtusâ, anfractibus quinque, subplanulatis, ultimo maximo; aperturâ semilunari, intùs albicante; peritremate incrassato, angusto, leviter reflexo, extùs nigro; labio columellari latiusculo, obliquo, planulato, crasso.* Long. 1·0; lat. 0·8 poll.

*Hab.* in foliis fruticum ad provinciam Ilocos septentrionalis insulæ Luçon, Philippinarum.

In general form and size and colouring this species somewhat resembles our *H. Orbitulus*, from which it may be at once distinguished by its narrow, scarcely reflected, dark-coloured lip. The ground-colour of this species is usually whitish, or lemon-yellow, and the varieties are banded with dark green, gray, nearly black, and light green, and the columellar lip is commonly purplish black, with a crimson tinge. The following is an indication of the varieties:—

*a.* Apex dull red; ground-colour lemon-yellow; antesutural band dark green; post-circumferential band light greenish gray; columellar lip purplish black, with rose-coloured edges; columellar circumference green. From Banqui, in the province of North Ilocos.

*b.* Apex dull red; ground-colour pale lemon-yellow; antesutural band dark green; post-circumferential band greenish gray close to the broad circumferential band, which is reddish black; *columella* purplish black, its circumference green. From Banqui.

*c.* Apex dull red; ground-colour pale lemon-yellow; antesutural band green, darker in front; post-circumferential band greenish gray, also darker in front; *columella* and its immediate circumference purplish black, around which is a rather broad green band. From Sinait. Found on the leaves of trees.

*d.* Apex dull red; ground-colour lemon-yellow; antesutural band broad, dark green, composed of several narrow bands, next to which is a broad, pale, greenish gray band; circumferential band dark green, nearly black; *columella* purplish red, its circumference with a broad green band. From Banqui.

*e.* Apex dull pale red; ground-colour pale lemon-yellow: antesutural band broad, dark green: post-circumferential band very broad, greenish gray, with a very narrow nearly black band in front; then comes a narrow band of the ground-colour, and the remainder is green to the circumference of the *columella*, which is blackish; the *columella* itself is purplish black. From Piddig, in the province of North Ilocos.

*f.* Apex pale dull red; ground-colour pale lemon-yellow; antesutural band very narrow, dark green; post-circumferential band very broad, greenish gray, united in front to the blackish circumferential band; *columella* blackish, its circumference with a very narrow green band. From Piddig.

*g.* Apex grayish white; ground-colour bright lemon-yellow; antesutural band narrow, dark green; post-circumferential band grayish green; circumferential band nearly black; *columella* crimson, its circumference green.

*h.* Apex and ground-colour white; bands as in *g.*; *columella* blackish; its immediate circumference black, around which is a dull green band; the antesutural band in this variety is very narrow, and of a dull colour, and two nearly black bands are distinctly seen within the aperture. From Sinait.

Helix fenestrata. *Hel. testâ subglobosâ, crassiusculâ, lævi, castaneo-nigrâ, epidermide fuscâ albicante-bifasciatâ; anfractibus quinque rotundatis, ultimo maximo, posticè prope suturas fenestratis (attritione epidermidis); aperturâ subrotundâ; peritremate lato, albo, reflexo; labio columellari lato, crasso, subplanulato.* Long. 1·0; lat. 0·85 poll.

*Hab.* supra foliis arborum ad montes Caravallo, provinciæ Cagayan, insulæ Luzon Philippinarum.

There are two varieties of this pretty species, which in general form resemble *H. Ilocónensis* and *H. annulata*: they are

*a.* Anterior intermediate band dark brown.

*b.* Anterior intermediate band light brown.

The next paper read was from Mr. G. B. Sowerby, Jun., and is entitled "Descriptions of some new species of *Murex*, principally from the collection of H. Cuming, Esq."

Murex Occa, Conch. Illustr. f. 45. *Mur. testâ clavatâ, ventricosâ, fulvo-glaucescente; spirâ mediocri; caudâ longissimâ, rectâ, ad terminum subexpansâ, subrecurvâ; anfractibus angulatis transversè leviter sulcatis; varicibus tribus, spinis dorsalibus tribus brevibus falcatis, tribusque minutissimis alternantibus, deinde ad caudam tribus ad quatuor subrectis, interstitiis bituberculatis: aperturâ ovatâ, rotundatâ, posticè subangulatâ; labio crenulato, dente unico magno lato marginali; canali ferè clauso.*

Long. 3; lat. extra varicibus, 1 poll.

*Hab.* ad insulas Nicobaricas.

The comparative smoothness of the whorls, and the short, curved character of the dorsal spines, are sufficient to distinguish this from other clavate species.

Murex Messorius, Conch. Illustr. f. 93. *Mur. testâ clavatâ, subventricosâ, fulvo-rubescente, griseo, rubro, fuscoque maculatâ; spirâ brevi; caudâ elongatâ, rectâ, angustâ, minimè recurvâ; varicibus tribus, crassis, costatis, antè crenulatis, ponè foveolatis, ad angulum posticum spinâ brevi rectâ, ad caudam spinâ falcatâ, subelongatâ, deinde unâ breviore, rectâ; interstitiis duobus ad tribus costis noduliferis; aperturâ ovali, posticè subcanaliferâ; labio interno posticè tumido, intùs crenulato; labio externo denticulato, anticè paululum extante; canali ferè clauso.*

Long. 2·40; lat. ex. var. ·90 poll.

*Hab.* ——? Mus. Cuming, Stainforth.

Distinguishable by the thickened varices, and the spine at the base of the caudal canal, shaped like a reaper's hook.

Murex rectirostris, Conch. Illustr. f. 95. *Mur. testâ clavatâ, subventricosâ, transversè costatâ, pallidè fulvâ, fusco-rubescente bifasciatâ; spirâ mediocri, anfractibus octo, rotundatis; suturis excavatis: caudâ elongatâ, angustâ, rectâ; varicibus tribus, crassis, antè crenulatis, ponè excavatis, ad angulum posticum spinâ crassâ, brevi, propè caudam tribus minutis proclivis, ad caudam duabus seu tribus tenuibus, rectis: interstitiis tricostatis; aperturâ ovali, peritremate extanti, labio externo crenulato; canali ferè clauso.*

Long. 2·80; lat. ex. var. 1 poll.

The spire is more elongated, the caudal canal is longer and more straight than in *M. recurvirostris*, Brod.

Murex nigrescens, Conch. Illustr. f. 98. *Mur. testâ subclavatâ, subrhomboideâ, transversè leviter costatâ, griseâ, nigro bifasciatâ, ad apicem fusco-rubescente: spirâ subproductâ, anfractibus septem, subangulatis, inter varices trifariàm tuberculiferis; suturis validis: caudâ elongatâ, rectâ, tenui; varicibus tribus, validis, rotundatis, noduliferis, ponè subexcavatis, ad angulum tuberculo subspinoso, ad basin caudæ spinis duabus: aperturâ ovali, labio interno albo, posticè tumido, anticè extante, crenulato, labio externo denticulato, intùs crenulato; canali clauso.*

Long. 2; lat. ex. var. ·80 poll.
*Hab.* ad Xipixapi. H. Cuming legit.

More ventricose and less clavate than *M. recurvirostris*, Brod., with a larger aperture, thinner varices, and straighter caudal canal. The sutures of the spire are not excavated, and the varices are very slightly so. Sandy mud, 11 fathoms.

Murex pliciferus, Conch. Illustr. f. 102. *Mur. testâ elongatâ, subfusiformi, subventricosâ, atrâ, albâ, pallidè fusco-subfasciatâ; transversè lineis moniliformibus striata spirâ productâ, anfractibus novem, subangulatis, suturis validis, subexcavatis; caudâ subelongatâ, rectâ, paulo exfoliatâ, leviter recurvâ: varicibus tribus, post angulum trifariàm spinoso-fimbriatis, ad angulum posticum spinâ crassâ, subelongatâ, rectâ, deindè quinque, brevioribus apertis, quarum primis duabus et ultimâ brevissimis, ad caudam duabus subelongatis, unâ brevi: aperturâ magnâ, ovali; labio interno lævi, paululùm extante; labio externo leviter crenulato, canali recto, aperto; interstitiis varicum tuberculo valido, tum costâ elongatâ, plicatâ, deindè costâ elongatâ angustiori subplicatâ.*

Long. 3·40; lat. ex. var. 1·50.
*Hab.* ——? Mus. Cuming.

There is no danger of confounding this fine species with any other. It is intermediate between the clavate and the fusiform groups.

Murex plicatus, Conch. Illustr. f. 6. *Mur. testâ clavatâ, ventricosâ, pallidè violaceâ, fulvo tinctâ et lineata: varicibus tribus, costatis crassis, ad latus marginale crenatis, ponè excavatis, ad angulum anfractuum spinâ crassâ brevi, deindè quinque alternatis, ad caudam tribus, subrectis, subelongatis; interstitiis tribus ad quatuor costis noduliferis: spirâ breviusculâ: aperturâ ovali, posticè canaliferâ; labio crenato; caudâ rectâ, crassâ, subelongatâ; canali ferè clauso.*

Long. 3·0; lat. ex. var. 1·30.
*Hab.* ad sinus Nocoyo. H. Cuming legit.

Found in coarse sand, at twelve fathoms. Distinguished from other species with elongated caudal canals by its width, and the thickness of the varices, which are deeply excavated at the back, and armed with short thick spines. *M. recurvirostris*, Brod., is the nearest approach, but is not so wide nor so spinose, and the caudal canal is recurved.

Murex formosus, Conch. Illustr. f. 91. *Mur. testâ subclavatâ, transversè leviter costatâ, scabrosâ, fulvo purpurascente: spirâ subproductâ, aculeatâ; anfractibus novem rotundatis; suturis validis; caudâ elongatâ, obliquâ, tenui, recurvâ, validissimè exfoliatâ: varicibus tribus à tergo subexcavatis, spinâ ferè elongatâ ad angulum posticum, deindè tribus apertis subelongatis, cum parvis quinque ad sex proclivis alternantibus, ad caudam duabus mediocribus ferentibus; interstitiis trifariàm noduloso-costatis; aperturâ ovali posticè subcanaliferâ, labio interno anticè vix minimè extante; labio externo denticulato, anticè extante; canali aperto.*

Long. 3·15; lat. ex. var. 1·05 poll.

*Hab.* ad Loay, Ins. Bohol. Mus. Cuming, Sowerby, Stainforth.

This belongs to the group of which *M. Motacilla* forms the type. It is an extremely elegant shell; the caudal canal is gracefully curved and exfoliated. Sandy mud, 7 fathoms.

Murex mindanaensis, Conch. Illustr. f. 92. *Mur. testâ subclavatâ, subventricosâ, transversè sulcatâ, pallidè fusco-rufescente: spirâ productâ, anfractibus octo rotundatis, suturis validis; caudâ elongatâ, subrecurvâ, exfoliatâ: varicibus tribus, validis, rotundatis, ponè subexcavatis; ad angulum posticum spinâ unicâ brevi; deindè spinis quinque brevioribus, parvisque quinque proclivis alternantibus: interstitiis tricostatis; aperturâ ovali; labio externo crenulato, margine dentato; labio interno lævi, paulo extante; canali ferè clauso.*

Long. 3; lat. ex. var. ·85; *cauda,* 1·5.

*Hab.* prope Cagayan, provinciæ Misamis ad insulam Mindanao Philippinarum. H. Cuming legit.

This beautiful and very distinct species presents a medium between the groups of which *M. Motacilla* and *M. ternispina* may be taken as the types. It was dredged at Cagayan in sandy mud, at a depth of 25 fathoms.

Murex elegans, Conch. Illustr. f. 84. *Mur. testâ clavatâ, ventricosâ, rhomboideâ, lævi, transversè costatâ, albâ, costis fuscolineatis; varicibus tribus, crassis, rarissimè subspinosis; interstitiis bituberculatis; aperturâ ovali, labio externo crenulato; caudâ elongatâ, recurvâ, anticè latâ, angulatâ.*

Long. 2·15; lat. ex. var. 1 poll.

*Hab.* —— ? Mus. H. Cuming.

A much smoother shell than *M. Motacilla*, and having two large tubercles between the varices, instead of three. It has been named as above by Dr. Beck in collections, but we believe has never been described.

Murex similis, Conch. Illustr. f. 69, 70. *Mur. testâ subfusiformi, subventricosâ, transversè interrupto-costatâ, pallidè fulvâ, transversè bifasciatâ vel interrupto lineatâ: varicibus tribus, costatis; ad angulum anfractuum unâ spinâ brevi, deindè quatuor ad quinque anterioribus minimis, ad caudam unâ spinâ brevi; interstitiis trifariàm noduloso-costatis: caudâ recurvâ longiusculâ posticè latâ, angulatâ exfoliatâ; aperturâ ovali; labio extante, intùs leviter crenulato; labro crenulato.*

Long. 1·90; lat. ·8.

*Hab.* —— ? Mus. Saul.

The spire is much more elongated, the varices more spinose and less thickened, and the caudal canal less elevated than in *M. Motacilla*, which, in general characters, it much resembles.

Murex scabrosus, Conch. Illustr. f. 73. *Mur. testâ subturbinatâ, ventricosâ, crassâ, corrugatâ, transversè lineis elevatis, scabrosis, distantibus, costatâ, pallidè fulvâ, fusco-maculatâ; spirâ brevi, obtusâ, anfractibus sex ventricosis, suturis validis; caudâ longi-*

*tudine aperturam æquante, rectâ, crassâ, latâ, exfoliatâ, ad basin sub-coarctatâ; varicibus tribus, validis, costatis, posticè excavatis; costarum, unâ ad angulum posticum subspinosâ, tribus ad partem anticam anfractus anticè fimbriatis, tribus ad caudam, validis, subspinosis, subfimbriatis; interstitiis tuberculis tribus corrugatis anticè ad basin caudæ læviusculis; aperturâ magnâ, albâ, rotundatâ; labio interno lævi, decumbente, purpureo; labio externo crenulato; canali aperto.*

Long. 2·20; lat. ex. var. 1·10 (*spira*, $\frac{1}{3}$; *apertura*, $\frac{1}{3}$; *cauda*, $\frac{1}{3}$).

*Hab.* ——? Mus. Saul.

We have only seen one specimen of this shell, which resembles, in some degree, the young of *M. pomum*; but the varices are narrower, the tubercles smaller, and there is a smooth space just below the ventricose part of the last whorl. The caudal canal is larger and straighter.

Murex Banksi, Conch. Illustr. f. 82. *Mur. testâ fusiformi, transversè scabroso-sulcatâ, fulvâ, fusco-maculatâ, ad varices nigrescente; spirâ productâ, anfractibus septem, rotundatis, suturis validis, subundatis; caudâ elongatâ, latâ, nisi ad extremitatem rectâ, paululum recurvâ: varicibus tribus, ramis breviusculis acuto-frondosis, subrectis, ad caudam quatuor compressis, quorum duobus elongatiusculis: interstitiis tuberculis tribus subpliciformibus: aperturâ albâ, ovali, posticè canaliferâ; labio externo acutissimè denticulato; canali aperto.*

Long. 2·80; lat. ex. var. 1·15 poll.

*Hab.* ad Moluccas.

The above name, although, we believe, never published, has been applied to this species in several cabinets. The compressed character of the fronds on the caudal canal bring it near to *axicornis*, but the other fronds are much shorter.

Murex Saulii, Conch. Illustr. f. 77. *Mur. testâ fusiformi, transversè lineis elevatis striatâ, pallidè fulvâ, fusco-rubescente vel nigricante lineatâ: spirâ elongatâ; anfractibus novem, rotundatis, gradatim crescentibus; suturis validis: caudâ subelongatâ ad basin planâ, exfoliatâ, rectâ; extremitate obliquâ, recurvâ: varicibus tribus obliquiter continuis, crassis, rotundatis ad angulum posticum; ramo crassiusculo, ad basin subcomplicato, extremitate frondoso, recurvo, roseo; deinde quatuor apertis, angustioribus, roseis, frondosis, cum quinis minoribus proclivibus alternantibus, tum tribus ad caudam subcompressis, roseis, frondosis: interstitiis tuberculis duobus, uno majore, uno minore: aperturâ ovali, posticè canaliferâ, angulatâ; labio interno lævi; labio externo dentibus duodecim acutis; canali aperto, subsinuoso.*

Long. 2·80; lat. ex. var. 1 poll.

*Hab.* ad insulam Capul, Philippinarum. H. Cuming legit. Mus. Saul, Stainforth, Reeves.

It is somewhat surprising that this species should not have been distinguished ere this from *M. Palmarosæ*, from which it differs in having a smooth inner lip, and in having small projecting fronds on the varices between the larger ones.

Murex torrefactus, Conch. Illustr. f. 110, 111. *Mur. testâ subfusiformi, subventricosâ, transversè costis subscabrosis striatâ: spirâ elongatâ; anfractibus novem, rotundatis, subgradatim crescentibus; suturis subvalidis: caudâ mediocri, latâ, palmatâ, exfoliatâ, ad basin rectâ, ad extremitatem obliquâ, recurvâ: varicibus tribus, crassis; ramis dorsalibus quinque, frondosis, brevibus (uno ad angulum posticum crassiusculo), cum parvis quinque proclivibus alternantibus, ad caudam tribus subcompressis: interstitiis tuberculis duobus, uno majore: aperturâ flavidâ ovali, posticè canaliferâ, subangulatâ; labio interno lævi; labio externo dentibus duodecim acutis; canali aperto, subsinuoso.*

Long. 3·70; lat. 1·60 poll.

Var. *Testâ pallidè fulvâ, fusco-nigricante, lineatâ: frondibus fuscis.*

Var. *Testâ ferè adustâ.*

Var. *Testâ flavido-rufescente, fusco-lineatâ.*

*Hab.* ad insulam Ticao, Philippinarum. H. Cuming inter alios legit.

Much more ventricose, with a wider caudal canal, and much shorter fronds than *M. Saulii.* Found on coral reefs.

Murex palmiferus, Conch. Illustr. f. 99. *Mur. testâ subfusiformi, transversè scabroso-sulcatâ, fulvo-roseo tinctâ: spirâ elongatiusculâ, acutâ; anfractibus octo, subangulatis: caudâ mediocri, exfoliatâ, obliquâ, paululùm recurvâ: varicibus tribus; frondibus palmatis, ad angulum posticum duobus subelongatis, subconnexis, tum duobus singularibus, deindè duobus connexis, cæteris parvis, proclivibus, ad caudam tribus singularibus, quarum ultimo brevissimo: interstitiis bituberculatis: aperturâ ovali, posticè subangulatâ; labio externo crenulato; canali aperto.*

Long. 1·70; lat. ex. var. ·80 poll.

*Hab.* Red Sea.

Murex corrugatus, Conch. Illustr. f. 72. *Mur. testâ subrhomboideâ, transversè costatâ, corrugatâ, scabrosâ, albo-lutescente: spirâ productâ; anfractibus septem, subangulatis: caudâ mediocri, exfoliatâ, ad basin latâ: varicibus tribus, tenuibus, costatis; frondibus sub-palmiferis, ad angulum duobus confertis, tum duobus singularibus, deinde tribus confertis, ad caudam duobus seu tribus singularibus: interstitiis bituberculatis: aperturâ magnâ; labio interno lævi; labio externo maximè extante, crenulato; canali aperto.*

Long. 1·30; lat. ex. var. ·60 poll.

*Hab.* ——? Mus. Cuming, Watson.

Murex laqueatus, Conch. Illustr. f. 78. *Mur. testâ rhomboideâ, transversè costatâ, crassâ, albâ: spirâ mediocri; anfractibus septem, subangulatis: caudâ breviusculâ, rectâ, crassâ: varicibus tribus obliquiter spiram decurrentibus, à tergo tumulosis, fimbriâ laqueatâ carinatis, ad caudam subspinosis: interstitiis tuberculo magno costatis: aperturâ parvâ, ovali; labio externo crenulato; canali aperto.*

*Hab.* ——? Mus. Saul.

A much thicker shell than *M. tripterus*, Born., and moreover having the caudal canal spinose.

Murex canaliferus, Conch. Illustr. f. 74. *Mur. testâ parvâ, crassâ, subfusiformi, sublævi, albo-lutescente: spirâ productâ; anfractibus sex ad septem, subplanis: caudâ breviusculâ, subrectâ, ad terminum minimè recurvâ: varicibus tribus, fimbriatis, antè inciso-fimbriatis, ponè lævibus, costatis; ramis uncinatis, planis, tubiformibus, ad angulum posticum uno valido, subelongato, ad medium anfractûs uno brevi, tum duobus minimis, obsoletis, ad caudam duobus parvis: interstitiis obscurè quadrifariam nodulosis: aperturâ integrâ, parvâ, ovali; peritremate lævi; canali nisi ad extremitatem clauso.*

Long. 1; lat. ex. var. ·35 poll.

*Hab.* ——? Mus. Stainforth, Sowerby.

Differing from *M. cancellatus*, in being more fusiform, thin and smooth, in the caudal canal being longer and straighter, and in the sutures of the whorls being simple.

Murex cancellatus, Conch. Illustr. f. 75. *Mur. testâ parvâ, crassiusculâ, fusiformi, cancellatâ, albo-lutescente: spirâ subproductâ; anfractibus quinque; suturis foveolatis: caudâ brevi, crassâ, latâ, ad terminum tortuosâ, minimè recurvâ: varicibus tribus, fimbriatis, crassis, costatis, utrinque foveolatis; ramis tubulatis, uno ad angulum crasso, valido, ad medium anfractûs, uno brevissimo, cæteris obsoletis: interstitiis trifariam noduloso-costatis: aperturâ parvâ, integra, ovali; peritremate lævi; canali nisi ad extremitatem clauso.*

Long. ·75; lat. ex. var. ·31 poll.

*Hab.* ——? Mus. Stainforth.

A small white fimbriated shell, with the canal and a frond open only at the extremities.

Murex Capensis, Conch. Illustr. f. 76. *Mur. testâ parvâ, subfusiformi, lævi, fulvo-rubescente: spira producta, caudam æquante: varicibus tribus, digitato-alatis; spinis quinque planis, subtubulatis, fimbriâ membranaceâ connexis, unâ ad angulum anfractuum falcatâ: aperturâ ovali, posticè subangulatâ: canali nisi ad extremitatem clauso.*

Long. 1; lat. ·40 poll.

*Hab.* ad Bonæ Spei promontorium. Mus. Cuming, Sowerby, &c.

A pretty little species, with nearly tubular digitations connected by a fringe. The posterior digitation of each varix is hooked.

Murex trialatus, Conch. Illustr. f. 18. *Mur. testâ rhomboideâ, lævi, subventricosâ, fulvâ, fusco-nigrescente fasciatâ: varicibus tribus, alatis, ad marginem undatis, posticè subelongatis, subaculeatis, ad latus marginale fimbriatis, subcanaliculatis, à tergo lævibus, ad terminum exfoliatis: apertura ovali; labio undato: caudâ brevi, latâ: canali clauso: spirâ elongatâ.*

*Hab.* ——? Mus. Saul.

Murex emarginatus, Conch. Illustr. f. 64. *Mur. testâ rhomboideâ, sublævi, pallidè fusco-rubescente: spirâ brevi; anfractibus quinque, prope suturas angulatis; suturis undatis: caudâ angustâ, obliquiter rectâ, exfoliatâ, leviter recurvâ: varicibus tri-*

*bus, crassis, angulatis, anticè dente unico subextanti, unico minore à tergo undato-costatis, supernè fimbria anticè dilatatâ, canalifera, subitò ad caudam truncata carinatis: interstitiis tuberculo magno: aperturâ magnâ, ovali; labio externo undato, extante, anticè dente unico armato; canali nisi ad extremitatem clauso.*

Long. 2; lat. ex. var. 1 poll.

This species presents a near approach to *M. Monoceros, nobis*, but the canal is closed, and it is also longer and narrower. The varices are fimbriated. The fringe near the canal is suddenly terminated, being in a manner drawn in.

Murex monoceros, Conch. Illustr. f. 65. *Mur. testâ rhomboideâ, irregulari, transversè minutè striatâ, griseâ, lineis albis inter fasciis fuscis cinctâ: spirâ mediocri; anfractibus septem, subangulatis: caudâ brevi, latâ, exfoliatâ: varicibus quatuor ad quinque subdecumbentibus, paululùm rotundatis, antè quadrifariam denticulatis, uno dente magno prope caudam subextante, uno minore: interstitiis tuberculo magno: aperturâ magnâ, posticè subangulatâ; labio externo, dente magno prope canalem extante, intùs denticulato, canalifero; canali aperto.*

Long. 2·25; lat. ex. var. 1·20 poll.

*Hab.* ——? Mus. Norris.

A very remarkable shell in the collection of J. Norris, Esq., with a large tooth on the anterior part of the outer lip, resembling that in *Monoceros*.

Murex fasciatus, Conch. Illustr. f. 86. *Mur. testâ rhomboideâ crassâ, transversè costatâ, albâ, vel pallidè fulvâ, fusco-bifasciatâ: spirâ breviusculâ; anfractibus sex, subrotundatis, paululùm angulatis: caudâ brevi, crassâ, compressâ, subumbilicatâ: varicibus tribus, rotundatis crassis, costatis: interstitiis tuberculo valido, elongato: aperturâ ovali, posticè subcanaliferâ; labio interno lævi; labio externo crenulato, intùs dentato; canali nisi ad extremitatem clauso.*

Long. 1·20; lat. ex. var. ·65 poll.

*Hab.* ad oras Africanas (River Gambia).

Murex varius, Conch. Illustr. f. 57, 104. *Mur. testâ crassâ, subrhomboideâ, ventricosâ, subscabrosâ, pallidè fulvâ, fusco-fasciatâ; rubro-lineatâ, lineis extantibus submoniliformibus transversè sulcatâ: spirâ mediocri; anfractibus septem, primis angulatis, ultimâ subrotundatâ: caudâ brevi, latâ, crassâ, exfoliatâ: varicibus quinque ad septem, decumbentibus, prope angulum posticum à tergo tumulosis; tuberculis subspinosis, uno ad angulum brevi, crasso, subcrispato, tum aliquando tribus minutis, deinde tribus majusculis, ad caudam uno subelongato: aperturâ magnâ, subrotundatâ, posticè subangulatâ; labio interno lævi, crasso; labio externo crenulato; canali aperto.*

Long. 2·35; lat. ex. var. 1·50.

*Hab.* Gambia. Mus. Cuming.

Murex tumulosus, Conch. Illustr. f. 71. *Mur. testâ clavatâ, ventricosâ, pallidè fulvâ, fusco-bifasciatâ, transversè scabroso-sulcatâ:*

*spirâ brevi; anfractuum suturis excavatis: varicibus septem, validis, crassis, costatis, antè crenulatis, ponè excavatis, ad suturas tumulosis; ad medium anfractuum spinis duabus subelongatis, rectis; ad caudam spinis tribus: caudâ elongatâ: aperturâ magnâ, ovali, posticè subangulatâ: anticè margine sub-producto, intùs crenulato.*

Long. 3·60 (*caudæ*, 2·3); lat. ex. var. 1·30.

*Hab.* ——? Mus. Stainforth.

This species differs from *M. cornutus*, in the thickness of the varices, which are excavated behind. The sutures of the spine are also excavated.

Murex varicosus, Conch. Illustr. f. 49. *Mur. testâ subclavatâ, transversè sulcatâ, albâ, ad varices fusco-nigricante: varicibus sex, tumidis, subfrondosis, anticè inciso-fimbriatis, ponè frondes lævibus, integris, posticè ad anfractum proximum dilatatis, ultimo magis expansâ, digitatâ: spirâ breviusculâ; suturis anfractuum excavatis: caudâ subelongata, latâ: aperturâ rotundatâ, albâ; canali ferè clauso: caudâ subelongatâ, latâ.*

Long. 1·70; lat. ex. var. ·80.

*Hab.* ——? Mus. Stainforth.

This species differs from *M. secundus*, in being muel less oblique, in not having the labial varix so mue larger than the rest, in having a greater number of varices and somewhat longer spire, and in attaining a larger size.

Murex digitatus, Conch. Illustr. f. 79. *Mur. testâ pyriformi, transversè costatâ, roseo-fulvâ: spirâ breviusculâ: anfractibus quinque, ventricosis, angulatis, supernè complanatis; suturis excavatis: caudâ longiusculâ, ad basin latâ, gradatim angustiore: varicibus octo, costatis, digitatis, posticè usque ad medium proximi anfractûs prolatis; digitis numerosis, nigrescentibus, subproclivibus, rugosis, palmatis, minoribus alternantibus: aperturâ ovali; labio externo crenulato; laminâ canalis latâ.*

Long. 1·55; lat. ex. var. ·80 poll.

*Hab.* ad insulam Messonam. Mus. Cuming.

In general form resembling *M. Scorpio*, *M. secundus* and *M. varicosus*, but differing from them in being much straighter, having many more varices, the digitations being less connected, and in their being continued across the body of the shell in the form of interstitial ribs.

Murex megacerus, Conch. Illustr. f. 18. *Mur. testâ rhomboideâ, subventricosâ, fulvo-rufescente, intùs albâ, transversì scabroso-sulcatâ: varicibus quinque, ad caudam exfoliatis; frondibus subrectis, crassis, ad terminum foliatis, unâ ad angulum anfractuum magnâ, deinde tribus mediocribus, cum quatuor parvis, proclivibus, alternantibus; ad caudam tribus mediocribus: interstitiis costâ quinquefariam tuberculiferâ: aperturâ ovali, posticè canaliferâ, subangulatâ, margine dentato, undato; canali aperto: caudâ longitudine spiram æquante, latâ, subrecurvâ.*

Long. 3·45; lat. ex. var. 1·90 poll.

*Hab.* ad mare Pacificum.

Distinguished by the thick, straight, prominent frond on each of the five varices.

MUREX FALCATUS, Conch. Illustr. f. 31. *Mur. testâ fusiformi, tenui, albâ, fulvo-fasciatâ; anfractibus angulatis, apicem versus cancellatis: varicibus quinque ad septem, alatis, lævibus, posticè elongatis, falcatis, ad marginem posticum plicâ involutis, ad caudam exfoliatis: interstitiis in medio uni-plicatis: caudâ elongatâ, subrecurvâ: aperturâ ovali, posticè angulatâ; margine externo perelevato, subcrenato; canali clauso.*

Long. 1·55; lat. ex. var. ·65.

*Hab.* ad insulam Japan. Mus. H. Cuming.

A beautiful species with five to seven broad, smooth, foliated varices in each whorl. Found in deep water.

MUREX INERMIS, Conch. Illustr. f. 87. *Mur. testâ fusiformi, transversè leviter costatâ, albâ: spirâ elongatâ, acutâ; anfractibus septem, rotundatis, ultimo pyriformi; suturis validis, foveolatis: caudâ elongatiusculâ, tortuosâ: varicibus sex, leviter noduliferis, posticè paululùm prolatis, ultimo latiore, crassiore: aperturâ ovali; labio interno, extante, lævi; labio externo crasso, intùs leviter crenulato; ad basin canalis tuberculo valido; canali aperto.*

Long. 1; lat. ex. var. ·40 poll.

*Hab.* ad mare Japonicum. Dr. Sibbald legit.

This singular shell has some of the characters of *Triton*.

MUREX BALTEATUS, Conch. Illustr. f. 83. *Mur. testâ parvâ, crassâ, subrhomboideâ, albo-rubescente, ad varices fusco-nigricante: spirâ subproductâ; anfractibus sex, angulatis: caudâ breviusculâ, exfoliatâ, recurvâ: varicibus sex, anticè inciso-fimbriatis, à tergo costatis; spinis brevibus, paululùm crispatis, unâ ad angulum posticum, deinde brevioribus quatuor, ad caudam duabus minutis, rectis: aperturâ ovali; labio interno posticè prolato, anticè valdè extante; labio externo crenulato, extante: canali ferè clauso.*

Long. ·95; lat. ex. var. ·47 poll.

*Testâ juniore: caudâ elongatâ, validè ascendente.*

*Var. Testâ breviore: varicibus validioribus: aperturâ roseâ.*

*Hab.* ad insulam Masbate, Philippinarum. H. Cuming legit.

The name given above has been applied to this shell by Dr. Beck, who, however, has not described it. Found in coral reefs.

MUREX CYCLOSTOMA, Conch. Illustr. f. 100. *Mur. testâ rhomboideâ, subventricosâ, pallidè griseo-fulvâ: spirâ longitudine aperturam et canalem æquante; anfractibus quinque, exiguis, rotundatis, transversè costatis; suturis validis, excavatis: caudâ brevi, latâ, recurvâ, exfoliatâ: varicibus sex, angulatis, crassis, magnis, utrinque costatis, anticè inciso-fimbriatis, posticè foveolatis, supernè subspinosis: aperturâ ovali rotundatâ, ferè integrâ; labio interno lævi, extante; labio externo extùs crenulato; canali ferè clauso.*

*Variat caudâ elongatâ, valdè recurvâ: varicibus spinis crispis armatis.*

Long. ·75; lat. ex. var. ·40; lat. var. incl. ·50.

*Hab.* ad insulam Bohol Philippinarum. H. Cuming legit.

The elongated, slender, elevated caudal canal, as well as the more distinct spines of the smaller shell, must be considered as a variation resulting partly from difference of age, partly from locality, and other circumstances. Sandy mud, 7 fathoms. – Loay.

MUREX BREVICULUS, Conch. Illustr. f. 37. *Mur. testâ rhomboideâ, brevi, ventricosâ, albâ, fulvo-fasciatâ: varicibus quatuor, crassis, nodulosis, inter nodulos utrinque foveolatis: spirâ brevi; anfractibus rotundatis: aperturâ rotundatâ, ad marginem crenatâ: caudâ brevi, subitò recurvâ; canali ferè clauso.*

Long. ·90; lat. ex. var. ·55.

*Hab.* —— ? Mus. G. B. S. Sen., H. Cuming, Stainforth.

Differing from *M. tetragonus*, *Brod.*, in the shortness of the shell, and in the caudal canal, which is turned abruptly over the back of the last whorl.

MUREX PERUVIANUS, Conch. Illustr. f. 116. *Mur. testâ fusiformi, subventricosâ, pallidè fulvâ, transversè costis fuscis, numerosis cingulatâ: varicibus novem: spinis numerosis ad angulum posticum crispatis, ad caudam duabus subelongatis, falcatis: spirâ elongatâ; anfractibus septem, rotundatis, posticè subplanatis: caudâ subelongatâ, exfoliatâ: aperturâ magnâ, posticè subangulatâ.*

Long. 1·20; lat. ·60.

*Hab.* ad Peruviam. Mus. H. Cuming.

MUREX NODULIFERUS, Conch. Illustr. f. 101. *Mur. testâ subrhomboideâ, crassâ, lævi, albo-lutescente: spirâ elongatâ; anfractibus sex, subangulatis; suturis inconspicuis, undatis: caudâ brevi, subexfoliatâ: varicibus sex, crassis, striatis, posticè obsoletis, lævibus: tuberculis nigrescentibus, ad angulum posticum uno subfrondoso, crasso, recurvo, crispato, minore anticè annexo, in medium anfractûs uno angusto, angulato, minore anticè annexo, ad caudam uno parvo: aperturâ luteâ subquadratâ; labio interno vix extante, lævi, anticè subcrenulato; labio externo angulato, intùs denticulato; canali latè aperto.*

Long. 1·10; lat. ex. var. ·55 poll.

*Hab.* ad insulam Masbate. H. Cuming legit.

Found in coral reefs.

Mr. Gould commenced the exhibition of fifty new species of Birds from his Australian collection, and proposed to bring forward the remainder of them at the succeeding meetings of the Society; those now exhibited were three new species of small Grass Parrakeets (*Euphema* of Wagler); for these he proposed respectively the names *Eu. splendida, aurantia,* and *petrophila.*

EUPHEMA SPLENDIDA. *Euph. facie et plumis auricularibus intensè cæruleis: pectore rufescenti-aurantiaco: humeris et alarum tectricibus lazulino-cæruleis.*

Face and ear-coverts deep indigo-blue, becoming lighter on the latter; all the upper surface grass-green; shoulders above, and wing-coverts beautiful lazuline blue; shoulders beneath deep indigo-blue; primaries and secondaries black, the former margined externally with blue, the latter with green; two centre tail-feathers dark brown; the remaining feathers black on the base of the internal webs, green on the base of external webs, and largely tipped with bright yellow; chest rich reddish orange; under surface yellow, becoming green on the flanks.

Total length, 8 inches; wing, $4\frac{1}{2}$; tail, $4\frac{1}{2}$; tarsi, $\frac{1}{2}$.

*Hab.* Western Australia.

EUPHEMA AURANTIA. *Euph. vittâ frontali lazulino-cæruleâ; loris viridibus: abdomine maculâ grandi splendidè aurantiacâ ornato.*

*Male.*—Frontal band blue, margined before and behind with a very faint line of greenish blue; crown of the head and all the upper surface deep grass-green; shoulders, many of the secondaries, and outer edges of the primaries deep indigo-blue; lores, cheeks and breast yellowish green, passing into greenish yellow on the abdomen and under tail-coverts, the centre of the abdomen being ornamented with a large spot of rich orange; two centre tail-feathers green; the next, on each side, blackish brown on the inner, and green on the outer webs; the remainder blackish brown on their inner, and green on their outer webs, and largely tipped with bright yellow; irides very dark brown, becoming lighter on the under side; legs and feet dull brown.

*Female.*—Possesses the orange spot, but in her it is neither so extensive nor so brilliant.

Total length, $8\frac{1}{2}$ inches; wing, $4\frac{1}{4}$; tail, $4\frac{1}{4}$; tarsi, $\frac{1}{2}$.

*Hab.* Van Diemen's Land and the Actæon Islands in D'Entrecasteaux Channel.

EUPHEMA PETROPHILA. *Euph. vittâ frontali intensè cæruleâ; loris et spatio circum oculos sordidè viridibus.*

Frontal band deep indigo-blue, bounded before and behind with a very narrow line of dull verditer-blue; lores and circle surrounding the eye dull verditer-blue; all the upper surface yellowish olive-green; under surface the same, but lighter, and passing into yellow, tinged with orange on the lower part of the abdomen; under surface of the shoulder indigo-blue; a few of the wing-coverts greenish blue; primaries brownish black on their inner webs, and deep indigo-blue on the outer; two centre tail-feathers bluish green; the remainder of the feathers brown at the base on the inner webs, green at the base on the outer webs, and largely tipped with bright yellow; irides dark brown; bill blackish brown; feet flesh-brown.

Total length, 8 inches; wing, $4\frac{1}{4}$; tail, $4\frac{1}{2}$; tarsi, $\frac{1}{2}$.

*Hab.* Western Australia.

Two new and highly interesting species of *Climacteris* were characterized as *Climacteris erythrops* and *C. rufa*; and Mr. Gould observed that four species of this genus now formed part of the Australian fauna.

CLIMACTERIS ERYTHROPS. *Clim.* Mas: *loris et spatio circum oculos rufescenti-castaneis; gulâ albidâ: pectore cinereo.*

Fœm. *plumis pectoris ferrugineis, singulis lineâ albâ centrali notatis, distinguenda.*

*Male.*—Crown of the head blackish-brown, each feather margined with grayish brown; lores and a circle surrounding the eye reddish chestnut; back brown; sides of the neck, lower part of the back, and upper tail-coverts, gray; primaries blackish brown at the base, and light brown at the tip, all but the first crossed in the centre by a broad band of buff, to which succeeds another broad band of blackish brown; two centre tail-feathers gray, the remainder blackish brown, largely tipped with light gray; chin dull white, passing into grayish brown on the chest; the remainder of the under surface grayish brown, each feather having a broad stripe of dull white, bounded on either side with black running down the centre; the lines becoming blended, indistinct, and tinged with buff on the centre of the abdomen; under tail-coverts buffy white, crossed by irregular bars of black; irides brown; bill and feet black.

The *female* differs in having the chestnut marking round the eye much richer, and in having, in place of the grayish brown on the breast, a series of feathers of a rusty red colour, with a broad stripe of dull white down their middles, the stripes appearing to radiate from a common centre: in all other particulars her plumage resembles that of the male.

Total length, 5 inches; bill, [illegible] wing, 3[illegible]; tail, [illegible] tarsi, [illegible]

*Hab.* New South Wales

Climacteris rufa. *Clim. gutture plumis auricularibus, et abdomine ferrugineis.*

*Male.*—Crown of the head and all the upper surface and wings, dark brown, tinged with rufous on the rump and upper tail-coverts; primaries brown, all but the first crossed by a broad band of rufous, to which succeeds a second broad band of dark brown; two centre tail-feathers brown, indistinctly barred with a darker hue; the remainder pale rufous, crossed by a broad band of blackish brown, and tipped with pale brown; line over the eye, lores, ear-coverts, throat, and under surface of the shoulder rust-brown; chest crossed by an indistinct band of rufous brown, each feather with a stripe of buffy white, bounded on each side with a line of black down the centre; the remainder of the under surface deep rust-red, with a faint line of buffy white down the centre of each feather, the white line being lost on the flanks and vent; under tail-coverts light rufous, with a double spot of blackish brown at intervals along the stem; irides dark reddish brown; bill and feet blackish brown.

*Female* rather less in size; in colour the same as the male, but much lighter, without the bounding line of black on each side of the buff stripes on the breast, and having only an indication of the double spots on the under tail-coverts.

Total length, 6 inches; bill $\frac{7}{8}$: wing, $3\frac{1}{2}$; tail, $2\frac{5}{8}$; tarsi, $\frac{7}{8}$.

*Hab.* Western Australia.

And a new and beautiful *Ocypterus*, by far the best-marked species of the genus, as

Ocypterus personatus. *Ocypt. gulâ et plumis auricularibus nigris: corpore subtùs in toto cinereo.*

Face, ear-coverts and throat jet black, bounded below with a narrow line of white; crown of the head sooty black, gradually passing into the deep gray which covers the whole of the upper surface, wings and tail; the latter tipped with white; all the under surface very delicate gray; thighs dark gray; irides blackish brown; bill blue at the base, becoming black at the tip; legs and feet mealy bluish gray. Total length, $6\frac{1}{2}$ inches; bill, 1; wing, 5; tail, 3; tarsi, $\frac{3}{4}$. About the size and having much the contour of *Ocypt. superciliosus.* It is one of the finest and best-marked species of the genus, the jet black colouring of the face and throat distinguishing it from every other. The sexes are nearly alike in colour.

*Hab.* Southern and Western Australia.

Ptilotis plumulus. *Ptil. loris nigris: plumis auricularibus fuscis, infra has penicillis duobus, uno angustissimo et nigro, altero lato et nitidè flavo.*

Crown of the head and all the upper surface olive-yellow, approaching to gray on the back; lores black; ear-coverts, throat and under surface yellowish gray, faintly striated with a darker tint; behind the ear two tufts, the upper of which is narrow and black, the lower more spread over the sides of the neck, and of a beautiful yellow; primaries and tail-feathers brown, margined with bright olive-yellow; irides very dark reddish brown; bill black; legs and feet apple-green.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{3}{4}$; wing, $3\frac{1}{4}$; tail, $2\frac{3}{4}$; tarsi, $\frac{3}{4}$.

*Hab.* Western Australia.

Hemipodius velox. *Hem. gutture, pectore et lateribus pallidè arenaceo-fuscescentibus; facie, vertice, et plumis auricularibus castaneo-rufis.*

*Female.*—Head, ear-coverts, and all the upper surface, chestnut-red; crown of the head with a longitudinal buff mark down the centre; feathers of the back, rump, scapularies, and sides of the chest, margined with buff, within which is a narrow line of black running in the same direction; the feathers of the lower part of the back also crossed by several narrow irregular bands of black; primaries light brown, margined with buff on their internal edges; throat, chest, and flanks sandy buff, passing into white on the abdomen; bill horn-colour; irides straw-white; legs and feet yellowish white.

Total length, $5\frac{1}{2}$ inches; bill, $\frac{1}{2}$; wing, 3; tarsi, $\frac{3}{4}$.

*Hab.* Interior of New South Wales.

The males are much smaller.

Hemipodius pyrrhothorax. *Hem. gutture, pectore et lateribus arenaceo-rufis, faciei plumis, nec non aurium tectricibus, albis, nigro-marginatis.*

*Female.*—Crown of the head dark brown, with a line of buff down the centre; feathers surrounding the eye, ear-coverts, and sides of the neck, white, edged with black; back and rump dark brown, transversely rayed with bars and freckles of buff and black; wings paler, edged with buff, within which is a line of black; primaries brown, margined with buff; throat, chest, flanks, and under tail-coverts sandy red, passing into white on the centre of the abdomen; bill horn-colour; irides straw-yellow; feet yellowish white.

Total length, $5\frac{1}{2}$ inches; bill, $\frac{9}{16}$; wing, 3; tarsi, $\frac{3}{4}$.

*Hab.* Interior of New South Wales.

Males are much smaller.

Mr. Gould also exhibited at this Meeting certain specimens of *Dasyurus*. The *D. Maugei* and *D. viverrinus* of authors, he stated, were the same species, a fact which he ascertained by finding in the same litter both the black and grey varieties: he then proceeded to point out the characters of a new species of *Dasyurus*, which he proposed to name

Dasyurus Geoffroii. *Das. fuscus, flavo lavatus; caudâ elongatâ, dimidio apicali nigro; corpore subtùs albescente, supra et ad latera albo maculato; pedibus posticis hallucе parvo instructis.*

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudæ basin.... | 15 | 0 |
| ——— *caudæ* ..................... | 11 | 6 |
| —— *tarsi digitorumque* ............ | | |
| —— ab apice rostri ad basin auris..... | | |
| ——— *auris* .................... | 1 | |

*Hab.* Liverpool Plains.

Like the *D. macroura*, the present species possesses a small thumb to the hind foot, a character which serves to distinguish these species from the *D. Maugei*. The *D. Geoffroii* is intermediate in its colouring between the *D. Maugei* of Geoffroy and the *D. macroura*; it resembles the latter in having a long and not very bushy tail, but is distinguishable by there being no spots on this part: the white spots on the head and body are smaller than in either of the species mentioned.

A small Rodent, supposed to be identical with the *Dipus Mitchellii*, was exhibited by Mr. Gould, as well as a skin and skeleton of the *Hapalotis albipes* of Lichtenstein.

Mr. Ogilby, referring to his paper on these two animals in the 18th volume of the Transactions of the Linnaean Society, pointed out the general conformity of reasoning there adduced in support of the rank and affinities of the latter species with the characters of the specimen exhibited by Mr. Gould. The dentition and structure of the skull, indeed, approach more nearly to that of the typical Rats (and closely agrees with *Hapalotis*) than the Jerboas; but the animal is a true Rodent, and from the conformation of the extremities and other influential external organs, appears, as there stated, to represent in Australia the Jerboas and Gerbilles of the Old World.

The eyes are apparently rather large; the ears are very large, broad at the base, and somewhat attenuated at the apex; the fore-legs are proportionately small; the fore-feet are furnished with four toes, and a rudimentary inner toe having a small rounded nail; the hind-legs and tarsi are long; there are five toes to the feet, of which the three central ones are very long; the outer and inner toes are small, especially the latter; the metatarsal bones are evidently not consolidated, as in the Jerboas: the tail exceeds the head and body in length (the latter being measured in a straight line), and exhibits scales and minute interspersed hairs at the base, like the Rats; but the apical third is furnished with long hairs, averaging rather more than half an inch in length; those which spring from the upper surface are of a brown-black colour, but on the under surface they are white: the fur of the animal is rather long, and very soft; the general colour of that of the upper surface of the head and body is brownish yellow, freely pencilled with black; on the sides of the body a yellowish hue prevails; the whole of the under parts, as well as the feet, are white: the hairs on both the upper and under parts of the body are of a deep slate-grey at the base. The dimensions of this interesting little animal are as follows:—

| | inches. | lines. |
|---|---|---|
| From nose to root of tail . . . . . | 5 | 6 |
| ——— ear | | |
| Length of tail . . . . . . . . . . . . . | 5 | 7 |
| ——— ear. . . . . . . . . . . . . . . | 0 | 10 |
| ——— *tarsus* . . . . . . . . . . . | 1 | 2 |

It was procured by Mr. Gould from Western Australia.

Nov. 24.—William Yarrell, Esq., Vice-President, in the Chair.

A Letter from Mr. Frembly, R.N., Corresponding Member Z.S., dated Gibraltar, November 13th, 1840, was read. In this letter Mr. Frembly states that he had forwarded for the Society's Museum a species of Petrel, rarely met with at Gibraltar, and that he is in expectation of a collection from Brazil, from which he will select some specimens to present to the Society.

In a letter from Charles Clarke, Esq., dated Colwich Molesley, November 2nd, 1840, which was read, that gentleman, at the request of the Curator, furnishes an account of the habits of a bird recently presented by him to the Society. The bird alluded to "is a native of the mountain-forests of Cuba, never being seen nor heard in the plains. It is named the 'Musician' by the coffee-planters, who invariably, in the south-eastern parts of the island, select the mountains for the site of their plantations, from the well-known fact, that the higher the elevation, *cæteris paribus*, the better the coffee; and this rule may be said to hold good in Cuba, to the height of 3000 feet above the level of the sea.

"The presence of this bird, in land intended to be cleared, is always hailed as highly satisfactory, as indicative of a cool temperature, and therefore of a climate suited for the production of high-priced coffee.

"The specimen presented to the Society was shot in a mountain-halt of forest named 'Brazos de Cauto,' varying perhaps from 1500 to 2500 feet of elevation, and it is found in all parts of that range. The thermometer rises in the lowest parts to 80° Fahrenheit in the summer heats (whilst it will stand in Santiago de Cuba at the same time at 90°); below this, and of course in a higher temperature, the bird is not known to exist.

"It confines itself exclusively to the woods, and takes its name of 'Musician' from its notes being very similar to those of the flute: it possesses only a few notes, and repeats nearly an exact repetition of its rather melancholy pipe at intervals, when in song, of two or three minutes.

"It is very rarely seen, although not a rare bird in many spots: repeatedly have I spent five to ten minutes along with my attendants, fellows of the most piercing vision, in vain efforts to discover the little dusky warbler piping above our heads, and that at no great height; but securely hidden, perhaps designedly, in its tangled and leafy covert.

"I never shot any other specimen, and never have seen more than one or two others during a residence in the Cuba woods of eighteen months.

"In conclusion I may observe, that I have always understood this bird to exist in the highest parts of the mountains of Cuba, estimated to reach 3500 feet; and when the thermometer falls in winter during the northern winds, to a degree little elevated, I should imagine, above the freezing-point. I have seen the thermometer, at an elevation of perhaps 1800 or 1900 feet, fall to 47° during a heavy northern wind last January."

The following memoir, "On the Blood-corpuscles of the common Paradoxure (*Paradoxurus Bondar**)," by G. Gulliver, Esq., was next read.

"Referring to my notes concerning the red particles of this animal, I was rather surprised to find that they appeared to be quite peculiar in size, when compared with the particles of the other species of the order *Feræ*. Hence I have been led to examine again the blood-corpuscles of the common Paradoxure, and those of two other species of the genus. The result confirms the general accuracy of my first observations, and as the subject appears to me both novel and interesting, I am induced to bring it briefly before the Society.

"The following measurements are expressed in fractional parts of an English inch. The common-sized corpuscles are first noted, then those of small and large size, and lastly the average deduced from a computation of the whole.

"1. Common Paradoxure (*Paradoxurus Bondar*).

| | |
|---|---|
| | 1·5665 |
| | 1·6000 |
| | 1·7110 |
| | 1·4570 |
| Average . . | 1·5693 |

"2. Two-spotted Paradoxure (*Paradoxurus binotatus*, Temm.).

* The animal in question is marked at the Zoological Gardens *P. typus*, F. Cuv.; and by this name I have previously mentioned it. But I have lately been informed that it is the *P. Bondar* of authors.

1·4572
1·4800
1·5052
1·6000
1·3555

Average . . 1·4660

"3. White-whiskered Paradoxure (*Paradoxurus leucomystax*, Gray).

1·4500
1·4365
1·4000
1·6000
1·3200

Average . . 1·4236

"From a comparison of these measurements with the notes of numerous others, published in the Philosophical Magazine for January, February, March and August, 1840, it will appear that, although the corpuscles of the Two-spotted and of the White-whiskered Paradoxure are not very remarkable for minuteness, yet the corpuscles of the common Paradoxure are not only smaller than the red particles, which have yet been examined, of any other carnivorous animal, but so minute as to approach to those of the goat in size.

"The blood-corpuscles of the latter animal were the smallest known to physiologists previously to my announcement in the Dublin Medical Press for November, and in the Philosophical Magazine for December 1839, of the singularly minute size of the corpuscles of the Napu Musk Deer (*Moschus Javanicus*); and I may notice, that another examination of the very remarkable blood-discs of this little ruminant has fully confirmed the accuracy of my former observations.

"It has long since been observed, that the size of the blood-corpuscles does not seem to be influenced by that of the animal. Thus Hewson figures them of the same magnitude in the ox, cat, ass, mouse, and bat. If, however, we compare a great number of measurements, taken from the corpuscles of different animals of the same order, it will appear generally that the larger species have comparatively large blood-corpuscles, and *vice versâ*. For numerous confirmations of this rule, if it may be so called, it will be sufficient to refer to my measurements in the Philosophical Magazine before quoted. Compare, for example, among the Rodents, the blood-corpuscles of the Capybara, the Coypu and Hoary Marmot, with those of the Squirrels; and among the Ruminants the large corpuscles of the Sambur, Wapiti, and Moose Deer, with the small corpuscles of the Napu Musk Deer, Sheep, and Goat. Many exceptions, however, will be found to the rule, particularly in the order *Feræ**; but as I propose, on a future occasion, to treat more at length on the subject, it is merely mentioned now with the view of suggesting what may appear to be a curious and interesting inquiry."

* Vide Proc. Zool. Soc., May 25, 1841.

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END OF THE SEVENTH VOLUME.

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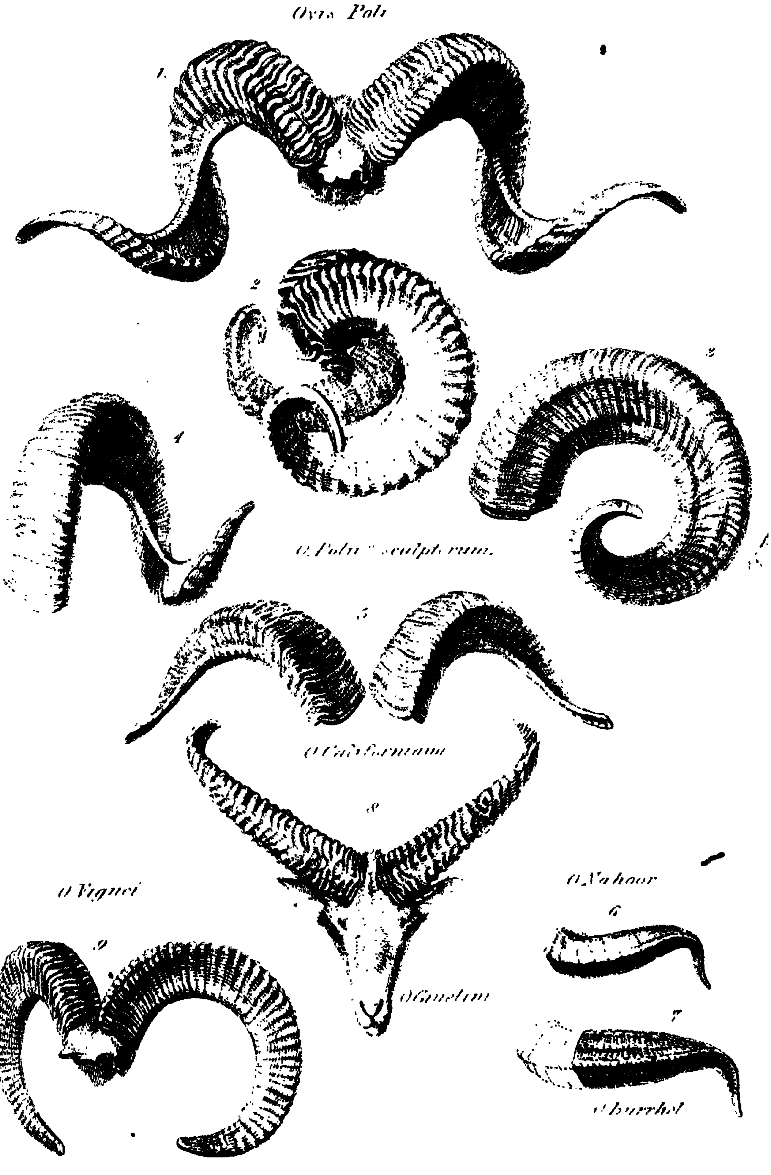
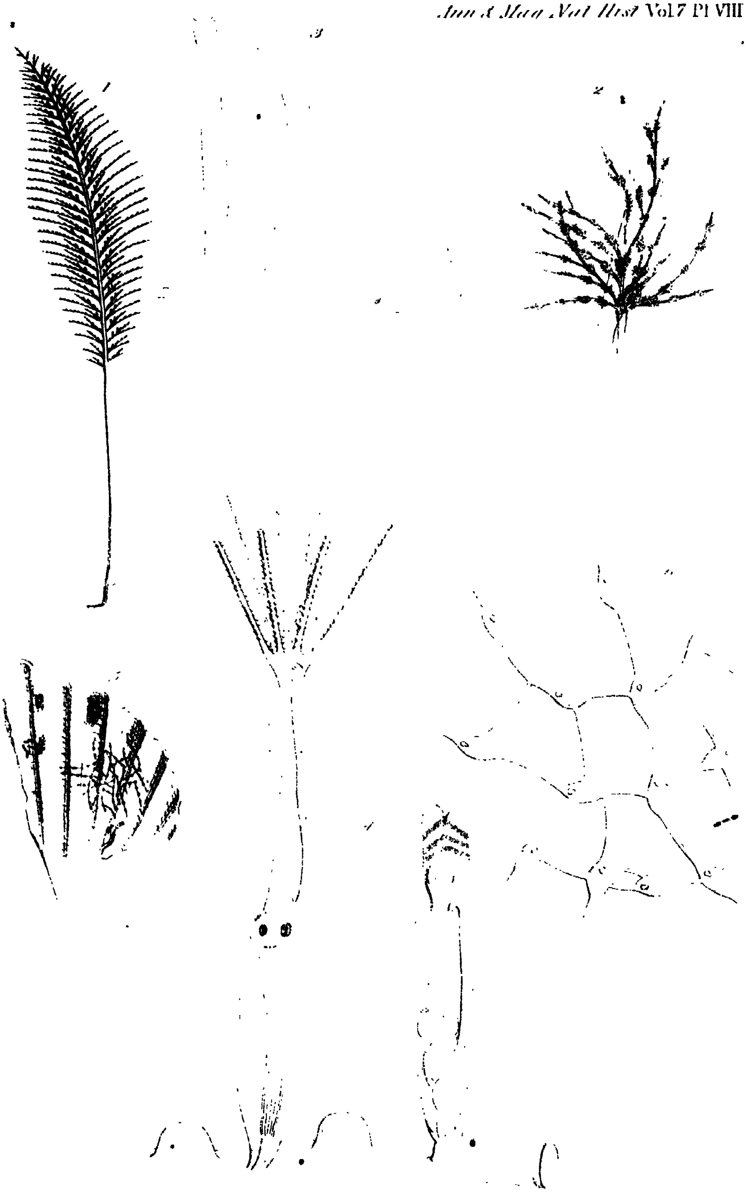
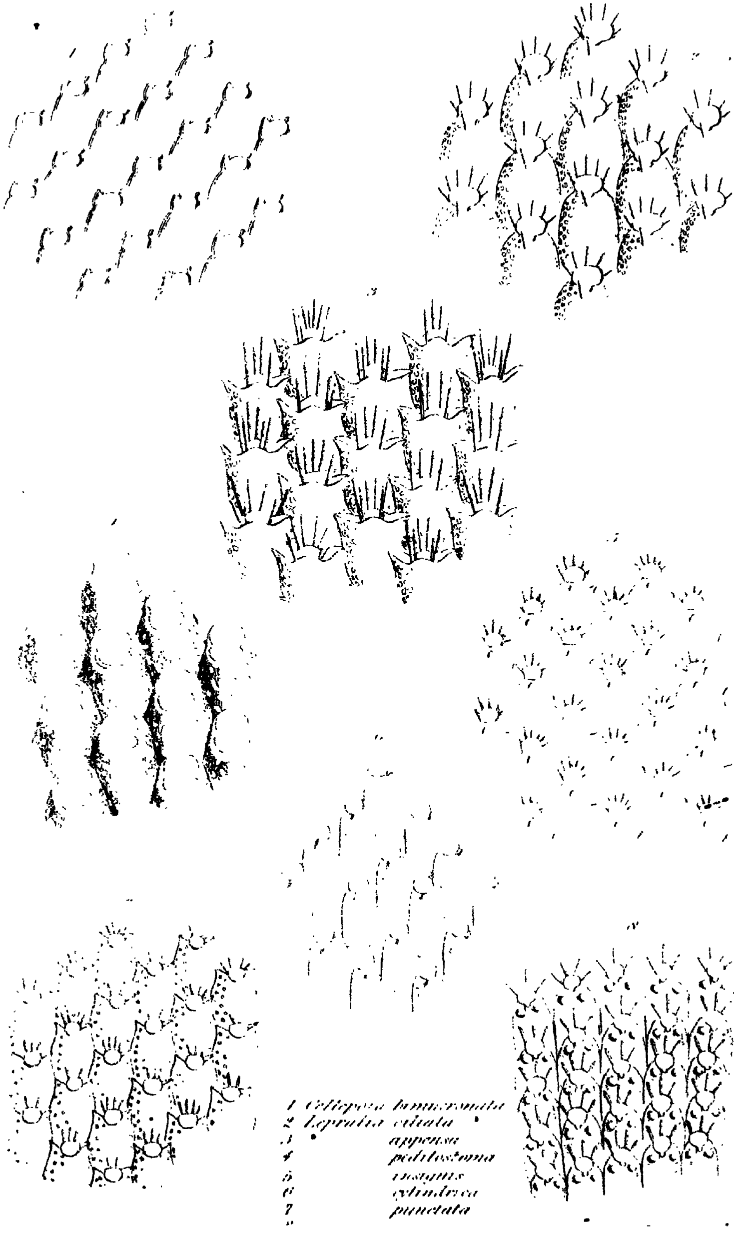
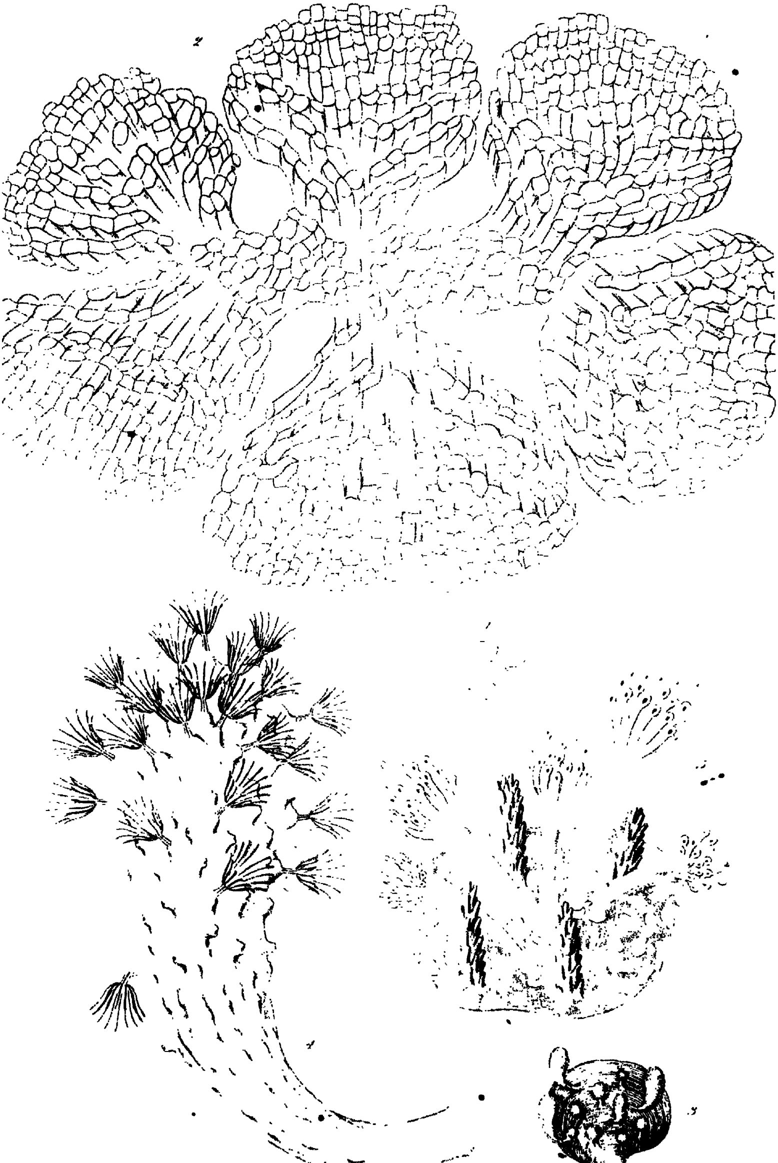

Ovis Poli
1.
2
3
4
O. Polii ? sculptorum.
5
O. Californiana
8
O. Nahoor
6
O. Vignei
9
O. Gmelini
7
O. burrhel



1 Plumularia frutescens
2. Valkeria imbricata
3 Laugenella repens?
4 Valkeria new species
5 Hippothoa lanceolata.
6 do mag^d

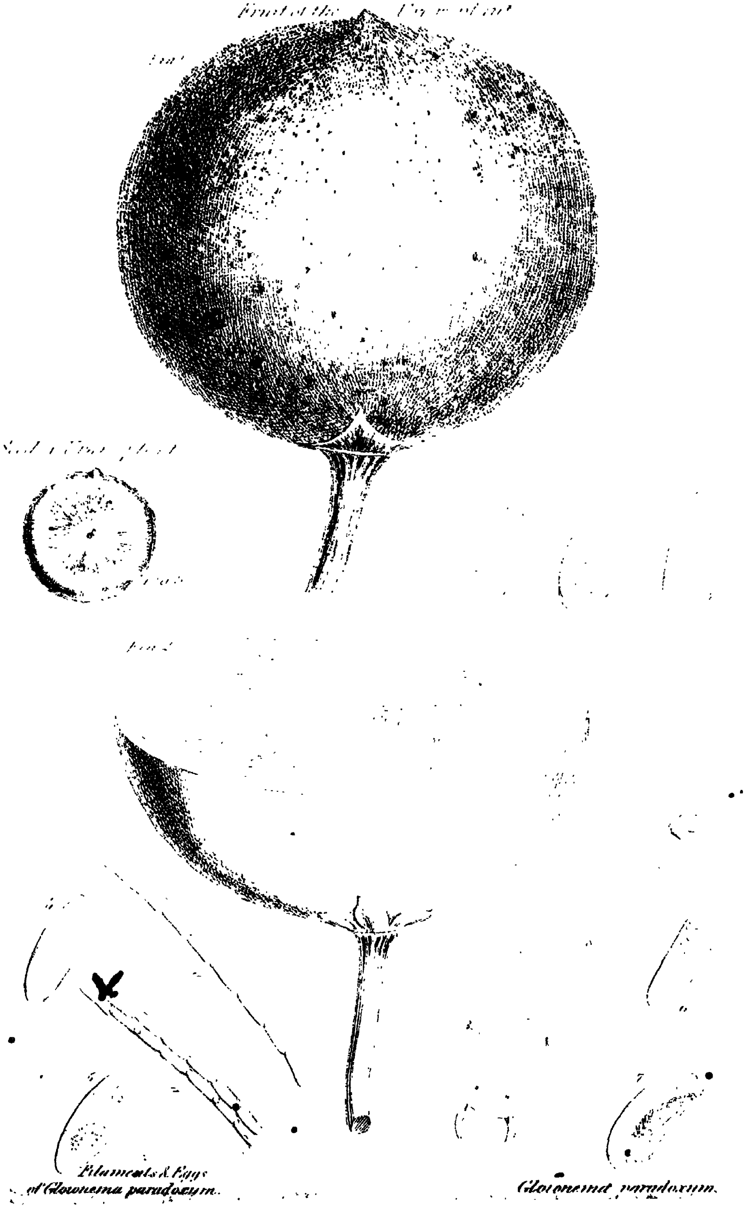


1 *Cellepora bimucronata*
2 *Lepralia ciliata*
3 " *appensa*
4 " *pedilostoma*
5 " *insignis*
6 " *cylindrica*
7 " *punctata*
8




1–2. Tubulipora lobatula

The Urari Plant. Strychnos toxifera.



Filaments & Eggs of Gloionema paradoxum.

Gloionema paradoxum.