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THE ANNALS
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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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AND

RICHARD TAYLOR, F.L.S., F.G.S.

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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, proportionem, renovationem, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; a vere eruditis et sapientibus semper exulta; male doctis et barbaris semper inimica fuit."—
LINN.



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* In the notice on this subject at p. 325 the number of the plate was not referred to.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

"..... per litora spargite muscum,
Naiades, et circum 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. 67. JANUARY 1843.

I.—*Account of a Species of Ichneumon whose Larva is parasitic on Spiders.* By JOHN BLACKWALL, F.L.S.*

IMMATURE spiders of the species *Epeïra antriada* and *Epeïra cucurbitina*, and adults of the species *Linyphia minuta* and *Linyphia pusilla*, are frequently infested by the larva of a small *Ichneumon*, which feeds upon their juices and ultimately occasions their death. This parasite is always attached to the upper part of the abdomen, near its union with the cephalothorax, generally in a transverse but occasionally in a longitudinal direction, and, though it proves a source of constant irritation, is secured by its position from every attempt of the spider to displace it. Being apodous, it appears to retain its hold upon its victim solely by the instrumentality of the mouth and of a viscid secretion emitted from its caudal extremity. I never saw more than a single larva on the same individual spider, which, indeed, could not supply sufficient nourishment for two.

In the earlier stages of its growth this parasite has an oblong oviform figure, somewhat depressed on the under side ; it is whitish with a faint tinge of yellow extending along the medial line, which seems to be occasioned by the contents of the viscera. At this period of its existence the external covering presents a smooth uniform surface ; but when it has completed its moultings and attained its full size, the head becomes visible, the body exhibits thirteen distinct segments, and the prevailing hue is pale greenish yellow.

* Read at the Manchester Meeting of the British Association.

In April 1838, I captured a young female *Epeira antriada* with one of these parasites upon it, and placing it in a phial of transparent glass, I supplied it with flies. Towards the end of May, having gone through its final moult and increased considerably in size, this larva became very restless, and on the 29th quitted the spider, which was found dead and much shrunk at the bottom of the phial, and attaching itself to the extremity of the cork with which the phial was stopped, it began to spin its envelope. On the 31st it had completed its cocoon, which was composed of pale yellowish white silk of a compact texture, and measured one-third of an inch in length and one-tenth in diameter; it was of an oblong quadrilateral figure tapering to its extremities, one of which was more pointed than the other, and was connected with the cork by numerous fine silken lines.

The perfect insect came out of the cocoon, at the larger end, on the 27th of June, and proved to be the female of a small species of *Ichneumon*; but whether it is known to entomologists or not I have not yet been able to ascertain*.

The length of this insect from the anterior part of the head to the extremity of the abdomen, not including the ovipositor, was one-fourth of an inch; the breadth from tip to tip of the anterior wings when expanded, $\frac{1}{2}\frac{1}{4}$ ths. The antennæ were filiform and had each twenty-four joints. The maxillary palpi had five joints, and the labial palpi four. The tibiæ were terminated by two spurs on the under side. The tarsi had five joints, of which the penultimate was the shortest, and the claw-joint was provided with two curved claws and a pulvillus. The head, antennæ, and several parts of the trunk were brownish black, with the exception of the organs of manducation, which were brown. An oblong soot-coloured spot occurred near the exterior margin of each anterior wing, a little beyond the middle towards the extremity. The legs, and the maxillary and labial palpi, were of a yellowish brown colour, the tarsi and the extremities of the tibiæ of the posterior legs excepted, which were brown. The abdomen consisted of eight segments: the first, which was the longest, was rather narrow and of a brownish black colour; the others were dark brown above, but the posterior margins of the second, third, fourth, and fifth were much the darkest. The caudal or terminal segment was the shortest, and had a small hairy process on each side, at the extremity. All the segments, except the first, were pale brown on the under side of

* Mr. Stevens, to whom we referred the insect in question, kindly informs us that it is the *Polysphincta carbonaria* of Gravenhorst.—Ed.

the abdomen. The ovipositor was hairy, very dark brown, and measured $\frac{1}{4}$ th of an inch in length.

On the 20th of July 1838, I obtained a young female *Epeira antriada*, to whose abdomen a full-grown larva of this *Ichneumon* was attached, and placed it in a phial. On the 23rd the larva became restless and destroyed the spider, after having reduced it to a mere corrugated skin; then quitting it, and taking its station on the extremity of the cork which stopped the phial, it commenced spinning its cocoon, and completed it on the 24th.

Out of this cocoon, which exactly resembled the one described above in figure and colour, though it was somewhat less, a male *Ichneumon* issued on the 16th of August.

This insect was without ovipositor, and was smaller than the female bred from the larva found on the female *Epeira antriada* captured in April 1838; its antennæ also had each twenty-two joints only; but these differences may be regarded as sexual peculiarities merely; the close resemblance of the two insects in other particulars, and the exact correspondence in the œconomy of their larvæ, leave no doubt about their specific identity.

On the 26th of October 1841, I caught an adult female *Linyphia minuta* with a parasitic larva, which had completed its moulting, fixed upon its abdomen, and enclosing it in a phial I fed it with flies. The larva increased in growth till the 1st of February 1842, when it destroyed the spider, which was much reduced in size, and having quitted it, attached itself to the under side of a slight horizontal sheet of web previously constructed in the phial by the spider. In this situation it remained till the evening of the same day, when it commenced spinning its cocoon, and on the evening of the day following had completed it. This cocoon was composed of brown silk of a compact texture, and was of an oblong quadrilateral form tapering to its extremities, one of which was more pointed than the other.

As this insect did not go through its final metamorphosis, I am unable to decide whether it differed specifically from those already described or not; but it is very probable that it did not, as the dissimilarity in the colour of the silk composing its cocoon may be reasonably ascribed to the quality of the food derived from a different species of spider, for it is a well-known fact that animal secretions are frequently modified in colour by changes of diet. As for the circumstance of the cocoon having been connected with the web of the spider which supplied the larva with sustenance, it may be considered as accidental; at all events, the spiders in the two former cases detailed in this paper did not construct webs,

but merely spun a few irregular lines to which they attached themselves.

It is a fact deserving of notice, that immature spiders infested with the larva of this *Ichneumon* do not change their skins. Were it not for this admirable provision of Providence, the larva, cast off with the integuments in the act of moulting, would inevitably perish, and the important purpose which its remarkable œconomy is so evidently intended to subserve, namely, the keeping of these deadly enemies of the insect tribes within due limits, would fail to be accomplished.

Various circumstances concur to render it probable that this species of *Ichneumon* deposits its eggs on spiders in the autumn, attaching one only to the abdomen of each individual.

Messrs. Kirby and Spence, in treating on the diseases of insects in the fourth volume of their 'Introduction to Entomology,' have given a brief account of observations made by De Geer on the larva of a small *Ichneumon* discovered on a young spider, whose œconomy is similar to that of the parasite which has engaged my attention*.

Being desirous of ascertaining whether these insects were of the same species or not, and having no opportunity of consulting De Geer's celebrated work, I availed myself of the assistance of Mr. Peter Barrow of Manchester, who obligingly transcribed all that the Swedish entomologist had published on the subject, and transmitted it to me in Wales.

On perusing the description of the female *Ichneumon* bred from the larva which formed the subject of his investigations †, I found that it presented several decided points of difference in colour from the species observed by me, from which it may be distinguished at once by the two longitudinal yellowish lines on its thorax.

It scarcely admits of a doubt, that the whitish oval object noticed by Baron Walckenaer on a specimen of *Linyphia montana* ‡, which seems to have induced no small degree of surprise and perplexity in the mind of that accomplished arachnologist, was the parasitic larva of a small species of *Ichneumon* §.

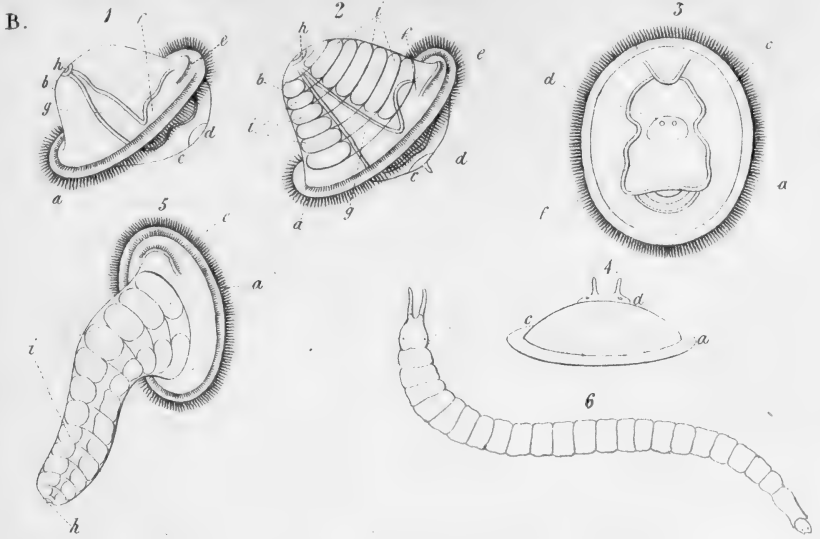
* Letter 44. p. 221.

† Mémoires pour servir à l'Histoire des Insectes, tom. ii. p. 866.

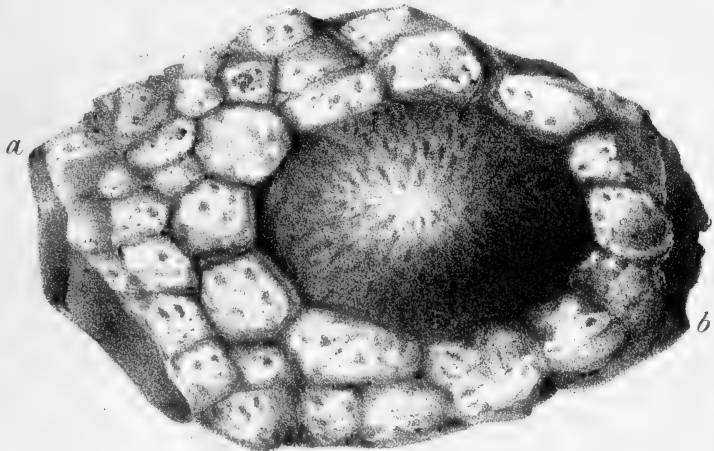
‡ Histoire Naturelle des Insectes Aptères, tom. i. p. 176.

[§ In a letter recently received from the author he thus writes: "The insect is not uncommon in this neighbourhood (Oakland); indeed, the *Ichneumonidæ* abound throughout the district. Two other species belonging to this family, which deposit their eggs in those of spiders, have come under my observation; one is very small and black; the other is small, though larger than the former; and the female, which is apterous, is of an orange-red colour, with a black head, and a zone of the same hue encircling the abdomen."—ED.]





C.



Section from a. to b.



II.—*Notice of Saurian Dermal Plates from the Wealden of the Isle of Wight.* By JOHN EDWARD LEE*.

[With a Plate.]

It is well known that the chief interest of the Wealden formation arises from the number of its saurian remains. Few beds contain so many genera, and at no other geological period did there exist reptiles of such enormous magnitude. The distribution of these fossils is in general extremely local, and they seldom occur in any other form than as detached bones.

All these circumstances render the determination of any new remains a matter of difficulty; and this remark applies very forcibly to three fossils which were found in the Hastings sands of Sandown Bay in the Isle of Wight, and which evidently appear to be the dermal plates of some of the saurians found in this formation.

The first and most perfect of the three is represented of the natural size in the annexed plate (Plate I. C.): it is of an irregularly oval shape. In the centre of the upper side is a deep oval depression, within which is a prominence rising gradually to the summit, which is eccentric. The space around the depressed part is slightly concave and is intersected by deep furrows, which are so arranged that the whole of this space might be said to consist of a number of obscurely pentagonal or hexagonal prominences, the surfaces of which are flattened and in some cases slightly concave. The lower side of the scale is convex. A general idea of the proportion may perhaps be better obtained by the lower figure, which represents a section from *a* to *b*. The fibrous bony structure is very apparent at the sides of both this scale and that next to be described, and the whole surface of both of them is covered with small pores, some of which, particularly on the central prominence, run together and form minute furrows.

The second scale is more irregular in its form, but the general characters are so similar to those of the former, that it most probably belonged to an animal of the same species. There is the same central depression, the same prominence within it, and the outer space is divided in a similar manner by furrows, but all these characters are far more obscure than in the other: the form also is not oval, but approaches to a

* The substance of the following paper was forwarded some time ago for insertion in the 'Ann. of Nat. Hist.,' together with drawings of the two scales first described. Unfortunately, however, the paper, drawings, and the two fossils themselves were lost in a hackney-coach on their way to Mr. Sowerby. A drawing of the most interesting scale has, however, been preserved in the hands of Mr. Charlesworth, who kindly returned it for the sake of illustrating the present notice.

square with one or two of the corners broken off, and both the upper and under sides are nearly flat and parallel.

The third dermal plate is not sufficiently perfect to admit of a drawing, but the characters, as far as they can be distinguished, are rather different from those of the other two. Like the first, the figure is oval and the under side convex, but the upper side is chiefly occupied with three ridges, rising gradually from the circumference to an eccentric summit. There is not the same appearance of porosity as on the surfaces of the other two, but the structure is decidedly bony. The general appearance bears some resemblance, on a large scale, to the plates which ornament the head of the recent Iguana, and it is only to be regretted that a specimen of this nature had not been secured before it became water-worn, as it might have afforded another link to connect the Iguanodon with the recent Iguana.

With respect to the other two scales, there do not appear to be any characters to connect them with the Iguanodon by a comparison with the living Iguana. The common Crocodile is furnished with large and strong plates, which in some parts of the body are oval; but, as far as I am aware, neither the scales of the crocodile nor those of any other recent reptile have exactly the same characters as the fossil plates.

But little assistance can be derived in their determination from the associated fossils. In the same locality were found the teeth of the Crocodile and the Iguanodon, and gigantic bones which have usually been considered as those of the latter saurian. One vertebra from Sandown Bay weighs above 14 lbs., and a portion of one of the bones of the leg is 26 inches in length. In the same formation, at Brixton Bay, the bones are still more gigantic: the upper part of a femur was obtained there, which measures 13 inches from the outer side of the head to the point of the trochanter. Fragments of bones of these dimensions are not uncommon in the Isle of Wight, so that it appears singular, if these scales belonged to the Iguanodon, that they should not have been before noticed; besides which, there is nothing like them in the covering of the recent Iguana, and they appear almost too small for a saurian of the size of the Iguanodon. Again, if we consider them as the scales of the Wealden Crocodile, the analogy with the recent animal certainly in a measure favours the idea; but still the question may very naturally be asked,—what has become of the scales of all the crocodiles from which the innumerable teeth in the Sussex beds are derived? None but those who have personally examined these beds can have any idea of the immense number of teeth and bones which they contain: it

cannot be argued that they have perished, for the most delicate bones are preserved, as well as the finest scales of the *Lepisosteus*; so that, to say the least, there certainly appears to be a difficulty in referring them to the Crocodile.

There are other genera the remains of which are found in the Wealden formation, but very little is known respecting them, and it would be little better than conjecture to refer the scales in question to the *Megalosaurus* or the *Phytosaurus*, because there were difficulties in referring them to the Crocodile or the *Iguanodon*. Before long it may be hoped that other specimens will be found under more favourable circumstances with respect to their determination.

III.—*On the Discovery of the Remains of a Mastodontoid Pachyderm in Australia.* By Prof. OWEN, F.R.S.

To the Editors of the Annals of Natural History.

GENTLEMEN,

I HAVE lately received a letter, dated April 6, 1842, from Sir Thomas Livingstone Mitchell, Surveyor-General of Australia, in which he announces the interesting discovery of large fossil mammalian remains in that continent. The specimens from the bone-caves in Wellington Valley, described in the second volume of Sir Thomas's work on Australia, were, it may be remembered, remains of extinct species of marsupial genera now existing in that continent, and of a genus very nearly allied to the existing ones; the largest fossil, which had been supposed to belong to a *Hippopotamus* or *Dugong*, indicating rather an extinct gigantic *Phascolome*; and there was not any conclusive evidence of a genus of placental mammal in that collection*.

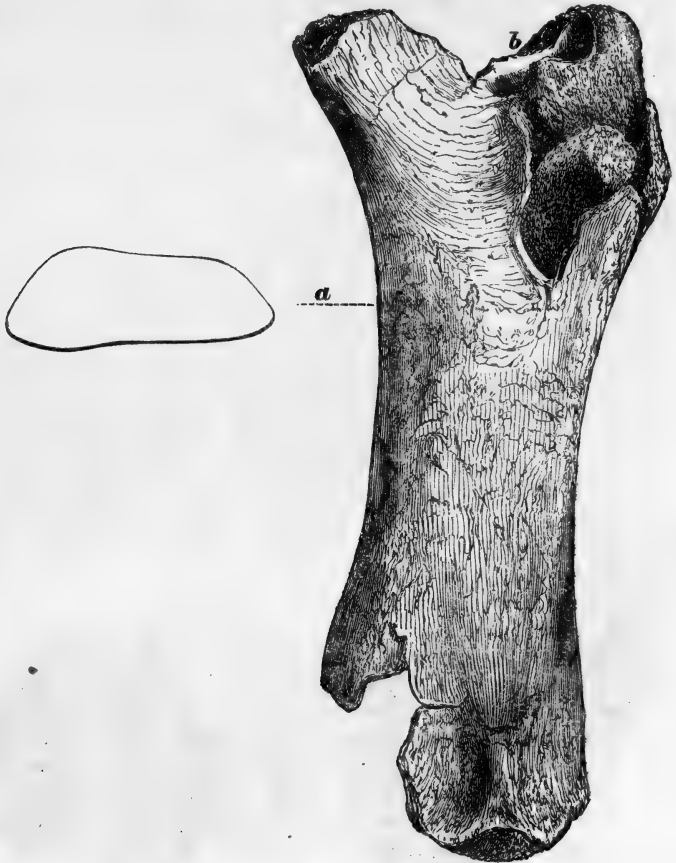
The fossils, which my friend has now transmitted, incontestably establish the former existence of a huge proboscidian *Pachyderm* in the Australian continent, referable to either the genus *Mastodon* or *Dinotherium*. These fossils consist of a portion of a molar tooth, and of the shaft of a femur with part of the spine of a scapula, and some smaller fragments of a long bone. Sir Thomas states, "these are not satisfactory specimens such as I hope soon to send you, but being the first from the locality, I am anxious you should first hear of them. I can tell you but little of the manner in which they occur; but such bones are found on the Darling Downs—those extensive plains which you will see marked to the S.W. of Moreton Bay on most maps of this country. They are at the

* Mr. Pentland informs me that a bone of a large quadruped, apparently a pachyderm, from the Wellington Valley, is, he believes, in the Museum at Paris.

sources of the Darling river and at a great height above the level of the sea, upwards of 4000 feet. I am informed that these huge bones, of which I send you but fragments, are found in some abundance."

These fragments, when their broken surfaces were re-adjusted, composed the very considerable part of the right femur, of which the subjoined cut, fig. 1, gives a view of the posterior and most entire surface, one-fifth the natural size;

Fig. 1.



the contour of the circumference at (a) illustrates the principal characteristic of the bone, viz. its being flattened from before backwards.

Among the larger quadrupeds the femur presents a similar antero-posterior compression in the elephant, mastodon, and rhinoceros, but the latter animal is distinguished by a

second external trochanter, situated below the great trochanter, which is not present in the Australian fossil. In the *Megatherium* and its congeners the flattening of the femur and its transverse breadth greatly surpass the proportions exhibited by the fossil under consideration, or those of the femora of the proboscidian *Pachyderms*.

The femur of the *Mastodon* is that which the fossil from the Darling Range most resembles, in being flatter on the posterior than on the anterior surface. Compared with the femur of the *Mastodon giganteus*, the fossil presents the following differences: it is broader in proportion to its length; as, for example,

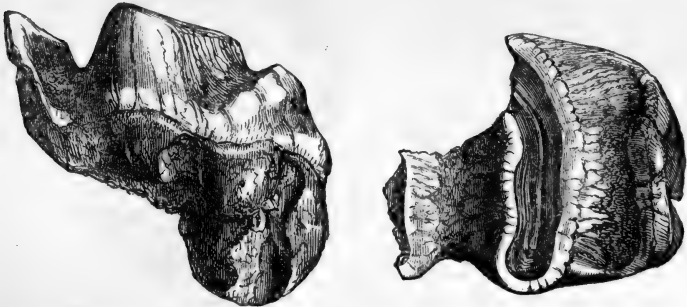
Australian femur.	Mastodon.
in. lines.	in. lines.

From the lower part of the post-trochanterian depression to the prominence above the outer condyle	18 0	24 0
Breadth of middle of shaft of femur	5 0	5 9
Circumference of do. do.	13 6	14 6

The surface of the bone below the post-trochanterian depression (*b*) is more convex in the Australian fossil, and the prominence above the back part of the outer condyle is more developed; the small trochanter is narrower and longer, and is defined by a groove along its anterior part. The femur in the *Mastodon giganteus* thins off almost to an edge at the outside of the distal half of the shaft: in the Australian fossil the corresponding part is broad and convex. The anterior part of the great trochanter rises higher above the level of that part of the femur in the Australian fossil than in the *Mastodon*. The orifice of the medullary artery is conspicuous in the Au-

Fig. 2.

Fig. 3.



stralian fossil at the back part a little above the middle of the shaft, and towards the inner side; the canal sloping upwards. I cannot detect the corresponding orifice in the *Mastodon's* femur compared. The Australian fossil exhibits a large me-

dullary cavity along the middle of the shaft, with dense parietes an inch thick. The total length of the fossil is twenty-two inches; its greatest breadth across the upper or proximal end, where the neck begins to bend inwards, is ten inches.

Traces of the smooth pitted surface at the broken distal end indicate the place of junction of the articular epiphysis, and prove that the entire shaft of the femur is here preserved; a part of the epiphysis is ankylosed to the shaft.

The portion of the molar tooth was obtained from the same locality as the femur, and if it belong, as is most probable, to the same animal, proves it to be most nearly allied to those Pachyderms, as the *Dinotherium* and *Mastodon giganteus*, in which the grinding surface of the teeth is raised into broad transverse ridges. Parts of two of the anterior ridges, and a smaller or lower one which runs across the base of the first, at the anterior part of the crown of the tooth, are here preserved; but the accuracy of the figures (figs. 2. and 3.), which are of the natural size, precludes the necessity of further description. The apex of both the higher ridges has been worn by mastication, but not to such an extent as is usually seen in the small deciduous molars of the Mastodons: there is less trace of a division of the summit of the ridge into mammillæ than would be presented by a similar sized molar, equally worn down, of the *Mastodon giganteus*, in which the two mammillæ would be indicated by a median constriction. The transverse ridges are still more subdivided in the other known species, as *M. longirostris*, *M. latidens*, *M. angustidens*, or *M. elephantoides*: the Australian tooth more resembles that of the *Dinotherium* in the simplicity of the transverse eminences, but there is a deposit of cement or *crusta petrosa* at the bottom of the intervening valleys, which I have not observed in any molar of *Dinotherium*. As the bones of the extremities of this most remarkable genus, the *Dinotherium*, have not yet been discovered, the affinities of the Australian Pachyderm to that genus do not at present derive further elucidation from the femur above described.

The close relationship of the *Mastodon* to the *Dinotherium* has received additional proof by the discovery of the two tusks of the lower jaw in the young individuals of the *Mastodon*, and by the retention of one of these as a sexual distinction of the male, in *Mastodon giganteus*: and the highly interesting member of the ancient fauna of Australia, revealed by the remains above described, must be referred, on their evidence, to the same natural family of gigantic Pachyderms as that which includes the Mastodons and *Dinotheres*, and to a species distinct from any yet determined. The interests of science

will, perhaps, be best consulted by refraining from the imposition of any generic or specific name until the requisite characters are obtained; and of this most desirable acquisition reasonable hopes may be entertained, since the zealous and distinguished officer to whom we are indebted for all the interesting fossils yet met with in Australia promises a continuance of his valuable aid. At the conclusion of his letter Sir T. L. Mitchell states, "I am promised part of a rib and other bones by the gentleman who gave the tooth, and I have some hopes of obtaining a jaw-bone; when I do, it shall be sent to you forthwith."

The fossils above described will be presented, in the name of Sir T. L. Mitchell, to the Museum of the Royal College of Surgeons, London. They cannot be contemplated without suggesting many interesting reflections. They tell us plainly that the time was when Australia's arid plains were trodden by the hoofs of heavy Pachyderms; but could the land then have been, as now, parched by long-continued droughts, with dry river-courses containing here and there a pond of water? All the facts and analogies which throw light on the habits of the extinct Mastodons and Dinotheres, indicate these creatures to have been frequenters of marshes, swamps, or lakes. Other relations of land and sea than now characterize the southern hemisphere, a different condition of the surface of the land and of the meteoric influences governing the proportion and distribution of fresh water on that surface, may, therefore, be conjectured to have prevailed, when huge Mastodontoid Pachyderms constituted part of the quadruped-population of Australia. May not the change from a more humid climate to the present peculiarly dry one have been the cause or chief cause of the extinction of such Pachyderms? Was not the ancient *terra australis*, when so populated, of greater extent than the present insular continent?

The mutual dependences between large mammalian quadrupeds, and other members of the animal kingdom, suggest other reflections in connexion with the present fossil. If the extinct species ever so abounded as to require its redundancy to be suppressed by a carnivorous enemy, then some destructive species of this kind must have coexisted, of larger dimensions than the extinct *Dasyurus lanarius*,—the ancient destroyer of the now equally extinct gigantic kangaroos, *Macropus Titan*, &c., whose remains were discovered in the bone-caves of Wellington Valley. Extremely few coprophagous beetles have hitherto, I believe, been found in Australia, and the scarcity of such is readily explained by the absence of native species of large herbivorous mammals; but the dung of the Mastodon-

toid quadrupeds which formerly existed in Australia must then have afforded the requisite conditions for a greater abundance of such Coleoptera. These and other speculations are naturally suggested by the highly interesting fossils here described. The great importance of such organic remains will be obvious from the few inferences which have been here briefly noted: our obligations to the enlightened collector and transmitter of the Mastodontoid fossils are great, and the arrival of additional facts and specimens will be most earnestly welcomed.

I have the honour to be, Gentlemen,

Your most obedient servant,

RICHARD OWEN.

London, Nov. 1st, 1842.

IV.—*Observationes de quibusdam Plantis Surinamensibus.*

Scriptis Dr. F. A. G. MIQUEL.

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

GENTLEMEN,

Rotterdam, Dec. 1, 1842.

I TAKE the liberty to offer you a botanical paper on some plants of Surinam, and to pray you to give it a place in your 'Annals and Magazine of Nat. History,' which journal I have for several years read with the greatest interest.

Believe me to be, your obedient Servant,

F. A. G. MIQUEL.

COMBRETACEÆ.

1. *Combretum Guianense.* Arborescens, ramis obtuse tetragonis tetrapteris, foliis oppositis breviter petiolatis oblongis obtuse et breviter acuminatis utrinque lepidotis, spicis terminalibus opposite vel ternatim paniculatis, floribus unilateralibus confertis ebracteolatis, calycibus extus lepidotissimis intus longe pilosis, fructibus tetragono-tetrapteris lepidotis.

Hab. Surinam prope plantationem Bergendaal, Sept. florens. Flores pulchre rubri.

Frutex humilis, ut videtur haud scandens; *rami* tereti-subtetragoni, faciebus duabus lateralibus angustioribus et magis planis quam reliquæ convexiores ac majores, sordide fuscis, membranis exiguis rigidis nigrescentibus fere tetrapteri, hic illic accessoriis membranulis pluralati, $\frac{1}{2}$ cent. fere crassi; internodia 8—10 cent. longa, nodis parumper tumidis, cicatricibus petiolorum fere circularibus. *Folia* opposita decussata; petioli breves $\frac{1}{2}$ cent. paullo superantes, cylindracei, antice canaliculati; *laminæ* ellipticæ, 14—17 et plura cent. longæ, 7—8 latæ, basi rotundatæ obtusæ, apice obtuse breviter et inæqualiter acuminatæ, margine repandæ, membranaceæ, subcoriaceæ, nervo medio valido 7—8 costas alternas aut suboppositas venoso-anastomosantes emittente, et ut ramuli, pagina inferior pal-

lidior confertius, superior remotius et magis subtiliter lepidota. *Flores* dense spicati, *spicis* terminalibus oppositis ternisve, ramos paniculatim terminantibus, singulis e foliorum paullo minorum axillis. Rhachides spicarum 7—10 cent. longæ, subtetragonæ, sursum attenuatæ, rubiginoso-fuscæ, ruguloso-lepidotæ. *Flores* sessiles, conferti, unilaterales, suberecti vel horizontales. Sicci flores æque ac folia facile cadunt. *Flos* totus cum genitalibus exsertis fere 4 cent. longus. *Ovarium* siccum subtetragono-ellipticum, utrinque attenuatum, lepidotum, 4 mm. longum; ea quæ in averso spicæ latere affixa, ob florem sursum directum, ad basin curvata sunt. *Alabastra* clavata. Præfloratio valvata. *Filamenta* flexuoso-incurva. *Calyx* floris aperti infundibuliformi-campanulatus, deciduus, squamulis orbicularibus rufis quam confertissime obtectus, quadridentatus, dentibus erectis lanceolato-acutis, 1 cent. fere longus. *Petala* 4 elliptica acuta inter dentes calycinis inserta iisque breviora ac angustiora haud lepidota, trinervia, erecta. *Tubus calycinus* intus usque ad petala pilis griseis rigidiusculis inclusis totus vestitus. *Stamina* 8 longissima ($2\frac{1}{2}$ cent.) exserta, biserialia, 4 petalis opposita, paullo altius inserta ac exserta. *Filamenta* nitida purpurea, sursum attenuata, paullo flexuosa; *antheræ* postice affixæ, ovales vel ovali-obovatae, rimis duabus longitudinalibus dehiscentes. *Stylus* filamenta æquans iisque colore etiam similis acutus. *Fructus* tetragono-subtetrapterus.

ŒNOTHEREÆ.

2. *Jussieua inclinata*, Linn., Fil. Suppl. p. 235; DeC. Prod. iii. p. 54. Pedunculorum longitudo varia, nec omnes petiolo paullo longiores uti auctores perhibent. Crescit ad Wanica Martio cum fl. et caps.
3. *Jussieua pilosa*, H. B. K., Nov. Gen. vi. p. 101. tab. 532. fig. a et b; DeC. Prod. iii. p. 53. Cum præcedente.
4. *Jussieua pterophora*. Herbacea, erecta ramosa glabra, caule alato, ramis compressiusculis alulatis vel apteris, foliis lineari-lanceolatis elongatis utrinque attenuatis, floribus sessilibus, calycis lobis lanceolatis quinquenerviis, petalis obovatis calycem fere æquantibus, capsula tetragona obpyramidata subalata.
Hab. Surinam variis locis.
Affinis *J. decurrenti*, DeC., et *J. palustri*, Meyen, DeC. Prod. iii. p. 56, sed caule diptero, foliis lineari-lanceolatis, floribus sessilibus, sepalis petala æquantibus probe distincta.
Planta gracilis, caule lævissimo glaberrimo fistuloso anguste bi-alato, pede altior. *Rami* alterni erecto-patentes compressiusculi. *Folia* caulina longiora, 15 cent. longa, vix $1\frac{1}{2}$ lata, versus apicem valde attenuata, membranacea, flaccida, nervo mediano fusciscente, costisque tenuibus; folia ramea multo breviora et angustiora. *Flores* in eorum axillis sessiles vel subsessiles, sed ad oppositum latus vergentes. *Tubus calycinus* 1 cent. longus, subalato-tetragonus. *Sepala* lineari-lanceolata, viridia, marginata, nervis 5 coloratis, tubum petalæque flava nervosa obovata fere æquantia.

PAPILIONACEÆ.

5. *Crotalaria Paramariboensis*. Ramis tetragonis subtetrapteris, stipulis reflexis majoribus sublunatis uno latere acuminatis, foliis latis ovato-rhombeis obtusissimis basi paulisper attenuatis utrinque puberulis, racemis terminalibus, bracteis exiguis linearibus ciliatis pedicello multum brevioribus, floribus calycem longe superantibus.

Hab. prope Paramaribo in hortis, m. Jan. fl.

Fruticulus humilis ad aspectu glaber, sed sub lente puberulus. *Rami* inæqualiter tetragoni, una facie latiore ac convexa, reliquis tribus planis vel convexiusculis. Anguli tenuissime alati aut tantum acutati. *Folia* alterna; *petioli* pubescentes, 5—6 mm. longi, *lamina* membranaceæ, puberulæ, ovato-subrotundæ rhombeæ, apice obtusissimo aliquando subretuso. Sex utrinque costæ e nervo medio. *Lamina* long. $5\frac{1}{2}$, lat. 5; minorum long. 4, lat. 3; maximorum 7 long., 6 latæ. *Stipula* foliaceæ, virides, horizontales, reflexæ, semiovatæ, acuminatæ, latere prope basin exciso affixæ, hinc semilunatæ, fere 1 cent. longæ. *Racemi* terminales pauciflori. *Bractea pedicellum* 5 mm. longum fulciens linearis patula perexigua, ambo pubescentes. *Calyx* sub lente puberulus membranaceus; labii 7 mm. longi dentes lanceolati. *Ovarium* oblongo-lineare antice barbatum. *Vexillum* 1 cent. longum subrotundum retusum. *Alæ* oblongæ basi attenuatæ unguiculatæ paulo breviores. *Carina* ad medium libera biunguiculata, e lata basi breviter rostrata. *Vagina staminea* antice fissa. *Legumen* (fere maturum) sordide fuscenscens, sparse, sed ad suturam dorsalem conferte pilosum, stylo coronatum. *Semina* circiter 10.

6. *Zornia Surinamensis*. Caulibus diffusis dichotome ramosis superne pubescentibus, foliolis 2 oblongo-lanceolatis superioribus lanceolatis pubescentibus demum glabratis, bracteis ovali-lanceolatis acutis basi inæqualiter semicordatis piloso-hirtis ciliatisque quinquenerviis non punctatis legumine brevioribus, leguminis articulis fere 3 radiato-aculeatis, aculeis retrorsum scabris.

Hab. Surinam, locis elevatioribus. *Zornia angustifoliæ* et *Z. pubescenti*, DeC. Prod. affinis.

7. *Phaseolus Surinamensis*. Volubilis, ramulis glabriusculis, foliolis diversis utrinque aspere pubescentibus, lateralibus foliorum inferiorum subdimidiato-ovatis acutis, supremorum dimidiatis trapezoideo-lanceolatis, margine interno superne concavo, foliolo impari inferiorum deltoideo-acuminato, supremorum lanceolato, racemis folia subæquantibus pedunculatis 6—8-floris, bracteolis ovato-lanceolatis, calycis labio superiore lato leviter emarginato, inferioris laciniis lanceolato-falcatis.

Hab. in vicinitate fl. Commewyne inf.; m. Octobri cum fl. et legum.

Pulchra species, prope *Ph. sylvestrem*, H. B. K., et *Ph. formosum*, H. B. K. DeC. Prod. ii. p. 392, collocanda.

Petioli 5—6 cent. longi, glabri; *pedicelli* brevissimi tomentosi; *foliolum impar* longius petiolulatum videtur, sed ejus petiolulus e glabro petiolo inter foliola continuato consistit quocum verus pedi-

cellus brevis articulatum connectitur. *Foliola* inferiorum lateralia 8 cent. longa, *impar* paullo longius, superiorum 6 cent. longa. *Bracteolæ* membranaceæ oblongo lanceolatæ ciliolatæ. *Calyx* membranaceus leviter puberulus, bracteolis longior, $\frac{1}{2}$ cent. longus. *Corolla* 2 cent. longa. *Legumina* immatura plana 9 cent. longa, 8 mm. lata, leviter falcata, apice corniculata, appresse pubescentia, marginibus scabra, 12—15-sperma.

8. *Cassia Savannensis*. Foliolis bijugis glabris, ramulis lævibus, foliolis obovato-ellipticis subtus flabellatim nervosis striatis, petiolis medio glandulosis et piliferis, stipulis membranaceis pallidis striatis ovatis acutis basi cordata fusce maculatis, pedicellis axillaribus unifloris decies petiolum superantibus, legumine compresso æquali leviter falcato sparse et appresse piloso. Ex affinitate *C. unifloræ*, Spr., et *C. Persoonii*, DeC.

Hab. Surinami, locis arenosis, in Tooden-Savanna, prope fl. Suriname Sup. Septemb. fl.

9. *Cassia Paramariboensis*. Erecta, glabra, petiolis pubescentibus eglandulosis, foliolis 15—25-jugis subalternis linearibus obtusiusculis mucronatis, pedicellis patenti-pubescentibus paucis aggregatis ad apices ramulorum ex axillis foliorum caulorum egredientibus. Ex affinitate *C. Æschynomenes*, DeC. l. c. p. 504, et *C. Otterbeinii*, Mey., DeC. l. c.

Hab. prope Paramaribo.

Planta suffruticosa, alterne ramosa. *Caulis* lævis striatus, viridis, fistulosus; *folia* alterna, sparsa, majora 6 cent. longa; *foliola* 8 mm. *Stipulæ* deciduæ. *Flores* terni quaterni in apicibus ramulorum; *sepala* infima pubescentia, oblonga, subacuta. *Legumina* stipitata, 5 cent. longa, margine inferiore recto, superiore sinuato, apice obtuso, in quibusdam mucronato, 5 mm. lata, glabra, margine sup. puberula, articulata, ad articulos fragilia, compressa, fusca, verrucosotessellata, 7—9-sperma.

PASSIFLOREÆ.

10. *Ryania tomentosa*. Foliis ellipticis coriaceis supra lucidis glabris modo in nervo setulosis, infra ramisque junioribus petiolisque fusce griseo-tomentosis, floribus axillaribus solitariis (majoribus) aliquando binis uno rudimentario, extus ochraceo-villosis.

Hab. Surinami prope plantationem Bergendaal, Octob. fl.

Fruticulus, habitu referens *Patrisiam parvifloram*, DeC. Prod. i. p. 256; De Less. Icon. Sel. tom. iii. tab. 14, sed floribus multo majoribus, sepalis lanceolatis quam stamina brevioribus, foliorum tomento diversissimus*.

Annotatio. Genera *Ryania*, Vahl, et *Patrisia*, L. C. Rich., nullo graviore caractere diversa, in unum genus merito conjungenda sunt. (*Endlich. Gener.*) Reliquæ *Ryania* species sunt:—

1. *R. speciosa*, Vahl, Eclog. i. p. 51. tab. 9.

* Plantæ omnes hic descriptæ, in solo natali collectæ sunt ab amico dilectissimo H. C. Focke.

2. *Ryania Candollei*, Vahl, *Patrisia bicolor*, DeC. Prod. i. p. 255.
3. *R. Patrisii*, Vahl, *Patrisia parviflora*, DeC. l. c.
4. *R. dentata*, Vahl, *Patrisia dentata*, H. B. K.
5. *R. Kunthii*, Vahl, *Patrisia affinis*, H. B. K.

Roterodami, m. Novemb. 1842.

V.—*Descriptions of new Shells from the Collection of Captain Belcher, R.N., C.B., &c.* By RICHARD BRINSLEY HINDS, Esq., Surgeon R.N.

THE genus *Triphoris** was established by M. Deshayes in 1824 to receive a small fossil reversed shell, having a near affinity to *Cerithium*, and which was characterized as the type of a group, as an elongated shell, turritid, inflated about the middle, sinistral, terminated by three rounded openings, the anterior being the largest, another at the base tubular, and a third posterior. Some recent shells were, however, soon conveniently placed in the same group, as the *Cerithium perversum* of Lamarck, and the old *Murex adversus* of our own coasts. The number of recent species amounts to five in Kiener's résumé of *Cerithium*, where they constitute his fourth group. I have found the species so numerous in the collection of Capt. Belcher, C.B., that they give a very formidable appearance to the genus, which seems likely to become extensive. This accession also makes it necessary to alter the character of the genus to some extent. Though all the species have diminutive shells, and generally require the assistance of a glass for their examination, yet they will be found to possess very distinct characters, and are at the same time eminently beautiful in their form and sculpture. If we except some fluctuation in colour, which may probably be attributable to locality, they seem liable to little variation. The only circumstance necessary to guard against in the discrimination of species, according to my own experience, is the circumstance, that in the transverse series of granulations which prevail in many, the number will be found to fluctuate with age. Thus, in the Mediterranean shell, *Triphoris perversus*, the young will be found to possess only two series of granules; when more advanced in age, a third, intermediate in position, and smaller, is added; and in the full-grown shell the last whorl has four distinct series. Whilst the shells from Captain Belcher's collection were under examination, Mr. J. E. Gray and Mr. W. Metcalfe did me the favour to place their specimens at my disposal, which has enabled me to add several more species.

* *Triphorus* of Swainson's Treatise, and *Triphora* of Sowerby's Manual.

TRIPHORIS, Deshayes,

Testa parva, gracilis, plerumque elongata, sinistra; carinæ et tubercula transversim disposita, canalis tubularis obliquus; sinus lateralis plus minusve coarctatus vel tubiformis.

Geog. As far as our present knowledge acquaints us, the genus would appear most numerous in the Indian seas, particularly in the Straits of Malacca. Though much attention was bestowed on small shells along the western coast of America, yet not a single species was met with. In crossing the Pacific to the westward, a solitary species was first seen at Bow Island; apparently *Triphoris adversus*. At New Ireland a few more were noticed, though not *T. violaceus* (*Cerithium violaceum*, Quoy). On the shores of New Guinea they were still more frequent; and those from the Straits of Malacca are particularly interesting shells. They occur in the United States, and a local species is described, *T. nigrocinctus* (*Cerithium nigrocinctum*, Adams). A few from our own shores and the Mediterranean are well known, and in the West Indies they would seem to be frequent. The genus is both littoral, and found in deep water.

1. Subgenus **INO.**

Testa cylindræa, elongata, acuminata.

1. *T. gigas*. Testa valde elongata; anfractibus 25—28 planulatis, quadriseriatim granulosis, inferiore paululum maxima ad basin granulorum punctatis. Axis 11 lin.

Geog. New Guinea; dredged from a muddy bottom at 18 fathoms.

This is the largest species with which I am acquainted. The colour would appear to be brown, but, as the specimens are dead, this cannot be relied on.

2. *T. concors*. Testa cylindræa; anfractibus viginti-duo triseriatim granulosis; serie media paululum minima; sutura lineata; apertura rotundata; sinu laterali tubiformi. Axis 6 lin.

Geog. Straits of Malacca; in 18 fathoms.

3. *T. sculptus*. Testa pallide rufente; anfractibus 15—18 biseriatim granoso-carinatis, medio lævigatis carina secundaria; prope suturam carinula monilifera; sinu laterali patulo. Axis $4\frac{1}{2}$ lin.

Geog. Straits of Malacca; in 23 fathoms.

4. *T. vittatus*. Testa lævigata, cornea; anfractibus 22—25 transversim leviter sulcatis, medio fusco elegantissime vittatis; apertura subquadrata; sinu laterali obsoleto. Axis 8 lin.

Geog. Straits of Malacca; in 23 fathoms.

5. *T. bilix*. Testa attenuata pallida; anfractibus quindecim tricarinatis; carina inferiore paululum maxima marmorata, media minima; apertura rotundata; sinu laterali patulo. Axis 3 lin.

Geog. Straits of Malacca; dredged from a muddy bottom in 20 fathoms.

6. *T. Metcalfeii*. Testa alba fusco marmorata; anfractibus numerosis tricarinatis; carina inferiore maxima fusco maculata, duobus superioribus parvis, media minima; sutura carinata. Axis 7 lin.

Geog. Pacific Ocean? Cab. Metcalfe.

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C

A fine species with squarish brown spots on a white surface; but I regret that the single specimen in Mr. Metcalfe's collection has neither the apex or mouth entire.

7. *T. cancellatus*. Testa pallide rufente; anfractibus 15—18 bicarinatis; carinis albo maculatis; inter carinas cancellata lineis albis longitudinalibus intervallis fuscis; sutura sulcata; apertura subquadrata; sinu laterali margine contracta. Axis $4\frac{1}{2}$ lin.
Geog. Straits of Malacca; in 20 fathoms.

8. *T. corrugatus*. Testa cornea; anfractibus 17—20 bicarinatis, inter carinas corrugatis, medio carina secundaria; sutura leviter carinata; apertura rotunda; sinu laterali lineari. Axis $6\frac{1}{2}$ lin.
Geog. New Guinea; dredged from 23 fathoms, among fine gravel. Straits of Malacca; from 18 to 23 fathoms.

9. *T. maxillaris*. Testa rosea; anfractibus 16—18, superficie lævigata, bisulcatis; marginibus sulcorum granulatis; sutura sulcata, marginibus granulatis, apertura subquadrata, sinu laterali parvo patulo. Axis $5\frac{1}{2}$ lin.
Geog. Straits of Malacca; dredged from 18 to 23 fathoms.

This shell is very remarkably characterized. The surface is perfectly smooth, and of an agreeable rose-colour; but each whorl is divided into three unequal parts by two furrows. The margins of each furrow, and also of the depressed line which marks the course of the suture, are provided with a series of horizontal granulations, which look towards each other and do not appear above the surface of the shell, but under a magnifying glass display an appearance which seems to justify the specific name.

10. *T. micans*. Testa gracili attenuata, fusca; anfractibus 20—22, supra coarctatis, triseriatim granulosis, serie inferiore maxima albida, superiore minima; apertura subquadrata; sinu laterali lineari. Axis 6 lin.

Geog. New Guinea; dredged from mud in from 5 to 18 fathoms.

11. *T. asperrimus*. Testa gracili attenuata; anfractibus 24—26, superne valde coarctatis, inferne angulatis, serie duplici granulorum; prope suturam granuloso-carinata. Axis 6 lin.

Geog. New Guinea; dredged from a muddy bottom in 8 fathoms.

The only specimen of this species in the collection has an injured mouth. It is remarkable for its long needle-like shape; and the upper portion of each whorl being strangulated, and the lower angular and with a series of tubercles, the shell has a very rough and jagged appearance.

12. *T. marmoratus*. Testa cylindræa fusca, albo marmorata; anfractibus 16—18 triseriatim granulosis; seriebus æqualibus, confertis, inferiore plerumque albida; sutura obsoleta. Axis 3 lin.

Geog. West Indies. Cab. Gray.

13. *T. elegans*. Testa alba, fusco marmorata; anfractibus 16—18

quater carinatis; carinis duobus primariis, inferiore maximo; duobus secundariis alternantibus; carinis omnibus maculis albis et fuscis ornatis. Apertura rotundata, sinu laterali patulo. Axis $4\frac{1}{2}$ lin.

Geog. Straits of Malacca; from 20 fathoms, mud.

2. Subgenus SYCHAR.

Testa elongata, anfractus rotundati, apex mamillaris.

14. *T. vitreus.* Testa pellucida; anfractibus quindecim lævigatis rotundatis, lineis duabus elevatis cinctis; apice mamillari; apertura subquadrata; sinu laterali patulo. Axis $4\frac{1}{2}$ lin.

Geog. Straits of Malacca; dredged from 20 fathoms.

One of the elevated lines traverses the whorl about its centre; the other, not at first very apparent, will be found on its lower surface near the suture.

3. Subgenus MASTONIA.

Testa acuminata, circa mediam tumida.

15. *T. vulpinus.* Testa nigricante; anfractibus quatuordecim tricarinatis; carina inferiore albida; apertura rotundata; sinu laterali subnullo. Axis 3 lin.

Geog. New Ireland; found, with other small shells, among fine gravel about low-water mark.

16. *T. monilifer.* Testa parva, elegantissime monili; anfractibus decem biseriatis granulosis; granulis seriei inferioris albis intervallis rubris, supremæ albis; apertura subquadrata, sinu laterali angusto. Axis $2\frac{3}{4}$ lin.

Geog. Straits of Malacca; in 18 to 23 fathoms, mud.

The manner in which the lower series of markings is repeated in the last whorl is very evident in this species, though to be met with in nearly the whole. Thus the series of beading, which is single on the upper whorls, will here be found to be double on the last.

17. *T. Grayii.* Testa ovali; anfractibus decem, superioribus biseriatis granulosis moniliferis, duabus inferioribus triseriatis, serie media minima. Axis $4\frac{1}{2}$ lin.

Geog. The Mediterranean Sea. Cab. Gray.

The single specimen of this very pretty shell has the mouth much injured.

18. *T. ruber.* Testa rufa; anfractibus undecim biseriatis granulosis, seriebus subdistantibus suturam obtegentibus; apertura rotundata; sinu laterali margine contracto. Axis 4 lin.

Geog. New Ireland; numerous among fine gravel at low water. Straits of Malacca; in 20 fathoms.

Its reddish colour and double series of tubercles will readily distinguish this shell. In some of the specimens a small in-

intermediate series is about to make its appearance on the one or two inferior whorls.

✓ 19. *T. affinis*. Testa fusca albo marmorata, præcipue serie granulorum inferiore; anfractibus tridecim triseriatim granulosis; seriebus æqualibus suturam offerentibus; apertura subquadrata. Axis $3\frac{1}{2}$ lin.

Geog. St. Vincent's, West Indies, Rev. W. J. Guilding. Cab. Gray et Metcalfe.

Nearly allied to *T. marmoratus*.

✓ 20. *T. castus*. Testa parva; anfractibus duodecim, biseriatis elegantè granosis; serie inferiore parva fusca, superiore maxima margaritacea; apertura rotunda; sinu laterali postico tubiformi. Axis 2 lin.

Geog. St. Vincent's, West Indies; Rev. W. J. Guilding. Cab. Gray et Metcalfe.

21. *T. cælebs*. Testa ovali; anfractibus undecim triseriatim granulosis; serie media fusca, alteris albidis; sutura sulcata; apertura subquadrata; sinu laterali subnullo. Axis 4 lin.

Geog. Pacific Ocean? Cab. Metcalfe.

22. *T. æmulans*. Testa albida; anfractibus duodecim biseriatis granulosis, medio carina minima granosa fusca; sutura carinulata; apertura subquadrata; sinu laterali patulo. Axis 5 lin.

Geog. Pacific Ocean? Cab. Metcalfe.

23. *T. concinnus*. Testa ovali elongata; anfractibus novem triseriatim granulosis; serie media minima, inferiore fusca, superiore cornea. Axis $3\frac{1}{2}$ lin.

Geog. Pacific Ocean? Cab. Metcalfe.

The manner in which the series of markings of the spire are repeated in the last whorl is well seen in this species, where the handsome dark spiral line resulting from the lower series is again twice repeated; so that the last whorl has really five series of granules.

24. *T. tristis*. Testa ovali elongata, ferruginea; anfractibus tridecim biseriatis granulosis; serie superiori paululum maxima et albida; anfractu penultimo serie tertia minima. Axis 3 lin.

Geog. —? Cab. Gray.

25. *T. clemens*. Testa cornea nitenti; anfractibus quindecim triseriatim granulosis; serie media parva ad inferiorem appropinquante, inferiore prominulo-margaritacea; anfractus ultimi granulis parvis; sutura sulcata; apertura rotunda; sinu laterali patulo. Axis 3 lin.

Geog. Straits of Malacca; from 20 fathoms, mud.

26. *T. Carteretensis*. Testa pallida; anfractibus quatuordecim triseriatim granulosis, serie media minima, infra duas superiores sulcatis; apertura subquadrata; sinu laterali patulo. Axis 3 lin.

Geog. Port Carteret, New Ireland; among fine gravel at low water.

The sulcus, which traverses the whorl transversely, will readily distinguish this species.

27. *T. roseus*. Testa ovali; anfractibus decem biserialim granulosis, seriebus corneis, medio lævigato roseo serie tertia parva; apertura rotundata. Axis $3\frac{1}{2}$ lin.

Geog. Pacific Ocean? Cab. Metcalfe.

28. *T. candidus*. Testa elongata, pallide cærulente; anfractibus sexdecim tricarinated lævigatis, medio subfuscis; carina media minima; apertura rotundata; sinu laterali patulo. Axis 4 lin.

Geog. Pacific Ocean? Cab. Metcalfe.

29. *T. hilaris*. Testa elongata; anfractibus quatuordecim tricarinated; carinis duabus inferioribus æqualibus albidis, superiore marmorata paululum maxima. Axis 4 lin.

Geog. Pacific Ocean? Cab. Metcalfe.

November 28, 1842.

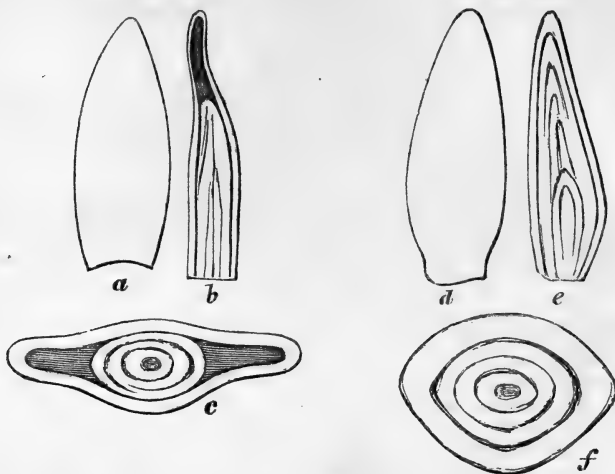
VI.—Hints towards a new specific character in the Willows.

By W. A. LEIGHTON, B.A., F.B.S.E., &c.

CURSORILY looking at the willows which fringe the margins of the river Severn near Shrewsbury, the thought suddenly occurred to me, that possibly a character might exist in the form of the leaf-bud, which might prove serviceable in distinguishing those species of this extensive and difficult genus that were closely allied to each other. On examining the leaf-buds of trees respectively named by Mr. Borrer *Russelliana* and *fragilis*, and described on his authority under those names in my 'Flora of Shropshire,' I found my conjecture strikingly realized. In *Russelliana* the leaf-bud was in form ovato-lanceolate, with a somewhat acute apex, very much dorsally compressed, the back alone being prominent from the enclosed contents. These did not by any means fill the entire cavity of the outer integument, but occupied the central portion only, and consequently the margins and apex of the leaf-bud were rendered thin and compressed, though nevertheless not decidedly acute. On the contrary, in *fragilis* the cavity of the outer integument was completely filled, and the leaf-bud assumed in consequence a decided full and plump appearance. It was of an elongated ovate shape, obtuse or rounded at the apex, nearly triangular, with the angles rounded. The accompanying figures will more clearly illustrate my meaning.

Whether this character prevail in the allied species of other groups I have had no means of deciding, but would be permitted to throw out the above hints, as the character appears to me important, and well worthy the attention of those bota-

nists who may possess opportunities of extensively testing its validity.

*Salix Russelliana.**Salix fragilis.*

- a.* Leaf-bud of *S. Russelliana*, viewed from the back.
b. Longitudinal section of ditto. *c.* Transverse section of ditto.
d. Leaf-bud of *S. fragilis*, viewed from the back.
e. Longitudinal section of ditto. *f.* Transverse section of ditto.

Shrewsbury, November 8, 1842.

VII.—*Contributions to the Ichthyology of Australia.* By JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of Hospitals, Haslar*.

[Continued from vol. x. p. 34.]

FISH of the Scomberoid family are numerous in the Australian seas, and many came under the observation of Parkinson, Solander, and the Forsters on Cook's first two voyages. Such of them as were sketched by Parkinson and George Forster are commented on in the 'Histoire des Poissons,' and Schneider's quotations from J. R. Forster's notes are also occasionally criticized in that work; but Solander's 'Pisces Australiæ' contains several descriptions of '*Scombri*,' which Cuvier has not found it possible to refer with certainty to any species known to him. Indeed the strong family likeness which prevails among the *Scomberoideæ* renders the detection

* Coloured figures of some of the rare species described in this communication are just published by Dr. Richardson in a work intitled '*Icones Piscium.*' See our Bibliographical Notices.

of precise specific differences proportionably difficult, and, in fact, it is often impossible to elicit even the generic forms from the descriptions of the naturalists of the Linnæan school. The authors of the 'Histoire des Poissons' were therefore undoubtedly right in abstaining from encumbering their great work by uncertain references to Solander's manuscripts; but the ichthyologist who shall hereafter revisit the ports explored by Cook, may wish to know what number of this difficult family he has to look for; and with the recent fish before him, he may find that the subjoined extracts from the 'Pisces Australiæ' will enable him to clear up the synonymy in a way which could scarcely be attempted by the European naturalist who has access to a few discoloured specimens only.

The *Scomber australasicus* (Cuv. et Val.) taken by Messrs. Quoy and Gaimard in King George's Sound, is said to be much like the Mediterranean *pneumatophorus* in general form, to have the angle of the preoperculum marked with diverging streaks, and the numbers of the fin-rays as follows:—

D. 9| — 1|12; A. 2|11, &c.

Another species, *Scomber loo* (Cuv. et Val), which was found by Messrs. Lesson and Garnot at New Ireland, Waigiou and New Guinea, represents the common mackerel of Europe almost exactly in form and in the numbers of its fin-rays, though it attains a larger size. It is ornamented by a series of spots and two lines of a brilliant gold-yellow tint. Solander saw a mackerel in Queen Charlotte's Sound, which he considered to be identical with the European one, and as he says nothing about yellow spots and lines, it is probable that the likeness is still more exact than that of the *Scomber loo*. His very brief notice of the fish is as follows: " *Scomber scombrus* (Linn. Syst. 492. 1.), habitat (Dec. 1, 1769) in sinu Motuaro. Nostratibus paulo majores. B. 7; D. 10| — 1|11; A. 1|11; C. 18; P. 20; V. 1|5." The fin-rays of the European mackerel are stated by Cuvier to be D. 10, 11 or 12| — 1|11; A. 1|11, with five pinnules above and below.

The *Scomber splendens* of Solander ('Pisces Australiæ,' p. 37) and the *Scomber dentex* of the Forsters, which is the "maga" of the natives of Queen Charlotte's Sound, are *Thyrsites*, and very probably the same species. George Forster's figure* of *Scomber dentex* (the *dentatus* of J. R. Forster, as quoted by

* From a reference written with a pencil under this figure, it appears to have been considered by some one as the same with the *Scomber lanceolatus* of Solander; but this is the *Cybium Solandri* of Cuvier and Valenciennes (viii. p. 192), which was taken off Thrumcap Island in the Polynesian Archipelago, and is named in the native language "tatea." The Banksian library contains a figure of it by Parkinson.

Schneider) is compared in the 'Histoire des Poissons' with the *Thyrsites atun* of the Cape of Good Hope. The *Thyr-sites altivelis* ('Zool. Proceed.' 1839, p. 99) from Port Arthur, Van Diemen's Land, differs but slightly from the *atun*. [Vide 'Zool. Trans.' vol. ii. p. 118.]

The *Scomber macrophthalmus* of Solander ('Pisces Austr.' p. 44), of which there is a drawing by Parkinson (91), is the *GEMPYLUS SOLANDRI* of the 'Histoire des Poissons' (viii. p. 215). It was obtained on the coast of Eahei no-mauwee, the northern division of New Zealand. The number of rays is stated by Solander to be according to our notation, D. 18| - 1|17, II; A. 1|15, II, which differs from the quotation in the 'Histoire des Poissons,' where the two spurious fins above and below are not supposed to have been included by Solander in his enumeration of the rays. His words are, "Pinna dorsalis posterior 20-radiata, radio primo simplici, reliquis muticis duobus posticis distinctis ideoque spuriis." And "Pinna analis sub pinna dorsali posteriori, illique similis 18-radiata; radio primo spinoso, reliquis muticis; duobus posticis reliquis distinctis, h. e. spuriis." Parkinson's figure indicates the number of spinous rays distinctly, but the articulated rays are not drawn with sufficient precision to show their exact number.

CHORINEMUS FORSTERI, Forster's Chorinemus.

Scomber maculatus, G. Forster, Icon. No. 228. Mus. Brit., J. R. Forster apud Schneider.

Scomber Forsteri, Bl. Schn., p. 26.
No. 30. Mr. Gilbert's list.

This fish is common in all parts of the harbour of Port Es-sington, and is captured daily in great numbers by the natives, who name it "milinjidne." It appears to be the same species which the Forsters found at New Zealand, and named *macu-latus*, and perhaps it is also the same with the *aken parah* of Russell (141) and the *Chorinemus commersonianus* of the 'Histoire des Poissons'; at least the detailed description contained in this work agrees almost exactly with Mr. Gilbert's specimen, the following exceptions being slight and perhaps only apparent.

The length of the snout before the eye is more nearly the fifth part of the length of the head than the fourth; the narrow maxillary dilates and is truncated at its lower extremity; and the scapular bone has an elongated oval shape and not a rectangular one, its ends being much rounded. The supra-scapular is shaped as in *commersonianus*. The upper profile of the head is scarcely curved. There is only a single row of teeth on the lateral limbs of the jaws. The couchant interosseous spine is very evident when the part is dissected; there are three interosseous bones without rays before it,

and the first very short dorsal spine stands upon it. The whole of the branching dorsal and anal rays are connected by a membrane, which is notched before the more posterior rays. The lateral line is slightly arched before the dorsal fin. It makes a small obtuse angle over the middle of the pectoral, not more conspicuous than three or four undulations, which follow at a little distance: after passing the first four jointed rays of the dorsal, the line runs perfectly evenly and directly to the caudal fin.

RAYS:—D. 7|—1|19; A. 2—1|17; C. 18 $\frac{1}{2}$; P. 17; V. 1|5.

DIMENSIONS.		Inches. lines.	
Length from tip of snout to	end of caudal fin	19	8
_____	base of ditto	16	4
_____	beginning of jointed dorsal	8	9
_____	anus	6	3
_____	first free dorsal spine.....	5	4
_____	edge of gill-cover	3	6
_____	edge of orbit	0	8
Diameter of the eye		0	8
Length of pectorals		2	2
Height of dorsal and anal.....		2	6
Depth of caudal fork		2	9
Height of body, about		5	0

The *Caranx trachurus*, Scad or Horse-mackerel, is an almost cosmopolitan fish; or at least, the peculiar characters of the species which inhabit the various districts of the ocean, if they be different, are not very obvious. There are variations of form in the *Trachuri* of the European seas, which appear, when a great number of individuals are examined, to pass into each other by such insensible gradations, that Cuvier hesitates to consider them as permanent, and merely divides the species into three groups of varieties. In the first group, which furnishes the example chosen for description in the 'Histoire des Poissons,' the lateral line is armed with seventy shields, and its oblique bend extends from opposite the beginning of the second dorsal to beneath the tenth ray. The second group comprises individuals having from eighty to eighty-eight shields, of less vertical height, and rather more than half of the lateral line posterior to the bend, which is also more sudden. The third group, which includes individuals possessing from ninety-four to ninety-nine lateral shields, is, in Cuvier's opinion, actually a distinct species, though he does not give it a name. Its members have a more slender body than the ordinary species, a narrower lateral line, which bends suddenly in the middle, and leaves the posterior part just equal to the anterior part, including the bend.

Scad differing very slightly from the European ones, and having from seventy-three to seventy-five lateral shields, are noticed in the 'Histoire des Poissons' (ix. p. 19) as having

been brought from the Cape of Good Hope by Delalande. Others, taken in Shark Bay by Lesson, and at New Zealand and Amboyna by Quoy and Gaimard, had from sixty-eight to seventy-three shields, and their external resemblance to the common species of the British Channel was very close, the bend of the lateral line being the same, and not, as in the Cape variety, more gradual. But some variations in the viscera of the New Zealand examples are detailed in the work above quoted (p. 26).

Mr. Jenyns, in the "Zoology" of the 'Voyage of the Beagle' (p. 68. pl. 14.), has described and figured, under the name of *Caranx declivis*, a scad from King George's Sound which has eighty-one or eighty-two shields, and the bend commencing under the fifth ray of the second dorsal and terminating under the ninth, or almost exactly at the middle of the line. It has the black spot at the opercular notch more or less distinctly seen in all the *Trachuri*, and indeed in most of the horse-mackerels (*Caranx*).

Solander, in his 'Pisces Australiæ,' gives the following account of a *Caranx*. It is not accompanied by a figure, but from the way in which he describes the lateral line, it is probably a *Trachurus*.

"*Scomber clupeioides*. Habitat in oceano australi prope Motuaro. Piscis 8-unciarum lanceolatus, supra medium e viridi- et cæruleo-opalinus, infra ex opalino-argenteus. Macula sublunaris nigra paulo supra angulum laminæ posticæ operculorum. Iris argentea. Pupilla nigra. Linea lateralis late loricata, postice et in cauda acute alteque carinata, in medio pisce descendens. Linea dorsalis ad initium pinnæ dorsi posterioris paulo divaricata. Area postica caudæ lanceolata. Pinna analis in lacuna, e regione ani continuata, recondenda. Supra pinnam analem linea obsolete impressa; forte hæc et linea dorsalis scombri propriæ."

The Australian seas nourish examples of other groups of *Caranx*. Of those which have only small scales on the forepart of their lateral line, no pinnules, little height, and an almost straight form of body, Cuvier remarks that the distinctive marks of most of the species are so obscure that they escape naturalists who have not an opportunity of comparing one with another, and that the synonymy is consequently involved. The *Scomber lutescens* of Solander ('Pisces Austr.' p. 38) is evidently one of this group, and is perhaps different from most of the other members of it, in the greater curvature of the lateral line, though without a figure this is not quite certain.

"Corpus lanceolatum, supra medium e lutescenti-opalinum, subtus ex argenteo-opalinum. Oculi mediocres: iris argentea: pupilla

nigra. Macula nigra ad angulum superiorem operculorum. Pinnae dorsales colore dorsi absque nitore. Pinnae pectorales pallidiores. Pinnae ventrales albidæ. Pinna ani antice albida, postice lutescens. Pinna caudalis lutescens. Pinnulæ spuria nullæ. Pectus sub pinnis ventralibus late canaliculatum. Pinna dorsalis anterior fossula recondenda. Linea dorsalis completa paulo pone pinnam dorsalem anteriorem parum descendens. Linea lateralis antice dorso propior, sub initium pinnæ dorsalis posterioris admodum descendens et dein recta ad carinam caudæ extensa. Cauda loricata anceps. Rictus amplus albus. *Habitat* in oceano Australiam alluente, prope Novam Zelandiam, Martii 30, 1770." (Solander.)

The *Scomber trachurus, varietas* (fig. 223, Banks. Lib.), of the Forsters, is also most probably another example of this group: it was taken in Dusky Bay, New Zealand. Broussonnet has added under the drawing a reference to *Scomber dimidiatus* of his MSS.; and some one has also considered it, though incorrectly, as synonymous with the *Scomber micans* of Solander. There is a short notice of it in the 'Histoire des Poissons' (ix. p. 20).

The *CARANX GEORGIANUS* (Cuv. and Val., ix. p. 85), procured by Messrs. Quoy and Gaimard in King George's Sound, is one of the species having a more elevated body, but still with a straight profile. A specimen from the same locality is described by Mr. Jenyns with more detail in the "Zoology" of the 'Voyage of the Beagle'; and Parkinson's figure, No. 89, and Solander's description of *Scomber micans*, do not appear to differ from it.

"Corpus ovato-oblongum, compressum nitens. Caput mediocre, antice nudum, postice squamosum. Rostrum parum descendens, obtusiusculum. Maxilla superior paulo longior, in ore clauso. Maxilla inferior subtus poris punctata. Os parvum. Dentes in maxillis, lingua, palato et fauce. Dentes maxillares minuti, conici, numerosi serie irregulari dispositi: dentes linguæ et palati acerosi, minuti, pauci: dentes faucium conici plures. Lingua ovata, obtusa alba, antice libera. Oculi parvi; iris e fusco-argentea: pupilla nigra. Nares in medio inter oculos et rostrum, vicinae, parvæ, oblongæ: anterior paulo major. Branchiarum opercula integra, squamosa. Membrana branchiostega tecta, 7-radiata. Linea lateralis supra pinnas pectorales late arcuata dorso propior, parum carinata, pone illarum apices descendens et dein recta per medium piscem in cauda loricata alte et acute carinata. Præter lineam lateralem linea dorso toto parallela, spatio vix semunciali ab illo remota (ideoque nobis dorsalis), punctulata; alia linea obsoleta, impressiuscula, paulo supra pinnam analem ducta. Regio ani in medio pisce, oblongo-lanceolata, nuda, $\frac{2}{3}$ unc. longa a pinna ani parum remota. Anus majusculus; apertura vaginæ genituræ parva. Cauda brevis, teres, e linea laterali loricata, subanceps, postice dilatata in aream quadratam ad latera carinæ lineæ lateralis. Pinnae dorsales duæ, anterior spinosa, 8-radiata, intra

cutem dorsi incrassatum elevatum, recipienda. Pinnæ pectorales, falcatae, paulo pone initium pinnæ analis extensæ, 18-radiatæ, muticæ. Pinnæ ventrales muticæ, oblongæ, acutiusculæ, breves, anum non attingentes, ventri arcte adnatæ. Pinnæ anales duæ; anterior spinosa, bi-radiata, radiis brevibus; posterior 25-radiata, uti pinna dorsalis intra cutem elevatam recipiendæ; radius primus simplex, spinosus cæteris brevior, reliqui mutici. Pinna caudalis bifurca, 20-radiata; lobi lanceolati, acuti, æquales. Squamæ parvæ, adhærentes, tennes, læves, integræ.

“*Color*:—Piscis supra medium e cæruleo-opalinus, infra ex opalino-argenteus, totus nitens. Caput ante oculos pellucido-virescens. Macula majuscula atra paulo supra angulum laminæ posterioris branchiarum. Pinna dorsalis, et pinna analis pallide olivaceæ. Pinnæ pectorales cinerascentes. Pinnæ ventrales albidæ, interdum parum rubentes. Pinna caudalis cinereo-plumbea. Linea dorsalis cyænea. Diameter piscis longitudinalis uncias 18, perpendicularis $5\frac{1}{2}$, transversalis $2\frac{1}{4}$.

“*RADII*:—Br. 7; D. 8|—1|28; A. 2—1|24; V. 1|5; P. 18; C. 20.

“*Habitat* in oceano Australiæ prope Motuaro.” (Solander.)

Representatives of the third division of *Caranx*, ‘Les Carangues’ (Cuv.), also exist in the seas of Australia. The *Caranx Lessonii* (Cuv. and Val. ix. p. 113) was brought from New Holland by MM. Lesson and Garnot, and is considered by Cuvier to be the *gundi-parah* of Russell, p. 144. The *Caranx speciosus* (Cuv. and Val. ix. p. 130), which inhabits the Red Sea, the Indian Ocean, and the Polynesian Archipelago, was brought by Bougainville (le fils) from New Holland. The *Scomber platinoïdes* of Solander, of which the only memorial is the following brief notice, is probably a member of this division.

“*Sæpe pedalis, totus argenteus, nitidissimus, dorsum parum cærulescens. Iris argentea, pupilla nigra. Macula nigra sublunata postice in angulo laminæ operculi posticæ. Pinnæ parum lutescent, præcipue pinna analis. Habitat Tolaga.*” (Pisces Austr.)

A pencil reference to *Sc. hippos*, with a mark of doubt, is appended to the MSS. The *Sc. hippos?* of Forster, of which a figure exists in the Banksian Library, and a description in Schneider (p. 28), was taken at Otaheite, and not in New Zealand, as stated in the ‘*Histoire des Poissons*,’ where it is named *Caranx forsteri*.

[To be continued.]

VIII.—*Observations on the “Sea-Cup.”* By CHARLES W. PEACH, Esq.

[With a Plate.]

HAVING read in Ellis’s ‘*Essay on the Corallines*’ that he considered the “*Sea-Cup*” to be “the ovary of the periwinkle

shell-fish," and having nowhere, in the few books I have access to, seen that contradicted, I beg to forward to you some observations on the subject, and to show that the "sea-cup" does not belong to the periwinkle, but to the *Purpureus lapillus*. In the early part of January of the present year I found that the *Purpureus lapillus* was very abundant on the rocks in Little Peraver near my residence, and that they got together in clusters. I watched their movements, and found that where they assembled the "sea-cup" was plentiful indeed; in fact I never before saw them so abundant. On taking hold of some of the whelks, I found that they covered three or four of the "cups" with their mantles, and it required a good pull to remove them. I also noticed that there were indentations in the mantle corresponding with the number of "cups" which it had enveloped, and that when the shell was removed a drop of transparent matter stood on the upper end of each cup. After the whelk has formed and filled them, the mouth is securely sealed up. The "cup" is then of a pale yellowish colour; the internal part soon assumes a granular appearance which becomes more and more distinct; after some time, some of them change to a pinkish hue, and the young fry can be better distinguished; the thickened seal of the operculum becomes thin, and after about *four months* opens, and the young prisoners escape into the surrounding medium, and take refuge in crevices of the rocks or amongst mussels, *Balani*, &c. &c. which are attached to them. The young leave the "cups" gradually, and sometimes a fortnight elapses between the exit of the first and the last, and they are of different sizes; they have all the peculiar habits of the adult ones, such as remaining out of the water for long periods: this I observed in many that I reared in a dish in my house; some of them also were of a purple colour. Some which I took out of the "cups"—nay, all—show the distinguishing canal, and are at first semitransparent and horn-coloured: the older before leaving the "cups," the more white and opaque they are, and show the striæ and markings on the pillar, with the canal, and all the characteristic appearances of the old shell, clearly evincing that they belong to the *Purpureus lapillus*, and not the *Turbo littoreus*, which latter **shell** has *no canal* or markings on the pillar.

I observe also, that in Little Peraver, where the "egg-cups" and *Purpureus lapillus* are abundant, there is scarcely a periwinkle to be found; whilst at Cologne in the same parish, about half a mile distant, where periwinkles are numerous, and the *Purpureus lapillus* very scarce, egg-cups are few and far between.

I have taken as many as thirty-four perfect shells from one cup, showing that they are prolific.

They fix these cups in indentations and crevices and under overhanging parts of the rocks, and *invariably on that side least exposed to the fury of the waves*; and this circumstance shows that even in this animal the Great Author of all has implanted a sense of guarding its young from injury, proving his superintending care over all his creatures.

The accompanying drawings will illustrate the above statement:—

PLATE I. A.

Fig. 1. Nidi taken from under the whelk when in the act of forming it.

— 2. Nidi after the escape of the young.

— 3. Magnified view of the upper part or operculum when left by the whelk.

IX.—*Descriptions of Chalcidites discovered near Conception, in South America, by C. Darwin, Esq.* By FRANCIS WALKER, F.L.S.

Lamprotatus Alcander, Mas. *Æneo-viridis cupreo et cyaneo varius, antennæ fulvæ, pedes fulvi, alæ limpidae.*

Corpus breve, robustum, convexum, æneo-viride, nitens, scitissime squameum, parce hirtum : caput transversum, breve, viride, thorace paullo latius ; vertex latus, frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ fulvæ, subfiliformes, thorace non longiores ; articulus 1^{us} nigro-viridis, longus, gracilis ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} brevissimi ; 5^{us} et sequentes usque ad 10^{um} breves, approximati, subæquales ; clava longiconica, compressa, acuminata, articulo 10^o duplo longior : thorax ovatus, cupreo-æneus : prothorax brevissimus : mesothoracis scutum cyaneo-viride, longitudine latius ; parapsidum suturæ bene determinatæ, postice approximata ; scutellum subrotundum : paraptera et epimera magna : metathorax mediocris, obconicus, declivis : petiolus sat longus : abdomen breviovatum, cupreo-varium, supra planum, basi cyaneo-viride, thorace multo brevius ; segmentum 1^{um} magnum, 2^{um} et sequentia brevia : pedes fulvi, simplices, subæquales ; coxæ virides ; tarsi apice fuscii : alæ amplæ, limpidae ; squamulæ fusæ ; nervi fulvi ; nervus humeralis ulnari fere duplo longior, radialis ulnari non brevior, cubitali multo longior ; stigma minutum. (Corp. long. lin. 1 ; alar. lin. 2.)

Gastrancistrus Cephalon, Fem. *Cupreus, antennæ nigrae, pedes lutei, femora basi nigra, alæ limpidae.*

Corpus cupreum, convexum, nitens, scitissime squameum, parce hirtum : caput transversum, breve, thorace latius ; vertex latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ subclavatae, nigrae, sat graciles, submoniliformes, thorace non longiores ; articulus 1^{us} longus, sublinearis ; 2^{us} cyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes usque ad 10^{um} breves, approximati, subæquales ; clava longiconica, acuminata, articulo 10^o plus duplo longior : thorax ovatus : prothorax transversus, mediocris, antice angustus : mesothoracis scutum longitudine latius ; parapsidum suturæ bene determinatæ, postice approximata ; scutellum subconicum : metathorax brevis, postice angustus : petiolus brevissimus : abdomen ova-

tum, læve, supra planum, subtus carinatum, apice acuminatum, thorace paulo brevius : pedes lutei, simplices, subæquales ; coxæ virides ; femora basi nigra ; tarsi apice fuscii : alæ limpidae ; squamulæ piceæ ; nervi fulvi ; nervus humeralis ulnari multo longior, radialis ulnari paulo brevior, cubitali multo longior ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Pteromalus Calenus, Mas. Æneo-viridis, abdomen cupreum, antennæ nigrae, pedes fulvi, femora viridia, alæ limpida.

Corpus convexum, æneo-viride, nitens, scitissime squameum, parce hirtum : caput transversum, breve, thorace latius ; vertex latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ nigrae, subclavatae, thorace paulo longiores ; articulus 1^{us} longus, gracilis, 2^{us} longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes ad 10^{um} subæquales ; clava conica, articulo 10^o multo longior : thorax ovatus : prothorax transversus, brevissimus : mesothoracis scutum longitudine latius ; parapsidum suturæ vix conspicuæ ; scutellum subconicum : paraptera magna ; metathorax brevis-obconicus, declivis : petiolus brevissimus : abdomen cupreum, sublineare, depressum, læve, fere glabrum, thorace multo angustius et paulo brevius : pedes fulvi, simplices, subæquales ; coxæ virides ; femora viridia, apice fulva ; tarsi apice fuscii ; mesotibiæ fusca ; metatibiæ piceo-cinctæ : alæ limpidae ; squamulæ piceæ ; nervi fuscii ; nervus humeralis ulnari duplo longior, radialis ulnari non brevior, cubitali paulo longior ; stigma minutum. (Corp. long. lin. 1 ; alar. lin. $1\frac{3}{4}$.)

Derostenus Alcetas, Mas. Viridis, antennæ nigrae, pedes flavi, alæ fulvo-tinctæ.

Corpus breve, convexum, viride, nitens, subtilissime squameum, parce hirtum : caput transversum, breve, thorace vix latius : vertex latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ graciles, submoniliformes, nigrae, apice acuminatae, thorace non longiores ; articulus 1^{us} longus, sublinearis ; 2^{us} et sequentes usque ad clavam breves : thorax ovatus, cupreo-varius : prothorax brevissimus, supra non conspicuus : mesothoracis scutum longitudine latius ; parapsidum suturæ bene determinatae, postice approximatae : scutellum obconicum : metathorax magnus, declivis, obconicus : petiolus sat longus : abdomen breviovatum, læve, fere planum, thorace multo brevius : pedes pallide flavi, graciles, subæquales ; coxæ virides ; ungues et pulvilli fuscii : alæ fulvo-tinctæ, latæ ; squamulæ piceæ ; nervi flavi ; nervus ulnaris humerali multo longior, radialis vix ullus, cubitalis brevissimus. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Closterocerus Cercius, Fem. Viridis, abdominis discus purpureus, antennæ nigrae, pedes nigri, tarsi flavi, alæ fusco-nebulosæ.

Corpus sublineare, fere planum, læte viride, nitens, scitissime squameum, parce hirtum : caput transversum, brevissimum, impressum, thorace non latius ; frons abrupte declivis : oculi rufi, mediocres, non extantes : antennæ nigrae, graciles, submoniliformes, apice acuminatae, thorace paulo breviores ; articulus 1^{us} longus, sublinearis ; 2^{us} et sequentes usque ad clavam breves, subæquales : thorax ovatus : prothorax brevissimus, supra non conspicuus : mesothoracis scutum longitudine latius ; parapsidum suturæ non bene determinatae ; scutellum æneo-viride, obconicum : metathorax brevis, postice angustus : petiolus brevissimus : abdomen ovatum, subtus carinatum, thorace brevius, non latius ; discus purpureus : pedes nigri, simplices, subæquales ; coxæ virides ; genua fulva ; tibiæ apice flavæ ; tarsi flavi, apice fuscii : alæ sublimpidae, ciliatæ, fusco obsolete nebulosæ ; squamulæ piceæ ; nervi fulvi ; nervus ulnaris humerali multo longior, radialis vix ullus, cubitalis brevissimus, in alæ discum abrupte declivis ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Bellerus (N.G.) Anaitis (Haliday MSS.), Mas. *Viridis, antennæ nigræ, pedes virides, tarsi fusci, alæ subfuscæ.*

Corpus gracile, sublineare, convexum, viride, nitens, scitissime squameum, parce hirtum : caput transversum, brevissimum, thorace vix latius ; vertex sat latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ 12-articulatæ ?, graciles, moniliformes, nodosæ, verticillatopilosæ, corpore paullo breviores ; articulus 1^{us} longus, sublinearis ; 2^{us} brevis ; 3^{us} et sequentes usque ad 9^{um} verticillo setarum ornati ; 5^{us} et sequentium quisque ad 9^{um} gracillimi, lineares, apice ubi setæ insident in clavam globosam latescentes ; clava triarticulata, fusiformis, acuminata : thorax longiovatus : prothorax transversus, sat magnus, antice angustus : mesothoracis scutum longitudine latius ; parapsidum suturæ optime determinatæ, postice approximata ; paraptera et epimera magna ; scutellum subovatum : metathorax mediocris, obconicus, declivis : petiolus brevissimus : abdomen sublineare, planum, læve, thorace angustius et multo brevius : pedes virides, simplices, subæquales ; trochanteres picei ; genua fusca ; tarsi 4-articulati, fusci ; ungues et pulvilli minuti ; protarsi basi flavi ; alæ subfuscæ ; squamulæ piceæ ; nervi fusci ; nervus ulnaris humerali multo longior, radialis humerali paullo brevior, cubitali plus duplo longior ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

Tetrastichus Naucles, Fem. *Ater, abdomen nigro-æneum, antennæ piceæ, pedes fulvi, femora nigra, metatibiæ fusco-cinctæ, alæ sublimpidæ.*

Corpus validum, convexum, atrum, nitens, læve, parce hirtum : caput transversum, brevissimum, thoracis latitudine ; vertex sat latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ piceæ, subclavatæ, thorace vix longiores : thorax ovatus : prothorax brevissimus, supra vix conspicuus : mesothoracis scutum magnum, longitudine non latius ; parapsidum suturæ bene determinatæ, remotæ, postice approximata ; scutellum bisulcatum, semicirculum fingens : metathorax brevis, transversus, declivis : petiolus brevissimus : abdomen ovatum, nigro-æneum, supra planum, subtus carinatum, apice acuminatum, thorace paullo longius : pedes fulvi, simplices, subæquales ; coxæ nigræ ; femora nigra, apice fulva ; tarsi apice fusci ; metatibiæ fusco-cinctæ : alæ sublimpidæ, pubescentes ; squamulæ piceæ ; nervi fusci ; nervus ulnaris humerali fere duplo longior, radialis nullus, cubitalis sat longus ; stigma minutum. (Corp. long. lin. 1 ; alar. lin. $1\frac{1}{2}$.)

Tetrastichus Norax, Fem. *Ater, antennæ piceæ, pedes flavi, femora nigra, alæ limpidæ.*

Præcedente gracilior. Corpus sublineare, convexum, atrum, nitens, læve, parce hirtum : caput transversum, brevissimum, thoracis latitudine ; vertex sat latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ piceæ, subclavatæ, thorace non longiores ; articulus 1^{us} niger : thorax ovatus : prothorax brevissimus, supra vix conspicuus : mesothoracis scutum longitudine non latius ; parapsidum suturæ remotæ, bene determinatæ, postice approximata ; scutellum bisulcatum, semicirculum fingens : metathorax brevis, declivis : petiolus brevissimus : abdomen ovatum, supra planum, subtus carinatum, apice acuminatum, thorace non longius : pedes flavi, simplices, subæquales ; coxæ nigræ ; femora nigra, apice flava ; tarsi apice fusci : alæ limpidæ ; squamulæ piceæ ; nervi fulvi ; nervus ulnaris humerali duplo longior, radialis nullus, cubitalis sat longus ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. $1\frac{1}{4}$.)

X.—On drying Plants for the Herbarium by means of a Deliquescent Salt. By J. J. MURCOTT, Esq.*

THE plants to be dried are placed between sheets of paper containing chloride of calcium, contact with the salt being prevented by an intervening cushion on one side, and a layer of fine calico on the other. Two thin boards support the apparatus, and are held together by a couple of buckled tapes; the whole is enveloped in oil cloth to exclude atmospheric moisture. The packet need not be opened till the plants are dry enough to be removed, or fresh plants require to be introduced. The time and trouble of frequently removing drying plants into fresh papers, as in the ordinary method, are both saved; for though the packet be full of plants, it need not be opened even for several months. Plants in general dry much faster than in blotting-paper, and their colours are much more frequently preserved: the use of the pad prevents injury to the soft parts of plants, and hinders their corollas from shrivelling up in drying, without applying so much pressure as would unfit any part for subsequent examination.

Brown paper, so thick as to prevent the transmission of light, with a smooth surface, and not much sized, is better fitted to hold the salt than blotting-paper, which it greatly surpasses in durability and tenacity in a damp state. The paper is impregnated with the salt by dipping it (a sheet at a time) in a solution formed by dissolving $13\frac{1}{2}$ oz. of the crystallized chloride of calcium in one (imperial) pint of water. Where the chloride is expensive, or difficult to be procured, it may be prepared by saturating hydrochloric acid with fragments of marble, or even with common chalk: the acid may be of commercial strength or slightly diluted with water; but the vessel containing it should be capable of holding several times the quantity, on account of ebullition. After saturation the liquid should be filtered, and diluted with water till its specific gravity falls to 1.188; this may be ascertained most readily by a glass bead of that number. The sheets as they are dipped (a large tea-tray is very convenient to hold the liquid) should be carefully laid one upon another, and at length so much liquid pressed out that they will not drip when held before a fire to dry. I dry them before a fire, but a friend suggests that much time and trouble would be saved by drying them in a baker's oven. A solution of this strength will communicate as much of the salt as the paper can retain without showing an exudation on its surface when applied to use and its complement of moisture absorbed, while the excessive brittleness occasioned, if the liquid be much more concentrated, soon splits the back of every sheet; and the drops of liquid that appear as the paper grows very damp might deter a beginner from following the method.

In applying the paper to use, I place about three sheets between every lot of plants: the plants do not touch the paper but lie on a cushion of cotton wool, and are covered with a piece of 'glazed lining' calico, or similar material; or they are placed between two

* Read before the Botanical Society of Glasgow, November 1842.

pieces of flannel; of course the same surface of the cotton or flannel should always be applied to the paper, to prevent communication of the salt to the plants. I have prepared some sheets of paper on one side only, but have not yet given them a trial. The pads do not much affect the quick drying, but they preserve soft parts from injury, and render a very slight pressure sufficient. When I wish to preserve the corolla of a plant in the best possible manner, I place under and above it a little finely opened cotton wool. When very watery plants are to be dried, such as *Hottonia palustris*, I would place an extra cushion of cotton wool over them. Plants seem to dry best at a temperature of about 100° F. When the papers have taken up as much moisture as they can absorb, they may be re-dried before a fire, if the method suggested by a friend (drying at a baker's oven) should not be accessible. *Orchidaceæ* and *Scrophulariaceæ* are bad driers even with the aid of chloride of calcium; but I find that *Listera ovata*, and probably some others, may have their colour perfectly preserved if immersed for a few seconds in a nearly boiling but very weak solution of carbonate of soda, then wiped and placed between the papers. This remark may perhaps induce some one with more leisure than myself to experiment on various ways of drying plants of these natural orders.

The disadvantages of the method are in my opinion inconsiderable when compared with the saving of time and trouble, and the much better preservation of the specimens. Brown paper is not expensive. Crystals of chloride of calcium may be bought of the Liverpool Apothecaries' Company, and perhaps elsewhere, at 5*d.* per lb.; or if prepared at home, the expense will be about the same. The cotton-wool cushions cost 1*d.* or 1½*d.* each; flannel is more durable, but more expensive. The cushions render the apparatus bulky, but this is only an inconvenience in travelling, and then the far greater inconvenience of drying papers at inns in the summer months is experienced about once in three weeks instead of once a day, or every other day. Such at least is the result of my experience; I have employed the salt in the manner described for two years and part of a third, for I commenced with it in 1840. The great dryness and consequent brittleness of the plants unfit them for the immediate examination of concealed parts, but exposure to a moist air for a short time would diminish their fragility in a sufficient degree.

Suppose some plants dried, whose colours are lost in the usual mode of drying, for instance the Campanulas: will they keep their colours after removal from the drying papers, and exposure continually to a moister air? I can scarcely answer the question, for my herbarium is kept artificially dry by means of the salt employed to dry the plants in the first instance. Some specimens, however, communicated to a friend four months after drying, lost their colour in his possession, while nearly twelve months later, specimens of the same plant, brought from the same place, at the same time, and dried in the same manner, were unaltered. The latter were in my herbarium, and the air within was much drier than the air outside. The best method I have thought of to keep a cabinet artificially dry, is by

having a cavity of about an inch at the back of the shelves (two cross bars might prevent the plant-holding papers from being pushed too far back) with a lid at the top, and sliding in one or more frames supporting Welsh Plane well dosed with the chloride and dried; gun-wadding prepared might perhaps do as well, but I have not at present tried either material. A servant might occasionally take out, dry, and replace the slides without having access to the plants.

One unconnected remark and I have finished: my vasculum is provided with a canvass lining, which I take care to have well-wetted in warm weather, to supply much of that moisture that would otherwise diffuse into the air from the contained plants alone. It is further provided with a covering of canvass to be used only in hot sunshine when it is wetted to keep the box cool by evaporation from its surface.

Woodloes, near Warwick, November 1842.

XI.—*On the relative position of the Divisions of Stigma and Parietal Placentæ in the Compound Ovarium of Plants.* By ROBERT BROWN, F.R. & L.S.*

To estimate correctly the importance of the relation between the divisions of the Stigma and the parietal placentæ of the compound ovarium, namely, whether when agreeing in number they are placed opposite to or alternate with each other, it is necessary to take into consideration the theoretical view which appears the most probable of the origin or formation of a simple ovarium, and that of the stigma belonging to it, as well as the various kinds and degrees of confluence by which the real nature of both organs, but especially the latter, is so often obscured.

It is at present, I believe, universally agreed to consider a polyspermous legumen as that state of the simple ovarium, which best exemplifies the hypothetical view of the formation of this organ generally adopted; namely, that it consists of the modification of a leaf folded inwards and united by its margins, which in most cases are the only parts of the organ producing ovula; or, at least, where this power of production is not absolutely confined to the margins, it generally commences with or includes them.

The exceptions to the structure as here stated are of two kinds:—

First. Where the whole internal surface of the carpel is

* This article, which is referred to at p. 255 of No. 65, is extracted from Mr. Brown's account of *Cyrtandra*, given in the second part of Dr. Horsfield's 'Plantæ Javanicæ Rariores,' published in 1840. Separate copies of this article were distributed in December, 1839.

equally ovuliferous, which is the case in a few families of very small extent, as *Butomeæ*, *Nymphæaceæ* and *Lardizabaleæ*.

Secondly. Where the production of ovula is limited to the external angle of the cell or axis of the leaf supposed to form the carpel.

A case of this kind is found in a portion of one of those families in which the whole surface is generally ovuliferous, namely, in *Hydropeltideæ*, which I have always regarded as merely a section of *Nymphæaceæ**; and from the nature of these differences in placentation, which are more apparent than real, an argument might even be adduced in favour of that opinion.

A placenta apparently limited to the outer angle of the cell also occurs in the greater number of species of *Mesembryanthemum*. As this structure, however, is certainly not without exception in that very natural genus, several species, among which are *Mesembryanthemum crystallinum*, *cordifolium*, *papulosum* and *nodiflorum*, having the placenta confined to the internal angle of the cell or margins of the carpel; and as in some of those species in which the outer angle is placentiferous, the production of ovula is not confined to it, but extends to the lower half of the inner angle;—this apparent deviation from ordinary structure may perhaps be explained by assuming cohesion of the inflected portion of the carpel with the wall of the cell;—an hypothesis, in some degree supported by the fact, that in several species the termination of the assumed inflected portion is free and not ovuliferous.

But whatever opinion may be adopted as to the relation of this seemingly anomalous to the ordinary structure, it cannot, as M. Fenzl proposes†, be employed as the essential character of a distinct natural family limited to the Linnæan genus *Mesembryanthemum*.

The placenta then of a simple ovarium in its usual state, according to this view, is necessarily double; though by the complete suppression of ovula in one of its two component parts, and their diminished production in the other, the ovarium is not unfrequently reduced to a single ovulum. That such is the origin of the single ovulum is at least manifest in a monstrosity of *Tropæolum majus*, in which the stamina are converted into pistilla; but the complete action being impeded by the presence of the regular trilocular pistillum, and the two marginal cords of each open ovarium remaining di-

* Gen. Rem. in Flinders's Voy. vol. ii. Append. p. 598.

† Annal. des Wien. Mus. vol. i. p. 349.

stinct, the origin of the ovulum from one only of these cords is satisfactorily shown.

An ovarium with two or a greater number of cells, whose placentæ project into the cavities more or less from their inner angles, is an organ, the composition of which is sufficiently obvious.

But a compound ovarium may be differently constructed; and, first, instead of each simple organ forming a complete cell by the union of its own margins or adjoining portions of its surface, the corresponding margins or adjoining portions of surface of the proximate component parts may unite together so as to form a parietal placenta, often apparently simple, but in reality double in all cases. This view of the composition of a unilocular ovarium having two or more parietal placentæ is also very generally received. But exceptions, supposed to prevail in whole families, in which the disc and not the margins are placentiferous, have lately been assumed by Professor Lindley, *Orchideæ* and *Orobanchææ* being the examples of this structure to which he more particularly refers.

The accurate determination of this question appears to me of great importance to the theoretical botanist, but the subject will be most advantageously discussed after treating of the origin and modifications of stigmata.

An ovarium less manifestly compound is that in which the centre of the cavity is occupied by a placenta entirely unconnected with its sides; the supposed inflected portions of each component organ, according to the view here adopted, being removed, or reabsorbed so completely in a very early stage of its development as to leave no trace of their existence either on the walls of the cavity or on the surface of the central placenta, which may either be polyspermous, or produce only a smaller and definite number of ovula having a relation to its supposed component parts, or, lastly, in some cases be reduced to a single ovulum.

These are the principal modifications of the compound ovarium when forming a simple series; but it is necessary to observe that both surfaces of the inflected and included portions of the carpels are not unfrequently equally productive of ovula, a structure which is manifest in many *Cyrtandraceæ*, especially *Cyrtandra*, although in several other genera of the same family the production is confined to the inner or upper surface of the margin. In other cases the polyspermous ovuliferous portion or placenta is connected with the inner angle of the cell by a single point only, which may proceed either from the apex or base of the cavity. This modification of

structure, though in some families hardly of generic importance, seems to me to assist in explaining the apparently anomalous structures of *Hydnora*, *Rafflesia*, and *Brugmansia*.

On the subject of the origin and type of Stigma, my first observation is, that the style where present can only be regarded as a mere attenuation, in many cases very gradual, of the whole body of the ovarium. Hence the idea naturally suggests itself, that the inner margins of the carpel, which in the lower part are generally ovuliferous, in the upper part perform the different, though in some degree analogous, function of stigma. As the function, however, of this organ implies its being external, and as in different families, genera, and even species, it has to adapt itself to various arrangements of parts destined to act upon it, corresponding modifications of form and position become necessary; hence it is frequently confined to the apex, and very often, especially in the compound ovarium with united styles, appears to be absolutely terminal.

In such cases, as it must always include and be closely approximated to the vascular cord of the axis, it has by some botanists been considered as actually derived from it, which it is, however, only in the same manner as the marginal placentæ are derived from the axis of the carpel. But according to the notion now advanced, each simple pistillum or carpel has necessarily two stigmata, which are to be regarded, not as terminal, but lateral.

That the stigma is always lateral may be inferred from its being obviously so in many cases; and in one genus at least, *Tasmannia*, it extends nearly the whole length of the ovarium, so as to be commensurate with and placed exactly opposite to the internal polyspermous placenta.

That the stigma is always double appears probable from those cases in which it is either completely developed, as in the greater part of *Gramineæ* where the ovarium is simple; in the compound ovarium in *Urena*; and from those in which the development, though less complete, is still sufficiently obvious, as in many *Euphorbiaceæ* and in several *Irideæ*. This degree of development, however, is comparatively rare, confluence between the two stigmata of each carpel being the more usual structure; and in the compound pistillum a greater degree of confluence often takes place in the stigmata than in the placentæ;—a fact, which in all such cases is obviously connected with adaptation of surface to the more complete performance of function.

Another difference frequently occurs between the mode of confluence of placentæ and stigmata, namely, that in the com-

pound but unilocular ovarium, while the placentæ of the adjoining carpels are united, the stigmata of each carpel are generally confluent. But this rule admits of exceptions, as in *Parnassia*, in many *Cruciferae*, and in *Papaveraceæ*: in all these cases the stigmata as well as placentæ of the adjoining carpels are confluent, a structure satisfactorily proved in *Cruciferae* by several cases of monstrosity, in which the stamina are transformed into pistilla; and in *Papaveraceæ* by a series of modifications of structure as well as by a like transformation of stamina.

A similar confluence of stigmata in the compound multilocular pericarpium is of much rarer occurrence; it is found, however, in the majority of *Irideæ*, in which the three stigmata alternate with the cells, and consequently with the placentæ of the trilocular ovarium. That this is the correct view of the composition of the stigmata in *Irideæ* is at least probable from their occasional deep division, and more particularly still from the bifid petal-like styles or stigmata which are opposite to the cells of the ovarium in other genera of the same family, as in *Iris* and *Moræa*. In both these arrangements the adaptation to the performance of function is equally manifest.

If the correctness of these observations be admitted, it follows that characters dependent on the various modifications of stigmata are of less value, both in a systematic point of view as determining the limits of families, and theoretically in ascertaining the true composition of organs, than those derived from the analogous differences in the ovaria or placentæ.

In those cases in which the nature of the composition of the ovarium is doubtful, it may, in the first place, be remarked, that wherever in the compound unilocular pistillum the placentæ are double or two-lobed, it is more probable that such placentæ are derived from two adjoining carpels, and are consequently marginal or submarginal, than that they occupy the disc of one and the same carpel: this being entirely the appearance in many cases where the marginal origin of placentæ is admitted; while in the greater part of those in which the disc is known to be ovuliferous, the ovula are never collected in two distinct masses, being generally scattered equally over the surface.

But the double placentæ are manifest in *Orchideæ*, the principal family in which Mr. Lindley considers the ovula as occupying the disc and not the margins. In this family also the alternation of stigmata with placentæ is that relation which is most usual in compound unilocular ovaria, where the apparent number of stigmata and placentæ is equal; and that

in *Orchideæ* each apparent stigma is formed by the confluence of the two stigmata of one and the same carpel, is proved by tracing to their origins their vascular cords, which are found to coalesce with those of the three outer foliola of the perianthium.

This view of the composition of the ovarium in *Orchideæ* is confirmed by finding that it agrees with the ordinary arrangement in monocotyledonous plants; namely, the opposition of the double parietal placentæ to the three inner divisions of perianthium*, while in *Apostasia* the three placentæ of the trilocular ovarium are opposite to the three outer divisions; and it is further strengthened on considering what takes place in *Scitamineæ*, where the same agreement is found both in the placentæ of the trilocular ovarium, which in this family is the ordinary structure, and in the unilocular, which is the exception.

I am aware that the agreement of *Orchideæ* with the usual relation of parts in Monocotyledones is not admitted by M. Achille Richard, nor by Mr. Lindley, who has adopted his hypothesis respecting the structure of the flower in this family. According to M. Richard, the outer series of perianthium is generally wanting, being found only in one genus, *Epistephium*: the three outer divisions actually existing in the whole order, according to this view, become petals, and the three inner divisions sterile petaloid stamina.

I have some years ago† stated several objections to this hypothesis; at present I shall advert to one of those only, considering it as conclusive; namely, the position of the two lateral stamina, which are generally rudimentary, but in some cases perfectly developed, in this family. In several species of *Cypripedium*, which is one of these cases of perfect development, I had then ascertained, by means of numerous transverse sections made at various heights in the column and at its base, that their vascular cords united with those of the two lateral inner divisions of the flower, while that of the third, generally the only perfect stamen, is manifestly opposite to the anterior division of the outer series. The position of stamina, therefore, so far from being regular, as the hypothesis in question considers it, is absolutely without example, two of the inner series being opposite to two of the supposed outer series of stamina.

A very different view respecting the formation of the ovarium in *Orchideæ* is that first advanced by Mr. Bauer and

* Denham, Trav. in Afr. Append. p. 243.

† Liun. Soc. Trans. vol. xvi. p. 698.

adopted by Mr. Lindley, namely, that it consists of six carpels, of which three, placed opposite to the outer series of perianthium or sepals, are sterile; the remaining three, opposite to the inner series, or petals, being fertile, and bearing their placentæ on their axes or discs.

The chief argument in support of this view is no doubt derived from the very remarkable dehiscence of the capsule into six valves. But I have elsewhere pointed out cases where an analogous dehiscence occurs, in which, however, a similar composition has never been supposed to exist: and if the presence of six vascular cords in sections of the ovarium be likewise adduced in favour of the opinion, I may add that I have in the same place remarked that these vascular bundles belong not to the ovarium only, but also to the perianthium and stamina, and are equally observable in other families with adherent ovarium, as *Irideæ*, in which a similar composition has never been inferred.

With regard to the second family, in which Mr. Lindley believes the disc of the carpel to be ovuliferous, namely, *Orobancheæ*, I find no other argument advanced in support of this view than that derived from the bursting of the capsule into two lateral valves: but an opinion founded on dehiscence only may be said to be a mere begging of the question; division through the axis of carpels, especially in the families related to *Orobancheæ*, being nearly as common as separation of their margins. In this family also, as in *Orchideæ*, the placentæ are double, an argument in favour of their submarginal origin: and although, whether the carpels be regarded as lateral, or anterior and posterior, the placentæ are not strictly marginal, yet there are other families where a similar position of placentæ is found, but in which the structure assumed in this hypothesis has never been suspected. As to the supposed affinity of *Orobancheæ* with *Gentianeæ*, which might be adduced in support of this view, as far as it is founded on the assumed agreement of the two orders in the lateral position of their carpels, the argument, even if correct, would hardly be conclusive; for in *Gentianeæ* there is at least one genus having quadrifid and another with quinquefid flowers, in which the carpels are not lateral, but anterior and posterior, as I believe them to be in *Orobancheæ*; nor has it ever been supposed that in *Gentianeæ* the disc or axis is ovuliferous.

In the account now given of the modifications of ovarium and stigma, I have, in conformity with the ordinary language of botanists, employed the term *confluence*, by which, however, is not to be understood the union or cohesion of parts originally distinct, for in the great majority of cases the sepa-

ration or complete development of these parts from the original cellular and pulpy state has never taken place. But with this explanation the word may still be retained, unless connate should be considered less exceptionable.

I have also assumed that ovula belong to the transformed leaf or carpel, and are not derived from processes of the axis united with it, as several eminent botanists have lately supposed. That the placentæ and ovula really belong to the carpel alone is at least manifest in all cases where stamina are changed into pistilla. To such monstrosities I have long since referred in my earliest observations on the type of the female organ in phænogamous plants*, and since more particularly in my paper on *Rafflesia*†: the most remarkable instances alluded to in illustration of this point being *Sempervivum tectorum*, *Salix oleifolia* and *Cochlearia armoracia*, in all of which every gradation between the perfect state of the anthera and its transformation into a complete pistillum, is occasionally found.

XII.—On the Structure of the Capsule of *Papaveraceæ*; and on the Nature of the Stigma of *Cruciferaæ*. By J. W. HOWELL, Esq., M.R.C.S.

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

GENTLEMEN,

IN reference to your notes appended to my paper "On the Structure of the Stigma of the *Papaveraceæ*," &c. in your last Number, wherein it would appear that I had been anticipated by M. Kunth, 'Flora Berolinensis,' published 1838, in the description of the apparently anomalous relation of the parietal placentæ to the stigmatic rays—permit me to observe, that my observations on this interesting subject were made in 1832.

In respect to your statement that "those of Mr. Howell's observations which relate to the opposition of stigmata to placentæ in *Papaveraceæ*, and to the composition and cohesion of stigmata, had already been published by Dr. Brown in his account of *Cyrtandraceæ* in Horsfield's 'Plantæ Javanicæ,'" which work I have not yet seen, but have learned that it was published in 1840—justice to myself compels me to inform you, that the paper I sent you was published *verbatim* in the 'Bath and Cheltenham Gazette' in October 1840, and was sent for republication in the 'Annals,' from a conviction that the subject was new, and worthy of a more extended circulation than a local paper could ensure.

* In Linn. Soc. Trans., vol. xii. p. 89.

† Ibid. vol. xiii. p. 212, note.

On any occasion I should esteem it an honour to find that my researches received the sanction of Dr. Brown's prior claim; it is to avoid the charge of plagiarism from the 'princeps botanicorum,' or from M. Kunth, that I trouble you with this explanation*.

I am, Sir, yours obediently,

Bath, December 21, 1842.

JOHN WARREN HOWELL.

XIII.—*Observations on the Metamorphosis of an Annelide.*

By S. LOVÉN†.

[With a Plate.]

AMONGST the articulated animals the Annelides have without doubt been the least studied, notwithstanding the excellent researches which have recently been published by Milne-Edwards concerning them. Their development in particular is still almost quite unknown to us. The observation which I now present, although dismembered and imperfect, appears however to indicate, that, at least in the higher divisions of these animals, during their development, a metamorphosis takes place, which is almost as remarkable as that of insects.

Last August, as I was endeavouring to catch small marine animals with a fine draw-net, such as Entomostraca, &c., I at the same time unexpectedly obtained with these a great number of small lively creatures, which were so strange to me that I was unable to make out to what class they belonged. Fig. 1. (Plate I. B.) represents one magnified, in the form in which it first appeared after capture. The natural size amounted to about half a millimetre, and its structure seemed very simple. The most striking thing was a disc or oval ring (*a*), which bore upon its margin a row of vibrating cilia, and had a second smaller one over this; by the unceasing motion of these cilia the animal moved quickly to and fro, mostly progressing in an oblique direction.

On the side of this ring, which was usually directed upwards, the body rose towards the hinder part to a somewhat oblique hemisphere (*b*); the side generally opposed to it was also inflated (figs. 1, 2, 3, *c*), yet much less, and obliquely in front. On the upper side the mouth (*e*) appeared to be situated anteriorly near to the ring, the lips of which were provided with cilia. At the apex of this side was the anus (*h*), a small opening surrounded by a muscular ring. The whole was very transparent, and the course of the intestinal canal

* [It was by no means our intention to question the undoubted originality of Mr. Howell's valuable observations, but merely to direct the attention of our readers to what had been done by other botanists on the same subject.—Ed.]

† Translated from the German in Wiegmann's Archiv, Part 3, p. 302: 1842.

might be seen in the interior, which appeared still plainer when the little animal was fed with indigo. I then found that the intestinal canal was divided into two parts, the stomach (*f*), in the form of a sack, which extends posteriorly and somewhat downwards, and the intestine (*g*) which is separated from it by a contraction, and then growing still narrower ascends directly upwards to the anus. Almost in the middle of the lower raised surface of the animal was a minute spot (*i*), more opaque, and placed diagonally, which in some individuals exhibited two small black points. From this structure it was easy to guess that the animal was not developed, but it was more difficult to say what it would change to.

This question was however soon solved. It was evident that the little animals, one after the other, underwent considerable changes. The upper elevated side (*b*) projected more and more, and divided into rings (fig. 2, *i*). The first of these formed themselves near to the anus (*h*), and their number increased by degrees, so that the last one added lay next to the disc. Each newly-formed ring consisted of four parts. Two of these semi-rings, the anterior and hinder, were large, and covered externally with muscular layers, and the other two shorter side-pieces united them. Whilst this change went on upon the disc, one quite as surprising took place below it. The above-mentioned spot constantly became more opaque and distinct, and between the black points and in front of them were formed by degrees near the eyes (figs. 2, 3, 4), pointed filaments, which were the tentacula. The object of this uninterrupted metamorphosis now became apparent; it was evidently the development of an Annelide. The form now described and represented in fig. 2. very soon changed into that which is seen in fig. 5, whilst the number of the rings rapidly increased, and the former round, arched part (*b*) became the curled body of a worm. The disc, with its vibrating cilia, still existed, and the little animals, which had been two days captured, died one after the other. I was upon the point of renouncing the hope of pursuing their development to its end, when at last I found one which had survived longer, and which I have represented in fig. 6: this had no longer the ring provided with cilia round about the head (as fig. 5.), which was stretched freely forwards, and as a remnant of the ring, appeared on each side an appendage, without any decided form; the animal soon after died. On this account I cannot decide whether this appendage still remained fixed any time, or soon fell off; I had, however, reason to suppose the former. Several years ago I had already observed and sketched a small Annelide, which was swimming on the surface of the sea, resembling the one now described, but more

developed, and apparently belonging to another species. It is almost the same which Dr. Johnston has described and represented in the 'Annals of Natural History,' iii. p. 293. pl. vi. fig. 2, and which he supposed might be the young of Linnæus's *Nereis pelagica*. Both of these animals seen by him and by me bear upon each side of the head a kind of winged appendage richly provided on the under side with vibrating cilia; perhaps the tentacula are formed from these. This question remains unanswered, and also the formation of the feet.

Had I been able to pursue the development for a longer time, it would have become much less difficult to determine the species exactly; that cannot now be done, and an exact determination of the genus will be difficult to make. In the first place, however, it is clear, from the nature of the head, its eyes, and tentacula, that it is an animal of the class of the free Annelida, Lamarck's *Antennati*, and amongst these the form of the body appears to point to the family of the *Nereidæ* or *Euniceæ*. From the form of the head and the number of the eyes we might suppose it to be a *Phyllodoce*, and species of this genus are not rare upon our western coast [Sweden]; but without knowing the form of the foot, it is impossible to decide anything about it.

Short and imperfect as this observation must appear, it proves that at least certain Annelides undergo a kind of metamorphosis, which is no less remarkable than that of insects, and some Crustacea. Besides, it shows that the growth in the Annelides takes place in such a way that the new rings are added in front of, and not behind, the older ones, and that the last hindermost ring is the oldest; or, that the increase takes place furthest from the head, a law which has also been remarked with respect to the Entozoa. It appears also, that every ring originally consists of an upper and an under half-ring, a tergum and sternum, which are united by two side-pieces, from which proceed the feet at a later period.

DESCRIPTION OF THE PLATE.

PLATE I. B.

Fig. 1. Represents a young one, as it first appeared.

Fig. 2. The same, which has increased in size, and in which seven rings have been developed.

Fig. 3. The same, from the under side, in order to show the head with eyes and tentacula.

Fig. 4. The same, in profile from behind.

Fig. 5. The animal with a greater number of rings, and worm-shaped body.

Fig. 6. An individual after transformation of the ring.

In these figures, *a* represents the ring or disc; *b*, the upper or abdominal part; *c*, the under or head part; *d*, the head; *e*, the mouth; *f*, the stomach; *g*, the intestine; *h*, the anus; *i*, the ventral rings.

XIV.—Description of two new species of Reptiles from the Collection made during the Voyages of H.M.S. Sulphur. By J. E. GRAY, F.R.S.

MY DEAR SIR,

CAPTAIN BELCHER having presented to the British Museum the reptiles collected during this voyage, I send you the description of the two following new species for insertion in the 'Annals;' they will be figured, with others not yet examined, in the forthcoming "Zoology" of his Voyage.

Yours truly,

R. Taylor, Esq.

J. E. GRAY.

CHAMELEONIDÆ.

Chameleo rhinoceros. Back and belly with a toothed keel; occiput low, prismatic, with a central keel; nose with a large projecting trigonal prominence, with a single smooth keel on its lower, and a toothed keel, separated by a deep groove, on each side of its upper surface. Colour dark, white-spotted (in spirits), with a pale streak along the middle of each side.

Hab. Madagascar?

IGUANIDÆ.

Oplurus torquatus, Cuv. Règne Anim. ii. 46.

Var. with three bands on the back; the one on the back of the neck narrow, the two others across the shoulders broad.

The young is pale gray, with seven black bands; the one across the shoulder, which remains in the adult animal, the broadest and darkest; limbs white-spotted.

According to Duméril, there is only a single discoloured species of this genus in the Paris collection.

HYDRIDÆ.

Lapemis loreatus.

Scales large; of the back smooth, of the sides with a small, and of the belly with a large, tubercular keel. Upper labial shields five on each side, with two smaller hinder ones, the first having a small additional plate on the margin; loreal shields large, over the second labial shield; the anterior ocular plate largely triangular.

Hab.

This species is nearly allied to *Lapemis Hardwickii* of my monograph of *Hydridæ* (Zool. Misc. part 2. p. 60); but it is larger than that species, though having the same number of upper labial shields; has no loreal plates, and has a smaller, square, anterior ocular shield; the keels of the lower scales are much smaller.

CROTALUS — ?

The young, just hatched, animal of this genus has a short, blunt tail, rather compressed at the end, with the tip covered by a compressed, cup-shaped, horny appendage, rounded at the end, about as long as high, near which is evidently the first joint of the future rattle.

BIBLIOGRAPHICAL NOTICES.

The Grasses of Scotland. By Richard Parnell, M.D., F.R.S.E., &c.
Illustrated by Figures drawn and engraved by the Author. 8vo.
Edinburgh, 1842.

It is not an easy thing to determine upon the best mode of bringing such a work as the present under the notice of our readers; for if we were to write a dissertation upon the modes that have been adopted by different authors for the classification of Grasses, however useful or amusing such a treatise might be, it could not be considered as a review of Dr. Parnell's work: on the other hand, if, leaving such extensive generalizations as must be inseparable from the above plan, we were to confine ourselves to an examination of the details of the work before us, we should produce a dry list of annotations, or kind of commentary on the book, but should be far from conveying any idea of its value to others.

It is necessary, however, that we should adopt some plan, and therefore we will first state what Dr. Parnell appears to have had in view, and then entering slightly into detail, endeavour to point out the mode that he has followed and the extent to which we consider that it has been attended with success. Our author is well known to many of our readers as a successful cultivator of the science of Ichthyology, and, from his being totally unknown as a botanist, we must confess that the announcement of the present work rather raised our curiosity than our expectations; but having now examined very many parts both of the descriptions and figures in a far more minute manner than is usual, not to say with reviewers, but even with students, we can confidently say that there is no part of British botany so thoroughly and successfully illustrated as the Scottish (would that we could say British) Grasses.

The author's object appears rather to have been the determination of species than distinction of genera, for that portion of his book which is occupied with the characters of the latter is greatly circumscribed, and the distinctions between them are far from being explained as is expected in a monograph. On the other hand, the descriptions of the species are given in fully as much detail as could be desired, and are so arranged that the same portion of each refers, in as nearly as possible the same words, to a similar part of the respective plants, thus producing descriptions every clause of which is admirably contrasted with the corresponding portion of the next. At the end of each description the points in which the respective species differ from the other plants contained in the same genus are placed in so clear a light, that it is almost, if not quite, impossible for the student to be at a loss in determining to which species his specimens would be referred by the author. The work is illustrated by sixty-six plates drawn by the author, in which are contained accurate figures of all the species, and most of the varieties of grasses that have been found in Scotland. To each of the figures is appended a dissection of the spikelet, showing the form and structure of the glumes and paleæ, upon which many of the characters which distinguish the plants depend.

We must now enter a little into detail. The author has paid peculiar attention to the elucidation of the species included in the difficult genera *Bromus* and *Poa*. In the former he has successfully applied some new characters to the distinction of those difficult species, *B. mollis*, *B. racemosus*, *B. arvensis* (or rather *commutatus*), and *B. secalinus*; and in the latter he has used throughout the genus characters, founded upon the webbed flowers, the nerves of the paleæ, the sheaths of the leaves, the ligules, and the joints of the stem, which had not previously been employed in more than a few species. The result has been that several forms of *Poa* which appear to have great claims to specific rank have been detected, and it seems probable that when all the British plants belonging to this genus have been examined with equal care, that several other additions will require to be made to our list. Dr. Parnell distinguishes *P. casia*, *P. montana* (a new species), and *P. Balfouri*,* (n.s.) from *P. nemoralis*, and *P. polynoda* (n.s.) from *P. compressa*. He considers his *P. montana* to be the *P. nemoralis*, var. *montana*, of Koch's 'Synopsis'; but for this there do not seem to be sufficient grounds, and the Scottish plant is probably a species not before recorded.

Three genera not usually recognized in this country have been adopted, namely, *Amenagrostis*, *Bucetum*, and *Trisetum*. To the former, which includes the *Agrostis spica-venti* alone, we have nothing to object except its name, which ought to have been *Apera*. Concerning the other two it will be necessary to speak at greater length. To *Bucetum* (a name invented by Dr. Parnell) he refers the *Festuca elatior*, *F. pratensis*, *F. loliacea*, and *F. gigantea* of authors. All these we refer to *Festuca*, considering the three former as belonging to one variable species. The only distinctions that we can detect between *Bucetum* and *Festuca* are, that the awned midrib is not attached to the palea quite to its summit in the former, and that the radical leaves are broader than those of the stem; whilst in *Festuca* the awn is (usually) quite terminal, and the stem leaves are broader than the radical. We do not consider this as a sufficient reason for constituting a new genus.

In *Trisetum*, the third genus to which we have referred, our author places *Avena pratensis* (including as varieties *A. alpina* and *A. planiculmis*) and *A. pubescens* in addition to *A. flavescens*, which has been often referred to that genus. As he has not contrasted the characters of *Avena* and *Trisetum*, it is rather difficult to ascertain upon what he would found their distinctions; indeed the short generic definitions do not afford any tangible point, except that *Avena* is included in the section "calyx containing two florets," and *Trisetum* in that with "the calyx containing three or more florets." Now this would exclude from the genus *Avena* several true *Oats*, such as *A. sterilis*, which often has four florets; *A. fatua*, in which three florets is as common as two; and *A. nuda* is often, if not usually, three-flowered. A character may certainly be found in the fewer ribs of the glumes and paleæ of Parnell's *Trisetum*, but that cannot be a suffi-

* This new grass was figured and described in vol. x. p. 121 of this Journal.

cient reason for combining plants with "crested and furrowed fruit" with the true genus *Trisetum*, in which that part is "neither crested nor furrowed." It appears then to us that the genus *Trisetum* should be confined (as far as Britain is concerned) to the *A. flavescens* of Linnæus, and that the other species of Parnell ought to be considered as belonging to *Avena*.

We must, however, draw these observations to a conclusion, and in doing so beg to congratulate the author upon the appearance of so creditable a book, and express a hope that he will not relax in his pursuit until he has illustrated in a similar manner at least all the British Grasses. At the same time we would hint, that a little more attention to the fine nerves on the calyx and corolla, which we do not find represented on some of the plates, although they exist in nature, and also to a representation of the ligule in all cases, would be highly desirable.

Histoire Naturelle des Poissons d'eau douce de l'Europe centrale, par L. Agassiz. *Embryologie des Salmones*, par C. Vogt. Neuchatel, 1842. 8vo, pp. 326.

Many of our readers will be aware that the first number of this work appeared some years since as an atlas of lithographic figures, representing several species of the *Salmonidæ* of central Europe in their various stages; the second number of these plates has now been received, devoted entirely to embryology, and with it a volume of letter-press by M. C. Vogt, to which they serve as illustrations. In the short preface by the author of the text, it is stated, that with the view of rendering the history of the freshwater fishes of Europe as complete as possible, M. Agassiz requested his assistance, and the observations were begun together towards the end of the year 1839. "Cependant," continues M. Vogt, "des travaux plus pressans empêchèrent plus tard M. Agassiz d'y consacrer tous ses soins, et comme ce genre d'étude exigeait des observations non interrompues et trop fréquentes pour que l'un ou l'autre eût pu se dispenser d'y vouer tout son temps, je fus chargé d'achever seul ce travail. En me confiant une tâche aussi honorable, mon célèbre ami n'est cependant point resté étranger à mes recherches. Nous avons discuté ensemble les faits capitaux, à mesure que l'observation me les révélait; souvent même nous les avons examinés de nouveau en commun, et lorsque j'eus rédigé mon travail, c'est encore lui qui a bien voulu le revoir." The plan pursued in the work has been to take one species, and to examine the progressive development of the germ in all its parts; for this purpose a species of *Coregonus* has been selected (*C. palea*, Cuv.), probably on account of being easily procured, and the ova which have been used have all been impregnated artificially. We could have wished that the observations had been made upon a typical member of the family, for although the differences may be comparatively small, the whole habit of the *Coregoni*, their spawning and impregnation, are closely similar to those of the *Clupeadæ*; nevertheless the volume is an important addition both to embryology and to the commencement of the structure of the

Salmons. It is confined almost to a journal of facts which seem to have been very carefully observed, M. Vogt having abstained, in a great measure, from attempts to generalize or to draw a comparison between the embryology of other classes, either higher or lower, for which purposes he considers that materials do not exist. "Embryologie, envisagée comme science, n'a guère été jusqu'à présent que l'histoire du développement de l'œuf de la poule, et l'on s'est généralement borné à indiquer les différences qu'on remarquait à l'égard de certains organes dans d'autres animaux, souvent sans avoir fait une étude spéciale de ces dernières; ce qui a donné lieu plus d'une fois à des rapprochemens inexacts." The work is divided into fourteen chapters, of which we give the titles.

Chap. I. *L'œuf avant la fécondation*.—A general description of the ovum in this state is given. The vitellus and vitellary membrane are the parts which increase most rapidly; but the germinating vesicle and germinating spots increase also, though in less proportion. The growth of the latter has been denied, but it is so evident in the ova of the *C. palea* as to be easily perceived. The surface of the ova is stated to be smooth and without any of that viscous covering which assists in attaching those of many other fishes to plants or stones, &c. "The ova of *C. palea*, like that of all the Salmons, is delivered free, and left to the mercy of the waves." This we have considered as one of the points of distinction in the œconomy of the *Coregoni* and the *Clupeadae*, compared with the true Salmons: in the first, the ova are deposited "on the waters," and impregnated at the same time; among the latter they are deposited on the ground, and are never removed from the furrow and gravel where they have been placed by the parent fish.

Chap. II. *Fécondation; condition de développement; maladies de l'œuf; méthode d'observation*.—The manner in which M. Vogt artificially impregnated the ova is described, differing little from that practised by Mr. Shaw of Drumlanrigg; various causes, however, seem to influence their development, some of which appear curious. "To bring them successfully to perfection, I believe it is necessary that they should be kept in the same water in which the fish has been accustomed to spawn. I have had experience of the fact, that the ova of the salmon trout which spawns in the rivers are destroyed when placed in the waters of the lake; while those of *C. palea* which spawns in the lake itself do not succeed in the water of the rivers. I have even been unable to bring to their term the ova of the pike of the marshes, which spawns earlier than that of the lake, though the fishes do not differ generically." Sudden violent changes of temperature are fatal, but a gradual cold, even though the ova were enclosed in ice, only retarded the progress. A disease attacks the ova in various stages, and is very fatal to the newly-hatched young; it is the growth of a cryptogamous plant or species of mould, considered analogous to that which M. Hannover has observed on different tritons, and perhaps also somewhat similar to that which has of late received attention in this country as vegetating upon living fishes.

Chap. III. *De l'œuf fécondé et du germe.*—Treating of the milt or sperm, M. Vogt writes, “ On ne sait cependant presque rien du rôle que les différentes parties de cette liqueur jouent dans la fécondation. Je me suis donné toutes les peines possibles pour savoir comment se comportent, dans la fécondation, ces animalcules spermatiques de la palea, mais en vain.” The rotatory motion of the vitellus known in the ova of Mollusca, and observed in those of Mammalia by Bischoff, has not been noticed in the ova of the *C. palea*, which seem on the contrary to remain in the same position, the oily disc being turned upwards. At certain periods after fecundation furrows and small regular elevations are discovered on one side of the ova : M. Vogt observes, “ I consider that the ova of fishes are distinguished from those of many other animals, and in particular from those of the frog, inasmuch as these furrows affect only the germ and never the vitellus, and cannot in reality be formed in any other manner, since in the egg of the *C. palea* the vitellus is completely deprived of cellules.” And in speaking of the primitive formation of the germ, he concludes with the following sentence, printed in italics :—“ *Les cellules du germe embryonique se développent des taches germinatives, que par conséquent les taches germinatives sont en réalité les véritables cellules embryonnaires primitives, et que, dans les poissons, elles forment à elles seules le premier rudiment de l'embryon.*”

Chap. IV. *L'embryon jusqu'à la fermeture du sillon dorsal.*—M. Vogt considers that the true embryonic development does not commence until the divisions of the germ into two parts, the embryo and vitellary vesicle ; previous to this the embryo is only a simple enlargement of the cellules. The first appearance of the embryo takes place under the form of a linear and uniform enlargement of the cellules which form the embryonic substance ; in short, that this “ *bande primitive*,” as it is named by M. Baer, exists in fishes as well as in the fowl or birds ; but he does not think with M. Baer that it is the commencement or forerunner of the vertebral column, nor the primitive form of the cerebro-spinal system. The transformation of the cephalic or anterior part of the furrow into many distinct divisions is the first index of the central nervous system, composed of the brain and spinal marrow. This transformation is not characterized by a new formation of cellules, nor by the appearance of cellules of a particular structure.

Chap. V. *Développement du système nerveux central.*

Chap. VI. *Développement des organes des sens.*—Speaking of the eye, where, in the embryo of the higher classes, it has been advanced that the two ocular sinuses are at first united, M. Vogt states, that “ in fishes at least I can affirm that the ocular sinuses are situate from the commencement upon the sides of the head, deeply separated by the cavity of the mesencephale. Of the ear, the first traces of the auditory organs show themselves when the formation of the crystalline sinus begins to appear in the eye. The nose, or development of smell, appears later than the other organs of the senses.

Chap. VII. *Développement du squelette.*—In summing up a portion of this chapter, M. Vogt combats the doctrine of the cranium being composed of and divisible into different vertebræ, and brings the structure of the embryo to his assistance; he concludes by stating, “that the cranium of the embryo does not present, like the trunk, vertebral divisions;” and he continues, “Je dis qu’il n’existe dans le crâne qu’une seule vertèbre, la vertèbre occipitale; tous qui est en avant doit être envisagé comme un prolongement de cette vertèbre, destinée, comme la vertèbre occipitale elle-même, à servir d’appui aux organes des sens et particulièrement à l’oreille.”

He names the maxillary and bronchial apparatus, with the tongue and opercular system, “pièces viscérales de la tête,” and considers them not distinctly separated during the embryonic development. The ventral fins do not appear until a considerable time after exclusion. “There never exists the smallest communication between these fins and the rest of the skeleton;” and for this reason, and their variable position, he considers the ventrals as locomotive organs PECULIAR to fishes, and not as the true analogues of the posterior extremities of the higher Vertebrata.

Chap. VIII. *Développement de la peau et des muscles.*

Chap. IX. *Développement des intestins.*—Of the kidneys it is remarked, they have evidently other functions among the osseous fishes than in the higher animals; they do not correspond with the true kidneys of the last, but rather to their embryonic rudiments, “les corps de Wolff.” This opinion already advanced is here confirmed by the early appearance of these isolated bodies, by the development of their secretory canals, and by their position and extension along the vertebral column, which reminds one in every respect of the “corps de Wolff.”

Chap. X. *Développement du système sanguin.*—The formation of the blood-cellules depends much on external circumstances: when the embryos were placed in a vessel with a dark or black bottom, although the general development went successfully on, the circulation was found to be retarded, only rare and isolated blood-cellules were seen in the vessels, and even the development of the blood-vessels themselves seemed to be kept back, compared with other parts of the structure; on placing again the embryos in a vessel with a white bottom, all the blood-vessels were filled with the blood-cellules, and in twenty-four hours the circulation appeared admirably developed. From these facts it is concluded that light has a considerable influence on the formation of the blood, and that the cellular life of the embryo and the development of the organs depend little on the circulation; this only acquires its importance after the transformation of the cellules into other constituting elements, which cannot subsist or be continued without a greater or less quantity of alimentary matter furnished by the blood.

Chap. XI. *Conformation extérieure de l’embryon.*

Chap. XII. *Développement des tissus en général.*—All the tissues are considered to have their origin from *cellules* of different kinds,

and in regard to the primitive formation of these cellules it is remarked,—“ 1°, chaque cellule nait isolement ; 2°, chaque cellule se forme autour d'un centre donné.”

Chap. XIII. *Système générale de la formation embryonique.*

Chap. XIV. *Aperçu historique de la marche du développement.*—

This details the appearance and condition of the ovum and embryo from the time of the expulsion of the former from the fish to the exclusion of the embryo, through a period of from forty to sixty days. As we previously observed, the whole work will be of much importance to embryologists ; and we would only make the suggestion, that as the ova experimented on, and the young fish after exclusion, (in which state they could not be kept beyond a month alive,) were often in a condition rather unhealthy,—could M. Vogt depend on the progress and development continuing to their greatest extent ?

The plates of the atlas are beautifully and minutely lithographed.

Narrative of a Residence on the Mosquito Shore, during the years 1839, 1840, 1841. By Thomas Young. Svo. London, 1842. Smith, Elder, and Co.

Although this little volume, written by the Deputy-Superintendent of the British Central American Land Company's settlements on the Mosquito Shore, only pretends to being considered as a “ sort of hand-book ” for settlers in that promising district of the New World, it appears to us to be highly deserving of the attention of the naturalist. The author is manifestly one of those who never visit any country without having their “ eyes open ” to whatever they may meet with, and accordingly without being a professed naturalist, or apparently knowing anything of scientific natural history, he has filled his book with interesting observations upon the native productions of the land in which his lot was temporarily cast. His account of the native tribes cannot fail highly to interest those who study the natural history of man, and his observations upon the animals and vegetables are full of facts deserving of the attention of the man of science. It is certainly most unfortunate that a person so well qualified for scientific observations should not have that acquaintance with science which would enable him to refer his facts to their respective species, so as to make them available for the use of the home naturalist. As, however, he has given the native names, a person on the spot would probably find little difficulty in determining the species. We have no room for extracts, but one statement has struck us as so interesting, and so similar in some respects to a disputed observation of Audubon upon the pigeon of the United States, that we must make room for it:—

“ The large flights of green parrots and yellow-tails, in the Black river, will hardly be credited ; flight after flight passing over our heads, and settling just at sunset on some tall spreading trees ; indeed on one occasion such quantities alighted on a tree at the back of our encampment that a large branch broke off, and the noise that ensued was laughable ; such callings, scoldings, and screamings, I never heard before.”—Page 100.

Report on the Invertebrata of Massachusetts, comprising the Mollusca, Crustacea, Annelida, and Radiata. Published agreeably to an order of the Legislature, by the Commissioners on the Zoological and Botanical Survey of the State. Cambridge, 1841. 8vo.

Washington, if we remember rightly, on abdicating the Presidency of the United States, put into his valedictory address a recommendation of the sciences to the protection and encouragement of the young Republic; and we look upon the 'Report' before us as one of many proofs which the separate "States" have given of their attention to their father's legacy. And naturalists in particular must be grateful to the "Legislatures" that so devote a share of the public purse; for in all new countries—we fear that we may safely add, and in all old ones too—the scientific study of living beings, that is, studied independently of their uses or relations to man, and merely as constituent parts of God's creation, his wisdom, and power, can have few followers when and where all are busy idolaters of Mammon and his legion.

"Appointed, as I suppose myself to have been," says Dr. Gould, "under that section of the Constitution which enjoins it upon the legislature to encourage the arts and sciences, and to promote, among other things, '*a natural history of the country*,' I have ventured to make my 'Report' mainly of a scientific character. It was the only way in which my labours could prove of much practical value, inasmuch as very few of the objects, belonging to the portion of the animal kingdom to which my attention has been given, are of much general interest, or of much importance in an œconomical point of view. I could not but suppose that an effort to contribute something towards that branch of science, which we have hitherto received entirely at the hands of other states and other lands, would be desired and approved; and that Massachusetts, which first set the example in those investigations of territorial natural resources, which have since been undertaken by almost every state in the Union, would not desire to be behind any of the states in this respect. I have, therefore, undertaken to present something more than a mere array of names in the form of a catalogue.

"As I could not extend my plan fully to all the objects assigned me, I have selected the SHELLS, on which to bestow my chief attention. These I have endeavoured to describe and figure in such a manner that the 'Report' might be used as a school-manual for the study of the conchology of New England. Such a work is greatly in demand, and nothing of the kind is in existence."

The want here indicated, it gives us unfeigned pleasure to say, has been most ably supplied by Dr. Augustus A. Gould, who has given a correct description of every mollusc found up to the period of his publication on the shores of Massachusetts, accompanied with a judicious synonymy, and with critical remarks of much value. The work has peculiar claims to the attention of the British naturalist, for he will find here many shells identical with those of his own island, many that bear a close resemblance to other natives and yet distinct, and several that are the living representatives of shells that with us have

passed into a fossil state. The figures that illustrate this well-printed volume are 213 in number, and are very accurately drawn and engraved. The number of species described is 268, of which there are of *Cirripedes* 12, *Conchifera* 92, *Brachiopoda* 2, *Gasteropoda* 154. Of these, 29 belong to the land, 42 to fresh water, and 197 are marine.

Relative to their geographical distribution Dr. Gould remarks :—
 “ The land and freshwater univalves are all distributed over every part of the territory, with the exceptions of *Helix hortensis*, which is as yet confined to some parts of the sea-coast, and *Helix tridentata*, *hirsuta*, and *monodon*, which are found only in the interior and western portions. Of the freshwater mussels we find *Unio complanatus*, *radiatus*, and probably *nasutus*, in every region ; *U. cariosus* is only found in the Connecticut and its tributaries, and in Plymouth ponds ; *Anodon cataracta*, and *Alasm. arcuata* and *marginata* are found everywhere in the interior, while *Anodon implicata* is perhaps entirely limited, in this state, to ponds in Essex and Middlesex, and *Anodon undulata* to Blackstone river and its branches.

“ The distribution of the marine shells is well worthy of notice as a geological fact. Cape Cod, the right arm of the Commonwealth, reaches out into the ocean some fifty or sixty miles. It is nowhere many miles wide ; but this narrow point of land has hitherto proved a barrier to the migrations of many species of Mollusca. Several genera and numerous species, which are separated by the intervention of only a few miles of land, are effectually prevented from intermingling by the Cape, and do not pass from one side to the other. No specimen of *Cochlodesma*, *Montacuta*, *Cumingia*, *Corbula*, *Ianthina*, *Tornatella*, *Vermetus*, *Columbella*, *Cerithium*, *Pyrula*, or *Ranella*, has as yet been found to the north of Cape Cod ; while *Panopæa*, *Glycymeris*, *Terebratula*, *Cemoria*, *Trichotropis*, *Rostellaria*, *Cancellaria*, and probably *Cyprina* and *Cardita*, do not seem to have passed to the south of it. Of the 197 marine species, 83 do not pass to the south shore, and 50 are not found on the north shore, of the Cape. The remaining 64 take a wider range, and are found on both sides. Buzzard's bay and the south shore have as yet been very little explored ; and we may yet expect to find many species peculiar to those localities.

“ At least seventy of our species are also found on the transatlantic shores ; and more than twenty of these have been described by different American conchologists as new species. About twenty may be regarded as intermediate, being found most frequently by fishermen about the banks, Newfoundland, and the islands intervening between Greenland and England.”—Page 315–316.

Dr. Gould has too seldom noticed the animal of the shells he has so well described ; his account of the *Mollusca Nudibranchia* is meagre, and the list scanty ; of the *Cephalopoda*, two species only are catalogued ; and his catalogue of the *Crustacea*, *Annelida*, and *Radiata* is useless, and needs to be worked anew. The Doctor is well aware of the truth of this censure :—“ The list,” he says, “ serves to show that we have about us an abundance of animals which have hitherto found few devotees in this country. So few gleanings have been made in this field, that no other promises a more

abundant return for labour.”—Page 352. All naturalists would rejoice could we promise them that Dr. Gould will himself cultivate this field, for then the harvest would be assuredly rich.

Figures of Molluscous Animals, selected from various Authors; etched for the use of Students. By Maria-Emma Gray. Vol. I. London, 1842. 8vo.

The distinguishing characteristic of this volume is its utility. In this country we have no work which, in this point of view, can be compared with it. Bowdich attempted something similar in his ‘Elements,’ but on a much more limited scale and in a less perfect manner; while Sowerby’s ‘Genera,’ being purely conchological, does not supply the naturalist with a very important desideratum, for which we are infinitely indebted to the skill and perseverance of Mrs. Gray.

The volume contains eighty-eight plates, most of them occupied with several figures, copied in general from rare and expensive publications beyond our reach, and, we presume, beyond the reach of all that reside in the country. The plates are etched with neatness and precision, and bring out very clearly the peculiarities of the animals that distinguish the several genera: and, says Mrs. Gray, “as the present work has been a labour of love, in order to bring it within the reach of conchologists of limited means, it is published at the cost of paper and printing, with only the addition requisite to cover the retail profit of the bookseller.”

To the student who is anxious to cultivate conchology as a science, we would recommend this convenient volume as a remembrancer and guide, for genera which are established solely on the examination of the shell can have no sure foundation, as many recent examples have proved. To the amateur, the “Figures” must, in our opinion, prove eminently interesting; for, from a perusal of them, he will learn a great deal of the structure of the creatures to whom he owes the cabinet of shells that he has so often looked over with admiration and delight.

In the hope that we may soon see another volume, we take leave at present of Mrs. Gray, tendering her our most hearty thanks for this useful contribution to a favourite branch of science.

The Naturalist’s Library, vol. xxxv. :—*Mammalia*, vol. xiii. *Introduction.* By Lieut.-Col. C. Hamilton Smith, K.H. & K.W., F.R. & L.S., &c. 12mo. 1842. pp. 313.

The thirteenth and concluding number of that portion of the ‘Naturalist’s Library’ which treats of the Mammalia having just reached us, we lose no time in introducing it to the favourable regard of our readers. Whether it were of design that the Introductory volume of this interesting section of natural history, according to an acknowledged canon of bookmaking, was delayed to the last, we have no means of knowing; but we may remark, that it at all events affords a good illustration of the advantages of the plan. After a few prefatory remarks, the distinguished author takes a rapid survey of all the orders of the class, making a special reference “to the principal families which have not been described at length in the foregoing

volumes;" whilst at the same time he by no means neglects even these, but almost without exception illustrates them by observations drawn from his own ample stores of information, as well as by the more recent discoveries of other naturalists. Nor does he confine his attention solely to existing animals, but furnishes likewise a rapid survey of such as belong to palæontology, including the extinct as well as the living species; thereby undoubtedly supplying the most comprehensive and interesting account which the subject affords. Hence this volume, in many particulars, throws light upon the preceding ones of the series; at the same time, alone, it presents a lucid summary of the whole extensive department to which it is devoted.

Maintaining all due respect for the classified arrangement of the Baron Cuvier, Col. Hamilton Smith suggests another, in which there are considerable modifications. Thus, instead of the well-known arrangement of the Baron, upon which we need not dwell, the Colonel divides the class Mammalia into two subclasses and twelve orders, as follows: — I. Subclass PLACENTALIA, including ten Orders, namely, *Bimana*, *Quadrumana*, *Chiroptera*, *Insectivora*, *Carnivora*, *Cetacea*, *Pachydermata*, *Ruminantia*, *Edentata* and *Rodentia*; and II. Subclass IMPLACENTALIA, including the *Marsupialia* and the *Monotremata*. There are various improvements here, as well as in the arrangement of many of the minor groups, which we cannot particularize; a general commendation, to which we take leave to append only one remark, and that regarding the inexpediency of the introduction of the first Order, or *Bimana*.

Did space permit, we should gladly have indulged ourselves by supplying some of the interesting information, scientific and popular, which the author with great industry has collected from almost every quarter of the globe. We have been most struck with this in the Order *Carnivora*, concerning the Felines, the Ermines and other *Mustelidæ*, the Bears and other *Ursidæ*, the Otters, Seals, and *Ruminantia*. Nor, as will readily be credited, has the pencil been wanting more than the pen, a considerable proportion of the portraits of the different animals being taken from life; and these, with all the others, derived from the best sources, especially the different museums, domestic and foreign, exhibit in a high degree the taste and execution of the able author.

We have still to add, that the value of the volume is considerably enhanced by an original memoir of Dr. Drury, an eminent entomologist of the last century, who died in the year 1763. Ample materials for the notice, including a correspondence with contemporary zoologists, have been kindly supplied by the descendants of the zealous naturalist, and these have been very judiciously arranged by the talented author of the biography.

Books received.

Nomenclator Zoologicus, continens nomina systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris in quibus reperiuntur, anno editionis, etymologia, et familiis ad quas pertinent, in variis classibus. Auctore L. Agassiz. Fasciculus II. continens Aves: 4to, 1842, pp. 90.

A work indispensable to the working ornithologist, carefully executed, and having the advantage of being revised by the Prince of Canino, Mr. G. R. Gray, and Mr. Strickland. In an undertaking requiring such extensive consultation of authors, some mistakes, or errors of the press, might be expected, but so far as we have examined it, these are remarkably few; *oreophilus*, p. 53, is *oreopholus*, or rather it should be *oreopölus*, from *öpos*, *mons*, and *πολέω*, *frequentö*.

The Birds of Australia, by J. Gould, F.L.S., &c. Parts VIII. IX. Oblong folio. 1842. The pictorial character and scientific interest of these numbers are sustained; in both we have illustrations of many new genera, (perhaps too many,) and the author is following a very useful practice, of devoting a considerable portion of every number to the illustration of a genus, so that the whole, or a great portion of it, is at once brought under review. Thus, in No. VIII. we have seven species of the old genus *Petroica* figured; the author, however, subdividing it, and placing the old *P. rhodinogaster* under the title of *Erythrodryas*. Again, in No. IX. there are plates of six species of swallows, illustrating five genera.

The Natural History of Selborne, by the late Rev. G. White. New edition, with Notes by the Rev. Leonard Jenyns. London, Van Voorst.

A General History of Animalcules, by A. Pritchard. Part I. London, Whittaker.

History of British Birds, by William Yarrell. Part XXXII. 8vo, August 1, 1842, concludes the history of the Goosanders, and contains those of the Grebes and Divers (*Podiceps*, *Colymbus*).

Faune Belge, 1^{ière} Partie, Indication des Mammifères, Oiseaux, Reptiles et Poissons observés jusqu'ici en Belgique, par Edm. De Selys-Longchamps.

Works preparing for publication.

Mr. Gould has in preparation an illustrated monograph of the genus *Ortyx*, or strong-billed American partridges.

Icones Piscium; or Plates of rare Fishes. By John Richardson, M.D., F.R.S., F.L.S., F.R.G.S., &c.

The fasciculi of this work are intended to appear at intervals, according to the encouragement it may receive. The charge not to exceed the outlay. Fasciculus I. will contain twelve coloured figures, being exact copies of drawings from the portfolio of J. B. Emery, Esq., late first lieutenant of the Beagle surveying vessel, employed on the western coasts of Australia, accompanied by brief notices. Full descriptions of some of the species by Dr. Richardson have appeared in our pages.

PROCEEDINGS OF LEARNED SOCIETIES.

ENTOMOLOGICAL SOCIETY.

March 7th, 1842.—W. W. Saunders, Esq., F.L.S., &c., President, in the Chair.

Mr. Boreham exhibited some curious varieties of *Hipparchia Janira*,

and Mr. S. Stevens a number of minute *Coleoptera*, collected from moss during the preceding winter.

The Rev. F. W. Hope exhibited a specimen of a new and coarse kind of white silk, communicated by Mr. Strachan. He also read some extracts from a letter received by him from Mr. Fortnum, Corr. Mem. F.S. at Adelaide, in South Australia, containing many observations on the entomology of that district.

Mr. Westwood exhibited specimens of *Uropoda vegetans* which had been found in countless multitudes on the surface of the ground, in a cucumber frame, and which attached themselves to a beetle introduced into the frame.

The following memoirs were read:—

Continuation of a memoir on the *Chrysomelidæ* of New Holland allied to *Cryptocephalus*. By W. W. Saunders, Esq., President, containing detailed descriptions of the following insects:—

OCHROSOPSIS, n. g., divided from *Anodonta*. *Eyes reniform*. *Antennæ* as long as the body, 11-jointed; 1st joint robust, clavate; 2nd small, obconic; 3rd, 4th and 5th of nearly equal length; 4th shortest, the remainder gradually decreasing in size. *Thorax* rounded in front, transverse, nearly as broad as the *elytra*. *Elytra* half as long again as broad. *Legs* moderate. *Colour* pale.

Ochrosopsis vermicularis. *Reddish-brown*; *thorax* and *elytra* fulvous, rugose, with the impressed punctures black, those on the *elytra* forming irregular striæ; *legs* light rufous brown. Length $\frac{5}{10}$ inch.—Hab. New Holland. Mus. Hope.

Ochrosopsis australis. *Head ochre-yellow*; *antennæ* dusky brown; *thorax* shining reddish brown, with a longitudinal band and two faint oblique bands of fulvous, with large black impressions; *scutellum* dark brown; *elytra* fulvous, with large irregular impressions; beneath pale ochre-yellow; *legs* dusky fulvous. Length $\frac{5}{26}$ inch.—Hab. Swan River. Mus. Hope.

Ochrosopsis erosa. *Head ochre-yellow*; *antennæ* black; *thorax* shining fulvous, with coarse black impressions forming two blackish patches; *scutellum* black; *elytra* pale ochre-yellow, with deep and irregular black punctures, which are occasionally confluent; *legs* light reddish brown. Length $\frac{2}{10}$ inch.—Hab. Swan River. Mus. Hope.

Ochrosopsis melanocephala. *Head ochre-yellow*, with the vertex and a central line black; *antennæ* black; *thorax* ochre-yellow, with a small oblong patch near the hinder angles, and a large triangular patch on each side in front black and punctured; *scutellum* black; *elytra* shining ochre-yellow, with dark brown punctures; *legs* reddish brown; *tips of femora, tibiæ* and *tarsi* black. Length $\frac{2}{10}$ inch.—Hab. New Holland. Mus. Hope.

Aporocera chalybea. *Head dark chestnut-brown*, mouth ochre; *antennæ* black; *thorax* pitchy black, with ochreous margins deeply punctured; *scutellum* black; *elytra* shining chalybeate blue, deeply punctured; *legs* pale ochre-yellow, with the tips of the *tibiæ* and *tarsi* black. Length $\frac{3}{10}$ inch.—Hab. Port Essington. Mus. Hope.

“Notes upon the genus *Hylæus*, and on *Cryptus bellosus*, and other insects.” By G. H. K. Thwaites, Esq., M.E.S.

In this communication (addressed to the Secretary) Mr. Thwaites states, that he discovered in the preceding summer that *Hylæus* is not parasitical, having reared several individuals of two species from bramble sticks, the holes in which exactly corresponded with the size of the insects, and were much too small for any other bee likely to be found in such a situation except *Heriades*, which does not occur in the neighbourhood of Bristol. Great care is taken by Mr. Thwaites in cutting away the wood of bored sticks so as to expose the cocoons, which are carefully watched, so that the insect escaping from each is at once detected.

It is desirable, Mr. Thwaites adds, to discover upon what kind of food the larva of the *Hylæus* is fed, and if on pollen, how the parent insect conveys it to its nest. Both *Hylæus* and *Ceratina* emit, when captured, a considerable quantity of sticky fluid from the mouth; but they can scarcely convey pollen to their nidi by means of a capacious stomach. The cocoons of the *Hylæus* are arranged regularly end to end, and the upper ones produce males, which come out first. Mr. Thwaites has also reared a new species of *Hylæus* allied to *H. dilatatus*, K., from bramble sticks.

Mr. Thwaites has reared *Cryptus bellosus* from a cocoon in a hole much too small for *Epipone levipes*, and which he believes to be that of a new species of *Trypoxylon* which he has discovered near Bristol.

Upon reading Mr. Dale's account of the curious mode in which a *Stylops* acted when a bee was placed under the glass in which it was confined, it occurred to Mr. Thwaites that the *Stylops* may perhaps lay its eggs on the body of the bee, and that they may be introduced into the nest by being brushed off with the pollen. If the bees, not infested, come out later than the others, the above idea cannot be true; but it is possible that he may have been deceived, and that the bees he observed later may not have been the same species. The *Stylopized* and other *Andrenæ* (mentioned in Mr. Thwaites's short article in *Trans. Ent. Soc.*, vol. iii. p. 67), appear to have been introduced in his garden with some mould brought there some months previously, as none had appeared since last year.

“Memoir on the genus *Hylæus*, with descriptions of several new British species.” By Mr. F. Smith, who also stated that he had reared *Cryptus bellosus* from the nests of more than one species of bee. The following are the new species described in this memoir:—

Hylæus cornutus, Kirby MSS. ♀ *This species is remarkable for the two teeth and frontal prominence which arm the clypeus; antennæ fulvous beneath, posterior tibiæ annulated with yellow.*—Cove Common, Hants. *Mus. Ent. Soc. London, and Smith.*

Hylæus plantaris, Smith. ♂ *Black; plantæ of the intermediate legs dilated at the base; antennæ yellow, short, with the scape considerably dilated in males, with a black streak above; thorax with a yellow spot on each side of the collar.* Length 3 lines.—Cove Common, Hants. *Mus. Smith.*

Hylæus pallidens, Kirby MSS. ♂ *Black; scape of antennæ with*

a yellow line in front; face white; mandibles yellow; anterior tibiae yellow; fore femora with a yellow line in front; abdomen piceous, with a fringe of white hair on each side of the first segment. Length 3 lines.

Hylæus punctulatissimus, Smith. ♀ Black, with a cream-coloured stripe close to the eyes; antennæ black; thorax coarsely punctured, varied with pale yellow; abdomen with a fringe of white hair on each side of the first segment. ♂ *H. annularis*, var. γ , Kirby. Taken in company together at Coombe.

Hylæus hyalinatus, Smith. ♀ Head and thorax black, very minutely punctured with deeper punctures intermixed; antennæ black; wings hyaline; legs black, posterior annulated with yellow. ♂ Black; face yellow, scape of antennæ black, remaining joints fulvous beneath; thorax with a yellow spot on the tegulæ and tubercles; wings hyaline. Length 2 lines.—Received from Mr. Thwaites.

“Descriptions of some new exotic genera belonging to the family of the Sacred Beetles.” By J. O. Westwood, F.L.S.

Retaining *Canthon viridis*, Klug, as the type of *Epilissus*, Dej. Cat., Mr. Westwood considers *Circellium nitidum*, Lap. Hist. nat. ins. col. ii. p. 66, from Madagascar, as the type of a separate subgenus under the name of

ARACHNODES, W. *Mentum basi latius, lateribus convergentibus apice haud emarginato. Palpi labiales graciles. Prothorax lateribus, pone medium valde angulatis et reflexis. Pedes valde elongati, femoribus longis haud compressis. Tarsi articulo ultimo subtus ad apicem in spinam parvam producto.*

NANOS, W. *Antennarum clava, brevis, subrotundata. Mentum in medio latius, anticè valde emarginatum. Palpi labiales brevissimi crassi. Prothorax lateribus ferè rotundatis haud reflexis. Pedes parùm elongati, tibiis curvatis.*—Type *Circellium pygmæum*, Laporte. Madagascar.

MACRODERES, W. *Corpus ferè hemisphericum, clypeus emarginatus. Mentum subtriangulare anticè profundè fissum. Prothorax maximus lateribus rotundatis, anticè utrinque obsolete retusus. Elytra levissime striato-punctata. Tibiæ posticæ apice dilatatæ, tarsi articulo basali magno compresso triangulari.*—Type *Onthophagus Greeni*, Kirby. Cape of Good Hope.

UROXYS, W. *Corpus oblongum subdepressum, elytris posticè acuminatis. Clypeus anticè acutè bilobus. Mentum subquadratum, anticè parùm emarginatum. Palpi labiales articulis longitudine ferè æqualibus. Prothorax lateribus in medio angulatis. Pedes antici elongati, tibiis (in uno sexu) depressis intus angulatis. Tarsi 4 postici articulis magnitudine decrescentibus.*

Uroxys cuprescens, W. *U. cupreo- seu violaceo-nigricans, nitida levissime punctulata, antennis rufescentibus, elytris striis 8 leviter punctatis, tarsis piceis.* Long. corp. lin. $4\frac{3}{4}$.—Hab. Colombia.

Scatonomus (Erichson) Myrmidon, W. *S. subcylindricus, niger, capite et pronoto viridibus nitidis, clypeo profundè emarginato, in sinu acutè bidentato; elytris leviter striatis; prothoracis angulis posticis prominentibus.* Long. corp. lin. 2.—Hab. Cayenne.

Scatonomus smaragdinus, W. *S. brevis, subcylindricus, smaragdinus; capite anticè profundè emarginato in sinu obtusè bidentato; elytris leviter striatis; tibiis 4 posticis angustioribus; prothoracis angulis anticis in lobum parvum productis.* Long. corp. lin. $2\frac{1}{4}$.—Hab. Brazil. Mus. Gory.

ANOMIOPUS, W. *Corpus oblongum subconvexum, pedibus latissimis. Mentum ovale basi truncatum, anticè vix emarginatum. Palpi labiales breves articulis sensim minoribus. Clypeus bidentatus. Prothorax lateribus rotundatis. Elytra marginata striisque impressa. Tarsi posticè latissimi.*

Anomiopus virescens, W. *A. æneo-virescens, dentibus duobus clypei obtusis, capite pronoto et elytris tenuissime et irregulariter punctulatis; elytris striato-punctatis; punctis vix distinctis; tibiis 4 posticis in medio prominulis; tibiis anticis ad basin externè 4-serratis.* Long. corp. lin. $3\frac{1}{2}$.—Hab. Brazil.

Anomiopus nigricans, W. *A. æneo-niger, dentibus clypei acutis parallelis; fortius punctatus; punctis duobus parvis inter oculos; elytris paulò longioribus cyaneo-nigris, striis profundis; pedibus anticis castaneis; tibiis anticis basi externè 7-denticulatis; tibiisque posticis in medio haud prominulis.* Long. corp. lin. $2\frac{1}{2}$.—Hab. Brazil.

“Descriptions of the *Coleopterous* insects sent to England by Dr. Cantor from Chusan and Canton, with observations on the Entomology of China.” By the Rev. F. W. Hope, F.R.S., &c.

The following are the characters of the new species described in this paper:—

Sp. 1. *Lucanus Confucius*, Hope. ♂ *Niger nitidus, mandibulis capite thoraceque ferè æqualibus; caput depressum, clypeo in medio producto, flavo-ciliato; thorace transversè oblongo, angulis posticis obliquè truncatis, granulato.* Long. lin. 28, lat. lin. 7.

Sp. 2. *Copris Sinicus*, Hope. ♂ *Niger exscutellatus, thorace prominentiâ duplici, cornu capitis erecto intus ad basin 2-denticulato.* Long. lin. 10, lat. lin. $5\frac{1}{4}$. Allied to *C. Sabæus*, Fab.

Sp. 3. *Copris Sinensis*, Hope. *Mas adhuc latet. Niger exscutellatus, clypeo emarginato, capite tuberculo lato armato, elytris striato-punctatis.* Long. lin. 9, lat. lin. $4\frac{1}{2}$.

Sp. 4. *Onthophagus Sinicus*, Hope. *Niger, antennis luteis, clypeo integro, capite cornu tauriformi; thorace punctulato; elytris striato-punctatis, interstitiis disci punctatis.* Long. lin. $4\frac{1}{4}$, lat. lin. $2\frac{1}{4}$.

Sp. 5. *Dipelicus Cantori*, Hope. *Piceus, capite anticè trigono, posticè cornu elevato triangulari; thorace convexo, varioloso punctato, marginibus undique elevatis; elytris lineato-punctatis.* Long. lin. 19, lat. lin. $8\frac{3}{4}$.

Sp. 6. *Mimela Downsii*, Hope. *Affinis Mimelæ glabræ Hope, at minor. Viridis glabra infrà aurato-viridis; antennis atrovirescentibus, mesosterno abruptè truncato.* Long. lin. 6, lat. lin. 3.

Sp. 7. *Popillia Maclellandi*, Hope. *Castanea, capite punctulato, thorace glabro cupreo, elytris castaneis podice atro, maculis duabus flavis e pilis brevibus formatis.* Long. lin. 7, lat. lin. $3\frac{1}{4}$.

- Sp. 8. *Popillia castanoptera*, Hope. *Castanea, clypeo integro punctato parùm reflexo, viridis; thorace concolori creberrimè punctulato, fossulá utrinque impressá; scutello punctato; elytris pallide castaneis, striato-punctatis.* Long. lin. 5, lat. lin. $2\frac{1}{2}$.
- Sp. 9. *Holotricha Sinensis*, Hope. *Picea, clypeo emarginato, thorace convexo pruinoso, fossulá utrinque impressá, marginibusque externè subserratis; elytris rubro-piceis punctatissimis, corpore infrá concolori.* Long. lin. 10, lat. lin. $4\frac{1}{2}$.
- Sp. 10. *Holotricha plumbea*, Hope. *Pruinosa, capitís clypeo ferè integro; thorace convexo punctulato, lateribus sub lente parùm subserratis; elytris plumbeo-piceis punctatis.* Long. lin. $10\frac{3}{4}$, lat. lin. $4\frac{1}{4}$.
- Sp. 11. *Serica Sinica*, Hope. *Atro-plumbea, clypeo integro, anticè punctulato, posticè glabro; thorace marginibus parùm elevatis; elytris plumbeis seu atro-pruinosis lineolatis.* Long. lin. 4, lat. lin. $2\frac{1}{4}$.
- Sp. 12. *Agrypnus orientalis*, Hope. *Affinis A. cœnoso, Hope, at major. Fuscus flavisque capillis aspersis; clypeo integro auricommo; thoracis angulis anticis obtusis, disco in medio 2-tuberculato.* Long. lin. 9, lat. lin. 3.
- Sp. 13. *Ludius crocopus*, Hope. *Fuscus, antennis concoloribus; thorace angulis posticis valdè acutis, tomentoso; elytris striatis, striis sub lente parùm punctatis.* Long. lin. 7, lat. lin. 2.
- Sp. 14. *Ludius luteipes*, Hope. *Affinis L. Umbricolæ, Eschscholtz, at minor. Niger, antennis flavescentibus; thorace albo-tomentoso; elytris striato-punctatis nigricantibus.* Long. lin. $5\frac{1}{4}$, lat. lin. $1\frac{1}{2}$.
- Sp. 15. *Ludius 4-lineatus*, Hope. *Castaneus, thorace nigro, elytris quatuor lineis nigris insignitis, antennis nigris, capite concolori, thorace atro capillis flavis asperso.* Long. lin. $4\frac{1}{2}$, lat. lin. $1\frac{1}{4}$.
- Sp. 16. *Colophotia flavida*, Hope. *Affinis C. præustæ, Eschscholtz. Flava, capite atro, oculis magnis; thorace convexo concolori, angulis posticis subacutis, medio disci lined fortiter impressá insignito; elytris flavescentibus apicibus subfuscis.* Long. lin. $4\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.
- Sp. 17. *Lycus Cantori*, Hope. *Aurantius, antennis fusco-nigris; thorace flavido cruce nigricante insignito; elytris latis aurantiis substriatis.* Long. lin. $3\frac{1}{4}$, lat. lin. 1.
- Sp. 18. *Nacerdes Chinensis*, Hope. *Flava, capite nigro, antennis duobus primis articulis fuscis, reliquis flavescentibus; thorace cum elytris concolori nigris.* Long. lin. $5\frac{1}{2}$, lat. lin. $1\frac{1}{4}$.
- Sp. 19. *Lagria nigricollis*, Hope. *Flava, antennis capite thoraceque nigris, elytris pallidè castaneis villosis, corpore infrá piceo, pedibus concoloribus.* Long. lin. 3, lat. lin. $1\frac{1}{4}$.
- Sp. 20. *Hamaticherus Cantori*. *Affinis Hamatich. Paridi, Wied. Magnus, fusco-brunneus, sericeus, elytrisque corpore longioribus; capite porrecto fronte foveolatá, thorace fortiter rugoso utrinque armato, lined mediá longitudinali valdè incisd.* Long. lin. 26, lat. lin. $6\frac{1}{2}$.
- TRIRACHYS**, Hope. Genus novum Hamatichero affine. *Caput porrectum, fronte rugosá. Antennæ 11-articulatæ; articulo 1^{mo} crasso,*

valdè rugoso ; 2^{do} minimo ; 3^{tio}, 4^{to} et 5^{ta} in mare spinis armatis, quinque sequentibus gradatim longioribus et inermibus, externo longissimo ternis præcedentibus haud æquali, thorax utrinque armatus.

- Sp. 21. *Trirachys orientalis*. *Magnus brunneus et aurato-sericeus ;* antennis piceis, thorace utrinque armato et rugoso, dorso binis sulcis longitudinaliter impressis. Long. lin. 21, lat. lin. $6\frac{1}{4}$.
- Sp. 22. *Monohammus alternatus*, Hope. *Affinis M. Dentatori, Fab., at minor. Griseo-brunneus, thorace spinoso, elytris cinereo brunneo glaucoque nebulosis, corpore infrà concolori.* Long. lin. 10, lat. lin. $3\frac{1}{4}$.
- Sp. 23. *Oplophora Horsfieldii*. *Nigra, antennis albo-cingulatis ; thorace utrinque spinoso atro, lineis binis flavis longitudinalibus insignito ; elytra duodecim maculis flavis notata.* Long. lin. 20, lat. lin. 8.
- Sp. 24. *Cassida piperata*, Hope. *Flava, antennis concoloribus, quatuor ultimis articulis nigricantibus ; thorace ferè hyalino flavo, maculâ minutâ nigrâ in medio disci positâ ; elytris flavis disco nigro-piperato.* Long. lin. $2\frac{1}{4}$, lat. lin. $1\frac{5}{8}$.
- Sp. 25. *Clythra nigrifrons*. *Aurantia, capite nigro, thorace flavo immaculato ; elytris rubro-flavis, humeris atro-maculatis fasciâque nigro-violaceâ ante apicem positâ.* Long. lin. 3, lat. lin. $1\frac{1}{2}$.
- Sp. 26. *Coccinella 18-spilota*. *Flava, binis maculis irregularibus nigris notata, elytris 18-spilotis, maculâ scutellari communi.* Long. lin. $3\frac{1}{4}$, lat. lin. $2\frac{1}{4}$.
- Sp. 27. *Coccinella succinea*. *Succineo-flava, thorace pallidiori, maculis quatuor in medio disci nigris ; elytris immaculatis, corpore infrà flavo, pedibus concoloribus.* Long. lin. 3, lat. lin. 2.
- Sp. 28. *Coccinella tetraspilota*. *Flava, thorace anticè flavo, posticè nigro ; elytris pallidè flavis, suturâ nigricanti, maculâ rotundatâ nigrâ ad humeros positâ, secundâ formâ irregulari ferè ad medium disci locatâ.* Long. lin. $2\frac{1}{4}$, lat. lin. $1\frac{1}{4}$.

Descriptions of the new *Coleoptera* from Canton :—

- Sp. 1. *Melolontha Chinensis*. *Affinis Mel. Nepalensi, Hope. Castanea, thorace colore saturatiori inquinato albisque capillis irrorato ; elytris testaceis, lateribus externè sulcatis et atro-marginatis.* Long. lin. 18, lat. lin. $8\frac{1}{4}$.
- Sp. 2. *Anomala controversa*, Hope. *Castanea, capite piceo, margine anteriori parùm elevato, antennis testaceis ; thorace flavo-castaneo punctato, maculis magnis binis nigris insignito, alterâque minori utrinque in marginibus locatâ ; elytris striato-punctatis, flavo piceoque colore variegatis.* Long. lin. $6\frac{1}{2}$, lat. lin. 3.
- Sp. 3. *Galba Chrysocoma*, Hope. *Flava, capite nigro, antennis pectinatis atris, thorace anticè rotundato, angulis posticis acutis, disco 4-tuberculato, tuberculis auratis capillis tectis, elytris aureo-tomentosis fuscis.* Long. lin. 8, lat. lin. $2\frac{1}{2}$.
- Sp. 4. *Harpalus Sinicus*. *Niger, capite anticè rubro-picco, posticè atro-nitido, antennis rufo-fuscis pilosis ; thorace lateribus rufo-*

- marginatis, posticè parùm punctulato; elytris striatis.* Long. lin. 7, lat. lin. 2.
- Sp. 5. *Amara orientalis.* *Nigra, antennis rufis, thorace rufo-marginato, elytris striato-punctatis pedibusque rufo-testaceis.* Long. lin. 3, lat. lin. 1.
- Sp. 6. *Harpalus cyanescens, Hope.* *Niger, capite concolori, antennis duobus articulis primis testaceis, reliquis fusco-nigris; thorace atro, margine omni flavo; elytris striato-punctatis, medio disci cyaneo, suturá flaveolá, ternis lateralibus striis flavis.* Long. lin. $4\frac{1}{2}$, lat. lin. $1\frac{1}{4}$.
- Sp. 7. *Harpalus difficilis, Hope.* *Atro-æneus, antennis fuscis, thorace flavo-marginato, elytris striatis atro-æneis, apicibus testaceis; corpore infrà piceo, pedibus flavescentibus.* Long. lin. 3, lat. lin. $\frac{3}{4}$.
- Sp. 8. *Harpalus Trechoides, Hope.* *Fusco-flavus, antennis binis primis articulis testaceis, reliquis atris; thorace brunneo, margine omni flavo; scutello concolori; elytris fusco-brunneis, suturá marginibusque externis flavescentibus.* Long. lin. $2\frac{1}{2}$, lat. lin. $\frac{3}{4}$.
- Sp. 9. *Coptodera 2-cincta, Hope.* *Flava, capite rufo antennisque rubris; thorace nigro; elytris nigris binis fasciisque flavis insignitis.* Long. lin. 2, lat. lin. $\frac{1}{2}$.
- Sp. 10. *Haliplus Sinensis.* *Flavus, capite rufo, thorace luteo binisque maculis punctis insignito; elytris pallide flavis striato-punctatis, punctis nigris, maculisque quatuor majoribus in medio disci positis, suturá nigricante.* Long. lin. $1\frac{5}{8}$, lat. lin. 1.
- Sp. 11. *Hydrobius neglectus.* *Fulvus, capite rufo, thorace pallidiorè; elytris fusco-flavis striatis; corpore infrà nigro, pedibus flavo-piceis.* Long. lin. 2, lat. lin. 1.
- Sp. 12. *Upis Sinensis, Hope.* *Niger opacus, thorace punctulato angulis anticis lateribusque parùm rotundatis; elytris variolosopunctatis, punctis fortiter insculptis.* Long. lin. 8, lat. lin. $2\frac{3}{4}$.
- Sp. 13. *Amarygmus carbonarius.* *Niger, capite fronte foveolatá, thorace convexo lateribus elevatis; elytris striato-punctatis nigris.* Long. lin. $8\frac{1}{2}$, lat. lin. $3\frac{1}{2}$.
- Sp. 14. *Epilampus pulcher.* *Cupreo-æneus, antennis nigris; thorace atro-æneo cupreoque colore tincto; scutello atro; elytris striatis aurato-viridibus puniceoque colore inquinatis.* Long. lin. $4\frac{1}{2}$, lat. lin. 2.
- Sp. 15. *Epilampus chrysostictus.* *Nigro-æneus, capite suprâ fortiter impresso, thorace atro marginato, maculâ mediâ auratâ, lateribus aureolâ falcatâ lunâ utrinque insignitis.* Long. lin. $5\frac{1}{4}$, lat. lin. 2.
- Sp. 16. *Apate rejecta, Hope.* *Nigra, thorace convexo, disco utrinque minutis dentibus scabro, elytris rugoso-punctatis, ante apicem 2-dentatis; corpore infrà nigro, pedibus atro-piceis.* Long. lin. $2\frac{1}{2}$, lat. lin. 1.
- Sp. 17. *Apate rufa.* *Rufa, thorace convexo punctulato; elytris fortissimè punctulatis, apicibus rotundatis et integris, pedibus concoloribus.* Long. lin. $1\frac{1}{2}$, lat. lin. $\frac{1}{4}$.

- Sp. 18. *Promeces Sinensis*. *Obscurè viridis, capite cyaneo antennisque atris; thorace utrinque armato nigro, ternis lineis viridauratis insignito; elytris elongatis nigro-viridibus, suturâ pallidiori*. Long. lin. 13, lat. lin. $2\frac{1}{2}$.
- Sp. 19. *Eumolpus ignicollis*. *Violaceus, capite anticè nigro, posticè aurato medioque viridi; thorace cupreo igneo marginato, sub lente punctulato; elytris violaceis lineato-punctatis, marginibus purpurascensibus*. Long. lin. $3\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.
- Sp. 20. *Galleruca atripennis*. *Nigra, antennis luteis; thorace flavo, elytrisque atris et nitidis, sub lente punctulatis; corpore infrâ luteo, pedibus concoloribus*. Long. lin. $3\frac{1}{2}$, lat. lin. $1\frac{1}{2}$.
- Sp. 21. *Galleruca erosa*. *Lutea, antennis fuscis, primo articulo rubro; thorace utrinque lateribus subspinosis; elytris pallide luteis erosis, corpore infrâ concolori*. Long. lin. $2\frac{1}{4}$, lat. lin. $1\frac{3}{4}$.

April 4th.—W. W. Saunders, Esq., President, in the Chair.

Mr. Westwood exhibited three new species of Australian *Rhipicera*, from the collections of the Entomological Society and the Rev. F. W. Hope, of which the following are the characters:—

Rhipicera attenuata, W. *R. nigra punctatissima angusta, elytris fusco-luteis, guttis minutis rotundatis albis sparsim notatis*. ♂ Long. corp. lin. 7.—Hab. New Holland.

Rhipicera pumilio, W. *R. angusta picea, capite nigro, prothorace et elytris guttis vel squamis albidis ornatis*. Long. corp. lin. 4.—Hab. New Holland; Swan River.

Rhipicera brunnea, W. *R. brevis crassa, opaca, luteo-setosa; elytris fuscis nonnullis irregularibus interruptis, e squamis fulvis formatis; antennis brevibus, 18-articulatis*. ♂ Long. corp. lin. $6\frac{1}{2}$ —9.—Hab. New. Holland.

He also exhibited specimens of *Goliathus Delessertii*, G., and *Gnathocera micans*, G., from the collection of M. Guerin Méneville.

The following memoirs were read:—

“Notice of an Apparatus for Capturing Insects by Lamp-light.”

By Mr. Stevenson, Corr. M.E.S., consisting of a box about two feet square and about a foot deep, without a wooden top, its place being supplied by four pieces of talc or glass, each fixed at an acute angle on the interior of the mouth, on each side of the square and opening inwards, a free open space of several inches square being left in the middle, at the back of which is a lamp, defended by a semi-circular glass guard, against which the insects will fly, attracted by the light, and falling to the bottom of the box will be prevented from crawling out again by the oblique direction of the talc or glass front. This apparatus may be hung in any locality likely of success.

Continuation of “Descriptions of New Holland *Chrysomelidæ* allied to *Cryptocephalus*.” By W. W. Saunders, Esq.

ANODONTA, Hope MSS. *Body short, ovate, compressed or cylindrical. Legs rather short. Head vertical, rotundate. Eyes reniform. Antennæ subclavate, half as long as the body in the females, nearly as long as the body in the males; 3rd, 4th and 5th joints rather long, nearly of equal length, slender, the re-*

mainder sensibly larger and gradually decreasing in length in the females, nearly of the same length in the males.

Section 1. *Body ovate, compressed.*

Anodonta Roei, Hope MSS. *Head rufous brown, the vertex and antennæ black; thorax rufous, shining, with a black diamond-shaped patch in the middle; scutellum black; elytra rich shining green, deeply punctured, with a narrow ochreous margin; legs black; base of femora and tibiæ rufous brown.* Length, .21 inch ♀; .17 ♂.—Hab. Swan River. Mus. Hope and Westwood.

Var. *atripennis*. *Elytra black, with a purplish iridescence; 3rd and 4th joints of antennæ brownish.*

Anodonta albilinea, Hope MSS. *Head black, spotted straw colour; antennæ black; thorax black, lateral margins white; elytra light yellowish brown, with a quadrate black patch on the disc, which joins the scutellum by a sutural band; punctate-striate near the tip; legs and tarsi shining black.* Length .16 inch.—Hab. Van Diemen's Land. Mus. Hope and Westwood.

Section 2. *Body cylindrical.*

Anodonta pulchella, Hope MSS. *Head rufous brown; vertex black; antennæ black, 3rd and 4th joints dull brown; thorax rufous brown, shining; elytra shining green, with a broad rufous brown lateral marginal band; legs and tarsi black.* Length .18 inch.—Hab. New Holland. Mus. Hope.

Anodonta cyanipennis, Hope MSS. *Head and antennæ glossy black; thorax rufous brown; scutellum black; elytra shining steel-blue with purplish iridescence, deeply punctured, geminato-striato-punctate at the tip. Legs and tarsi black.* Length ♀ .16 inch; ♂ .13 inch.—Hab. New Holland. Mus. Hope and Westwood.

Anodonta flaviventris, Hope MSS. *Head jet-black, with a yellow heart-shaped patch on the face; thorax rufous brown, with a black line in front; scutellum black; elytra shining black, striated with a subcentral V-like yellow mark; body beneath and legs pale yellow; tips of tibiæ and tarsi black.* Length .14 inch.—Hab. New Holland. Mus. Hope.

Anodonta rugosa, Hope MSS. *Head and antennæ black; thorax black, shining, very gibbose in front, rugose and deeply punctured; scutellum black; elytra black, shining; apex rufous brown, rugose and deeply punctured; legs black.* Length .18 inch.—Hab. New Holland. Mus. Hope.

HELODIMORPHA. *Body elongate, ovate, compressed. Head vertical, small. Eyes reniform. Antennæ filiform, variable in length; 3rd, 4th and 5th joints long, somewhat slender; 5th the longest, the remainder shorter than the 5th. Scutellum rounded behind.*

Helodimorpha atra. *Black; face striate; thorax shining, finely punctate; elytra shining, irregularly striate and punctured.* Length .18 inch.—Hab. Van Diemen's Land. Mus. Westwood.

Helodimorpha ænea. *Shining bronze with coppery iridescence. antennæ black; 3rd, 4th and 5th joints dull rufous; thorax*

deeply punctured; elytra irregularly punctured. Length .17 inch.—Hab. Van Diemen's Land. Mus. Westwood.

Helodimorpha viridis, Hope MSS. *Antennæ nearly as long as the body, brilliant metallic green; antennæ black, 2nd, 3rd and 4th joints dull rufous; thorax coarsely punctured and subcarinated behind in the middle; elytra closely and irregularly punctured; tips of posterior tibiæ and tarsi dull brown.* Length .11 inch.—Hab. New Holland. Mus. Hope and Westwood.

“Description of a new British species of *Iulus*.” By George Newport, Esq.

Iulus Sandvicensis, Newport. *Rather larger and thicker than I. terrestris; face very convex and polished; antennæ scarcely longer than the head, clavate; 2nd, 3rd, 4th and 5th joints subequal, 6th shorter, infundibuliform; segments of body 52, posterior half of each polished; anal valves very large; pre-anal scale short, trigonate.* Found near Sandwich in Kent.

“Note on the occurrence of two species of *Entozoa* in the large veins of the liver of the human subject.” By W. J. Pettigrew, Esq.

“Description of a new genus of *Lamellicorn* Beetles allied to *Pachypus*.” By J. O. Westwood, F.L.S.

METASCELIS, Westw. *Corpus apterum. Elytris apice dehiscentibus, podice detecto. Clypeus os omnino obtegens. Antennæ breves, 9-articulatæ, articulo 4^{to} brevi internè producto, 5 et 6 lamelliformibus, 7, 8, 9que paullo longioribus. Maxillæ lobis apicalibus obsolete. Prothorax lateribus rotundatis. Pedes 2 postici breviores crassissimi.*

Metascelis flexilis, W. *M. fusca, nitida; capite et podice magis castaneis, illo punctato; prothorace et elytris lævibus; infra cum pedibus lutea, luteoque pilosa.* Long. corp. lin. 7.—Hab. —? Mus. Soc. Linn. Lond.

“Notes on the habits of *Nyssia zonaria*.” By Mr. Gregson.

This newly-discovered moth occurs in the winged state in the first week in March. The pupæ are buried about an inch and a half deep in the sand, at New Brighton in Cheshire, in a valley among the sand-hills near the hotel, and have never been noticed at any other place except about three miles further down the sand-hills, on the level land adjoining cultivated ground near Leasow Castle, where Mr. Gregson found them at the end of June and beginning of July during several successive years. The spring brood are never seen on the wing; but the summer brood take wing in fine sunshine, darting about like the gamma moth. The former brood are observed fanning their wings on the long grass on the sand-hills; but should the wind be cold they creep to the warm side of the tufts of grass, and are very difficult to find.

“Notes on the parasitic habits of the *Nomadæ*, and on the habits of other insects.” By Mr. F. Smith.

In this paper Mr. Smith details the plans which he has adopted in order to observe the habits of the long-horned bee, *Eucera longicornis*, and its parasite, *Nomada Schüfferella*, (the male of which

latter is the *Andrena conneza*, K.) which he succeeded in obtaining early in the spring from the nests of the former. He also mentions having found an immense number (thousands) of specimens of the minute insect considered as the larvæ of *Meloe*, upon a flower, in April, whilst in June he captured a similar insect (but differing in form and colour) on the underside of the abdomen of *Nomada Schæfferella*. He likewise mentions that he had reared specimens of the same species of *Cryptus* (a genus of *Ichneumonidæ*) from *Epipone levipes* and *Trichiosoma lucorum*.

“Note on the parasitic habits of *Nomada*.” By George Newport, Esq., who obtained specimens of *Nomada Sheppardana* on the 16th July, 1829, from a bank of dry clay, at Ash near Sandwich, where he found from six to eight specimens apparently recently disclosed, but sufficiently active to take flight when disturbed, in a single nidus apparently about the size of that of *Colletes*.

Mr. Shuckard, in allusion to the last two papers, stated that it was interesting to find that the genus *Nomada* did not confine its parasitism to one genus of bees, as he obtained *Nomada Sheppardana* from the nest of *Halictus minutus*. He also stated that he had detected a specimen of *Macropis labiata* (a genus of bees not previously recorded as natives of this country) in the indigenous cabinet at the British Museum, with a label inscribed “Leicester,” from the collection of Dr. Leach.

WERNERIAN NATURAL HISTORY SOCIETY.

The Societies in Edinburgh have again commenced their scientific meetings; the Wernerian Society on the 26th of Nov. elected as its office-bearers for the Session 1842-43 the following gentlemen:—

President: Professor Jameson.—*Vice-Presidents*: Dr. R. Graham, Sir Wm. Newbigging, Right Hon. Lord Greenock, Sir Ch. G. S. Menteith, Bart., Dr. R. Paterson, Prof. Edward Forbes.—*Council*: R. Stevenson, Esq., D. Milne, Esq., J. Stark, Esq., T. Brown, Esq., Sir W. Jardine, Bart., Professor T. S. Traill, Dr. R. K. Greville, J. Goodsir, Esq.—*Joint-Secretaries*: Dr. Pat. Neill, T. J. Torrie, Esq.—*Treasurer*: A. G. Ellis, Esq.—*Joint-Librarians*: J. Wilson, Esq., Dr. R. Hamilton.—*Artists*: P. Syme, Esq., and W. H. Townsend, Esq.

After which, Saturday the 10th of December was fixed for the first meeting, when the following communications were read:—

1. “Account of the *Elaps Jamesoni*, a new species of Serpent from South America;” by Dr. Traill. Dr. Traill considered that eventually this serpent might be removed from *Elaps*. It was procured at Demerara, was four feet in length, and on dissection was found to be furnished with fangs provided with a gland and fine duct to the hollow tooth.

2. “Account of new tribes of Crustacea from the Firth of Forth;” by Mr. Goodsir, jun.

A fine specimen of the *Squalus Vulpes* or Fox Shark, taken in Largo Bay, 13 feet in length, was exhibited, and is interesting as being, so

far as can be traced, the only authentic specimen of the fish on record as taken in the Scottish seas.

ROYAL SOCIETY OF EDINBURGH.

Dec. 19, 1842.—Read, “A Notice of the occurrence in Scotland of the *Tetrao medius*; showing that supposed *Species* to be a Hybrid.”
By James Wilson, Esq.

Mr. Wilson, after stating the opinions of the ornithologists who consider the *Tetrao medius* of authors as a hybrid, and the views of those who maintain it to be a species, exhibited a specimen shot in Perthshire during the present winter, being the second which had been killed. He observed, that previous to the extirpation of the Capercaillie in the Highlands, a specimen of the *T. medius* had been recorded as a native of Scotland, and that the re-appearance now in the vicinity of the Breadalbane preserves, immediately after the re-introduction of the Capercaillie by the exertions of the noble proprietor, was a very convincing proof of the hybridity of the birds, while dissection had shown that the generative organs were very imperfect, or as they generally are found in hybrids; in fact, that now there could be little doubt upon the subject. The bird exhibited was very similar to a continental specimen placed on the table for comparison.

Note.—Mr. Wilson deserves the acknowledgements of ornithologists for bringing this subject before them, but we would wish that it should not yet be considered as closed, particularly at a time when direct evidence is likely to be obtained. We are sure that the Earl of Breadalbane will allow every facility in the interesting investigation; and as the birds breed in captivity, it might be ascertained either at Taymouth, or it would be a fitting subject of experiment in the Edinburgh Zoological Gardens.

The facts stated by Mr. Wilson are very strong circumstantial evidence; at the same time they amount only to the proof that the *T. medius*, if a species, was extirpated from Scotland at a similar period with the Capercaillie; and we must be perfectly assured that no specimens of the former were introduced either as eggs, or immature birds, among those procured by Lord Breadalbane. It is curious also, that the specimens which reach this country in spring from the continent, through the poulterers, are all exactly similar in plumage, as much so as any true species; and if proved to be a hybrid, it will stand as a remarkable fact, that two distinct forms propagate a cross, having almost an individual specific identity.—ED.

BOTANICAL SOCIETY OF EDINBURGH.

This Society held its first annual meeting for the season on Nov. 10th, Professor Graham in the chair.

Mr. Brand read a paper by Mr. Edmonstone, jun., on the Botany of Shetland, and instituted a comparison between the numbers of genera and species existing in that region, and those which occur in other districts of Scotland*.

* See Mr. Edmonstone's former remarks on this subject in vol. ix. p. 69.—ED.

“The botany of Shetland,” observes Mr. Edmonstone, “though not very extensive, is interesting. Many of the less common (chiefly subalpine) plants are abundant in all situations; and many species, very commonly distributed, and indeed often marked as *universal*, throughout Great Britain, are very rare, or altogether unknown in Shetland. Among the last may be mentioned *Alchemilla arvensis* and *vulgaris*, *Briza media*, *Primula veris*, *Anagallis arvensis*, *Convolvulus arvensis*, *Teucrium Scorodonia*, *Geranium robertianum*, *Lapsana communis*, and others of the commonest weeds. Again, *Thalictrum alpinum*, and other *local* plants are everywhere abundant, growing down to the sea-level; and sylvan plants—those generally associated with woods or luxuriant pasturage—are almost entirely wanting. The *geology* of Shetland is rich in interesting phenomena. The formation is almost wholly primitive, the most abundant rocks being gneiss, mica-schist, clay and chlorite-slate, granite quartz, serpentine limestone, &c., besides which, there are amygdaloidal porphyritic rocks of different kinds. The difference of formation between Shetland and Orkney is very striking, that of the latter being as uninteresting as the former is the reverse. Orkney consists chiefly of an apparent continuation of the north coast of the mainland, being composed of sandstone, clay-slate, and other *secondary* rocks, while the Shetlands may be said to belong to the *oceanic* series of islands. Again, the difference seems as great between the Shetland and Faroe Isles, for in the latter group the rocks are all *basaltic*. Many of the Shetland rocks present a most remarkable degree of similarity to those of the south of England, chrome ore, native magnesia, serpentine, crystallized fluor, and several others, being common to both extremities of Great Britain, though rarely found in the intermediate space; and it is a singular fact that some of the plants present a corresponding analogy, as for instance, *Lathyrus maritimus*, &c.

“The prevalence of *peat* is a very characteristic feature in the general aspect of Shetland, and proves beyond a doubt the great abundance of trees in former ages. Judging from the remains, these seem chiefly to have belonged to *Corylaceæ* and *Pinaceæ*, as trunks and nuts of the hazel, and cones of *Abies picea* have repeatedly been dug out of the moors. This evidence of their existing formerly in such abundance, leads to the question whether they may still be grown. I certainly do not think that the experiment has been fairly tried, nor is it probable that it soon will be on a scale which can set the matter at rest; indeed, many reasons seem to concur in rendering it unlikely that trees could be reared so as to render them profitable in an *œconomical* point of view. The frosts and cold weather which often occur early in autumn do not leave the plants time to form their buds for hybernation before the old leaves are nipped; and the heat of summer is by no means sufficient (as in most other northern latitudes) to compensate for the shortness of its duration. I do not attach so much importance as has sometimes been done to the influence of the sea-spray, by which, during heavy gales, Shet-

land is liable to be swept, for these happen generally after the sap has descended, and when therefore the plant is dormant.

“ I may here mention some experiments which have been carried on by my father for five or six years, in order, if possible, to settle the question. He obtained from Messrs. Lawson, of Edinburgh, all the more generally cultivated trees and shrubs,—North British, North American, and North Asiatic, and the result has been as follows. Among the indigenous trees of Scotland, the ash appears to stand as well as any other, as it puts forth its leaves late, and loses them early. Of the scarcely indigenous, or naturalized species, the plane-tree appears to be the hardiest, while the birch and Scotch fir will scarcely live a year. Again, *Pinus montana* and *Æsculus Hippocastanum*, comparatively tender plants, appear to thrive well; and *Pyrus Aucuparia*, which is indigenous with us, thrives tolerably in cultivation. Almost all the willows do well;—*Salix Russelliana*, *fragilis*, *cinerea*, *viminalis*, and *vitellina*, among the best. The alder is rather too early in putting forth its leaves, but some poplars appear to do well, especially the white Scotch, black Italian, and Lombardy, and *Populus nigra* is indigenous. Oak and beech will not thrive at all. Generally speaking, evergreens, both trees and shrubs, appear not to suit. *Pinus Cembra*, *Abies picea*, black, white, and Norway, have all been repeatedly tried, but seldom languished a year. Even the hardy, shrubby evergreens, which are met with indigenous, or in every shrubbery on the mainland, as *Ilex aquifolium*, *Rhododendron ponticum* and *flavum*, *Viburnum Tinus*, &c., die almost immediately. Among the best-thriving evergreen shrubs may be mentioned *Arbutus mucronata*, *Cotoneaster Uva-ursi*, *Hedera Helix*, &c. The latter indeed is native, and in some situations thrives remarkably well, as it also does in Orkney.

“ The climate of Orkney and Shetland are much alike, but scientific observations have only been recorded of the former. ‘ Regarding it,’ Mr. Clouston states, ‘ the high latitude of Orkney will no doubt induce many well-informed persons even in Scotland to suppose that our winter is much colder than that of any other country, and it may surprise them when we say that our winter is as warm as that of Glasgow, and several degrees warmer than that of Applegarth in Dumfriesshire, on the very southern border. This is owing to the influence of the surrounding ocean, which elevates the temperature of winter as much as it lowers that of summer. Thus, the temperature of Orkney in May, June and July is 7 degrees below that of Glasgow during these months; but for the whole year the mean annual temperature in Orkney is nearly the same as that in Applegarth, both being about 46°, or 3½ below that of Glasgow.’ ”

Mr. Edmonstone goes on to observe, that “ the uniformity of temperature in Shetland strikes every one; and a remarkable feature in the climate is the great and almost constant humidity. These causes no doubt have a great influence on the vegetation, for there is not a semblance of *arctic*, and scarcely (except in a very few instances)

of *alpine* vegetation throughout the whole islands. This is certainly rather what might be expected than otherwise; but there are other anomalies which cannot be altogether referred to climate; and the extreme scantiness of the flora is remarkable, considering the extent of the islands, and the variety of soil, exposure, and situation which they present."

The flowering plants (including the grasses) hitherto observed in Shetland extend to 94 genera and 178 species, while those found in the district of Moray amount to 333 genera and 692 species; and even in a range of 16 miles round Aberdeen, there have been found 287 genera and 562 species; and in a similar extent round Edinburgh, the numbers are 389 genera and 908 species, while the flowering plants of Great Britain extend to 523 genera and 1594 species. The proportion of species to genera is also least in Shetland and Aberdeenshire, being only 2 to 1; whereas in the Edinburgh district it is $2\frac{1}{2}$ to 1, and in Britain generally it is 3 to 1.

The statements in Mr. Edmonstone's paper led to some interesting conversation, in the course of which Professor Graham remarked, as a phænomenon which has not hitherto received a satisfactory solution, the entire destruction or absence of wood in many parts of Scotland where once it evidently abounded, and where the change cannot apparently have arisen through human instrumentality; and he observed, that the investigation of this subject would be attended with great interest, besides being of importance in a national point of view.

Dr. Neill said, that in his opinion the peat mosses of Scotland have generally been formed at an earlier period than is usually supposed, some of them containing trees which do not now exist in the country; and he suggested that means should be taken to ascertain the particular species of which the mosses consist, by taking specimens of wood and seeds, or cones, &c., from the successive layers, and duly noting their relative position, with all such circumstances as might tend to establish a correct theory respecting our aboriginal forest-vegetation; indeed he had once proposed that a prize should be offered by the Highland Society for the best essay on this subject, but his proposal had not been carried into effect.

Mr. Brand remarked, that in this country, as in America, the forests in many places appear to have been destroyed by fire, and he instanced some oak-trees in Dalkeith Park which appear to have been burnt down at an early period, and to have thrown out new trunks from the stumps at a later date.

Mr. Goodsir supposed that the increase of the peat might gradually render the soil unfit for the support of trees, and stated, in reference to a remark made by Professor Graham on the approach of the alpine plants in Shetland to the sea-edge, that this peculiarity coincided with the elevation of the deep-sea invertebrate animals to the high-water mark in the same locality.

This Society met again on the evening of Wednesday, December 7th, Professor Christison in the chair. The election of office-bearers

for the season took place,—Dr. Neill, President; Professors Christison, Graham, Balfour, and D. Stewart, Esq., Vice-Presidents.

Professor Christison then submitted to the Society a highly interesting communication on the Assam Tea Plant, illustrated by specimens. The author stated that the different kinds of tea were produced by different modes of preparation, and showed, by a series of examples of the preserved tea-leaf, that the various forms were merely varieties of the same plant. A specimen of tea, of a yellow colour and of a remarkably strong flavour, was exhibited; also tea, in the form of small rolls, sent to this country about twenty years ago, as a present from the Emperor of China to George IV.

Mr. Goodsir then read a paper by Charles C. Babington, Esq., F.L.S., F.G.S., entitled “Observations upon a few Plants, concerning the claim of which to be considered as natives of Great Britain, Sir W. J. Hooker expresses doubt in the 5th Ed. of his ‘British Flora,’ with a few notes upon other species contained in that work, with reference to the Edinburgh Catalogue of British Plants.” The object of this paper was to show upon what evidence the authors (Professor Balfour, Mr. Babington himself, and Dr. Campbell) of the Botanical Society’s Catalogue of British Plants had included in it the species concerning which Sir W. J. Hooker expresses doubt. “I cannot allow this opportunity to pass,” says the author of this paper, “without expressing the great satisfaction which it gives me to see that so distinguished a botanist as Hooker has considered the Catalogue deserving of quotation *throughout his work*, as I must consider it as a proof that the compilers of the Catalogue of British Plants have not produced a work discreditable either to themselves or to the Society that entrusted its preparation to them.”

Mr. Brand afterwards read to the Society a “Notice of the presence of Iodine in some Plants growing near the Sea,” by G. Dickie, M.D., Lecturer on Botany in the University and King’s College, Aberdeen. The author found, by chemical examination of specimens of *Statice Armeria* from the sea-shore, and of others from the inland and higher districts of Aberdeenshire, that the former contained iodine, and that soda was more abundant in them, while potass prevailed in the latter. Iodine was also found in *Grimmia maritima*; and Mr. P. Grant of Aberdeen has found it in *Pyrethrum maritimum*. An analysis was made of examples of *Statice Armeria*, *Grimmia maritima*, *Lichina confinis*, and *Ramalina scopulorum*, all growing near the same spot, and occasionally during storms exposed to the sea-spray; and all these plants, with the exception of the lichen, contained iodine. The specimens having been washed previous to analysis, the iodine could not have been derived from saline incrustation. All these vegetables were healthy, and the author of the paper has been led to conclude that marine algæ are not the only plants which possess the power of separating from sea-water the compounds of iodine and of condensing them in their tissues, and this without any detriment to their healthy functions.

MISCELLANEOUS.

MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF
SCIENCE FOR 1843.

THE inhabitants of Cork and its vicinity have put their shoulders to the wheel of science in earnest, and we will venture to predict that the supporters of the *Corkites* at the Manchester meeting will not be disappointed in their anticipations of a welcome befitting the Association and most hearty to themselves. We copy the following resolutions proposed at a preliminary meeting held at Cork for the purpose of making necessary arrangements; they are conceived, and we are sure would be uttered, in the true spirit of Irish feeling and hospitality:—

“Resolved,—That, whether we consider the vast field of science its inquiries embrace, and which it has so successfully cultivated—the extensive European influence it possesses—the enlarged intercourse and co-operation between the learned of every clime which it produces; or the great benefits it locally dispenses in its annual visits through these kingdoms, we cannot but look upon the British Association for the Advancement of Science as the most important institution in the republic of letters; and the one which, far beyond all others, best illustrates the spirit, the energy, the intellect, the wealth, the learning and scientific advancement of the present day.

“Resolved,—That the periodical visits of the British Association are of peculiar advantage and importance to Ireland. By means thereof, men of influence and weight in other lands become acquainted with a country, which to be valued requires only to be studied and understood, and whose inexhaustible resources can only be fully developed by that combination of native intellect with advancing science, which this Association tends so powerfully to produce.

“Resolved,—That therefore we hail with pleasure the contemplated visit of the Association to this city, and recognizing with gratitude the preference given in the choice of locality to Cork, we are determined to make its reception here worthy of ourselves, our visitors, and our country.

“Resolved,—That, to give effect to this determination by making the requisite arrangement for the reception of the Association, and in conformity with the constitution of that body, the following gentlemen be now chosen a Local Council, subject to the approval of the General Council in London, and to them shall be entrusted the previous preparations and the management of the other details on this interesting occasion.

“Resolved,—That a Sub-Committee for each of the seven scientific sections be selected by the Local Council, to consist of members; namely, one Committee for the Section of Mathematics and Physical Science, one for Chemistry and Mineralogy, one for Geology and Geography, one for Zoology and Botany, one for Anatomy and Medicine, one for Statistics, one for Mechanical Science; and to these Committees shall be entrusted the duty of framing, as far as

may be practicable, collections relating to agricultural, zoological, and geological subjects, and procuring scientific communications, uniting local with general interest.

“Resolved,—That we recommend that a Sub-Committee be also appointed by the Local Council, to whom shall be committed the care of enlisting, through the medium of the Local and Metropolitan Press, and by other such means, the national interest in this important undertaking.

“Resolved,—That the Local Council be requested to organize committees of correspondence in London, Dublin, Belfast, Limerick, Waterford, and with whom communications may be opened connected with this subject; and that a Committee for sending invitations to distinguished scientific men, foreigners and others, be also appointed.

“Resolved,—That the Local Council do request the Agricultural Association of this county to appoint a Committee from their body to co-operate with the Local Council in its arrangements for rendering the visit of the Association permanently and practically useful.

“Resolved,—That it is desirable to hold during the meeting of the Association an exhibition of the manufactures of Ireland, including the tabinets of Dublin, the linens of Belfast, and the lace-fabrics of Limerick, and that the Local Council be recommended to make the necessary arrangements to effect so important an object.

“Resolved,—That a request be made to the Committee of the Art-Union not to open the Exhibition of Pictures next year until the meeting of the Association, and that it be not confined to the productions of resident artists alone, but be open for the exhibition of works of eminent artists, living and dead, connected with Ireland.”

EPILOBIUM VIRGATUM, FRIES.

In a review of Dr. Deakin's 'Florigraphia Britannica,' it is stated (Ann. N. H. ix. 340) that that botanist had found the *Epilobium virgatum* (Fries) in the neighbourhood of Lincoln, and I have now the satisfaction of recording, that during the summer of 1842 I gathered it myself, on the sides and bottoms of deep ditches in peat bogs, in several spots above the High Force in Teesdale, Durham; and also near Caerlaverock (in the Lochar Moss), Dumfries-shire. I likewise obtained specimens at Ventry, in the county of Kerry, in July 1841. This plant closely resembles *E. tetragonum* (Linn.), from which it is most easily distinguished by its scions, which spring from the lower joints of the stem, not the root, are very slender, and do not terminate in a rose-shaped cluster of leaves; those of *E. tetragonum* being short, rather stout, spring directly from the root, and produce a terminal rose-shaped cluster of leaves. It is probable that *E. virgatum* is not an uncommon plant in peat mosses. It may be as well to add, that the same character distinguishes *E. alsinifolium* from *E. alpinum*.—C. C. B.

HABITS OF TARSIPES SPENSERÆ.

Some months ago I described a new animal from South Australia sent me by Governor Grey. Mrs. Grey has sent me the following very

interesting account of its habits :—“ We had two of them for some time in our possession ; the first specimen which is sent home died, I fear from starvation, for I was told that they feed on roots and nuts ; but this I found was a mistake, for they are carnivorous and feed on moths and flies, at least the last we had did so ; it used to take the moths, &c. by their two wings, holding them by its fore paws ; it ate the bodies, and the wings it threw away. I never saw it drink. It generally slept during the day rolled up like a ball, but of a night it became very lively, and was fond of climbing branches of trees ; it would hang suspended by its tail to a small branch, and suddenly jump to another. They were both found by men while ploughing, lying in a nest of grass and fur in a state of stupor. The last lived for many months, and made its escape from us.” Capt. Grey adds, “ it was a great pet.”—J. E. GRAY.

NEW BRITISH PLANT.

Mr. Robert Embleton of Embleton, in the county of Northumberland, has sent me a specimen of the *Majanthemum bifolium* (DeC.), *Convallaria bifolia* (Linn.), gathered in the woods at Howick in that county. He states that it also occurs at Kenwood, and that he has every reason to believe that it is *truly* indigenous in both places. As this plant is found in similar situations in France, Germany and Sweden, I can see no reason for doubting its being a native of Britain.—C. C. B.

NOTE ON HOMŒOCLADIA ANGLICA, AG.*

The following remarks on *Homœocladia anglica* (*Microcoleus marinus*, Harv.) will, I hope, tend to remove the confusion which has prevailed respecting the name of that plant. When in 1835 I first found it near Torquay, Mrs. Griffiths and myself thought that it was a species of *Schizonema* : one specimen was then forwarded to Dr. Greville, but probably overlooked, as he made no remarks upon it. Mr. Harvey, to whom I sent another, named it *Oscillatoria chthonoplastes*, a. ; but as I subsequently pointed out to him that it had none of the characters of *Oscillatoria*, and also differed in almost every respect from *Conf. vaginata*, ‘E. Bot.’ with which it was united in the ‘Br. Flora,’ he has in his ‘Manual’ described it as a species of *Microcoleus*, Desm., under the specific name of *marinus*.

In the meantime, Mrs. Griffiths and Mr. Borrer examined it together and considered it a *Schizonema*, whence Mr. Borrer gave it the name of *S. xylodes*. Afterwards suspecting that it might be *Homœocladia anglica*, I requested Mr. Borrer to compare its structure with a specimen of *H. martiana* sent him by Agardh, and I here subjoin the result of his examination :—“ I have examined, as well as I could, the ‘*Sch. xylodes*,’ and Agardh’s specimen of *Homœocladia martiana*. The structure is surely the same in both, a tube containing (possibly composed of) oscillatoria-like threads, which seem more broken into short bits in Agardh’s plant than in the other, the ‘frustules,’ I suppose, and the white interstices, represented in Agardh’s

* Read before the Botanical Society of Edinburgh.

fig. e. I do not find the 'binate series' of frustules, but I cannot affirm that they do not exist: neither can I make out the ramification of either. Agardh's 'nec facile definitur structura in specimine exsiccato' is quite applicable to both. Agardh's plant is rather more slender and of a greener brown."

My supposition now seemed very probable, but a few days since I was fully assured of its correctness on comparing my plant with a specimen of *H. anglica* in my friend Mr. Berkeley's herbarium, which he received from M. Crouan of Brest, and which I presume was so named by Agardh.—JOHN RALFS, Penzance.

JUNCUS DIFFUSUS, HOPPE, AND DROSERA OBOVATA, M. AND K.

M. W. Sander, of Hamburgh, has just informed me that he has received these two plants from Scotland, under other names. The *Juncus* was gathered at "Kincardine"-shire (?), in wet places; it is distinguished from *J. effusus* by the shape of its capsule and the pith being continuous. (See Koch, Syn. Fl. Germ. 727.) The *Drosera* grew at Lochnacross in Dumfries-shire, and was named *D. longifolia*. I may add, that all my Scottish specimens of *D. anglica* would probably be referred to *D. obovata*; and that I do not consider it as a distinct species, but only a variety of that plant.—C. C. B.

WHITE'S THRUSH.

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

GENTLEMEN,

Will you oblige me by noticing in the next number of the 'Annals' the occurrence in this island of White's Thrush, *Turdus Whitei*? This very rare bird was obtained about ten days since, in the neighbourhood of Bandon, co. Cork, by R. L. Allman, Esq., and is now in my possession. It agrees in every respect with Yarrell's description of the thrush shot by Lord Malmesbury in Hampshire, and is peculiarly interesting when we recollect that the present is the first recorded instance of the occurrence of *Turdus Whitei* in Ireland; and that unless we suppose the thrush in the collection of Mr. Bigge, which Yarrell contrasts with the Earl of Malmesbury's bird, to be of the same species with the latter, his lordship's specimen is the only one which has hitherto been noticed as occurring in any part of the British Islands.

Very faithfully yours,

Dublin, 6 Grattan Street, Dec. 15, 1842.

GEO. JAS. ALLMAN.

FOSSIL MAMMALIA.

Mr. Blyth, Curator to the Asiatic Society of Bengal, in his report of presents received by the Society, states that he has been so fortunate as to discover, among the numerous valuable relics from the Sivalik ranges, which were presented to the Society by Col. Colvin, part of the head and bony cores of the horns of a large species of *Ovis*, nearly allied to, if not absolutely identical with, the *O. Ammon* of Siberia; and a corresponding portion of a true *Ibex*, to all appearance identical with the species (*Capra Sakeen*, nobis,) which still inhabits the loftiest Himalayan crags. It is unnecessary to dwell

here upon the conclusive proof afforded by the occurrence of these highly interesting remains of the existence of lofty, and even snow-clad, mountain heights in the immediate vicinity of the region then tenanted by the *Sivatherium* and its extinct contemporaries; but I shall avail myself of the earliest opportunity to draw up a memoir on the subject, illustrated by figures of the splendid fossils, which there cannot be the slightest hesitation in identifying (generically) as aforesaid.

CURATORSHIP OF THE GEOLOGICAL SOCIETY.

Our able correspondent Mr. E. Forbes, lately appointed to succeed our lamented colleague Mr. Don in the Botanical chair in King's College London, has also been selected by the council of the Geological Society, from a list of nine candidates, (several of whom preferred very strong scientific claims,) to be the successor of Mr. Lonsdale, as Curator and Librarian of the Society. We have much satisfaction in stating that the choice of the Council was confirmed by an unanimous vote of a Special Meeting of the Society held on the 14th of December.

METEOROLOGICAL OBSERVATIONS FOR NOVEMBER 1842.

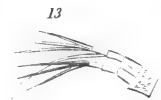
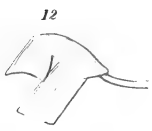
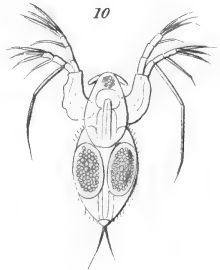
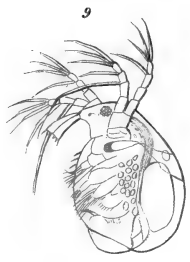
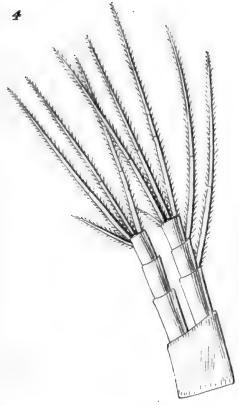
Chiswick.—Nov. 1. Cloudless and very fine: foggy at night. 2. Foggy. 3. Hazy. 4. Cloudy: slight showers. 5. Overcast: sleet. 6. Slight showers: cloudy. 7, 8. Cloudy. 9. Densely overcast: stormy, with rain at night. 10, 11. Rain. 12. Stormy and wet: clear at night. 13. Boisterous, with rain. 14. Overcast: very fine: boisterous, with heavy rain at night. 15. Stormy and wet: foggy. 16. Rain: drizzly: clear at night. 17, 18. Overcast. 19. Heavy rain. 20. Overcast. 21. Clear. 22. Rain, with some sleet. 23. Lightly overcast: rain. 24. Fine: lightning, with rain at night. 25. Heavy rain. 26. Clear and fine. 27. Fine: stormy, with rain at night. 28. Cloudy: rain: fine. 29, 30. Very fine.—Mean temperature of the month $0^{\circ}18$ above the average.

Boston.—Nov. 1. Fine. 2. Foggy. 3. Cloudy. 4. Fine: rain early A.M.: hail and rain P.M. 5. Fine: rain P.M. 6—8. Fine. 9. Windy: rain P.M. 10. Cloudy: rain P.M. 11. Stormy: rain early A.M.: rain P.M. 12. Fine. 13. Cloudy: rain A.M. and P.M. 14. Cloudy. 15. Cloudy: rain early A.M. 16. Cloudy: rain A.M. and P.M. 17. Fine. 18. Cloudy. 19. Rain. 20, 21. Fine. 22. Rain: rain early A.M.: snow P.M. 23. Fine: rain P.M. 24. Rain: rain early A.M. 25. Fine. 26, 27. Fine: rain P.M. 28. Rain: rain early A.M.: rain P.M. 29. Fine. 30. Cloudy: rain early A.M.

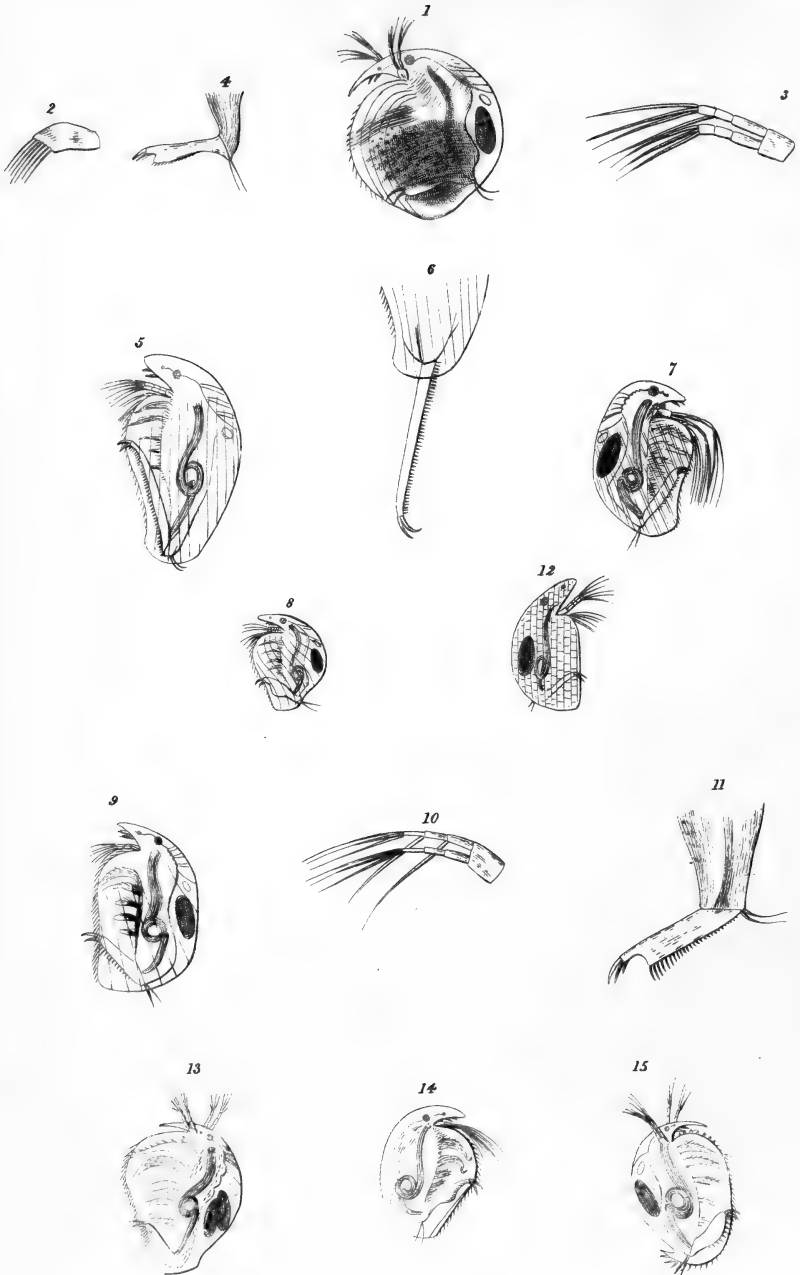
Sandwich Manse, Orkney.—Nov. 1. Drizzle. 2. Cloudy. 3. Cloudy: clear: aurora. 4. Very clear: aurora. 5, 6. Cloudy. 7. Sleet-showers. 8. Damp: rain. 9. Rain: showers. 10. Sleet-showers: cloudy. 11. Damp: rain. 12. Rain. 13. Rain: showers. 14. Snow-showers: sleet-showers. 15. Frost and a little snow: clear and frosty. 16, 17. Frost: cloudy and frosty. 18. Cloudy: drizzle. 19. Drizzle: damp. 20. Drops: clear. 21. Hail-showers: clear: frost. 22. Cloudy: rain. 23. Cloudy: drops. 24—27. Showers. 28. Showers: a gale and rain. 29. Clear. 30. Cloudy: clear.

Applegarth Manse, Dumfries-shire.—Nov. 1. Fair and fine. 2, 3. Fair but dull. 4. Fair but dull: clear. 5. Fair but dull: hoar-frost A.M. 6. Fair but dull: a few drops. 7. Fair but dull. 8. Slight shower. 9. Heavy rain. 10. Frost A.M.: rain P.M. 11. Heavy rain. 12. Wet A.M.: cleared and fine. 13. Fair: hoar-frost A.M. 14. Fair and fine: frost P.M. 15. Fair, but raw and cold. 16. Fair and keen. 17. Fair but cloudy. 18. A few drops of rain. 19. Wet morning. 20. Fair, but raw and cloudy. 21. Fair: frost A.M. 22. Snow: frost: rain P.M. 23. Fair and fine: slight frost. 24. Rain and wind. 25, 26. Rain. 27. Wet morning: cleared. 28. Storm of wind and rain. 29. Slight showers. 30. Fair and fine.









THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

No. 68. FEBRUARY 1843.

XV.—*The Natural History of the British Entomostraca*,
No. VI. By W. BAIRD, M.D., late Surgeon of the
H.E.I.C.S. Berwickshire, Member of the Berwickshire
Naturalists' Club, and Assistant in the Zoological Depart-
ment of the British Museum.

[Continued from Ann. Nat. Hist. vol. i. p. 256.]

[With two Plates.]

THE genus *Lynceus* of Müller is the second genus of the group *Cladocera* of Latreille, vide 'Mag. Zool. and Bot.' vol. ii. p. 400. According to Milne Edwards's arrangement it forms the third genus of the Family *Daphnidiens*, Order *Cladoceres* or *Daphnoïdes*. It is composed however of rather heterogeneous elements and requires to be completely reformed.

Bibliographical history.—Müller established the genus in his 'Zoolog. Dan. Prodróm.' in 1776, and named it *Lynceus* from its having, according to his idea, two eyes. At the time he established it, no author had previously taken notice of any species belonging to it. In 1781 he confirmed the genus in his work on the "Entomostraca," described nine species, and gave a few particulars with regard to them. About the same time Schrank and Eichhorn both mention an insect, which may perhaps be the same species, and which evidently belongs to this genus. The first of these two authors in his 'Enum. Insect. Austriæ,' 1781, p. 536, no. 1119, describes it briefly as *Monoc. infusorius, testa bivalvi, rostratus, oculis duobus in rostro sitis*, and says it is very abundant in stagnant waters, and is perhaps the smallest of its congeners. Eichhorn gives a figure of his species, says it is distinguished from that "*Wasserfloh*" described by Schæffer (*Daphnia*) in that it has a pointed beak which lies close upon the mouth; that it differs from it in its motion through the water, not by bounds but swimming like other insects in the water, and that it is very common. Vide 'Beytr. zur Naturgesch.' p. 37. t. iii. f. D. 1781. These authors give little satisfactory information however with regard to the genus, and Müller's characters are very indifferant, as will be more clearly shown hereafter. His spe-

Ann. & Mag. N. Hist. Vol. xi.

cies, without any original matter, are given by Gmelin in his 'Syst. Natur. Linn.,' 1778; Manuel in the 'Encyc. Méthod.,' 1792; Fabricius in his 'Entomol. Syst.,' 1793; Latreille in his 'Hist. gén. et part. des Crust. et Ins.,' 1802; and Lamarck in his 'Hist. Nat. des Anim. sans Vert.,' 1818; but no new species are added. Leach in the 'Supplement to the Encyc. Britann.,' art. Crustacea, 1816, and in 'Dict. des Scien. Nat.,' t. xiv. p. 541, 1819, appears to have been sensible that the genus was an ill-formed one, and splits it into two; but with the exception of this, we have nothing new written upon the genus till Jurine published his 'Hist. des Monoc.,' &c. in 1820. In this work he has given us a few particulars with regard to the question of their having two eyes, their mode of reproduction, &c.; he notices several of Müller's species, describes three or four new ones, and hints at the necessity of reforming the genus altogether. These additional species are given along with those of Müller which Jurine notices, by Desmarest in his 'Consid. gén. sur les Crust.,' 1825, but we have no new information till Milne Edwards published his work on the Crustacea in 1840*. In this work the author shows the necessity for breaking up this heterogeneous genus and reforming it, but does not make the attempt himself, nor do I know of any further attempt having been made till now.

Habits and Manners.—These insects are found in stagnant waters and in slow running streams, amongst the *Lemnæ* and *Confervæ*, &c. which collect in these situations. The males, as far as I know, have not been met with or described, though Müller mentions having seen two, three, and even four individuals fixed to each other and swimming about in that state. Several species are very abundant throughout the spring, autumn and summer, and may be met with in almost every pond and ditch. They are not individually however so prolific as the *Daphniæ*, as they produce only a few eggs, generally two or three only at each laying; with the exception of the *lamellatus* †, which has nearly as many as the *Daphnia vetula*, and is about the same size. Their mode of reproduction is the same as in the *Daphniæ*, the intervention of the male being not necessary for fecundating the eggs of the female. In one species, the *sphaericus* ‡, Jurine obtained by isolating the young successively fifteen generations; and in the *striatus* § he followed up the moultings and generations for nine successive periods. "On the 7th of June he isolated a female which had two eggs; 8th of June, two young ones were

* The first volume was published in 1834; but the third, containing the Entomostraca, was not published till 1840.

† *Eurycercus lamellatus*, nob.

‡ *Chydorus sphaericus*.

§ *Alona quadrangularis*, nob.

born; 9th, it has moulted and got two eggs clear brown coloured; 11th, eggs are elongated, eye visible; 13th, a second accouchement; 14th, has moulted and has two eggs; 17th, a third accouchement; 19th, has moulted and has three eggs; 20th, a fourth accouchement; 21st, moulted and has two eggs; 22nd, a fifth accouchement; 23rd, moulted and has two eggs; 25th a sixth accouchement; 26th, moulted and has two eggs; 28th, a seventh accouchement; July 3rd, moulted and has two eggs; 8th, an eighth accouchement; 9th, moulted, cannot exactly determine whether it has eggs the insect is so yellow; 11th, moulted, cannot see eggs; 14th, ninth accouchement, young ones dead; 15th, mother herself dead." (Jurine, pp. 155, 156.) The young are born perfect; and even before they are ushered into the world, and whilst still in the matrix, we discern the eye and its accompanying black spot. These insects are said by Jurine to be subject, like the *Daphniæ*, to the formation of the saddle or ephippium; and that in each ephippium there is only one egg, which is placed in the middle of the saddle and makes a projection from it. I have never myself met with an individual having the saddle; and in general I have found those which I have kept very short-lived as compared with the *Daphniæ*. The motion of these insects through the water is somewhat different from that of the genus *Daphnia*. Instead of swimming by short irregular bounds as these latter do, they direct themselves by a rapid motion of their rami and legs straight towards the point to which they wish to go. This was noticed by Eichhorn as already mentioned, who seems to be the only person who remarks it till the time of Jurine, and it appears chiefly perhaps to depend upon the comparative shortness and position of the rami, as the *Daphnia cornuta*, which has also very short rami situated as in the *Lyncei*, has the same kind of motion. [Vide Mag. Zool. and Bot. vol. ii. p. 412.] The food of the *Lyncei* consists of both animal and vegetable matter, and whilst they prey upon animalcules smaller than themselves, they in their turn are devoured in great numbers by insects larger than they are. According to Pritchard the *Lynceus sphericus* is the choice food of a species of freshwater *Nais* which he calls the *Lurco*. "So great is the voracity," he says, "of this creature, that I have seen a middle-sized one devour seven *Lyncei* in half an hour. Five of these were moving about in the first cavity; at the end of that time the other two having passed into the second had become exhausted*."

Anatomy.—In general formation the animals of this genus are very much like the preceding, the *Daphniæ*, the most remarkable point of difference being a small black spot a little

* Vide Pritchard's Microscopic Cabinet, p. 81.

distance from the eye, much smaller than it, which was considered by Müller as a second organ of sight, and from which he has given the name to the genus*, and the shape of the head and beak. The shell, or covering which incloses the body, does not consist of two distinct and separate valves, but is open only on the anterior margin, and for a portion of the posterior extremity. The part which we may call the head is harder than the other portion of the shell, and is prolonged, in most of the species, into a sharp and very distinct beak. Belonging to it we find, besides this beak, the *eye* with its accompanying black spot, the two *antennæ*, the *rami*, *brain*, *mouth*, and part of the *digestive canal*. The *eye*, as in the *Daphniæ*, is a spherical body contained in a somewhat funnel-shaped tube, having a semirotatory motion, and consisting of a series of crystalline bodies, in the *lamellatus*† being about twenty in number (Pl. II. f. 2.). The black spot which Müller considers as a second eye, is situate before and at a little distance from the real eye, generally near the end of the beak, almost at the extremity of the body of the animal, and near the root of the *antennæ*. It is much smaller than the eye, has no communication with it, and is immoveable. It is not composed of crystallines, and its situation is not exactly the same in all the species. Jurine says he has only examined it in small individuals, and that in consequence he has not been able to discover its use. He does not appear to have met with the larger species of the genus, the *lamellatus*, in which I have examined this spot, but without being able to discover any use to which it is applied. I quite agree with him however in considering it not to be an organ of vision. Straus considers the upper larger spot alone deserving the name of eye, and that this small black spot is similar to the one which exists in the *Daphniæ*, adjacent to the brain; the relative situation too of which is nearly the same as this black spot in the *Lyncei*‡. As I have said above, we find it in the young before birth exactly as in the adult. The *antennæ* are two in number, and are placed near the extremity of the beak, projecting from its under surface. Each consists of a solid body of a somewhat conical shape and slightly curved, which terminates in six short spines, each of which again gives out a fine seta or bristle (Pl. II. f. 3.). They are not possessed of much motion. The *rami*§ or arms are situate on each side of the base of the head, rather lower than in the *Daphniæ*, and consist, as in them,

* "Nomen *Lyncei* in 'Zool. Dan. Prodróm,' ex punctis binis ocellaribus, quæ organa visus absque dubio sunt, indici."—*Entomost.* p. 67.

† *Eurycercus lamellatus*, nob.

‡ Mem. Mus. Hist. Nat. tom. vi. p. 153.

§ *Antennæ* of Müller, &c.

of a single joint at the base which divides into two branches, each having three joints. They are much shorter in all the species than in the *Daphniæ*. In the *lamellatus** the anterior branch sends off from the last joint three long filaments or bristles and a short one, and one from the extremity of the second and first joints, while the posterior branch sends off only three long ones and a short one from the last joint. The long setæ or filaments are each furnished with a joint near the centre as in *Daphnia pulex*, and as in it also, are beautifully plumose, while the short ones are neither jointed nor plumose. The use of these organs is the same as in the *Daphniæ*, being chiefly organs of locomotion. The *brain* apparently is the same in situation and shape as in the *Daphniæ*. The *mouth* also is nearly of the same construction. The *mandible* (Pl. II. f. 5.) is a strong organ, articulating superiorly with the body by a sharp and pointed extremity, whilst the inferior extremity is free and unattached, curved a little inwards and rounded somewhat at the tip, which is furnished with several strong teeth. The *jaws* consist each of a strong large plate articulating with the body by the narrow end, to which are attached the muscles which move it. About the centre of its length it takes a sudden curve and descends in the form of a broad plate, which is slightly lunated at the extremity, the edges terminating in sharp points. To the lower edge of its superior extremity is attached a flat squarish plate, which moves simultaneously with the other part and to which it seems firmly fixed†. These organs may be seen almost constantly in motion when the animal is stationary, the motion of the mandibles being pretty quick and oscillatory, whilst that of the jaws is slow, upwards and downwards. Part of the *digestive canal* may be seen also in this upper part of the animal, commencing as in the *Daphniæ* immediately behind the mouth in the form of an *œsophagus* and terminating in the *stomach*, which is situate in the lower portion or body of the shell. The stomach differs somewhat from that organ as seen in the *Daphniæ*, being curved or twisted into one or two complete convolutions near the centre (Pl. II. f. 6.). The *body* of the animal is quite free and unattached within the valves of the shell, except at the superior portion where we see it attached to the posterior edge of the shell by about three broadish muscles. It terminates superiorly in a point near the root of the antennæ, and almost upon the extremity of this point is situate the black spot in front of the eye. A short distance from this the body has an indentation, in which, or rather on its edge, is situate the eye, already described. It then takes a round turn, the edge of which is more or less crenated, and

* *Eurycercus lamellatus*, nob. Vide Pl. II. fig. 4. † Pl. II. fig. 12.

from it the muscles attaching the body to the shell arise. It now turns inwards for a short distance and then bulges outwards again towards the posterior edge, terminating by a joint in the *tail**. The space left where the body turns inwards, between it and the shell, is the *matrix* or place where the animal deposits its ova and where the young remain till ready to be extruded, and immediately above this is situate the *heart*. The tail in all the species I have examined is connected to the body by an articulated joint, differing in this very particularly from the *Daphniæ* (Pl. II. fig. 7.). At this joint we see two setæ arise, which in some species, as in the *lamellatus*†, are beautifully plumose and of considerable length. The tail is then projected upwards, being always within the shell when the animal is at rest. It terminates in two or more strong hooked claws, the use of which seems to be to assist in cleaning the interior of the shell, as the tail is flexible and can be extended to a considerable length beyond the shell. In one or two species it is remarkably long, as in the *macrourus*‡, and extremely flexible, and the motion of this organ is evidently of great use to the animal in assisting and regulating its movements. A little beyond the joint is placed the *anus* or termination of the alimentary canal. The *feet* are five pairs in number. The first pair are the largest, and consist each of a fleshy sort of body, bent a little, strongly ciliated on its upper edge and furnished at its extremity with five long and strong setæ, which in general project a little beyond the edge of the valves (Pl. II. fig. 8.). The other pairs are difficult, from their extreme delicacy of structure and transparency, to be made out. They are very much like those of the *Daphniæ* however in structure, consisting of branchial plates and finely plumose setæ, and have the same functions and uses.

The characters of the genus *Lynceus*, as established by Müller, are both vague and erroneous. "Antennæ," he says §, "two or four, capillaceous." These characters are incorrect: in none of the species that I have seen are they four in number, being invariably only two, and in none are they capillary, being in all branched and articulated. "Feet eight or more:" this may mean any number, but in none are they eight; they do not vary in any of the species, being in all of them five pairs. "Eyes two:" this we have given our reasons above for thinking incorrect also. "Shell bivalve:" this is not correct, the shell being, as we have mentioned above, not divided

* The body as described above is particularly well seen in the *Lynceus harpæ*, the *Acroperus harpæ*, nob. Pl. III. fig. 12.

† *Eurycercus lamellatus*, nob. ‡ *Camptocercus macrourus*, nob.

§ The *rami* are the *antennæ* of Müller.

into two separate valves. Leach's characters of the genus are equally incorrect: "two eyes; four antennæ, branched*." We have stated above the incorrectness of these characters. Straus's characters are equally infelicitous: "Rami with two branches, divided into a much greater number of articulations than in the other genera of this family; primitive stalk very short." He gives as the type of this genus the *sphæricus* of Müller, but these characters do not agree with those belonging to that species, as the *rami* are each possessed of only three articulations. In the *brachyurus* of Müller the *rami* have numerous articulations, but from Müller's figure they appear to be four in number instead of two. Milne Edwards is the last writer who has characterized this genus. His characters for the different genera belonging to the family *Daphnidiens* he adopts from Straus, taking them from the number of branches and the number of joints to each branch of the *rami*. In *Lynceus* he says, "at least four joints to each of the branches †:" this is decidedly incorrect in all the species we have met with. The subgenus *Chydorus* of Leach, as established by him in 'Sup. Encyc. Britan.,' 1816, for the reception of *L. sphæricus* of Müller, is equally unhappily characterized: "two eyes; antennæ two, in shape of threads." These characters are decidedly incorrect, the *rami* (antennæ) being branched and jointed in that species as well as the others.

We propose for the present reforming this genus as follows:—

Fam. DAPHNIDÆ.

Genus LYNCEUS.

"Rami two, for the most part very short, branched; each branch 3-jointed. Eye single, accompanied with a black spot in front of it. Feet, five pairs. Intestine convoluted. Tail jointed."

1st Subgenus. *MACROTHRIX* ‡. "Anterior branch of ramus having a very long seta or filament springing from root of second articulation. Antennæ pendulous from extremity of beak."

1st Sp. *Macrothrix laticornis*. Pl. II. f. 9, 10.

Syn. *Daphnia curvirostris*? Müller, *Ent.* t. 13. f. 1, 2.—*Monoculus laticornis*, Jurine, t. 15. f. 6.—*Lynceus laticornis*, Desmarest, p. 376.—*Daphnia laticornis*? M. Edwards, iii. p. 373.

* The species *brachyurus* of Müller is the type of Leach's genus; but as this anomalous-looking species is one I have never met with, though Leach mentions it as common, I have not been able to ascertain its precise characters. It must form a new genus.

† "Au moins quatre articles à chacune des ces branches," iii. p. 374.

‡ From μακρός long, and θρίξ a hair.

Rami strong and large. Posterior branch having four setæ, three from extremity of last articulation and one from extremity of second. Anterior branch has five setæ, four disposed as in the posterior branch, and one very long one from extremity of first articulation. Antennæ pendulous from extremity of beak, broad, and furnished with three short setæ at their extremities. Eye large, distinctly areolar, and having its accompanying black spot near the root of antennæ. Shell transparent, colourless, smooth, ciliated on anterior margin. Having only met with this species once or twice I have not taken any note of the intestine, but according to Jurine's figure, it is not convoluted as in the other genera. In general appearance this insect resembles very much a *Daphnia*, and accordingly it has been transferred to this latter genus by Milne Edwards*, though he thinks the species *laticornis* to be the same as the *roseus* of Jurine†.

Hab. Along with *Daphnia cornuta* and *Cythere inopinata*, in a pond near Hanwell; also in a pond at Highgate, but is rare.

2nd Subgenus. EURYCERCUS †. "Subquadrangular. Tail very broad, in form of a flat plate, densely serrated."

1st Sp. *Eurycercus lamellatus*. Pl. II. f. 1—8.

Syn. *Lynceus lamellatus*, Müll. *Zool. Dan. Prod.* no. 3396; *Entomost.* 73. t. 9. f. 4 to 6.—*Monoculus lamellatus*, Linn. *Gmel.* 3008. no. 62; *Manuel, Enc. Méth.* vii. 733. no. 62. t. 268. f. 21—23; *Fabricius, Ent. Syst.* ii. 498.—*Lynceus lamellatus*, Latreille, *Hist. des Crust.* 208; *Baird, Trans. Berw. Nat. Club*, p. 100; *M. Edwards, Hist. des Crust.* iii. 388.

This is the largest of all the known species of the *Lyncei*, being in old specimens fully as large as the *Daphnia vetula*. Shell of an olive colour, rather square-shaped; ciliated on anterior margin, ventricose in centre, and arched on posterior edge of shell. Beak rather blunt and short. Rami very short compared with the size of insect. Anterior branch with three long setæ and a short one springing from extremity of last,

* I have elsewhere mentioned that M. Edwards takes his generic characters of the fam. *Daphniidæ* from the number of branches and articulations of the rami. The genus *Daphnia* is restricted by him to those species which have two branched rami, with four articulations in one branch and three in the other. Of course, as this insect has only three articulations in each branch, it cannot enter into the genus *Daphnia* as thus constituted. The *Monoculus roseus* of Jurine we have not met with, but it differs according to his description from the *laticornis* in having no areola round the eye, in colour and in shape of antennæ; it is also larger.

† In Yarrell's 'British Fishes' we have a figure of the *roseus* at p. 93, tom. ii. copied from Jurine apparently, where it is mentioned as being the food of the fish called the Vendace (*Coregonus Willughbii*) caught in Lochmaben Loch, Dumfries-shire.

‡ From *εὐρύς* broad, and *κέρκος* a tail.

and one long one from first and second articulations. These setæ are finely plumose, like those of *Daphnia pulex*, and jointed about the middle of their length. Eye large, contained in an infundibuliform tube, areolar, areolæ about twenty in number. The accompanying black spot is remarkably small, situated almost directly under the eye instead of in front of it, and is somewhat of a square shape. Intestine convoluted, having one complete convolution and nearly a half. The lower part of abdomen or body of animal has a lobe springing out from its edge like a spur. Setæ at joint of tail finely plumose and jointed at about half their length. Tail very broad, lamellar, densely and strongly serrated on lower edge, sinuated deeply on anterior margin, and terminating in two stout claws and two small ones. Antennæ are stout solid bodies, somewhat conical in shape, slightly curved and terminating in six short spines, each of which gives out a fine seta or bristle. They are not possessed of much motion. The mandibles are strong, rounded towards extremity, which is possessed of sharp teeth. The first pair of feet consist of a strong fleshy body strongly ciliated on upper edge, and terminating in five long and strong filaments, which generally project outside the shell. The other feet consist of broad plates with the branchial apparatus attached, and resemble a good deal those of the *Daphniæ*. The motion of this species is peculiar; it generally lives at the bottom of the vessel in which it is kept, and when disturbed it bounds up by rapid short motions in a curved sort of line, and then returns in the same manner to the place from where it rose. It is very heavy and slothful compared with the other genera, and I have frequently turned it over two or three times before it moved.

Hab. Not uncommon in ponds and ditches near Isleworth; "in Yetholm Loch, and in a pond on Beaumont water."—*Trans. Berw. Nat. Club.*

3rd Subgenus. *CHYDORUS*, Leach. "Nearly spherical in shape. Beak very long and sharp, curved almost into the shape of a crescent. Rami very short."

1st Sp. *Chydorus sphaericus*. Pl. II. fig. 11—13.

Syn. Lynceus sphaericus, Müll. *Zool. Dan. Prod.* no. 2392; *Entom.* 71. t. 9. f. 7 to 9.—*Monoculus infusorius*, Schrank, *En. Ins. Aust.* 536. no. 1119; *Eichhorn**? *Beyt.* t. 3. f. D.—*Mon. sphaericus*, Linn. *Gmel.* 3008. no. 60; *Manuel. Enc. Méth. Hist. Nat.* vii. 732. t. 268. f. 15—17; *Fabricius*, *Ent. Syst.* ii. 497.—*Lynceus sphaericus*,

* Perhaps this may be a new species. Müller quotes this figure of Eichhorn for his *Lyn. trigonellus*, but it appears to me to be quite distinct. It resembles the *sphaericus* in shape, except that the inferior extremity of the shell is pointed. Should it prove a new species, I should propose to name it *Chydorus Eichhorni*.

Latreille, Hist. des Crust. 207; *Lamarck, An. sans Vert.* v. 128. no. 3.—*Chydorus Mülleri, Leach, Sup. Enc. Brit. art. Crustacea; Dict. des Sc. Nat.* xiv. 541.—*Monoc. sphaericus, Jurine, Hist. des Mon.* t. 16. f. 3.—*Lyn. sphaericus, Desmarest, Cons. des Crust.* 377; *Baird, Trans. Berw. Nat. Club,* p. 100; *M. Edwards, Hist. des Crust.* iii. 386; *Pritchard, Micros. Cab.* t. 8. f. 3.*

Shell round, smooth, slightly ciliated on anterior margin; of an olive colour. Rami very short; anterior branch has three setæ springing from the extremity of last articulation, and one from extremity of second †; posterior branch has only three from last joint. Intestine convoluted, having one complete convolution and about a half. Tail jointed, and having two stout claws at its extremity; the intestine passing through the joint and terminating in the anus near the claws. Eye areolar, its accompanying black spot pretty large and situated just above the root of the antennæ. Its motion through the water is more like rolling, as Jurine describes it, than swimming. The mandibles, feet and antennæ are very like those of the preceding subgenus. According to Pritchard, "the young play near their parent, and at the approach of danger swim for protection within the shell of the mother, which she, conscious of their feebleness, immediately closes †!!"

Hab. Ponds and ditches. Common.

2nd Sp. *Chydorus globosus*. Pl. III. fig. 1—4.

Shell quite globular, a good deal resembling in form the last species, but more completely rounded and nearly six times larger; striated circularly on exterior and upper margin, and dotted with small black spots; the anterior portion of shell is reddish coloured, with a large irregular-shaped dark band running across the centre of shell and occupying about half its extent. The beak is extremely long, and at times appears to lie close to the body. Tail elbowed at the joint and hollowed out immediately before it, terminating in two long claws. Eye large, areolar. Intestine convoluted, having one complete turn and about a half. First pair of feet large. Antennæ large, with seven teeth and seven long setæ§. Rami very short and slender. Anterior branch has four setæ, one from second articulation and three from last. Posterior branch has three only from last joint. The motion of this species is very much like that of a *Cypris*.

Hab. Ditch near Richmond; pond near Isleworth. Rare, apparently confined to small patches.

* In Koch's '*Deutschlands Crustaceen*,' &c. there is a figure of the *Lynceus sphaericus*, Heft 8. t. 2., but it is certainly not the *L. sphaericus* of Müller.

† Pl. II. fig. 13.

‡ l. c. p. 90.

§ Pl. III. fig. 2.

4th Subgenus. *CAMPTOCERCUS**. "Ovoid-shaped. Tail long, slender and extremely flexible, serrated."

1st Sp. *Camptocercus macrourus*. Pl. III. fig. 5, 6.

Syn. *Lynceus macrourus*, Müll. *Zool. Dan. Prod.* 2397; *Entom.* t. 10. f. 1 to 3.—*Monoculus macrourus*, Linn. *Gmel.* 3008. no. 65; *Manuel, Enc. Méth.* vii. 733. no. 65. t. 268. f. 26, 27; *Fabricius, Ent. Syst.* ii. 499.—*Lynceus macrourus*, Latreille, *Hist. des Crust.* 207; *M. Edwards, Hist. des Crust.* iii.

Of an ovoid shape. Shell pellucid and whitish, finely striated or ribbed longitudinally; slightly sinuated and ciliated on anterior margin. Beak rounded and bluntish. Rami short. Tail very long and slender, with thirteen well-marked serræ or teeth on lower edge, and several smaller ones, terminating in two long and slender claws; setæ short. This organ and lower part of body is extremely flexible, and the animal can twist it completely round in a circle, and then unbending it thrust it far out beyond the shell. Eye small but areolar; accompanying black spot nearly as large as the eye. First pair of feet large. Intestine convoluted once and about a half. Antennæ rather long and slender, the terminating setæ long also. Anterior branch of rami has four long filaments and one short one; one long from second articulation, and three long ones and one short from last. Posterior branch has only three long filaments and one short from last joint.

Hab. Ditch near Richmond, pond top of Brazil Mill-lane near Isleworth, and at Highgate.

5th Subgenus. *ACROPERUS*†. "Shell somewhat harp-shaped, terminating inferiorly on anterior margin in a more or less blunt point projecting forwards. Rami rather long."

1st Sp. *Acroperus harpæ*. Pl. III. fig. 7.

Syn. *Lynceus harpæ*, Baird, *Trans. Berw. Nat. Club*, p. 100. t. 2. f. 17.

Shell rounded posteriorly, sinuated rather deeply and ciliated anteriorly, and terminating in an obtuse point projecting forwards; strongly striated or rather ribbed longitudinally and somewhat obliquely, giving the shell, which is quite transparent, a good deal of resemblance to a harp. Beak rounded and obtuse. Rami slender, and of considerable length, each branch provided with three long setæ from the extremity of last articulation only. The rami and setæ together extend almost the length of the shell, reaching nearly to the inferior extremity. Tail slender, not serrated on under edge, but marked near the edge with a row of indentations, and terminating in two claws, which are long and slender. Antennæ of considerable length, the terminating setæ being much longer than

* From *καμπτός* flexible, and *κέρκος* a tail.

† From *ἄκρος* pointed, and *πέρας* the extremity.

in the other genera. First pair of feet large. Eye areolar, accompanying black spot nearly half the size of the eye, squarish shaped. Upper part of body very rounded and crenated round the outer edge. Intestine convoluted, having one turn and nearly half another.

Hab. Pond at Osterly Park; ditch near Richmond opposite Isleworth church; "pond on Beaumont water, and in Dun-glass pond."—*Trans. Berw. Nat. Club.*

2nd Sp. *Acroperus nanus*. Pl. III. f. 8.

Somewhat resembles the last in shape, but is very small, not the seventh part the size, is less transparent, less deeply sinuated on anterior margin and less projecting at lower extremity. The striæ or ribs are not so large, and are disposed in a waved form, obliquely transverse. Anterior margin of shell ciliated. Beak rather long, sharper than in preceding species. Rami slender and rather shorter than in *harpæ*. Anterior branch has four setæ, one springing from the second, and three from extremity of last articulation. Posterior branch has three setæ springing from last joint only. Tail has a gibbous projection about the middle of the lower margin, and is serrated at extremity. Intestine convoluted, one turn and nearly a half. One ovum. In size this species is considerably less than the *Chydorus sphericus*, and is about the smallest of the *Lyncei* that I have met with.

Hab. Pond at Norwood Green and near Southall, Middlesex. Rare.

6th Subgenus. *ALONA*. "Shell quadrangular-shaped, striated. Rami short."

1st Sp. *Alona quadrangularis*. Pl. III. f. 9—11.

Syn. *Lynceus quadrangularis*, Müll. *Zool. Dan. Prod.* no. 2393; *Entom.* t. 9. f. 1 to 3.—*Monoculus quadrangulus*, Linn. *Gmel.* 3008. no. 61; *Manuel, Enc. Méth.* vii. 733. t. 268. f. 18 to 20.—*M. quadrangularis*, *Fab. Ent. Syst.* ii. 498.—*Lynceus quadrangularis*, *Latreille, Hist. des Crust.* 208; *Baird, Trans. Berw. Nat. Club*, p. 100.—*Monoculus striatus*, *Jurine, Hist. des Monoc.* t. 16. f. 1, 2.—*Lynceus quadrangularis*? *M. Edwards, Hist. des Crust.* iii. 388.

Shell nearly quadrangular, transparent, of a deep brown colour; strongly ciliated on anterior margin, cilia long; striated or ribbed longitudinally, the striæ or ribs rather distant. Rami short, the setæ also being short. Anterior branch with four, one from second, and three from last articulation. Posterior branch has three from last joint only. Beak rather bluntish. Tail rather narrow, sinuated near extremity and serrated for about half its length on under edge; the serræ or teeth at the extremity being the longest. Terminating claws long. An-

tennæ conical-shaped. Intestine convoluted once and nearly a half, but not so very distinctly visible as in the other genera. Eye areolar. Body rounded at upper extremity as in *Acroperus harpæ*. I had some doubts at first as to this being identical with the *striatus* of Jurine. In his figure the beak is blunter and the tail shorter and rounder-shaped than in my specimens. He gives it the name of *striatus* with a doubt, and remarks, "if this species be the *truncatus* of Müller, as we may presume it is, it must be confessed that its specific name is improper; for the shell is not truncated, it is obliquely striated and strongly ciliated*."

It is evident that Jurine could never have seen the *truncatus* of Müller, and the *quadrangularis* seems also to have been unknown to him, for the difference between his species (the *striatus*) and Müller's *truncatus* is so great and evident that they cannot be mistaken for each other; while the similarity between it and the *quadrangularis* is so evident, that notwithstanding the slight differences mentioned above, I have little or no hesitation in referring them both to the same species.

Hab. Ditch near Richmond, opposite Isleworth church; pond at Osterly Park and near Hounslow; "in the Pease burn, and in a pool on Beaumont water at Yetholm."—*Trans. Berw. Nat. Club.*

2nd Sp. *Alona reticulata*. Pl. III. f. 12.

In size this is perhaps the smallest of all the species of this family, being rather smaller than the *Acroperus nanus*. Shell of a quadrangular shape, rounded a little posteriorly, and nearly straight on anterior margin, which appears free from cilia. The lower margin is obtuse, and the whole shell is closely reticulated. Beak prominent and long, projecting upwards, rather blunt. Rami rather slender; anterior branch provided with four setæ, one shortish from second articulation, and three long and stout ones from last. Posterior branch has three from last joint only. Tail rather tapering towards the extremity, and serrated on inferior margin. Eye large for the size of the animal, areolar. Intestine convoluted, but it is not very easily seen, from reticulated surface of shell. One ovum.

Hab. Pond near Southall, Middlesex: Sept. 1842.

7th Subgenus. PLEUROXUS†. "Anterior margin prominent on the upper portion; the lower part being truncated, or as it were cut sharp and straight. First pair of feet very large."

1st Sp. *Pleuroxus trigonellus*. Pl. III. f. 13.

Syn. *Lynceus trigonellus*, Müll. *Zool. Dan. Prod.* no. 2395; *Ent.*

* l. c. p. 154.

† From *πλευρόν* a side, and *ὀξύς* sharp.

t. 10. f. 5, 6.—*Monoculus trigonellus*, Linn. *Gmel.* 3008. no. 63; *Manuel, Encyc. Méth.* vii. 733. no. 63. t. 268. f. 24, 25.—*Fabricius, Ent. Syst.* p. 498.—*Lynceus trigonellus*, *Latreille, Hist. gén. et part. des Crust.* p. 205; *Lamarck, An. sans Vert.* 123. no. 2; *Baird, Trans. Berw. Nat. Club*, p. 100; *M. Edwards, Hist. des Crust.* iii. p. 387.

Shell somewhat triangular-shaped and transparent; gibbous on upper portion on anterior edge for about a third of its length, the other two-thirds being truncated, or as it were cut obliquely with a straight sharp edge, and ciliated. Posterior margin gibbous also, and sinuated near lower extremity, which terminates in a square point. Beak long, curved and sharp-pointed. First pair of feet very large; the *pediform organ* of Müller being the first pair of feet. Rami short and slender. The anterior branch has four setæ, one from first articulation, one from second, and two from last. Posterior branch has three setæ, all springing from last joint. Tail gibbous for latter half, and serrated. Intestine convoluted, having one turn and nearly a half. Eye areolar.

Hab. Pond near Copenhagen fields; at Osterly Park, Norwood Green and Southall; "pond at Foulden and at Yetholm."—*Trans. Berw. Nat. Club*.

2nd Sp. *Pleuroxus hamatus*. Pl. III. f. 14.

Syn. *Lynceus hamatus*, *Baird, Trans. Berw. Nat. Club*, p. 100. t. 2. f. 18.

"Shell truncated anteriorly and ciliated; upper part gibbous; tail not serrated, gibbous, terminated by two setæ*; two upper feet large, and each furnished at extremity with a strong hook or claw turned upwards; antennæ† of three setæ each. Approaches *Lync. trigonellus*, but differs from it in the beak being blunted and stronger, in the tail not being serrated, and in the upper feet having the strong hooks‡.

Hab. Yetholm Loch, Roxburghshire."—*Trans. Berw. Nat. Club*.

I first found this species in the autumn of 1835 in Yetholm Loch, Roxburghshire, and afterwards in a pool near Yetholm Bridge, but have not since met with it. The intestine is curved, and the shell extremely transparent.

8th Subgenus. *PERACANTHA* §. "Oval-shaped; the lower extremity of shell slightly curved backwards, and, as well as upper extremity of anterior margin, beset with strong hooked spines."

1st Sp. *Peracantha truncata*. Pl. III. f. 15.

Syn. *Lynceus truncatus*, *Müll. Entom.* 75. t. 11. f. 4 to 6.—*Monoc.*

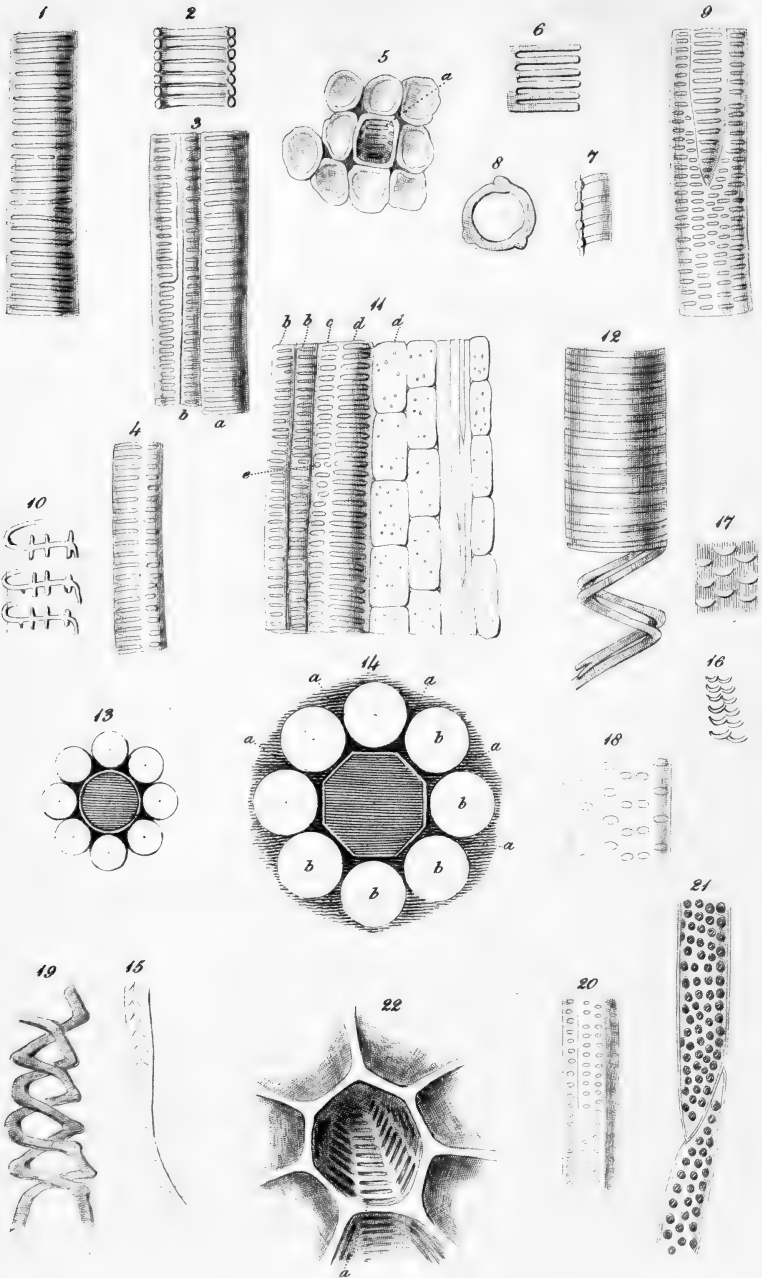
* Claws or hooks.

† Rami.

‡ It is only about half the size of *trigonellus*.

§ From *πίρα* extremity, and *ἀκανθα* spine.





On the Pitted Tissue of Plants.

truncatus. Linn. *Gmel.* 3008. no. 64; *Manuel, Enc. Méth.* vii. 733. t. 268. f. 30—34; *Fabricius, Ent. Syst.* 498.—*Lynceus truncatus*, *Latreille, Hist. gén. des Crust.* 206; *Baird, Trans. Berw. Nat. Club*, p. 100; *M. Edwards, Hist. des Crust.* iii. 388.

Shell nearly of an oval form; the lower extremity having a curved projection backwards, and provided with a number of pretty strong spines, about seventeen in number, the three last of which are curved backwards. On the upper extremity of anterior margin there are about an equal number of spines, the upper ones being curved upwards. These are partly concealed by the cilia which densely cover the anterior margin of the shell. The shell is striated longitudinally. Beak rounded and sharp-pointed, rather long. Rami short; anterior branch furnished with five setæ, one from first, one from second, and three from last articulation. Posterior branch has three setæ, all from last joint. First pair of feet large. Tail rather gibbous on lower edge, and on latter half has about eight spines, and terminates in two stout claws. Intestine convoluted, having one turn and nearly a half. Antennæ conical-shaped. Eye areolar. Accompanying black spot squarish-shaped. Two ova.

Hab. Pond at Osterly Park; ditch near Richmond opposite Isleworth church; near Southall; "pond on Beaumont water at Yetholm."—*Trans. Berw. Nat. Club.*

XVI.—*Observations on the Formation of the Pitted Tissue of Plants, with one or two remarks on the Analogy between the Blood-discs in Animals and the Starch Particles in Vegetables.* By JOHN WM. GRIFFITH, M.D., F.L.S. &c.

[With a Plate.]

THE object of the present remarks is to point out the mode of formation of the dotted tissue of plants, the cause of the peculiar arrangement of the dots, &c. I shall also allude to one or two points of vegetable anatomy in which my observations differ from those of authors generally. It is well known that the dotted or pitted tissue varies very much in its characters; sometimes the dots are surrounded by a rim, in other varieties the pits or dots are without it. My observations will apply at present to the latter variety only*; the cause of the rim surrounding the dot in the former variety is, I think, quite unexplained. The explanation advanced by Dr. Willshire†,

* The dot, or elliptical thinner portion of the marking of the dotted duct (i. e. the part generally within the rim), I think is formed in the same manner as the dots on the spiroid tissue, but I know of no explanation of the origin of the rim.

† *Annals of Natural History*, Aug. 1842.

who considers them formed by spaces left between filaments "not only having a spiral direction with respect to the duct in which they are formed, but bent upon themselves forming sinuous curves," I have not been able to verify. The fibres here spoken of, although I have carefully sought for them, I have never been able to perceive. Moreover, Dr. Willshire does not attempt to account for the dot. Dr. Martin Barry* has also advanced a theory of the formation of what he has termed dotted ducts, but by reference to his figure it will be perceived that he alludes to that variety which has no rim, and which, according to Hugo Mohl's definition, is not the real dotted duct. He says, "the spirals in vegetables are produced in the same manner as the muscular fibres (of animals). Were the division of the spiral, or at least the separation, to be complete in some parts and not in others, the appearance would resemble that denominated the reticulated duct, and the tendency (as it is supposed) of vegetable fibre to anastomosis might be explained†." By acting upon a spiral vessel with a spirituous solution of corrosive sublimate, Dr. Barry produces what he terms a double spiral, whose coils appear to interlace, and by their close contact to produce the appear-

* Trans. of Royal Society of London, 1842, Part I.

† Through the kindness of Dr. M. Barry I have examined his preparations exhibiting the interlacement of double spirals; but, although the appearance presented in one or two of them is exactly similar to that which would be seen when a fibre formed in the manner described by him, and of the same size as his, was examined under the microscope, nevertheless there are one or two points which strongly militate against the idea of their being really double spirals. In one beautiful preparation made by Professor Sharpey from the tadpole, the upper portion of one of the fibrillæ exhibited an apparent interlacement most distinctly, so much so, that I am sure no prejudiced eye even could have viewed this alone without coming to the conclusion that it was formed in the manner described by Dr. Barry. But upon viewing the fibre lower down, the interlacing appearance was replaced by that of a rope wherein the fibres all took one oblique direction, leaving spaces between them. When this lower part was carefully brought in and out of focus, at first the oblique portions of fibre above described were seen, but afterwards no alteration would bring into focus the posterior portions of the coil, which satisfactorily convinced me that they were really not spiral fibres. When we examine spirals, however minute, from vegetables under the microscope, we can first bring into focus the upper portion of the coils, and then by depressing the object-glass distinctly perceive the lower; but in the case of the specimen spoken of this could not be done. I cannot help believing that in this lower portion the fibre really has separated into discs, whose edges give the peculiar rope-like appearance; but I cannot explain the cause of the peculiar appearance of the upper portion. The fact of the fibres of muscles splitting into discs, is, I think, a proof that they cannot be spirals. To break up into discs, the fibrillæ must be weaker in one portion than another, and I have no doubt this weak part is opposite the dark line on the fibrils, where they are thinnest; but I do not believe the fibrils are beaded, I think they are merely transversely thinned opposite the dark portions, and that the beaded appearance is an optical illusion.

ance of transverse and elliptical pores and dots. The apparent pores or dots he believes to be no other than the spaces between the winds of spirals contained within a tube. This theory appears to me totally inadequate to anything like a true explanation of the phenomena. In all dotted vessels, (excluding the true dotted ducts of Mohl, not alluded to by Dr. Barry,) traces of spiral formation or spiral fibre in some forms may always be met with; these vessels usually uncoil spirally, and when torn across, the dots appear as spaces between the projecting teeth of the fibres. The fibres, according to my observations, never run longitudinally to the axis of the containing tube, but always spirally. Therefore, if such be the case, the two interlacing fibres composing the compound spiral must leave spaces whose axes are nearly parallel to the axis of the vessel, and therefore the dots ought to be nearly parallel to the same axis. But that such is not the case, I need not say. The views of Dr. Barry then are not consistent with experience, at least on the formation of dotted tissue. The tissue of which I speak is, I think, generally acknowledged as a modification of true vascular tissue. The dots or pits are formed by spaces left between the fibres but covered by the membrane, so that the wall of the tube opposite the dots is formed by membrane alone; this may always be found in the younger tissue, but in the older tubes the membrane disappears, leaving them porous. These tubes are very common in Endogenous plants, herbaceous Exogens, and Ferns; they are often mixed with spiral vessels and sometimes annular ducts. In some of the lower plants (*Equiseta*, &c.) where these are afterwards found, they appear preceded by annular ducts only, spiral vessels being comparatively rare; whilst in others, as Ferns, annular ducts are very rare, and the remains of the spiral fibre may always be found. In the higher plants we find them in all the stages of development. They are more abundant in the older than in the younger plants. The cause of the transformations from spiral vessels, and the regularity of arrangement of the dots of these tubes, depend entirely upon the pressure of the surrounding parts. Mohl has shown that this is the case with the true dotted ducts, and I am convinced that it is the case with the tubes now under consideration; but I believe that the arrangement of the dots of one tube opposite those of the next is not constant. When a spiral vessel has formed in a young plant, the rapid growth of the stem induces considerable pressure of the surrounding parts; the consequence is, that the convexity or parts of the surrounding vessels or cells opposite to the spiral vessel are pressed firmly against it, whilst opposite the intercellular and intervacular spaces the pressure is much

less; thus the fibre within the compressed spiral is bent into as many sides as there are surrounding and pressing vesicles or vessels. This is illustrated in fig. 14; accordingly, if the spiral fibre be examined at this period it will be found bent as above mentioned, and the natural curve of the fibre straightened. Opposite the intercellular or intervascular spaces, *i. e.* at the bendings of the fibres, the latter become firmly adherent to the membrane, thickened and united to the fibres above and below. These thickened portions form the line of space running between the rows of dots. The dots themselves are formed by the spaces left between the portions of the fibres opposite the convexity of the surrounding cells and vessels. Thus, when we examine the tubes at this stage, we find the membrane and fibre united so firmly that they are with great difficulty separated. The vegetable substance which fills up the intercellular spaces often also becomes firmly adherent to the membrane and fibre, so that when we dissect out these tubes from the surrounding parts we often find the remains of adherent portions which existed opposite the intercellular spaces; therefore the number and arrangement of the dots must depend entirely upon the surrounding vessels and cells. When the compressing and compressed tubes are equal in size, the dots extend nearly across the face or opposed side of the tube; and when several small tubes and vessels compress a spiral so as to convert it into a dotted tube, the dots will be small and numerous. The observation of Schleiden, that, "in consequence of the deposition of formative substance, the pore appears the rounder the more the cell is developed," is, I think, incorrect—I believe the reverse to be correct. The examination of the young and old stems of any plant containing these vessels will prove this. If the fibre be separated from the surrounding parts in the early stages, it will be found bent and thickened at the bendings; and oftentimes we can find portions of membrane &c. adhering as above mentioned. These vessels are generally observed in plants whose growth is rapid, so that in the older stems we cannot expect to find the arrangement persistent; but in a large number of plants it can readily be perceived, especially where the formation has not been completed. We can now readily account for the impression of a small tube sometimes observed as imprinted on a larger one; the black lines running between the dots and separating their rows is also readily explained. In making careful transverse and oblique sections of stems of the above-mentioned plants, we can readily perceive the appearances sketched in Pl. IV. fig. 5, where *a* represents the rows of dots corresponding to the projecting portion of the cell opposed to the forming tube. The bent appearance of the fibre within the

tube gives the prismatic or angular appearance to many of these tubes, so readily perceived when two vessels press against each other. In some few cases a large number of very small cells appear to act in compressing as a single large one. When I first noticed the transitions above described I imagined they were confined to the Ferns only, but I have since found them applicable to all the plants above enumerated. A very common cause of the beaded appearance on the margins of tubes viewed under the microscope is their longitudinal section, so that the projecting extremities of the cut fibres produce the peculiar appearance of beads.

I cannot refrain here from making a few observations on the remarks made by Dr. Willshire* relative to the function of some starch particles, or of starch particles existing in the laticiferous vessels. He says, "Dr. Barry has demonstrated the existence of primordial fibre or filament in bodies of animal organization, and we shall endeavour to draw an analogy between some of his views with phænomena known to exist in the vegetable kingdom." I think, that before any analogy be attempted to be drawn, the basis of that analogy ought to be established: this has certainly not been done in the present instance. The appearances observed by Dr. Barry in the blood, are, I think, totally misinterpreted; and I am happy to find Dr. Willshire comparing the fibre of the blood-disc to a dark line on a piece of starch, for I am convinced that it is not a fibre at all. I believe the appearance alluded to is in all cases produced after the vitality of the blood is destroyed, and is dependent on physical causes alone for its production. The blood-discs are sacs containing the colouring matter of the blood and a liquid, which is most probably the same as the liquor sanguinis. Dr. Barry says, "the filaments may be discerned without any addition whatever, *if the coagulation has begun*, provided its appearance be familiar," &c. I believe that the sac is generally cracked at the time of the production of the fibre, and the contents coagulated, either by the causes producing the ordinary coagulation of the blood, or by the imbibition of a portion of corrosive sublimate when that is used. Moreover, I am at a loss to understand how the "fibre" is primary or primordial. Dr. Barry says, "in the mature blood-corpuscle there is often to be seen a flat filament or band already *formed* within the corpuscle." "This filament is formed of the discs within the corpuscle." So that here we should have the discs performing the part of cytoblasts to the blood-corpuscle or cell, as in vegetables; and the fibre must be secondary, not primary.

I think we are bound to believe that the appearances ob-

* Annals of Nat. History, *loc. cit.*

servable in spiral vegetable fibres, mould, &c., simulating doubly interlacing spirals, are produced by the action of the corrosives employed, as these are not observable without their use; moreover, it is difficult to imagine that the walls of the cells of the lowest vegetable productions in the scale of organization should be formed of spiral fibres, and a complexity of arrangement which seems almost exclusively to belong to the higher plants; nor do I believe that nature in her constant simplicity would ever make use of so truly artificial an arrangement. A common appearance of double interlacement in muscular fibre results from the apposition of two fibres with oblique striæ, as in Mr. Bostock's preparations. As regards the existence of primary fibre in vegetables, I think no such productions exist. I am at a loss to conceive how the arrangement of particles about to form a fibre can be produced without their being enclosed within a sac filled with a fluid to allow of free motion of the particles. Were the spiral fibres cells, they might possess the power of growth by elongation, or formation of budding cells, &c. from the extremity of the old ones; but this is not the case, they are always solid. Moreover Mr. Quekett* has seen and described their mode of formation, and I am not aware of, neither do I believe in, the existence of any other mode than that described by him. The tissue of *Stelis*, brought by Meyen from Luçon, in which cells exist apparently formed of fibres only, ought to be referred to that variety described by Slack† where the membrane and fibre have been firmly consolidated. And the fibres on the testa of *Collomia* I am convinced are surrounded by a true cylindrical membrane with as defined an outline as that of any spiral vessel; the only difference between these fibres and their membrane, and those of ordinary spiral vessels is, that in the former the membrane is never in approximation with the fibre, but distended with mucus, and their termination is not in a point as in ordinary spiral vessels; but the fibre breaks up into distinct rings, and I believe they are mere modifications of the spiral vessels similar to those on the testa of *Ruellia* and *Acanthodium*, &c.

The regularity of the relation of the fibre to the sheath in *Collomia* is much too constant to be regarded as simply mucus. In vegetable cells approaching nearest to those described by Meyen where the fibre apparently forms the entire cell, careful examination will nearly always detect evidences of the existence of both fibre and membrane. I think the great cause of "primary vegetable fibre" being found, is the tissue being examined in much too advanced a state. I feel author-

* Transactions of Microscopical Society, vol. i. 1842.

† Transactions of Soc. of Arts, vol. xlix.

ized in drawing from the above considerations the following conclusions:—

1st. That the uniform dotted arrangement on the walls of the vasa spiroidea simply results from the pressure of the surrounding parts alone.

2nd. That the supposition of the starch particles being analogous in function to the blood-globules is unfounded; and that the black line seen upon the starch particles cannot, and does not, perform any such office as has been supposed.

3rd. That the imagined secondary formations from the blood-corpuscles are really misinterpreted appearances; not vital but physical*.

9 St. John's Square, Dec. 1842.

EXPLANATION OF PLATE IV.

- Fig. 1. Vessel from *Typha latifolia*, showing the dots extending nearly across the face of the tube from the pressure of one large similar tube or cell.
- Fig. 2. Origin of beaded appearance, *i. e.* the fibres cut across and projecting. (*T. latifolia*.)
- Fig. 3. Same as 1 and 2. On the tube *b* two smaller tubes have pressed, whilst opposite *a* only one has existed. (*T. latifolia*.)
- Fig. 4. Tube from *Arundo Phragmites*, showing the results of the pressure of two of different sizes on one tube.
- Fig. 5. From *Aspidium Filix mas*, a transverse section showing the dots opposite the convexity of the projecting cells.
- Fig. 6. Projecting teeth, leaving spaces between them corresponding to the dot. (*T. latifolia*.)
- Fig. 7. Section of tube of the same, showing the dot to be formed of membrane only.
- Fig. 8. Ring of an annular duct of *Arundo Phragmites*, which has been pressed upon by three surrounding cells or vessels, thickened at the bendings.
- Fig. 9. Tube from *Pteris Aquilina*, showing the impression of one tube upon another, and the dots on that portion corresponding to its breadth.
- Fig. 10. From *Typha*, showing adhering portions of surrounding cells or vessels.
- Fig. 11. Section of stem of *Typha*: cells similar to those at *a*, pressing upon and producing large dots; those similar in size to *b*, *b* produce smaller ones, as at *c*. The interruptions to the regular arrangement, as at *e*, are caused by the abrupt terminations of the surrounding tubes, leaving spaces.
- Fig. 12. Tube from *Typha*, showing the loose fibres bent and thickened at the joints.
- Fig. 13. Diagram showing the spiral fibre pressed upon by surrounding vessels or cells, first stage.
- Fig. 14. Second stage. *a, a, a, a*, bendings of fibres corresponding to intercellular or intervascular spaces; *b*, pressing cells.
- Fig. 15. Muscular fibre, showing what might be interpreted into an appearance of interlacing fibres when not quite in focus. (Bostock, Barry in Trans. of Royal Soc.)

* I believe the tissues to be all reproduced by the transudation of the liquor sanguinis through the walls of the capillaries; and that no blood-globules can ever leave the capillaries unless their walls be ruptured, which must always be the case in hæmorrhage by "simple exudation."

- Fig. 16. Interlacing double spirals, leaving spaces which afterwards become dots. (After Barry.)
- Fig. 17. Same in a more advanced stage. (Id. loc. cit.)
- Fig. 18. Dotted duct thus perfected. (Barry, loc. cit.)
- Fig. 19. Fibres from *T. latifolia* bent and thickened, in an advanced stage.
- Fig. 20. Dotted vessel from *Arundo Donax*, the black lines formed by adherent portions of vegetable matter which filled up the spaces separating the surrounding cells and vessels.
- Fig. 21. Dotted duct from *Sambucus nigra*.
- Fig. 22. Transverse section of dotted tube in *Aspidium Filix mas*, showing the rows of dots corresponding to projecting portions of surrounding cells.

XVII.—*The Crustacea of Ireland.* By WM. THOMPSON, Esq.,
Vice-Pres. Nat. Hist. Society of Belfast.

[Continued from vol. x. p. 287.]

Order DECAPODA.

2nd Section. DECAPODA ANOMOURA.

Lithodes Maia, Leach, Mal. pl. 34.

L. arctica, Edw. Crust. t. ii. p. 186; *Desm. Consid. Crust.* p. 160.
pl. 25.

Horrid Crab, *Penn. Brit. Zool.* vol. iv. p. 6. pl. 8. f. 14, edition 1812.

Templeton says of this species—"Found on the coast of the county Wexford: a specimen thence is in Trinity College Museum [Dublin]. It is called by the people *craban*."

I have not seen any Irish example of this crab, but am indebted to Dr. Wylie of Ballantrae, Ayrshire, for a very fine specimen which was taken in a herring-net there in the summer of 1838, in water from twenty to thirty fathoms in depth. It was brought to Dr. Wylie by the fishermen as a species which they had never before met with.

Pagurus Bernhardus, Edw. Crust. t. ii. p. 215; *Penn.* vol. iv. p. 30.
pl. 18; *Desm.* p. 178. pl. 30. f. 2.

P. streblonyx, *Leach, Mal.* pl. 26. f. 1—4.

Hermit-crabs of this species are very common in univalve shells around the coast of Ireland. Leach mentions their "first occupying the shells of the common periwinkle or trochus" (*Art. Crustaceology* in *Edin. Encyclop.*); but some examples in my collection are much smaller than those contained in the species just named. They are in the *Littorina retusa*, *Turritella terebra*, and *Nasa macula*—univalves from this size up to that of the largest *Buccina* are commonly inhabited by the *P. Bernhardus*: a specimen of this crab from the coast of Down, in my collection, is $6\frac{1}{2}$ inches in length. Samouelle speaks of the shell occupied by the *Pagurus* being "destined to preserve the body from injury, and to guard them from the attacks of fishes, which would otherwise devour them." *Entom. Compend.* p. 92. In this latter respect the shells are of little service, as I have remarked *Paguri* very commonly in the stomachs of various species of fishes, but especially in the omnivorous and voracious cod: all the moderate-sized and large hermit-crabs which have thus occurred to me

must have been dragged from their shells, which, in no instance that I recollect, were found in the stomach of the fish along with them.

One of these crabs inhabiting a *Buccinum undatum* was brought up alive in the dredge from a depth of fifty fathoms off the Mull of Galloway. See 'Annals,' vol. x. p. 21.

Pagurus Prideaux, Leach, Mal. pl. 26. f. 5 and 6.

P. Prideauxii, Edw. Crust. t. ii. p. 216.

Has been taken by Mr. Hyndman and myself when dredging in Strangford and Belfast loughs, and in the open sea off Dundrum, county Down, and in every instance occupying the shell invested by the *Adamsia maculata* (*Actinia maculata*, Adams). Leach states that "Mr. Prideaux has observed it in a vast variety of habitations, even in the tubes of the *Dentalia* and in the shell of *Scaphander lignarius* [*Bulla lignaria*]." To me this appears singular, for among the very numerous specimens of *Paguri* in my collection from all quarters of the Irish coast, and found inhabiting shells of various species, not a *P. Prideauxii* occurs, except in connection with the *Actinia* already named. This is a remarkable fact. The connection of the two species is surely more than accidental. It may be further stated, that in the localities whence *P. Prideauxii* was obtained, *P. Bernhardus* is very common; and in the loughs mentioned, a few individuals of two or three other species of *Paguri* have been procured.

"*Pagurus erinaceus*."

In the collection of Mr. J. V. Thompson is an Irish specimen of a *Pagurus* considered as undescribed, and so named by him.

Porcellana platycheles, Edw. Crust. t. ii. p. 255; Desm. p. 195. pl. 34. f. 1.

Great-clawed crab, *Penn. Brit. Zool.* vol. iv. p. 9. pl. 6. f. 2.

This littoral crab seems to be a local species, but plentiful where it does occur; Templeton notices it as found on the "Whitehouse shore by Mr. James Grimshaw, Jun." On the beach near Carrickfergus, a few miles distant from that locality, it was procured in abundance in June 1835, by the late Mrs. Patterson of Belfast, who subsequently obtained it near Cultra, on the county Down shore of the bay. Mr. R. Ball states that this species is very abundant on the shores of the county Dublin, and especially at Portmarnock: he remarks that in once turning over a large stone here in cold wintry weather, the under side was entirely covered with these crabs, "packed as close to each other as tiles on a roof!" In June 1838, I found the *P. platycheles* in numbers beneath large stones at the island of Lambay, off the Dublin coast—on the 1st of this month, the females abounded in ova. At Lahinch, county Clare, this species occurred to Mr. E. Forbes and myself in July 1840, between tide-marks, and beneath the same stones *P. longicornis* was met with alive.

Porcellana longicornis, Edw. Crust. t. ii. p. 257.

Long-horned crab, *Penn. Brit. Zool.* vol. iv. p. 5, pl. 1. f. 3.

This species chiefly inhabits deep water on our coasts, but in some localities lives on shores exposed at the ebb of every tide. It has been dredged up in abundance in the loughs of Strangford and Belfast, and in the open sea off the north-east coast of Ireland in

1834, and subsequently by Mr. Hyndman and myself. It is generally found in connection with large shell-fish brought up from deep water, such as oysters, horse-mussels (*Modiolus vulgaris*) or clams (*Pecten maximus*), and shelters itself under any extraneous matter or natural roughness (as between the testaceous layers of an old oyster) sufficient for the purpose. Mr. R. Ball's collection contains specimens from Youghal* and Dublin Bay:—on the shore of the island of Lambay I have taken it alive, as well as at Lahinch on the west-coast.

Specimens of this crab have been sent me from the coast of Wigtownshire, Scotland, by Captain Fayrer, R.N.

Order DECAPODA.

3rd Section. DECAPODA MACROURA.

Galathea strigosa, Edw. Crust. t. ii. p. 273; Desm. p. 189. pl. 33. f. 1. *G. spinigera*, Leach, Mal. pl. 28 B.

Plaited lobster, *Penn. Brit. Zool.* vol. iv. p. 24. pl. 15.

Would appear to be distributed around the coast, but everywhere in very limited numbers. Templeton notes it as found at "Bangor, co. Down, November 1819, and in the stomach of a cod-fish." It is enumerated in Mr. J. V. Thompson's catalogue, his specimen being probably from Cork. Two were captured by Mr. Hyndman and myself, when dredging in Strangford lough in October 1834; and others have subsequently been added to my cabinet from the rocky coast of Antrim, as from Island Magee; Glenarm; the vicinity of the Giant's Causeway; one or two only from each place: at the last-named, a couple of individuals, which were brought to me alive in the month of June, were captured under stones at low water. The species may probably resort to the shallows to deposit their ova, which in these examples were ready for exclusion. The Ordnance collection contains the *G. strigosa* from Belfast bay. Mr. R. Ball has a specimen from Dublin bay:—its length of body is $4\frac{3}{8}$ inches; arm from basal insertion to end of claw $4\frac{6}{8}$ inches.

In March 1835, a *G. strigosa* from Portpatrick was kindly sent to me by Captain Fayrer, R.N.; and on the beach at Newhaven, near Edinburgh, I once picked up a very large one, which had probably been thrown out of some of the fishing-boats. At Ventnor, in the Isle of Wight, one which had been captured in a crab-pot was brought to me; it was $5\frac{1}{2}$ inches in length from the points of the claws to the extremity of the tail-plates.

Both the young and adult specimens in my cabinet are highly attractive, from still retaining their fine red and bright blue markings.

Galathea rugosa, Leach, Mal. pl. 29; Edw. Crust. t. ii. p. 274.

Astacus Bamiffius, Long-clawed lobster, *Penn. Brit. Zool.* vol. iv. p. 23. pl. 24.

Is noticed as Irish by Mr. J. V. Thompson. The specimens which I have seen were mostly found in the stomach of the cod-fish. Dr.

* Mr. J. V. Thompson mentions a "species of *Porcellana*" being in "abundance in the deep water of the harbour of Cove." Ent. Mag. vol. iii. p. 275. The Irish species contained in his collection (Royal College of Surgeons, Dublin) is the *P. longicornis*—it is named *P. Linneana*.

J. L. Drummond thus obtained two of them from fish brought to Belfast market. In a cod taken near Carrickfergus, I once found a fine male *G. rugosa*; its length of body from base of eyes to extremity of tail-plates, 3 inches; its arm from base to point of claw, $5\frac{1}{2}$ inches. Another individual was found in the mouth of a haddock captured at Killough, county Down. Mr. R. Ball in one instance procured three specimens from the stomach of a cod taken at Youghal. Dr. Leach remarks "that the *G. rugosa* appears to be a very rare species in Britain," and so may it likewise be considered on the Irish coast. It is probably one of those species not to be found in numbers anywhere.

A *G. rugosa* has been kindly sent to me from Portpatrick by Captain Fayrer, R.N. Several small individuals were dredged alive in water from 110 to 140 fathoms in depth off the Mull of Galloway. See 'Annals,' vol. x. p. 23. None of them exceeded $1\frac{1}{2}$ inch in length of body.

Among the genera of Crustacea which possess a luminous property when living, *Galathea* is included, and the species particularized is the *G. amplexens*, Fabricius (McCulloch's West. Isles, Scotland, vol. ii. p. 192), observed by Sir Joseph Banks on the coast of Brazil. It is perhaps not worth remarking, that in a dead specimen of *G. rugosa* I observed the same property. On the evening of the second day after it had been kept in a warm room, the entire soft portion of its under surface was highly luminous.

Galathea squamifera, Leach, Mal. pl. 28 A; Edw. Crust. t. ii. p. 275.

Is marked Irish in Mr. J. V. Thompson's catalogue. It is our most common species of *Galathea*, and is found on all sides of the island. It is not uncommonly dredged up by us in the loughs of Strangford and Belfast, the specimens being generally of a small size. In the Ordnance collection are examples from Portrush, near the Giant's Causeway. At Lahinch, county Clare, two of the *G. squamifera* were procured by us under stones between tide-marks. Specimens from Youghal and the western coast are in Mr. R. Ball's collection.

Captain Fayrer, R.N., has favoured me with this species from Portpatrick.

Galathea nexa, Embleton, Proceedings Berwickshire Club, p. 71. pl. 1.

"I have found it in the stomachs of cod-fish brought from the coasts of Down and Antrim to Belfast market; and in Dr. Drummond's collection are specimens which were similarly procured. A comparison of one of these with an original specimen in Dr. Johnston's possession, proved (what from its agreement with the description and figure I had previously little doubt of) the identity of the species."—W. T. in 'Annals,' vol. v. p. 255.

Palinurus vulgaris, Leach, Mal. pl. 30; Edw. Crust. t. ii. p. 292; Desm. p. 184. pl. 32.

Astacus homarus, Penn. Brit. Zool. vol. iv. p. 22. pl. 12.

The spiny lobster is found sparingly on the north, but commonly on the south coast. Smith in his 'History of Kerry' remarks that one side of Dingle bay "is noted for having very large cray-fish;" and

in his 'History of Cork' states that "we have of them in great plenty from one to six or eight pounds weight on the south coast of Ireland." Ruddy, in his 'Natural History of the County of Dublin,' says of the *Palinurus*, "this, though common on their tables at Cork, and a more delicate food than the lobster, is rare in Dublin, though sometimes brought to our market from Munster, and sometimes from England." Mr. R. Ball informs me that it is still occasionally brought to Dublin, and that it is at the present time rather commonly taken at Youghal along with lobsters, and of the size noticed by Leach—from 18 to 20 inches in length of body. It is considered coarse food at the last-named place. A specimen obtained many years ago at Magilligan, county Londonderry, is in Mr. Hyndman's collection: one or two have subsequently been procured there by the Ordnance Survey, as well as on the coast of Donegal. A specimen captured in a crab-pot at Carrickfergus is preserved in the Belfast museum.

Callianassa subterranea, Leach, Mal. pl. 32; Edw. Crust. t. ii. p. 309; Desm. p. 205. pl. 36. f. 2.

Cancer *Astacus subterraneus*, Mont. Linn. Trans. vol. ix. p. 88. pl. 3. f. 1 & 2.

"March 25, 1839.—On examining the contents of the stomach of several individuals of the *Platessa Pola*, which were taken early this morning off Newcastle (county Down), two of the larger arms of this species, so peculiar in form and still retaining their beautiful pink colour, were detected*."—W. T. in 'Annals,' vol. v. p. 256.

Astacus fluviatilis, Edw. Crust. t. ii. p. 330.

Craw-fish, Penn. Brit. Zool. vol. iv. p. 24. pl. 16. f. 1.

Inhabits the rivers in many parts of Ireland, but is generally stated to have been introduced to its recorded haunts from other quarters. Thus, Ruddy in his 'Natural History of Dublin' remarks, "It has been sometimes found in this county, chiefly in gentlemen's ponds, and lately in the river near Finglass; but said to have been brought thither from Munster." In an essay on the parish of Templepatrick, written in 1824, it was stated, that "the lady of the late Arthur Upton introduced a stranger into our river called craw-fish. It was put into the brook at Templepatrick; it descended the Six-mile water, where it found a situation perfectly suited to its nature, deep water and banks of loam, which they excavate as lodgings for themselves and their young; they have increased to a very great multitude." This locality is about ten miles distant from Belfast. The date of the introduction of the cray-fish unfortunately is not given, nor are we informed whence they were brought. About thirty years before the essay was written, as I am informed by a venerable friend, cray-fish were plentiful some miles farther up the river than

* A species named "*Thalassina Montagu*" appears as Irish in Mr. J. V. Thompson's catalogue. It may be presumed to have been considered by that gentleman a new species, although "n.d." is not prefixed to it as in other cases of non-descriptors. Only one species of this genus,—the *T. scorpioides*, a native of Chili,—is noticed in M. Edwards's Hist. des Crustacés (t. ii. p. 316).

where they are said to have been introduced. They were obtained in drains connected with the river near Doagh, and were not sought for as a marketable commodity, but served up at the table of the Antrim Hunt, to gratify the special palate of one of the knightly members of that body. About Florence Court, county Fermanagh, the cray-fish is abundant, but to this locality also, Lord Enniskillen tells me that the species is said to have been introduced many years ago from Queens-county:—of the correctness of this, as in former cases, there is no proof. About two years ago, however, I had ‘ocular demonstration’ of the introduction of the cray-fish into a pond at Lismoyne, the seat of a relative near Belfast. Early in September 1840, supplies taken in a small river in the county of Kildare were from time to time forwarded by the coach from Dublin to Belfast, and arrived in tolerable condition on the second day after capture; sometimes all were alive and apparently in good health; at others, perhaps one-fourth would be sickly or dead. At this period none contained ova, but a supply sent forward in the middle of November had them well-developed. It may be worth mentioning that these cray-fish were captured by a man wading up to his middle in the river, and thrusting his hands into their burrows in the banks—the water must be low at the time to render the holes visible. When caught they are generally put in a bag containing a little hay, and by being kept cool will live a few days out of the water. They are likewise taken in numbers by baiting with chickens’ entrails a common creel or basket, which is let down by a rope to the bottom of the river in the evening, and next morning is pulled up so quickly, that the contained cray-fish having no time for escape are all captured.

Templeton says of the *Ast. fluviatilis* that it “inhabits several of our lakes and rivers; near Antrim, in the Six-mile water; in great abundance in a lake near Tullahan, county Monaghan.” About Bal-liband and Glaslough in this county it is now said to be met with. About Kill lake, lough Sheehan, &c. in the neighbouring county of Cavan it is found*. Mr. R. Ball states that the cray-fish is taken in the Royal Canal, about twelve miles from Dublin.

Mr. Patrick Doran, a well-known and intelligent collector of objects of natural history, gives me the following account of cray-fish as observed by him in Killymoon river, near Cookstown, county Tyrone, when the water was very low. They ascend from the

* In Mr. Hyndman’s cabinet there is a specimen of a cray-fish considerably smaller and more delicately proportioned than the *A. fluviatilis*, and apparently a different species. It is believed by him to be Irish, but of this he is not certain. A very intelligent lady who saw the specimens above alluded to from Kildare—and which were the ordinary *A. fluviatilis*—remarked on their being much larger than those she had been accustomed to see in county Cavan. On Mr. Hyndman’s *Astacus* being shown, it was stated that of the quantities which she had seen served up at table, none were ever larger. They were taken in one of the tributaries to lough Sheehan, about $1\frac{1}{2}$ mile above the lake, and eight miles from the town of Cavan. I have as yet been unable to obtain cray-fish from this locality. Silence would perhaps have been more judicious, than the introduction of matter of this kind without any positive evidence.

deeper to the shallow parts to spawn. It is the office of the males to cater for the young. He has seen them catch minute fish and *Gammari*, bring them to the female and young, and break the fish up in pieces for the latter, so as to muddy the water in the process. On being disturbed, both sexes gather the young under their tails "as a hen gathereth her chickens under her wings," but a singular difference prevails between the sexes with regard to their manner of protecting their progeny. The male on being lifted out of the water retains the young under his tail; but the female on being captured, wiser than her lord, slaps them from her into their native element with great force, thus producing an effect which is likened by my informant to "a shower of rain upon the surface." He has repeatedly witnessed this different procedure of the two sexes.

Mr. R. Ball supplies me with the following note:—"Some years ago I kept a cray-fish for a considerable time in a shallow glass vessel, about 20 inches in diameter, and containing about two inches depth of water. This animal gradually acquired great viciousness, and would eagerly attack the fingers of any one who chose to put them within his range, pursuing the intruding digits round the boundaries of his demesne. After he had been thus a year in my possession, I was one day surprised to see a second cray-fish in the vessel, but on taking the intruder in my hand (believing it to have been placed in the vessel by a waggish relative) it proved to be the exuvia of my old friend so perfect as to present his exact counterpart. Instead of his usual boldness, he now exhibited the most remarkable timidity, which continued for three or four days. He was at first quite soft and appeared considerably larger than usual, but gradually grew firmer, and on the fifth day felt to the touch as hard as usual, and advanced with open pincers to the attack of my finger, though evidently not without some little doubtfulness of his powers. Before the end of the week he was himself again, came on more boldly than ever and with greater effect, as his weapons were much sharper. He lived nearly two years with me, and during the whole time received no food excepting one or two worms. The water was never changed, but some was occasionally added merely to supply the loss by evaporation. I had found by previous experiments that cray-fish placed in pans with much water died, while those which were merely covered, or in such a manner that they could raise a portion of their bodies above the surface, lived as long as they were taken care of."

Homarus vulgaris, Edw. Crust. t. ii. p. 334.

Astacus marinus, Desm. p. 211. pl. 41. f. 1.

A. gammarus, Penn. Brit. Zool. vol. iv. p. 14. pl. 11.

Lobsters are in plenty around the rocky shores of Ireland. From the iron-bound north-eastern coast, great quantities of them are now sent by the regularly plying steamers to Glasgow. About Dublin, Mr. R. Ball informs me that the flounder (*Platessa flesus*) is used as bait for the lobster; and at Youghal, that the best plaice (*Platessa vulgaris*), which would bring a good price at market, are cut up for the same purpose.

The lightest looking and most tasteful lobster-pot that I have seen

is that used at the South Islands of Arran (off Galway bay). It is of the form and about the size of a tenor-drum. The frame-work consists simply of a small hoop at each end fastened to three almost equally light but tough pieces of wood, so as to present the drum form; over all a net is stretched, having an opening in the centre of each end. The bait used is fish.

Nephrops Norvegicus, Leach, Mal. pl. 36; Edw. Crust. t. ii. p. 336; Desm. p. 213. pl. 37. f. 1.

Norway Lobster, *Penn. Brit. Zool.* p. 23. pl. 13. f. 1.

Templeton says of this—"a rare species, but sometimes found in Belfast lough." I have heard of its being taken near Portaferry about the entrance to Strangford lough, and that it has been procured in numbers off Dundrum on the Down coast, but specimens have not come under my observation from any of these localities. It is brought in great quantities to Dublin as an article of food, and is chiefly used by the poorer people. Mr. R. Ball informs me that the species is very numerous in Dublin bay, near the Pigeon House, and that hence the town is supplied: he has taken the *Nephrops* along with echini and star-fish from the stomachs of cod bought in Dublin.

Specimens have been obligingly sent to me from the island of Holyhead (Wales) by Captain Fayerer, R.N.

Crangon vulgaris, Leach, Mal. pl. 37 B; Edw. Crust. t. ii. p. 341; Desm. p. 218. pl. 38. f. 1.

Astacus crangon, *Penn. Brit. Zool.* p. 26. pl. 16. f. 2.

The shrimp, being an article of food, is noticed in several of our old county histories. It is common on the sandy shores and adjacent saline marshes from north to south of Ireland. The western shore of Belfast bay was many years ago of a hard sandy nature, so as to admit of being ridden over by persons on horseback. At that period, as I am informed, shrimps abounded there, and were regularly sought for as objects of sale. At present this same part of the shore is soft and oozy, and the shrimps so very limited in number and small in size that they are never looked after. Although this species chiefly frequents sandy shores, I have occasionally seen it brought up in the dredge from deep water and at a considerable distance from land, in the loughs of Strangford and Belfast. Mr. R. Ball mentions that shrimps, though taken in large quantities at Youghal, are held in little esteem, but that the prawn (*Palemon serratus*), caught abundantly at spring-tides, is much thought of—this latter is called "shrimp" there; the former the "gray shrimp:" this term is also used in Smith's 'History of the County of Cork,' written nearly a century since.

"*Pontophilus spinosus*," Leach, Mal. pl. 37.

Crangon cataphractus, *Edw. Crust.* t. ii. p. 343.

In Mr. J. V. Thompson's collection there is a specimen bearing the former name, and marked as Irish. It is much to be regretted that the notice of the Irish Crustacea in this collection (now in the College of Surgeons, Dublin,) is limited to a single letter, the initial

"I" simply indicating them, as "F" does the foreign species. The native specimens were, I believe, chiefly derived from the harbour of Cove, whence those were brought upon which that naturalist founded his highly important and celebrated 'Researches into the Metamorphoses of the Crustacea.'

"*Processa (vel Nika) canaliculata.*"

Irish examples of this species are in Mr. J. V. Thompson's collection.

Athanas nitescens, Leach, Mal. pl. 44; Edw. Crust. t. ii. p. 366.

A single specimen was found under a stone between tide-marks at Lahinch, county Clare, by Mr. E. Forbes and myself in July 1840, as noticed in the seventh volume of this Journal.

Hippolyta varians, Leach, Mal. pl. 38. f. 6-16; Edw. Crust. t. ii. p. 371.

Is an inhabitant of deep water around the coast. Mr. J. V. Thompson's collection contains Irish specimens. This species has been dredged in Belfast and Strangford loughs by Mr. Hyndman and myself, and was similarly procured by our party in July 1840, in Clew and Roundstone bays on the western coast. In Dalkey Sound, Dublin bay, an *H. varians*? was taken by us in the dredge.

"*Hippolyte Cranchii*"

Is marked in Mr. J. V. Thompson's collection as Irish.

Pandalus annulicornis, Leach, Mal. pl. 40; Edw. Crust. t. ii. p. 384; Desm. p. 220. pl. 38. f. 2.

Is in Mr. J. V. Thompson's collection. The species has been taken commonly by Mr. Hyndman and myself in the rock-pools accessible at low-water throughout the Down coast, and has been dredged by us in deep water on the north-east coast, and in Killery bay, Connemara. Mr. R. Ball has specimens from the shores about Dublin.

Palæmon serratus, Leach, Mal. pl. 43. f. 1; Edw. Crust. t. ii. p. 389; Desm. p. 234. pl. 40. f. 1.

Astacus serratus, Penn. Brit. Zool. vol. iv. p. 25. pl. 17. f. 1.

The prawn, an article of human consumption, is noticed in some of our old county histories, as Harris's 'Down,' Smith's 'Cork and Waterford,' Rutt's 'Dublin.' The last author says, apparently* with reference to this species, that "it was formerly frequent on our coast, but the frost in 1740 destroyed many of them"! vol. i. p. 379. Templeton speaks of it as "once common in Belfast lough; now rare." Some years ago I obtained from this locality a very large specimen, which was taken in a lobster-pot at the entrance of the bay. Here the species has more lately been obtained by the collectors attached to the Ordnance Survey, who likewise procured it at Portrush near the Giant's Causeway. Mr. R. Ball states that at Youghal,

* He refers to Rondeletius for the species meant, a work which I have not at present to consult.

prawns are taken only during the first quarter of flood-tide, and then plentifully : at the South Islands of Arran he captured numbers of them in the summer of 1835, and out of about fifty, found three with *Bopyri* attached.—See 'Annals,' vol. v. p. 256.

Palæmon squilla, Leach, Mal. pl. 43. f. 11–13; Edw. Crust. t. ii. p. 390.

Templeton notices this species as "common on the shore of Belfast lough." It is of frequent occurrence in rock-pools throughout the range of the Down coast, and is likewise occasionally taken in deep water with the dredge.

I have met with it commonly in rock-pools about Ballantrae, Ayrshire.

Palæmon varians, Leach, Mal. pl. 43. f. 14–16; Edw. Crust. t. ii. p. 391.

A few examples have been procured in Belfast and Strangford loughs by Dr. Drummond and myself. Leach remarks that the *Astacus squilla* of Pennant may be his *P. varians*.

"*Palæmon Leachii*"

Is the name attached by Mr. J. V. Thompson to an Irish specimen in his collection.

Pasiphaë Sivado, Risso, Hist. Nat. l'Eur. Mérid. t. v. p. 81, ed. 1826; Edw. Crust. t. ii. p. 426.

"In the British Museum there is a specimen so named, and labelled 'Ireland.' From the donor, the Rev. James Bulwer, I learned that it was taken by him in the vicinity of Dublin."—W. T. in 'Annals,' vol. v. p. 256.

[To be continued.]

XVIII.—Remarks on three species of *Marine Zoophytes*.

By ARTHUR HILL HASSALL, Esq.

Antennularia arborescens. Polypidom arborescent, arising from a tangled mass of tubular root-like filaments by a single trunk, which subsequently divides and subdivides into numerous branches; branchlets verticillate, long; cells tubular, not separated from each other by one or more small cup-like processes, as are those of *Antennularia antennina*.

In the 'Annals and Magazine of Natural History,' vol. vi. p. 168, pl. 5, I have described and figured an *Antennularia* which I conceived to be distinct from the common *A. antennina*, and which I then conjectured to be identical with the *Antennularia ramosa* of Lamarck.

The opinion originally entertained of its specific distinctness has recently been confirmed by some observations of Mr. J. Macgillivray, recorded in the ninth vol. of the 'Annals,' by whom many specimens have been found at Aberdeen, agreeing in all respects with my description; but I have since seen reason to discard the notion of its identity with Lamarck's *Antennularia ramosa*, whose description of

that species, which is probably nothing more than the common branched condition, not worthy of being considered as a variety, of *Antennularia antennina*, contains no reference to the two chief specific characters of my species, viz. the circumstance of the polypidom arising by a single trunk, and the absence of the small tubular processes placed between the proper polype-bearing cells present in *A. antennina*. I propose, therefore, to designate my species *Antennularia arborescens*, a term which expresses one of its peculiarities.

Alcyonidium glomeratum. Polypidom massive, of no very defined outline; colour a deep uniform red, the shade of which approaches to vermilion.

I have lately been informed by Dr. Johnston that the *Alcyonidium rubrum* of Müller is very different from the deep red *Alcyonidium* referred to by me in the seventh vol. of the 'Annals of Natural History,' and which I supposed to be identical with that zoophyte. Although not the *Alcyonidium rubrum* of Müller, I still regard it as specifically distinct, notwithstanding the observations of Mr. Macgillivray to the contrary; or at all events, if it does not claim to be regarded as a distinct species, it can only be looked upon as a *permanent variety*, which is the next thing to a distinct species.

Mr. Macgillivray appears inclined to consider it as a mere accidental variety, and observes that I appear "to regard it as distinct, apparently on the sole ground of not having been able to detect any gradations of colour between it and the common kind, as might be expected were it a mere variety;" and says further, "that to be consistent, I ought to separate as so many distinct species those *Sertulariæ* which are occasionally found of a bright pink colour, and make two species out of *Laomedea geniculata*, of which Dr. Johnston has often observed coloured and colourless specimens growing upon the same stone."

The cases do not appear to me, however, to be at all analogous: the polypidoms of the Hydroid zoophytes are corneous and extravascular, while those of the *Alcyonidia* are coriaceous, fleshy, and continuous with the polypi themselves; the colour in *Alcyonidium glomeratum* is, therefore, probably a secretion from glands placed in it, which cannot be the case with the *Sertulariæ*. Moreover the colouring matter is uniformly diffused over the surface of the polypidom of *A. glomeratum*; while in the Hydroid zoophytes it usually extends only over a portion of the polypidoms, parts of them retaining their normal appearance.

Believing that in doubtful cases the truth is more likely to be elicited by separating species than by uniting them, I have ventured to assign a distinct specific name to what some would be disposed perhaps to regard as a mere variety; an opinion, however, in which at present I by no means concur.

Farcimia spathulosa. Internodes three or four times as large as those of *Farcimia salicornia*; cells spathulate, that is to say, rounded above and excavated below, for the reception of the head of the cell beneath; apertures semilunar, situated in the upper third of each cell.

As Mr. Macgillivray's observations on some specimens of *Farcimia* which occurred to him at Aberdeen would appear to throw some doubts upon the genuineness of this species, I have been induced to re-examine carefully my specimens of *Farcimia*, and the result has been, that in no case have I found other than rhomboidal cells on those of *Farcimia salicornia*, or spathulate, or modified spathulate, on those of *F. sinuosa*, or as I have now named it, *F. spathulosa*, a term which expresses a more positive character of the species than the other. The modified spathulate cells do indeed approach somewhat to a rhombic form, but are not perfectly so, and these I have only noticed in three or four of the basal, imperfectly developed internodes of a single specimen. My opinion, therefore, of the validity of this species remains unshaken; indeed, the great difference in the size of the internodes affords a character sufficiently distinctive, when there are no other differences between the species.

XIX.—*On certain species of Siberian Birds described by Latham, but which have hitherto been insufficiently determined.* By Prof. J. F. BRANDT of St. Petersburg. (Communicated by H. E. Strickland, Esq., M.A.)

[BEING very desirous that some light should, if possible, be thrown on the numerous nominal species of Siberian birds recorded in the works of Latham, I prepared a list of all the so-called species from Asiatic Russia, which appeared to be unknown to the modern ornithologists of Britain. This list I forwarded to Professor Brandt of St. Petersburg, the learned author of 'Descriptiones et Icones Animalium Rossicorum,' and of numerous other zoological memoirs, who has obligingly transmitted to me the letter which is here translated.—H. E. STRICKLAND.]

SIR,

You have had the goodness to send me a list of those species of birds in the 'Index Ornithologicus' of Latham which appear obscure to modern ornithologists. Accept my sincere thanks, together with a short notice of some of these species which I have been enabled to decypher, or which have been already correctly placed by other naturalists.

I have the honour, &c.

J. F. BRANDT.

St. Petersburg, Sept. 7, 1842.

RAPACES.

1. *Falco leucoryphos*, Lath. Ind. Orn. p. 17; Gm. Syst. vol. i. p. 259; Pallas, Itin. vol. i. p. 454; *Aquila leucorypha*, Pall. Zoogr. Rosso-Asiatica, vol. i. p. 352. = *Haliaëtos leucorypha*. It was in 1836 that I communicated to the Zoological Section of the German naturalists assembled at Jena a notice on the place which this bird

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ought to occupy. Messrs. Keyserling and Blasius, in their excellent work, 'Die Wirbelthiere Europas,' p. xxx. No. 31, are of the same opinion. The *Haliaeetus unicolor* of Mr. J. E. Gray (Illustrations of Indian Zoology) appears to be the same species.

PASSERINÆ.

1. *Corvus dauricus*, Pall. Itin. Append. p. 694. = *Corvus (Monedula) daurica*. The *Corvus dauricus* is a species very nearly allied to the common jackdaw, and hence some naturalists, Gloger for instance (Das Abändern der Vögel, Breslau, 1833, 8vo. p. 144), have taken it for a climatic variety of *Corvus monedula*. On the distinctions of this species see Keyserling and Blasius, l. c. p. xlv, and Wagler, 'Syst. Avium,' Corvus.

2. *Merops persicus*, Pall. = *Merops ægyptius*, Savigny. *Le Guepier Savigny male*, Levaill. Prom. et Guep. pl. 6.

3. *Emberiza rutila*, Pall. Itin. vol. iii. App. p. 698. No. 23; Pallas, Zoogr. vol. ii. p. 53. No. 217. This is a true bunting, which is very clearly distinguished from the species which I have called *Emberiza bruniceps* (Bulletin de l'Acad. Imp. de Petersb.).

4. *Alauda mongolica*, Pall. Itin. App. p. 697. No. 19. = *Alauda (Calandra) mongolica*. This is a very distinct species belonging to the subgenus *Calandra* or *Melanocorypha*, Boié, together with *Alauda tatarica*, *A. leucoptera*, Pall. and *A. bimaculata*, Menetries (Catal. des objets de zoologie du Caucase).

5. *Hirundo daurica*, Linn. Mant.; Lath. Ind. Orn. p. 576; *Hirundo alpestris*, Pall. Itin. vol. ii. p. 709; Zoogr. Rosso-Asiat. vol. i. p. 534. pl. 30. A very distinct species from Eastern Siberia, of which M. Kittlitz has brought a specimen from Manilla*.

GRALLÆ.

1. *Charadrius gregarius*, Pall. Itin. vol. i. App. p. 206; Lath. Ind. Orn. p. 745; *Tringa fasciata*, Gm. Itin. vol. ii. p. 194. pl. 26; *Tringa keptuschka*, Lepechin, It. vol. ii. p. 229. = *Vanellus gregarius*, Keys. et Blasius, l. c. p. lxx. The "Black-sided Sandpiper," Gray, Ind. Zool., seems to belong to this species.

2. *Charadrius asiaticus*, Pall. It. vol. ii. App. p. 715; Lath. Ind. Orn. p. 746; *Charadrius caspius*, Pall. Zoogr. vol. ii. p. 136. pl. 58. = *Eudromias caspius*, Keys. et Blasius, l. c. A very distinct species, and one which, if we are to characterize genera or subgenera by the position and figure of the tarsal scutella, ought to be regarded as the type of a separate group.

3. *Charadrius tataricus*, Pall. It. vol. ii. App. p. 715; Lath. Ind. Orn. vol. ii. p. 746; and *Charadrius sibiricus*, Lepechin, It. vol. ii. pl. 6; Lath. Ind. Orn. p. 747. = *Charadrius (Eudromias) morinellus*, Lin. Syst. Nat. vol. i. p. 254.

NATATORES.

A. Anatidæ, seu Lamellirotres.

1. *Anas grandis*, Lath. Ind. Orn. p. 837; Pall. Zoogr. vol. ii.

* The *Hirundo erythroptgia* described by Col. Sykes in the 'Proceedings of the Zoological Society for 1832,' p. 83, appears from the description to be the same as *H. daurica*, Lin.—(H. E. S.)

p. 221. This is a species observed by Steller and Gmelin, which I have not yet seen, and which, from Pallas's description, may probably be a species of *Cygnus*.

2. *Anas beringi*, Lath. Ind. Orn. p. 843. = *Anas spectabilis*, Lin. according to the observations of Pallas, Zoogr. vol. ii. p. 236, which appear to me well-founded.

3. *Anas falcaria*, Lath. Ind. Orn. p. 860; *Anas falcata*, Pall. Zoogr. vol. ii. p. 239. A very beautiful species, of which I have given a very detailed description in my work 'Descriptiones et Icones Animalium Rossicorum,' Aves, fasc. i. p. 21. pl. 3.

4. *Anas formosa*, Georgi, Reise, vol. i. p. 168; Lath. Ind. Orn. vol. ii. p. 876. = *Anas glochitans*, Pall. Zoogr. vol. ii. p. 261. I have also given a full description of this bird in the same work*.

5. *Anas peregrina*, Gmel. Reise, vol. ii. p. 183. pl. 16; *Anas gmelini*, Lath. Ind. Orn. vol. ii. p. 876, appears to me to = *Anas nyroca*, juv.

6. *Anas kekuschka*, Gm. Reise, vol. iii. p. 249. pl. 26; Lath. Ind. Orn. vol. ii. p. 877. = *Anas strepera*, according to Pallas, Zoogr. vol. ii. p. 254, in which opinion I concur.

B. Tubinares.

1. *Procellaria æquinoctialis*, β . Kuril Petrel, Lath. Ind. Orn. p. 821; *Procellaria æquinoctialis*, Pall. Zoogr. vol. ii. p. 314. = *Puffinus curilicus*, mihi in Museo Academico.

2. *Procellaria furcata*, Lath. Ind. Orn. p. 825; *Procellaria orientalis*, Pall. Zoogr. vol. ii. p. 315. = *Thalassidroma furcata*, mihi in Museo Academico. A well-marked species, of which I intend publishing a full description accompanied by a figure.

C. Steganopodes.

1. *Pelecanus violaceus*, Gm. Syst. vol. i. p. 575; Lath. Ind. Orn. vol. ii. p. 888. = *Carbo violaceus*, mihi, Carbonum Monographia, MSS. A very distinct species, which will shortly be described and figured with accuracy by myself.

2. *Pelecanus urile*, Gm. Syst. Nat. et Lath. Ind. Orn. p. 888; *Phalacrocorax pelagicus* et *bicristatus*, Pall. Zoogr. vol. ii. pp. 301, 303. = *Carbo urile*, mihi, Carbonum Monogr. MSS.

XX.—Descriptions of Chalcidites found near Lima by C. Darwin, Esq. By FRANCIS WALKER, Esq., F.L.S.

Dicyclus Arduine, Fem. *Ater*, abdomen *æneum*, antennæ *nigræ*, pedes *flavo-fulvi*, alæ *limpidæ*.

Corpus breve, convexum, atrum, scite squameum, parum nitens, parce hirtum: caput transversum, breve, thorace paullo latius; vertex latus; frons

* The above two beautiful species of Teal, *Querquedula falcaria* and *Querquedula formosa*, may now be seen in the Chinese Exhibition at Hyde Park Corner (Nos. 864 and 884 of the catalogue). M. Brandt appears to consider *Q. formosa* to be identical with *Anas glochitans*, Pall., the "Bimaculated Duck" of British authors. The latest authors, however, regard them

impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigræ, submoniliformes, extrorsum crassiores, thorace non longiores; articulus 1^{us} longus, gracilis; 2^{us} cyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, usque ad 10^{um} paullo curtantes; clava longiconica, acuminata, articulo 10^o plus duplo longior: thorax ovatus: prothorax transversus, brevis: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum brevi-conicum: metathorax sat magnus, obconicus, declivis: petiolus sat longus: abdomen æneum, subrotundum, fere planum, nitens, læve, glabrum, thorace multo brevius; segmentum 1^{um} magnum, 2^{um} et sequentia breviora: pedes nigri, simplices, subæquales; trochanteres picei; femora apice flava; tibiæ fulvæ, apice basique flavæ; tarsi flavi, apice fuscii: alæ limpidae; squamulæ piceæ; nervi flavi; nervus humeralis ulnari fere duplo longior, radialis ulnari vix brevior, cubitali multo longior; stigma minutum. (Corp. long. lin. 1; alar. lin. 1 $\frac{3}{4}$.)

Pachylarthrus Cleodoxa, Mas. *Viridis, abdomen cupreum, antennæ fulvæ, pedes flavi, alæ limpidae.*

Corpus convexum, viride, nitens, scitissime squameum, parce hirtum: caput convexum, breve, thorace paullo latius; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: palpi maxillares fulvi, clavati: antennæ fulvæ, extrorsum crassiores, thorace paullo longiores; articulus 1^{us} longus, gracilis; 2^{us} fuscus, longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, usque ad 10^{um} paullo curtantes et latescentes; clava fusiformis, pallide fusca, articulo 10^o paullo latior et plus duplo longior: thorax ovatus: prothorax transversus, mediocris, antice angustus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum subconicum: metathorax mediocris, declivis, obconicus: petiolus brevis: abdomen cupreum, breviovatum, læve, depressum, fere glabrum, thorace brevius: pedes flavi, simplices, subæquales; coxæ virides; tarsi apice fuscii: alæ limpidae; squamulæ piceæ; nervi flavi; nervus humeralis ulnari fere duplo longior, radialis ulnari vix brevior, cubitali multo longior; stigma minutum. (Corp. long. lin. $\frac{2}{3}$; alar. lin. 1 $\frac{1}{2}$.)

Pteromalus Archia, Mas. *Niger, antennæ nigræ, pedes rufi, femora nigra, alæ fuscæ.*

Corpus sublineare, convexum, nigrum, obscurum, pubescens, scitissime squameum: caput transversum, breve, thoracis latitudine; vertex sat latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigræ, subfiliformes, pubescentes, thorace non longiores; articulus 1^{us} longus, gracilis; 2^{us} cyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes usque ad 10^{um} breves, subæquales, approximati; clava subconica, articulo 10^o multo longior: thorax ovatus: prothorax transversus, brevis, antice angustus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; scutellum subconicum: metathorax mediocris, declivis, obconicus: petiolus brevissimus: abdomen sublineare, depressum, nitens, læve, fere glabrum, thorace paullo brevius, non latius: pedes obscure rufi, simplices, subæquales; coxæ nigræ; trochanteres picei; femora nigra, apice rufa; tarsi apice obscuriores: alæ fuscæ; squamulæ piceæ; nervi picei; nervus humeralis ulnari duplo longior, radialis ulnari longior, cubitalis ulnari paullo brevior; stigma sat magnum. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 2.)

as distinct (see Temm. Man. Orn. pt. 4. p. 536, and Yarrell, Brit. Birds, vol. iii. p. 168), and it appears that European specimens never exhibit the peculiar plumage of *Anas formosa*. The subject, however, requires further investigation.—(H. E. S.)

Entedon (Horismenus, n.g. Haliday MSS.) Cleodora, Fem. *Æneo-ater*, antennæ nigræ, pedes fulvi, femora nigra, alæ limpidae.

Corpus angustum, convexum, æneo atrum, nitens, læve, fere glabrum: caput transversum, brevissimum, thorace non latius; vertex sat latus; frons impressa, abrupte declivis: oculi rufi, sat magni, non extantes: antennæ nigræ, submoniliformes, extrorsum crassiores, thorace non longiores; clava fusiformis, acuminata, articulo præcedente plus duplo longior: thorax longiovatus: prothorax transversus, brevis, antice angustus: mesothoracis scutum transversum, latum; parapsidium suturæ non bene determinatæ; scutellum subrhombiforme, unisulcatum, postice latum; paraptera et epimera magna: metathorax sat magnus, declivis, obconicus, nigro-viridis: petiolus brevis, crassus: abdomen ovatum, convexum, subtus carinatum, apice acuminatum, thorace paulo brevius; segmentum 1^{um} maximum; 2^{um} et sequentia brevissima: pedes fulvi; coxæ nigræ; femora nigra, apice fulva; tarsi 4-articulati; articulus 1^{us} brevis; ungues et pulvilli minuti: alæ limpidae, hirtæ; squamulæ piceæ; nervi fulvi; nervus ulnaris humerali duplo longior, radialis vix ullus, cubitalis brevissimus; stigma minimum. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 2.)

[To be continued.]

XXI.—*Descriptions of some new genera and species of Mammalia in the British Museum Collection.* By J. E. GRAY, Esq., F.R.S., Keeper of the Zoological Collection in the British Museum.

Fam. VESPERTILIONIDÆ.

Mosia (n. g.) *Vespertilionina*? Cutting teeth $\frac{1.1}{6}$, the upper oblique, far apart; wings thin; head small, hairy; forehead flattened, rather concave in front; lips rather thick, lower with a triangular wart in front; nose rounded; nostrils apical, roundish, not produced, and without any groove on its hinder edge; ears moderate, lateral; tragus elongate, well-developed; interfemoral membrane large, truncated; heel-bone rather long; tail slender, tip produced on the middle of the upper surface of the membrane; hind feet small; wings from the base of the toes.

This genus has all the external appearance of a *Vespertilio*, but it has the tail of an *Embalanura*; it differs from that genus in the nose not being produced and truncated, and the nostrils not tubular. It appears to be the link between the *Vespertilionina* and the *Nostilionina*.

Mosia nigrescens. Fur brown, rather paler below; wings blackish; tragus elongate, linear, blunt. Length of body, 1 $\frac{1}{2}$ inch.

Hab. South America? Capt. Belcher, R.N.

This may be the *Vespertilio canina* of Prince Neuwied, *Embalanura canina* of Temm.; but the tragus of that species is described as very short, broader above and with a constriction at the base, and the animal as considerably larger.

Kerivoula Brasiliensis. Blackish; hairs with brownish tips, beneath rather paler; ears large, acute, bent back.

Hab. Brazils.

Fam. FELIDÆ.

Mustela Horsfieldii. Uniform dark blackish brown, very little paler beneath; middle of the front of the chin and the lower lips white; whiskers black; tail slender, blacker, half as long as the body and head.

Var. ? Throat with a large white spot, chin all white. Mus. East India Company.

Hab. Bhotan, India.

This species differs from *P. subhemachalanus*, Hodgson, in the dorsal line not being darker; from *M. Cathia*, now *M. auriventer*, of the same author, in the much darker colour; and from *M. sibirica*, in the face not being varied with black, and in the general colour being much darker.

Mustela xanthogenys, Yellow-cheeked Weasel. Bright chestnut, beneath golden yellow; chin, small spot above the angle of the mouth, and feet white; spot under the ear yellowish white; spot behind the angle of the mouth towards the throat chestnut; end of tail black.

Hab. California, Capt. Belcher, R.N., C.B.

Rather larger than *M. erminea*; the upper lip and spot on side of the head chestnut, and spot under the ears whitish.

Mustela Hodgsoni, Hodgson's Weasel. Fur yellowish brown, rather paler beneath; upper part and side of head much darker; face, lips, chin and throat varied with white; tail elongate, rather bushy, rather more than half as long as the body and head.

Var. Rather darker, white extended to between the eyes.

Hab. India, Himalaya.

This species does not agree with either of those described by Mr. Hodgson*.

Vulpes flavescens. Pale yellowish, back rather darker; face and outer side of fore legs and base of tail pale fulvous; spot on side of face just before the eyes, the chin, the front of fore legs, a round spot on the upper part of hind foot, and the tips of the hairs of the tail, blackish; the ears externally black; end of tail white.

Hab. Persia.

LUTRA.

The species of this genus are said to be extremely difficult to determine, but this appears to arise from sufficient attention not having been paid to organic characters which are of a permanent description. They may be thus divided into genera or subgenera:—

A. *Hind and front feet similar in size; tail tapering, acute, elongate.*

1. *Lontra*. Muffle hairy; soles of hind feet half naked; claws distinct. *L. canadensis*, *L. brasiliensis*.

2. *Lutra*. Muffle bald, oblong, transverse; claws distinct; soles half naked. *L. vulgaris*, *L. indica*, *L. chinensis*.

* Neither of these Indian species are amongst Mr. Hodgson's collection of Nepaul animals which he has just presented to the British Museum preparatory to their being published by Mr. F. Howard.

3. *Aonyx*. Muffle bald, oblong, transverse; claws rudimentary; soles half naked. *A. Horsfieldii*, *A. aurobrunnea*, *A. indigitata* of India, and *A. Lalandii* of South Africa.

4. *Latax*. Muffle bald, large, oblong, triangular, angular above; claws distinct; soles hairy. *L. Lataxina*.

B. *Hind feet large.*

5. *Enhydra*. Tail short, cylindrical; muffle bald, oblong, triangular; soles entirely hairy. *E. marina*.

6. *Pteronura*. Tail elongate, with a fin on each side. *P. Sanbachi*.

XXII.—*History and Observations on the Pearly Nautilus, involving a new Theory to account for the camerated construction of its Shell by the aid of the Siphonic Membrane.*
By Mr. LOVELL REEVE, A.L.S.*

THE two great conchiferous Cephalopods, *Argonauta* and *Nautilus*, seem to have been equally well known to the father of natural history; for in Scaliger's translation of the 'Historia Animalium' we learn that Aristotle, when speaking of his *Polypi*, or *Cephalopodous Malakia*, makes especial mention of two of them having shells. They were both regarded by this venerable philosopher as species of *Nautilus*; "the one," says Aristotle, "has a hollow shell, not naturally adherent to it; the other has a shell, which like a snail it never quits." Here, however, remained the history of these mollusks for ages. Pliny, and indeed other writers subsequent to Aristotle, seem only to have noticed one of the *Nautili* of their predecessor, for their observations embody little beyond what he had transmitted to them of his *Nautilus primus*, the light monothalamous *Argonaut* of Linnæus. The *Nautilus secundus* of the ancients remained in obscurity until the revival of letters; Belon, a French author of 1550, gave a representation of the shell; and its animal inhabitant was figured in 1703 by Rumphius, a Dutch merchant and naturalist resident at Amboyna. Although an accurate delineator of character for the age in which he lived, he was no anatomist, and his drawings are somewhat inaccurate; having lost his sketches, he is said to have renewed them from recollection; they have, however, been valued from necessity, for no other living specimen of this mollusk was discovered for the lapse of a century and a quarter.

Cuvier, the first great anatomist who tested the organism

* From Mr. Lovell Reeve's valuable work on the Mollusca.

of the Cephalopods by minute dissection, looked with earnest solicitude, no doubt, for the soft and living portion of the *Nautilus*; but the act which made at last so prominent a step in the history of these animals was reserved for a no less skilful operator of our own day. A Nautilus was captured in 1829 in the Bay of Marekini, at the Island of Erromango, New Hebrides; it was seen floating on the surface of the water, and was just about to sink, when a sailor caught hold of it with a boat-hook. The right eye was almost shattered in the struggle to secure it, and the shell being much broken it was injudiciously removed. Two years unfortunately elapsed before the soft parts, which were carefully preserved in spirits, reached England: they were presented to Mr. Owen for dissection; and although a minute portion of shell, adhering to one of the lateral expansions of the belt, was all that remained of the original frame-work, he admirably succeeded, by a train of analogical reasoning, to establish the relation of the whole. His celebrated 'Memoir on the Pearly Nautilus*' was published in London in 1832 by the Royal College of Surgeons, and to the severe disappointment of the author, the illustrious Cuvier died but a few days before it issued from the press.

Although the animal of the Nautilus was an important acquisition to conchological science, it would have been far more acceptable if accompanied with the shell: a doubt immediately arose amongst naturalists, as to whether the position which Mr. Owen had assigned to the animal in the shell was the true one. "*Mais dans quelle position,*" asks De Blainville, "*le Nautil est-il dans sa coquille?*" "*And if,*" says Mr. Gray, "*the relative position of the animal of the Nautilus be correctly assigned by Mr. Owen with respect to its shell, it must offer a similar anomaly to the genera Patella and Lottia.*"

In 1840 two more specimens of the Nautilus were procured after a long and arduous search, by a Dutch gentleman at New Guinea. One was sent to the public museum of Leyden, and the other to Paris; but as these also were destitute of their calcareous envelope, an investigation of them could add little to what had been already advanced by Mr. Owen. M. Valenciennes, however, with a laudable desire, probably, of emulating his predecessor, undertook the dissection, and a skilful

* The very elaborate character of this memoir directly stamped its author as the first zootomist of the day. The smallest nerve has its immediate office assigned to it, the simplest organ its peculiar function; the component systems are traced with the most rigorous accuracy, and the inferences that are deduced from a consideration of the whole, exhibit a fertility of imagination that renders an abstruse subject as pleasing as it is full of scientific interest.

memoir was the result, though not containing much of novelty beyond a difference in his calculation of the tentacles, and the demonstration of an organ of hearing*. His observations are conducted with accuracy and plainness, but the memoir is not so rich in that eloquent analogical reasoning which so vividly characterizes the writings of his contemporary. The opportunity that was thus afforded the continental professor of examining the soft parts of the Nautilus, was highly satisfactory to Mr. Owen, for he arrived at precisely the same conclusion as himself in regard to their relation with the shell. "*En confirmant,*" says Valenciennes, "*la manière de voir de M. Owen, si juste et si conforme à la nature, j'ai établi l'animal dans la vraie place occupée par lui dans sa coquille, je ne laisse plus aucune discussion raisonnable possible sur ce point.*" Here, however, was no direct proof, the testimony of both the learned professors was alike circumstantial; indeed, the very necessity for the introduction of the word *raisonnable* in this statement proclaimed it to be an hypothesis. Mr. Owen was himself singularly destined to prove the truth of his conjecture, for only two days since a magnificent specimen of the Nautilus, with its shell entire, was presented to him by Capt. Belcher, R.N. The individual in question was captured by that gentleman at Amboy, not long since; it was secured alive, and has been preserved, together with its shell, in spirits without the slightest injury. When put into Mr. Owen's hands, he was extremely gratified to behold that the animal held exactly the position in its shell that he had ventured to assign to it; and we doubt not but that M. Valenciennes will be as highly pleased to find that his expectations have been so soon realized †.

Having detailed the history of the Nautilus from the time of Aristotle to the present day, it now remains for us to speak of its structure and general habits. The soft parts of this animal form a kind of oblong mass, such as may be supposed capable of fitting into the porch or aperture of its well-known shell, and, like the rest of the Cephalopods, consist of two

* Mr. Owen says on this head, "With respect to the sense of hearing, I have not been able to detect a distinct organ for that faculty."

† We shall not readily forget the glorious delight of the Hunterian Professor, as he hurried past our door only yesterday on his way to the Zoological Society; his treasure proudly suspended in an anatomical jar; himself loaded with the controversial theories of his contemporaries, that he was about to level at a breath. Nor can we fail to remember his animated enthusiasm at the Meeting, when, holding up the precious truant, fresh as it were from its native element, without a fracture, and apparently dozing under its capacious hood, he proved, beyond the possibility of contradiction, the generalizations he had so admirably worked out as a student ten years before by an ingenious complication of analogies.

parts. The anterior or outer part incloses a well-developed head, with a pair of strong, horny mandibles, a mass of some thirty or forty tentacles, and a number of delicate structures, including the organs of smelling, hearing, seeing, &c.; and over all these parts is a capacious fleshy hood, which may be considered as the analogue of the operculum in the Gastropods. The inner or posterior part of the body contains the viscera, with a funnel or vent-hole extending from beneath the tentacles, and the entire abdominal mass, together with the breathing apparatus, is enveloped by a large sack-like mantle fitting into the hollow of the shell. The anterior portion of the mantle, or that which is attached to the back part of the head, is produced into a considerable fold, which overlaps the involuted convexity of the shell, and from the lower extremity of the entire body extends a central membranous tubiform process, which, by passing the siphonic apertures of the septa, extends completely through the convolutions of the shell, from chamber to chamber, until it is fastened to the nucleus or parietal wall of the central or first-formed chamber. Around the circumference of this abdominal sack there is a thin layer of horny matter, called the belt, expanding on each side into a kind of broad patch, and becoming the medium of muscular attachment.

The natural position, then, of the Nautilus in its shell, is with the back of the head and concavity of the hood against the camerated convexity of the spire, and the funnel resting on the outer concave wall of the chamber: the tentacles are consequently protruded over the lateral margins of the aperture, and the body is retained within the shell by the adhesion of the membrane and the horny girdle.

The following appears to us to be the manner in which the Nautilus constructs its shell. The animal in its embryo formation deposits a simple hollow shell, out of which it necessarily advances as it increases in bulk; and in order to assist its specific gravity at the bottom of the ocean, the vacated portion of the shell is chambered in by the secretion of transverse septa, the animal having first taken the precaution to secure a strong tubiform membrane to the inner wall, in order to adjust its position (a consideration of the habits of this pelagic mollusk will show the necessity for this membrane). As the soft parts increase in bulk, the muscular girdle which binds them to the shell would naturally be forced from any adhesion; but from its being furnished with a certain degree of elasticity, it advances by a series of periodical slips, the suddenness of which is undoubtedly counteracted by the attachment of the central membrane. The growth of the shell

then proceeds in a circular direction, and serves to buoy up its inhabitant in the water by having the vacated portion chambered in to meet its specific gravity. The geometrical increase of it arises simply thus. The natural position of the Nautilus, like other Cephalopods, is with its head downwards, the shell being consequently above; and the periodical slip of the belt of adhesion most probably takes place when the animal is in this supine position. It lets itself down, and round and round, as it were, upon its axis, by the limited extension of this membranous pulley; the operation ceases when it arrives at maturity, and the membrane being no longer wanted, probably decays. Such is the manner in which our observations lead us to suppose the Nautilus grows; the chambers have certainly no communication with the surrounding fluid. The camerated portion of the shell of Nautilus is evidently a simple, mechanical construction, (though planned by the wisest intelligence,) to assist the specific gravity of its inhabitant whilst under the different mutations of pressure that it is liable to at different periods of growth in its passage through the element; and it is, moreover, a contrivance that could only be effected by the aid of this adjusting membrane upon the simple geometry of motion above described*.

M. Valenciennes regards the periodical introduction of a partition in the shell of Nautilus as in some measure analogous to the occasional deposit of a varix in the shell of *Murex* and other Gastropods. The septa, like the varices, may undoubtedly be secreted by the mantle during a period of rest, but there the analogy ceases. We would rather compare the rotatory increase of the Nautilus to the horizontal growth of that singular Gastropod, the *Magilus* (Conch. Syst. p. 231). The one gravitates round a centre, increasing by a peculiarity of con-

* The principle here advanced, of the geometrical formation of the Nautilus shell round its axis by the aid of an adjusting membrane, and of its camerated construction being accommodated to the specific gravity of the inhabitant, will, perhaps, receive additional weight by a consideration of the following passage from the 'Memoir' of Professor Owen:—

"In sections of recent shells, its [the membrane's] dried remains may occasionally be seen of a black colour and pergameneous texture, continuing from septum to septum as far as the central or first-formed chamber; and a further confirmation that this is the true structure of the parts, is afforded by the fossil shells of this genus. In some polished sections of these remains, not only is the continuation of the tube through all the chambers evident, but it is seen to become slightly dilated in them, and in some instances appears also to have been reflected over the outer part of the testaceous tube prior to being continued across the chamber to the next partition. There is no indication, however, of the latter structure in the recent shells where the membranous tube is preserved."

trivance the volume and comparative buoyancy of its shell to keep pace with the surrounding pressure, which naturally increases in intenseness as the subject increases in bulk; the other having a different medium to combat with, namely, the outward increase of the coral in which it is imbedded, leaves its spiral plan of construction to pursue a straight growth, and, raising itself forward, fills the vacated portion of the shell with an extraordinary secretion of solid matter. If the *Margilus* had advanced by a deposit of transverse septa, instead of solidifying its shell, the increase of the madreporite might have crushed it; and if the *Nautilus* had advanced by the solidifying of its shell instead of by the deposit of transverse septa, it would have produced an incumbrance incompatible with its locomotive faculties.

We are now brought to the consideration of the habits of the *Nautilus*. It is evidently, as Mr. Owen expresses it, "a ground-dwelling animal," creeping along the bottom of the sea, with hood and tentacles, at a tolerably quick pace; and the shell, being above its head, must greatly assist the animal in its movements, from a tendency to float. It is not improbable but that the *Nautilus* may use a certain hydrostatic influence over the branchial cavity to enable it to rise to the surface. Valenciennes says, "*Il nage avec facilité dans le sein des eaux en faisant sortir avec force la grande quantité d'eau contenue dans sa cavité branchiale.*" And the testimony of Rumphius in respect to its capacity of floating, cited by Mr. Owen, is of so much interest, considering the time in which it was written, that we venture to repeat it.

"When he thus floats on the water, he puts out his head, and all his barbs (tentacles), and spreads them upon the water with the poop (of the shell) above; but at the bottom he creeps in the reverse position, with his boat above him, and with his head and barbs upon the ground, making* a tolerably quick progress. He keeps himself chiefly upon the ground, creeping sometimes also into the nets of the fishermen; but after a storm, as the weather becomes calm, they are seen in troops floating on the water, being driven up by the agitation of the waves: whence one may infer that they congregate in troops at the bottom. This sailing, however, is not of long continuance; for having taken in all their tentacles, they upset their boat, and so return to the bottom." This account, published at Amsterdam more than a hundred years ago, is mainly authenticated; but it may still be a little exaggerated, for the

* By force of gravity probably.

Nautili have never since been found floating in troops, nor exercising the bold familiarity, above-mentioned, of walking into the fisherman's nets.

The natural history of this mollusk is important to the *zoologist*, but far more so to the *geologist*. The mysterious nature of those polythalamous tenants of a former world, the *Ammonites* and their multifarious congeners, is at length demonstrated by the discovery of the *Nautilus*, a solitary living remnant, proving that the vast assemblage of those organic remains so abundant in our secondary formations must have belonged to animals who once dwelt in full activity and vigour at the bottom of the ocean, constructing a discoidal shell by force of gravity, and hermetically sealing the vacated portion of it as they increased in bulk, to give them buoyancy under the surrounding pressure*.

XXIII.—*History of a Case in which a Fluid periodically ejected from the Stomach contained Vegetable Organisms of an undescribed form.* By JOHN GOODSIR, Esq., Conservator of the Royal College of Surgeons in Edinburgh †.

THE case detailed by Mr. Goodsir is that of a young man, aged 19, who had laboured for four months under stomach complaint, accompanied with the ejection of a peculiar acid fluid from the stomach. The fluid passed from the stomach every morning without any effort of vomiting. On examining the ejected fluid with the microscope, peculiar organisms were detected, in the form of square or slightly oblong plates. "The flat surfaces were divided into four secondary squares by two rectilinear transparent spaces, which, passing from side to side, intersected one another in the centre, like two cross garden-walks. Each of the four secondary squares was again divided by similarly arranged, but more feebly developed spaces, into four ternary squares. The sixteen ternary squares thus constituted, when examined with deeper powers, were seen to consist each of four cells, which were not separated by transparent spaces, but simply by dissepiments formed by the conjunction of the walls of contiguous cells. These sixty-four cells, of which the organism consisted, did not present in perfect individuals distinct nuclei." The whole organism had the appearance of a wool-pack, or of a soft bundle bound with cord, crossing it four times at right angles and at equal distances: hence Mr. Goodsir gives it the name of *Sarcina*. He considers it to be of a vegetable nature, and to be allied to some of the

* "The *Nautilus*," says Prof. Owen, "is the living, and perhaps sole living archetype of a vast tribe of organized beings, whose fossilized remains testify their existence at a remote period, and in another order of things."

† From the Edinburgh Medical and Surgical Journal, No. 151.

species of *Gonium*, more particularly *Gonium hyalinum*, *glaucum*, and *tranquillum*. The genus *Gonium*, as at present constituted, he thinks consists both of animal and vegetable species.

The following are the generic characters of *Sarcina*:—"Plants coriaceous, transparent, consisting of sixteen, or sixty-four four-celled square frustules, arranged parallel to one another in a square transparent matrix."

The species under consideration is denominated by Mr. Goodsir *Sarcina ventriculi*, and is thus defined: "Frustules sixteen; colour light brown; transparent matrix very perceptible between the frustules, less so around the edges; size 800 to 1000 of an inch.

Hab. The human stomach."

A perfect individual *Sarcina* consists then "of sixty-four ultimate cells, but as soon as each of these again divides into, or produces four new cells, the individual becomes composite, and may forthwith divide into four young ones, each of these again to undergo the same quaternary division." The parts of the individuals are arranged in the square; these parts increase in numbers in a geometrical progression, and the species propagates according to the same law, four in the first generation, sixteen in the second, sixty-four in the third, 256 in the fourth, 1024 in the fifth, and so on with a rapidity peculiar to such a series of numbers. The liquid of the stomach in which the *Sarcina* was found, was analysed by Dr. George Wilson, Lecturer on Chemistry in Edinburgh; he found three acids in it,—hydrochloric, acetic, and lactic. The first was present in very small quantity, while the two others (more especially the acetic) were abundant.

Since the publication of Mr. Goodsir's paper, similar organisms have been detected in other cases of stomach complaint by Dr. J. H. Davidson and Mr. Benjamin Joseph Bell, of Edinburgh.

XXIV.—*On the Parasitic Vegetable Structures found growing in Living Animals.* By J. H. BENNETT, M.D.*

THE objects of this memoir, as stated by the author, are—"1st, to confirm and extend the observations and experiments of Gruby concerning the mycodermatous vegetations found in the crusts of the disease called *Tinea favosa*, or *Porriigo lupinosa* of Bateman; 2nd, to announce the occasional existence, and describe a plant found growing on the lining membrane or cheesy matter of tubercular cavities in the lungs of man; 3rd, to describe the structure of a plant found growing on the skin of the gold-fish; and 4th, from a review of all the facts hitherto recorded in connexion with this subject, to draw certain conclusions respecting the pathological state which furnishes the conditions necessary for the growth of fungi in living animals."

* In the Transactions of the Royal Society of Edinburgh, vol. xv.

Dr. Bennett has traced the growth of mycodermatous vegetations in several cases of *Tinea*, and has given figures to show the appearances they present. He thinks that they spring up originally below, or in the thickness of the cuticle: they consist of small articulated filaments containing sporules. The author endeavoured to propagate the disease by introducing the sporules into his arm and scalp, but he did not succeed in causing the plants to germinate on parts different from those which originally produced them. A plant of a similar nature, consisting of jointed filaments and sporules, was detected by Dr. Bennett in the lungs of a man who died of tubercular consumption. The vegetations were seen on dissection, but were also detected in the sputa freshly expectorated during life. The plant is allied to *Penicillium glaucum*. A similar structure was seen in the sordes collected on the teeth and gums of persons labouring under typhus fever.

Dr. Bennett and Mr. Goodsir* have both examined the vegetations found occasionally growing on the gold-fish (*Cyprinus auratus*). These consist of elongated cells presenting the appearance of long jointed tubes, and of fine filaments arising from the sides of the cellular tubes. Numerous instances are mentioned in different tribes of animals, as mollusca, insects, fishes, birds, and mammalia, in which vegetations have been detected during life, and copious references are given to the works in which the cases are detailed. From all the facts which the author has been able to collect, he thinks it probable—"1st, that these vegetations always arise in living animals *previously* diseased; 2nd, that their presence indicates great depression of the vital powers, and impairment of the nutritive functions of the œconomy; 3rd, that the peculiar constitution or cachexia favourable to their growth is the tubercular or scrofulous in the mammalia, birds, and fishes, and most probably in reptiles and insects; and 4th, that the therapeutic indications are to invigorate the system, and to use locally, if possible, such applications as tend to destroy vegetable life."

The paper is one of great interest, and is worthy of an attentive perusal.

Further observations on the subject of the vegetable nature of *Tinea favosa* will be found in the 'Edinburgh Medical and Surgical Journal' for June 1842.

BIBLIOGRAPHICAL NOTICES.

A History of British Starfishes, and other Animals of the Class Echinodermata. By Edward Forbes, M.W.S., For. Sec. B.S., &c.

THIS book is one of that fair sisterhood of natural-history publications, for which we are indebted to Van Voorst. We had intended, immediately on the completion of the work, to have introduced it to

* See Annals, vol. ix. p. 333.

the notice of our readers, and have given them, as best we could, a knowledge of the kind of information which it contained, and of the manner in which that information had been communicated. But an editor, alas! like still greater potentates, is dependent on his allies, and not until now have we succeeded in obtaining that co-operation and assistance which the fulfilment of our design required. We shall therefore endeavour by a careful analysis, and by extracts more copious than we generally give, to make amends to our readers for our delay in making them acquainted with a work of such originality and value; one which has elicited the encomiums of Professor Agassiz, who, among living naturalists, is perhaps the one best qualified to appreciate its merits*.

The following passages from the introduction state precisely what portion of the animal kingdom is treated of under the term Echinodermata:—

“The Echinodermata constitute one of the three great classes into which the Radiata are divided. The Radiate type presents us with animals which either have their parts arranged in a ray-like manner round a common centre, or have their bilaterality so modified as to give them a star-like form. The Zoophytes, the Medusæ, and the creatures to which this volume is devoted, constitute the type. The Echinodermata are most highly organized, much more so than the Polypes; they are almost all free animals, creeping about at the bottom of the sea; and as the greater number of species are covered with a coriaceous skin, which is commonly strengthened by calcareous plates or spines, they have derived their general appellation from that remarkable character, which at once distinguishes them from the Medusæ, free swimming animals of the most delicate and membranous texture.”

“The system most characteristic of the Radiate type is the Aquiferous, or apparatus for a water circulation; indeed, it can scarcely be said to exist in any of the other types. It is chiefly developed in the Arachnodermata and Echinodermata, and in the last is intimately connected with the movements of the animals; for it is by means of this water circulation that the suckers or cirrhi are enabled to act as organs of progression. In many species of the most typical group, that of *Echinidæ*, we find a portion of the dermatoskeleton turned in, as it were, to form arches for the protection of the water-canals, thus evidencing their great importance in those creatures. Among the Annelidous Echinodermata, however, the aquiferous system seems altogether to disappear.

“On the modifications of this characteristic system, its presence or absence, and its combination with the tegumentary system for purposes of motion, I have founded my arrangement of the Echinodermata. I look upon the Echinodermata and Arachnodermata as two parallel groups, and hold it as a law that *the divisions of parallel groups should be based on a common principle.*”

In accordance with this view the author proposes the following arrangement:—

Order I. PINNIGRADA. CRINOIDEÆ—First appearance of cirrhi, springing from brachial membranes, which, with the true arms, form the organs of motion.

* See Ann. Nat. Hist. vol. ix. p. 189.

- Order II. SPINIGRADA. OPHIURIDÆ—Disappearance of brachial membranes, cirrhi as before; true arms clothed with spines for motion.
- III. CIRRHIGRADA. ASTERIIDÆ—Arms disappear; body more or less lobed, and lobes channeled beneath for cirrhi, which act as suckers, and are the organs of motion.
- IV. CIRRHI-SPINIGRADA. ECHINIDÆ — Gradual disappearance of lobes; cirriferous canals appearing as avenues where cirrhi act as in Order III., but are assisted by mobile spines clothing the integument.
- V. CIRRHI-VERMIGRADA. HOLOTHURIADÆ—Lobes disappear; motions affected by avenues of cirrhi, assisted by contraction and extension of the soft body.
- VI. VERMIGRADA. SIPUNCULIDÆ—Cirrhi become obsolete and disappear; motion effected by the contraction and extension of the animal's body.

“All the Radiata,” it is remarked, “are greatly influenced in the arrangement of their parts by some definite number. In the Echinodermata the reigning number is five. The name of ‘five-fingers,’ commonly applied by mariners to the Starfishes, is founded on a popular recognition of the number regnant.”

“Every plate of the Sea-Urchin is built up of pentagonal particles. The skeletons of the digestive, the aquiferous, and the tegumentary systems, equally present the quinary arrangement; and even the cartilaginous framework of the disk of every sucker is regulated by this mystic number. When the parts of Echinoderms deviate from it, it is always either in consequence of the abortion of certain organs, or it is a *variation by representation*, that is to say, by the assumption of the regnant number of another class. Thus do monstrous Starfishes and Urchins often appear quadrate, and have their parts fourfold, assuming the reigning number of the Actinodermata, consistent with a law in which I put firm trust, that *when parallel groups vary numerically by representation they vary by interchange of their respective numbers.*”

We pass by the excellent tables showing the distribution of species, both in regard to the zones of the sea and the coasts of the British Isles, and proceed to the consideration of the several orders into which the Echinodermata are divided. The first is the *Crinoidea*, of which we have now but one living British species. The former abundance and present scarcity of these singular and interesting tribes is thus announced in the opening paragraph, in which the beauty of the diction is surpassed only by the elevation, the grandeur and poetic interest of the ideas which it embodies.

“One of the most remarkable phænomena displayed to us by the researches of the geologist, is the evidence of the existence, in primæval times, of animals and plants, the analogies of which are now rare or wanting on our lands and in our seas. Among those tribes which have become all but extinct, but which once presented numerous generic modifications of form and structure, the order of Crinoid Starfishes is most prominent. Now scarcely a dozen kinds of these beautiful animals live in the seas of our globe, and individuals of these kinds are comparatively rarely to be met with: formerly they were among the most numerous of the ocean's inhabitants,—so numerous that the remains of their skeletons constitute great tracts of the dry land as it now appears. For miles and miles we may walk over the stony

fragments of the *Crinoideæ*; fragments which were once built up in animated forms, encased in living flesh, and obeying the will of creatures among the loveliest of the inhabitants of the ocean. Even in their present disjointed and petrified state, they excite the admiration not only of the naturalist but of the common gazer; and the name of Stone-lily popularly applied to them, indicates a popular appreciation of their beauty. To the philosopher they have long been subjects of contemplation as well as of admiration. In him they raise up a vision of an early world, a world the potentates of which were not men but animals—of seas on whose tranquil surfaces myriads of convoluted Nautili sported, and in whose depths millions of Lily-stars waved wilfully on their slender stems. Now the Lily-stars and the Nautili are almost gone: a few lovely stragglers of those once-abounding tribes remain to evidence the wondrous forms and structures of their comrades. Other beings, not less wonderful, and scarcely less graceful, have replaced them; while the seas in which they flourished have become lands, whereon man in his columned cathedrals and mazy palaces emulates the beauty and symmetry of their fluted stems and chambered shells."

The species figured is the *Comatula rosacea*, or Rosy Feather-Star, "a creature which in its youth is fixed and pedunculate, like a zoo-phyte, in its adult state free and star-like." This view was first maintained by Mr. J. V. Thompson of Cork, who regarded the *Pentacrinus Europæus* as the young state of the *Comatula*, an opinion which has now been fully confirmed.

"When dredging," says Mr. Forbes, "in Dublin Bay in August 1840, with my friends Mr. R. Ball and W. Thompson, we found numbers of the Phytocrinus or Polype state of the Feather-star, more advanced than they had ever been seen before, so advanced that we saw the creature drop from its stem and swim about a true *Comatula*; nor could we find any difference between it and the perfect animal, when examining it under the microscope."

The Starfishes composing the second order are the OPHIURIDÆ, "so named from the long serpent or worm-like arms, which are appended to their round, depressed, urchin-like bodies;" they are divided into three genera and thirteen species; of these, two (*O. punctata* and *O. Goodsirii*) are for the first time described and figured. The *O. Ballii*, described a short time before in the 'Annals,' is now for the first time figured. A figure and description of *O. filiformis*, as a British species, appears for the first time, as does also a figure of the *O. brachiata* of Montagu. In speaking of the *O. filiformis*, the author describes a remarkable peculiarity in the structure of its spines, exhibiting "a very beautiful example of the adaptation of organization to the locality in which the creature is destined to live." And in the *O. bellis*, "one of the prettiest of its tribe," it is remarked,—

"This intermingled surface of spines and plates gives the disk that likeness to a daisy-flower, whence it has been called 'bellis' by some; nor is the flower at all degraded by the comparison, for but few daisies can show such beauty either of form or colour as is presented by this little Sea-star."

Persons who have not given attention to these objects, or who know them only in the dried and rigid aspect which they present in our museums, have no idea of the variety and beauty which they exhibit in the living state. Those who have ever been present when a dredge half-filled with the commonest of our Brittle-stars, *O. rosula*,

has been emptied, will bear testimony to the fidelity of the following description :—

“Of all our native Brittle-stars this is the most common and the most variable. It is also one of the handsomest, presenting every variety of variation, and the most splendid displays of vivid hues arranged in beautiful patterns. Not often do we find two specimens coloured alike. It varies also in the length of the ray-spines, the spinousness of the disk, and the relative proportions of rays and disk; and in some places it grows to a much greater size than in others. It is the most brittle of all Brittle-stars, separating itself into pieces with wonderful quickness and ease. Touch it, and it flings away an arm; hold it, and in a moment not an arm remains attached to the body.”

The notice of this species is most appropriately concluded by a vignette representing a portion of one of its spines, which, as it is justly observed, exhibits “a structure, the lightness and beauty of which might serve as a model for the spire of a cathedral.”

We next come to the *ASTERIADÆ*, or true Starfishes, an order whose beauty and symmetry seems to have “attracted the attention of such observers of nature as dwelt by the sea-side, from a very early period.”

“A fanciful analogy between the form of these Radiata and the popular notion of a star, has originated a name applied to them in most maritime countries,—a name which has given rise to a fine thought or two. ‘As there are stars in the sky, so are there stars in the sea,’ is Linck’s first sentence. ‘Cœlorum spectare sidera decet juvatque Astronomos: Physicorum interest stellis marinis visum intendere,’ saith Christian Gabriel Fischer in his preface to Linck’s volume. Our own poet, James Montgomery, whose inspiration has revelled gloriously among the wonders of Nature, beautifully expresses the same analogy,

‘The heavens
Were throng’d with constellations, and the seas
Strown with their images.’”

The order *Asteriadae* contains fourteen British species, distributed into eight genera, two of which, *Solaster* and *Luidia*, are established by our author. The *Cribella rosea* comes forward for the first time as a British species; *Uraster glacialis* is figured for the first time from a British specimen, and *Goniaster Templetoni* appeared previously only in Mr. Forbes’s paper in the ‘Wernerian Memoirs.’ The following important observation occurs in p. 82 :—

“It is a remarkable fact, one which I have elsewhere pressed on the attention of geologists when considering the Mollusca, that whenever, as in the Hebrides, the tides fall but a few feet, these animals, usually inhabitants of deep water, may be found living above low-water mark. This holds good as well in regard to Radiata as to Mollusca; and the mixture of species generally considered inhabitants of the depths of the sea, with truly littoral species, should a fossil bed be formed, might lead to false conclusions unless such fact be borne in mind. Thus a change in the tides of a line of coast would materially affect its fauna.”

“The Solasters,” we are told, “are suns in the systems of Sea-stars. Their many rays and brilliant hues give them a distinguished place among the marine constellations.” The structure of the eyelid is described in p. 113; it forms a very perfect protection to the

eye, and is extremely difficult to be forced open against the will of the animal.

The fourth order, that of the *ECHINIDÆ* or Sea-Urchins, is thus introduced to our notice :—

“Of equal importance to zoologist and geologist is the study of the Sea-Urchins: to the former they present the perfection of radiism, as well as the first steps towards a symmetrical or bilateral form; to the latter the knowledge of their habits and organization is necessary in order to understand the relations and associations of the numerous species which abound in many of the earth's strata. Of all the Radiata they are most perfectly preserved in a fossil state. Their hard calcareous integument, or *shell*, as it is popularly but inaccurately termed, the parts of which are jointed together with wondrous completeness, is especially durable; consequently we find the hard parts of the extinct species frequently as perfect as those of the recent examples preserved in our cabinets.

“The Sea-Urchins are distinguished from all the other Echinoderms by their form, which is more or less rounded, without arms of any kind, and by their integument, in which calcareous matter is deposited so as to form series of regular plates, which plates are studded with tubercles, bearing jointed on them spines of various forms and sizes according to the genus or family.”

“The *Echinidæ* progress by means of the joint action of their suckers and spines, using the former in the manner of the *Asteriadae*, and the latter as the *Ophiuridæ* do. Many Sea-Urchins, such as live on hard surfaces, moor themselves also by means of the suckers, and thus adhere very firmly to the rocks. That such is the mode of progression and rest among this family I assert, not only from the general belief of naturalists, but also from personal observation.”

On this point we can fully corroborate what the author has advanced, having repeatedly seen the common Urchin (*Echinus sphaera*) moving about or anchoring at pleasure by means of its suckers. The first time we noticed the fact was under circumstances which we still very vividly remember. We had cut horizontally into two nearly equal parts a large Sea-Urchin, for the purpose of examining the intestine and ovaries. These being removed, the shell was thrown on the deck of the little vessel, as being no longer of any service. It chanced, however, that we afterwards picked up the parts and placed them in a shallow vessel of sea-water. To our surprise, the suckers were soon extended and the animal walked about apparently as unconcerned as if the loss of intestine and ovaries had been an every-day occurrence.

Of the order *Echinidæ* there are seven genera and twelve species. *Brissus lyrifer* is now for the first time described and figured, and we have also for the first time figures of the *E. Flemingii* and *lividus*. We have long been aware of the fact that the common *Echinus* of the Mediterranean was a species distinct from our own, though both had been included in the common appellation of *E. esculentus*. The distinction is now announced by Mr. Forbes, and he gives the following excellent characteristics for the family *Echinidæ* :—

“The essential specific characters depend on the arrangement of the tubercles which bear the spines, on the spines themselves, and on the number and arrangement of the pairs of pores in the avenues of suckers. These pre-

sent good marks of distinction throughout the genus *Echinus*. The spines are especially important, as from the examination of a single spine it is possible to pronounce on the species to which it belongs. To the geologist this is evidently of great consequence, as frequently he meets only with a few scattered spines. But when we leave the family *Echinidæ*, we leave this important character behind us. Among the Heart-Urchins the spines present one common family structure. A single plate, either ambulacral or interambulacral, will also, from the arrangement of the spiniferous tubercles which cover its surface, enable us to pronounce pretty certainly on the animal of which it formed a part. Thus, in this family of Echinodermata, from an apparently insignificant fragment we can construct, as it were, a species, even as the student of the Vertebrata, from a broken bone, can pronounce on the form and habits of the animal to which it belonged."

To those—if such there be—who wandering on the beach, and noticing a Sea-Urchin flung there by the retiring tide, view it merely as part of the rejectamenta of the ocean—a thing to be glanced at with contempt, and broken into fragments under the foot, we recommend the careful perusal of the following extract, and beg they will treasure up in their "heart of hearts" the reflection with which it concludes :—

"In a moderate-sized Urchin I reckoned sixty-two rows of pores in each of the ten avenues. Now, as there are three pairs of pores in each row, their number multiplied by six, and again by ten, would give the great number of 3720 pores; but as each sucker occupies a pair of pores, the number of suckers would be half that amount, or 1860. The structure in the Egg-Urchin is not less complicated in other parts. There are above 300 plates of one kind, and nearly as many of another, all dove-tailing together with the greatest nicety and regularity, bearing on their surfaces above 4000 spines, each spine perfect in itself, and of a complicated structure, and having a free movement on its socket. Truly the skill of the Great Architect of Nature is not less displayed in the construction of a Sea-Urchin than in the building-up of a world!"

Among the *Echinidæ* none are more attractive than the *E. lividus*, a species which at the time Mr. Forbes wrote was believed to be peculiar to Ireland among the British Isles, but which has recently been discovered on the west coast of Scotland by the Rev. D. Landsborough. It is remarkable for its singular habit of boring principally into limestone rocks, and living in the excavation thus formed. In treating of this species the author gives the following interesting particulars :—

"Mr. W. Thompson informs me it is gregarious, and was seen abundantly in rock pools at low water by himself and Mr. Ball when visiting the South Isles of Arran in 1834. It is always stationary, the hole in which it is found being cup-like, yet fitting so as not to impede the spines. Every one lived in a hole fitted to its own size, the little ones in little holes and the large ones in large holes; and their purple spines and regular forms presented a most beautiful appearance studding the bottoms of the gray limestone rocks' pools."

We now pass on to the HOLOTHURIADÆ, an order composed of animals much less known to naturalists in general than those of the preceding orders. "A Holothuria may be regarded in one light as a soft Sea-Urchin, in another as a radiated animal approximating to the

Annelides." Besides progressing by means of suckers, "the *Holothuriadæ* move as Annelides do, by the extension and contraction of their bodies." "On our shores they are rare and unattractive animals, not often seen even by the zoologist; but abroad they are very abundant, and are in some places used as food."

"It is this animal which the Malays of the Oriental Isles seek so diligently for the supply of the China market, where it obtains a good price when well-preserved. It is employed by the Chinese in the preparation of nutritious soups, in common with an esculent sea-weed, sharks' fins, edible birds'-nests, and other materials, affording much jelly. Jaeger says the intestines are extracted, the animal then boiled in sea-water, and dried in smoke."

The order *Holothuriadæ* contains six genera, two of which, *Psalinus* and *Ocnus* are constituted by our author. It contains altogether fifteen native species, six of which are now for the first time described and figured; these are *Psolinus brevis*, *Cucumaria communis*, *C. fusiformis*, *C. fucicola*, *Ocnus lacteus* and *Thyone Portlockii*. There are three others which had been recently described in the 'Annals,' and are now for the first time figured, viz. *C. Drummondii*, *C. Hyndmanni*, and *Ocnus brunneus*; we have also for the first time a figure of *Cuc. hyalina*.

"Doubtless there yet remain many undiscovered species of *Holothuriadæ* in the British seas. Of Starfishes we must not expect to find many more kinds, though *Goniaster miliaris*, and some few others which have been seen on the Norwegian shores, may be looked for. Of Sea-Urchins there are probably still fewer unnoticed; but of the Sea-Cucumbers many. Their comparatively unattractive aspect, the difficulty of preserving them (they must always be kept in spirits), their habitat in the sea, and the little attention that has hitherto been paid to them by native zoologists, all lead me to believe that many species have been passed over. We have as yet no representative of the typical *Holothuria* which have twenty tentacula in the British Fauna. Several of these, such as the *Holothuria elegans* and *Holothuria mollis*, inhabitants of the Scandinavian shores, will probably ere long prove to be natives of our own."

Lastly, we come to the sixth order, SIPUNCULIDÆ. "In their external appearance they are worms," but internally they afford evidence of belonging to the same great class "with the *Holothuriadæ*." In the *Sipunculidæ* there are five British genera and eight species; two of these, *Syrinx Harveii* and *Sipunculus Johnstonii*, are now for the first time described and figured. Of *Syrinx papillosus* we have for the first time a figure; it was described shortly before this work appeared. *Syrinx nudus*, *Sipunc. Bernhardus*, *Priapulius caudatus*, and *Echinus vulgaris*, are for the first time figured from British specimens; the last-mentioned had not before been announced as a native of our seas.

The description given of some of these animals is extremely curious; one (*Priapulius caudatus*) "is shaped like a dice-box;" another has a sheath for its tentacula, presenting the form of a marrow-spoon. When we find the likeness of our household appurtenances thus dwelling beneath the waters as living animals, it calls to our mind the well-known quotation, "Nothing of *them* but doth suffer

a sea change." Instead, however, of giving a brief notice of three or four species, we shall content ourselves by taking the following more copious extract, descriptive of the *Sipunculus Bernhardus* :—

"The species bury in sand, or in the crevices of rocks, or, as is the custom of the curious animal before us, adopt the shells of dead univalve testacea for a house and home, after the manner of the Hermit Crab. The *Sipunculus* would appear, however, to be of a less changeable disposition of mind and body than its crustacean analogue, and when once securely housed in a shell to make that its permanent habitation. Whether the egg is originally deposited in the future habitation of the animal by some wonderful instinct, or is only developed when lodged by the waters in such a locality, or whether the parent *Sipunculus* bequeathes the chosen lodging of its caudal termination to its eldest born, and so on from generation to generation, a veritable *entailed* property, we know not at present; but the inquiry is a most interesting one, and well worth the attention of the experimental zoologist. The *Sipunculus* is not, however, content with the habitation built for it by its molluscan predecessor; it exercises its own architectural ingenuity, and secures the entrance of its shell by a plaster-work of sand, leaving a round hole in the centre sufficiently large to admit of the protrusion of its trunk, which it sends out to a great length, and moves about in all directions with great facility."

Throughout the entire work, Mr. Forbes makes the most hearty acknowledgments, not only to those who have either by specimens or by communications assisted his present labours, but to those hardy pioneers in the paths of science who first "broke ground" in this department of inquiry. As an example, we select the following tribute to Col. Montagu :—

"It is not merely the copiousness of his descriptions which gives them their peculiar value, though their fulness is a great merit; nor merely their perspicuity, though that is a still greater merit; but it is their logical character, that instinctive perception of the essential attributes and relations of each species, which is the most important faculty a naturalist can possess. Too many of our older naturalists (and can we claim exemption from the fault yet?) described forms as if there could be no creatures existing with which those forms might be confounded: they wrote of the animals they were characterizing, as if the whole book of Nature was already in print. Montagu was a forward-looking philosopher; he spoke of every creature as if one exceeding like it, yet different from it, would be washed up by the waves the next tide. Consequently his descriptions are permanent; and when he had full opportunities of examining any marine animal, subsequent observers have but little to add to his words."

We may remark, that in Mr. Forbes's own definition of species, he has evinced in no trivial degree the mental characteristics which he has ascribed to Montagu, and that the specific characters are remarkable, not only for the judgment with which they are selected, but for the precision and perspicuity with which they are expressed.

Yet notwithstanding the pains-taking accuracy with which these definitions must have been elaborated, the book smells not of the lamp. The style throughout is peculiarly easy, varied, and unlaboured. As we turn over the pages, we find we are giving attention to animals, not dried in a cabinet, or preserved in alcohol, but putting forth in their native haunts, their several aspects, powers, and

peculiarities. Our thoughts turn to the sea. We hear in fancy the rippling of the tide, or the swelling of the surge, and feel upon our cheek its fresh and invigorating gales. We accompany the author in his researches on the coasts of Great Britain and Ireland, and venture with him even into the Shetland seas, where "the king of the sea-cucumbers" holds his court. In by-gone times we remember learning from a fragment of some old ballad,

"The herring loves the merry moonlight,
The mackerel loves the wind,
But the oyster loves the dredging song,
For they come of a gentle kind."

Mr. Forbes does not tell us if any of the creatures which he has taken under his patronage partake of the penchant for the dredging song, which is here attributed to the oyster. We would rather surmise, that all which have escaped his pen and pencil are evincing their determination not to permit any prying naturalist "to draw their frailties from their dread abode," for we believe that the researches of succeeding naturalists have not as yet added even one species of Echinodermata to those which Mr. Forbes has recorded.

In other departments of zoology, traditionary lore and superstitious feelings have made certain animals be regarded with some degree of reverence, or avoided with some infusion of awe. It is curious to find, that even to the Radiate animals, though so low in the scale of being, something of the same kind of superstitious dread has been extended. Thus we are told,—

"The Common Brittle-star often congregates in great numbers on the edges of scallop-banks, and I have seen a large dredge come up completely filled with them; a most curious sight, for when the dredge was emptied, these little creatures, writhing with the strangest contortions, crept about in all directions, often flinging their arms in broken pieces around them, and their snake-like and threatening attitudes were by no means relished by the boatmen, who anxiously asked permission to shovel them overboard, superstitiously remarking that 'the things weren't altogether right.'"

The great Sea-Cucumber, we are told, is by the Shetland fishermen arranged

"in an extensive though most unphilosophically constituted class of marine animals, to which they apply the term 'Pushen,' which being translated signifies poison. In this Thulean arrangement numbers of the rarest of British animals are unfortunately included,—I say unfortunately, for all members of the class *Pushen* are unceremoniously and speedily thrust overboard almost as soon as seen in the fishing-boats, being considered unlucky and dangerous in their nature."

The author elsewhere says, in speaking of the common Cross-fish (*Uraster rubens*),—

"Dr. J. L. Drummond of Belfast favours me with the following note on their Irish denomination:—'The Starfishes are called at Bangor (county Down) the *Devil's fingers*, and the *Devil's hands*, and the children have a superstitious dread of touching them. When drying some in the little garden behind my lodgings, I heard some of them on the other side of the hedge put the following queries:—'What's the gentleman doing with the bad man's hand? Is he ganging to eat the bad man's hands, do ye think?'"

We should be glad, did our space permit, to descant on the permanence of certain kinds of traditionary legends among the fishermen of our coasts. Mingling comparatively little with other classes of men, pursuing in companionship with each other their laborious and uncertain calling, they transmit to the succeeding generation the heritage of legendary superstition which they have acquired from the past. We lately noticed a plank covered with the barnacle shells (*Lepas anatifera*) in a living state, cast upon the shore, and upon asking what they were of a hoary fisherman who was expounding their nature to a circle of attentive listeners, we were told that they were the shells that gave birth to the barnacle goose, and with a gracious condescension fitted to our seeming ignorance, he offered to point out the bill and feathers of the future bird. We must own we take a great pleasure in listening to these old stories, and in viewing the simple and industrious race among whom they are current. To the humble but hardy companions of his dredging labours, Mr. Forbes has not been inattentive. While studying the marine productions which the dredge brought to light, he has not neglected the men, by whose exertions they were procured. And this habit we know has not been suffered to slumber during his recent visit to the Ægean, for we have seen a letter to a friend, in which he says, "The scenery in many of the islands was very picturesque, the people in all most interesting; and the inquisitive, speculative, and news-knowing spirit of the old Greek is the same now as in the days when it was caricatured by Aristophanes."

Our author would seem to be one of those who believe "it is good to be merry and wise," for mirth and wisdom seem at times to dispute the possession of his pages, or rather we should say to hold them as joint and friendly occupants. Matters of high interest in the history or œconomy of the animal are served up to us in so humorous a style, that there are pages in the 'History of British Starfishes' which we would be half inclined to prescribe as "a cure for the heart-ache." Thus, under the head of *Ophiocoma punctata* we have the following paragraph:—

"The stomachs of fishes are often zoological treasuries. The Haddock is a great conchologist. In his travels through the country of the Mermaids, he picks up many curiosities in the shell way. Not a few rare species have been discovered by him; and the ungrateful zoologist too frequently describes novelties without an allusion to the original discoverer. As Haddocks are not in the habit of writing pamphlets or papers, the fraud remains undiscovered, greatly to the detriment of science: for, had the describer stated to whom he was indebted for his specimen, we could form some idea of its habitat and history, whether littoral or deep sea,—very important points in the œconomy of Mollusca,—important not only to the malacologist, but also to the geologist. Like the Haddock, the Cod also is a great naturalist; and he, too, carries his devotion to our dear science so far as occasionally to die for its sake with a new species in his stomach, probably with a view to its being described and figured by some competent authority. The Cod is not so much devoted to the Mollusca as to the Echinodermata; and doubtless his knowledge of the *Ophiuræ* exceeds that of any biped. He has a great taste for that tribe. It was a Cod that communicated the pretty little species I am about to describe, to my friend Mr. Henry Goodsir, at Anstru-

ther; and, as far as that gentleman could learn, it would appear the industrious animal had observed and entrapped this new *Ophiocoma* in the North Sea near the Dogger Bank.

And as a worthy companion to this picture, we present one of the *Luidia fragilissima* :—

“It is the wonderful power which the *Luidia* possesses, not merely of casting away its arms entire, but of breaking them voluntarily into little pieces with great rapidity, which approximates it to the *Ophiuræ*. This faculty renders the preservation of a perfect specimen a very difficult matter. The first time I ever took one of these creatures I succeeded in getting it into the boat entire. Never having seen one before, and quite unconscious of its suicidal powers, I spread it out on a rowing bench, the better to admire its form and colours. On attempting to remove it for preservation, to my horror and disappointment I found only an assemblage of rejected members. My conservative endeavours were all neutralized by its destructive exertions, and it is now badly represented in my cabinet by an armless disk and a diskless arm. Next time I went to dredge on the same spot, determined not to be cheated out of a specimen in such a way a second time, I brought with me a bucket of cold fresh water, to which article Starfishes have a great antipathy. As I expected, a *Luidia* came up in the dredge, a most gorgeous specimen. As it does not generally break up before it is raised above the surface of the sea, cautiously and anxiously I sunk my bucket to a level with the dredge's mouth, and proceeded in the most gentle manner to introduce *Luidia* to the purer element. Whether the cold air was too much for him, or the sight of the bucket too terrific, I know not, but in a moment he proceeded to dissolve his corporation, and at every mesh of the dredge his fragments were seen escaping. In despair I grasped at the largest, and brought up the extremity of an arm with its terminating eye, the spinous eyelid of which opened and closed with something exceedingly like a wink of derision.”

The following extract is of a different character, and needs not our introduction. Its philosophic spirit will commend itself to our readers :—

“The tracing of the connections between species and species, through minute differences combined with general resemblances, is one of the greatest pleasures which enliven the studies of the naturalist. Every here and there in organized nature we find creatures presenting the forms of one species, and the structure of another, filling up a supposed blank, or overturning a supposed barrier. The discovery of such forms frequently annihilates genera which we had long considered fixed, or brings together species which we had long looked upon as but doubtfully related to each other. There are men who affect to look down on the investigator of ‘mere species,’ who, with patronizing self-sufficiency, talk of the ‘humble observers of minute differences of forms,’ and who scarcely rank the recorder of new animals or plants above the mere collector or virtuoso. Yet such persons affect perfectly to understand the great laws of nature; and will write on what they are pleased to term the philosophy of natural history, often without the knowledge of a single form or structure save from a picture in a book. The humility which the knowledge of the abundance of undiscovered things teaches the practical naturalist, prevents him retorting on such would-be philosophers; and knowing how little we yet know, he scarcely ventures to pronounce any law general. He knows too well that the conclusion he drew in the morning is often overturned by the discovery he makes in the evening, to pronounce himself the lawgiver of nature; yet also knowing, from

the perfection of all he sees around him, that the machinery of nature is perfect, and hoping the laws of that machinery discoverable, he points out the indications of those laws wherever he perceives a glimpse of their influence, and works as trustfully towards the development of the truth."

And although our quotations have extended to great length, we cannot withstand the gratification of giving to our readers the concluding paragraph. It breathes a spirit which the pious and philosophic naturalist will ever appreciate :—

" Among the British Echinodermata we have seen some of the most extraordinary forms in the animal kingdom, some of the most wonderful structures and of the strangest habits. Much yet remains to be done towards their elucidation, and the investigation of them both structurally and formally presents a wide field of inquiry to the student of Nature, as yet but imperfectly explored. The great naturalist of Denmark, Müller, long ago said that we need not resort to distant regions and foreign climes for rare or wonderful creatures; that the fields, the woods, the streams, and the seas of our native lands abounded in wondrous evidences of God's power and wisdom. The investigation of our native animals must ever be a chief source of sound zoological knowledge, for it is there only we can watch, under favourable circumstances, for the observation of their development, their habits, and their characters. The naturalist whose acquaintance is confined to preserved specimens in a cabinet, can form but a vague idea of the glorious variety of Nature, of the wisdom displayed in the building up of the atoms of matter to be the houses of life and intellect. And unless we study the creatures living around us, how can we gain that delightful knowledge? The passing note of an animal observed during travel is an addition to science not to be scorned; the briefly characterizing of a new species from a preserved specimen, if done with judgement, is of importance; but the real progress of natural history must ever depend on the detailed examination of the beings gathered around us by the laws of geographical distribution, living and multiplying in their destined homes and habitats."

Our extracts have extended to such a length, that we are unable to notice as they deserve the numerous wood-cuts with which the work is illustrated and embellished. They may be divided into three classes. First, the representation of each of the sixty-three species described in the work, with magnified drawings of such parts as serve to convey a better idea of the specific distinctions or peculiarities of structure. The author says in the introduction, " with three exceptions the figures of species are from my own drawings, and with a view to secure correctness were mostly drawn on the wood by myself."

" The wood-cutting," he remarks, " speaks for itself,—thanks to Mr. Bastin, who in the most praiseworthy manner made himself acquainted not merely with the drawings, but with the texture and appearance of the animals themselves, in order the better to express them."

Next in order we may mention those which may be regarded as embellishments, including under this title the poetical or allegorical designs which appear at the commencement of the several orders, and those which are technically known as " tail-pieces." Some of the latter are replete with humour, and will be sure to find favour with every admirer of Bewick. The third division of the illustrations is of a kind peculiar to the present work, and well fitted to increase the

interest with which it is read. They consist of a series of views of many of the localities in these kingdoms where researches among the Echinodermata have been conducted. Thus we have from the Isle of Man, Breda Head, the ruins of Peel Castle, and those of St. Germain's Cathedral. On the English coast we have Scarborough and Tyne-mouth. On the Irish, Belfast Bay. On the Scotch, St. Andrew's Castle, the Kyles of Bute, &c. These vignettes in general represent scenery which is in itself picturesque; some of them are perfect gems—as for example, that of the Frith of Forth, with the Bass Rock and North Berwick Law, and that of Holy Loch, in the Clyde district, during a squall,—all are deserving of commendation, and furnish exquisite examples of the perfection which the art of wood-engraving has now attained. The woodcuts alone are worth, at a very moderate computation, more than the publication price of the entire volume.

A General History of Animalcules. By A. Pritchard. Part I. London, Whittaker.

We have already had occasion to notice this work in a former Number of this Journal, and we have now much pleasure in informing our readers that Mr. Pritchard has thought it expedient to publish the plates of this work, containing upwards of 3500 beautiful figures illustrative of each genus of Infusoria, described by Ehrenberg in his large work in a separate form. In no branch of natural history are drawings of the subjects more requisite, and there is no doubt, from microscopes being now in the hands of almost all lovers of natural history, and Infusoria being generally the first things which attract the attention of the observer, that this work will meet with great approbation, especially as it leaves nothing to be desired with respect to price, the cost of each plate, containing upwards of fifty subjects, not amounting to sixpence. The whole is accompanied by a general history of Animalcules, with their localities, best mode of capture, and method of examining them under the microscope, &c.

Books received.

The Naturalist's Library:—Ornithology, vol. xiii. *The Nectarinidæ*, or Sun Birds. By Sir W. Jardine.

Thirty-six volumes of the Naturalist's Library are now published, viz. :—

Of Ornithology, 13 vols.

Of Ichthyology, 3 vols.

Of Entomology (complete), 7 vols.

Of Mammalia (complete), 13 vols.

There will be forty volumes in all. The remaining four will include British Fishes in 2 vols., and the concluding portions of British Birds and the Fishes of Guiana. These are confidently expected by Midsummer.

History of British Birds. By William Yarrell, F.L.S., &c. Part 34. Dec. 1842. 8vo. Van Voorst.

This Part commences the *Laridæ*, and completes the descriptions

of the Terns, of which ten species are introduced belonging to our native list. The most interesting species to the British ornithologist is the *Sterna Leucopreia*, for species of which, killed in the end of August at Lyme on the Dorsetshire coast, Mr. Yarrell is indebted to T. C. Heythem, Esq. of Carlisle.

Transactions of the Royal Society of Edinburgh. Vol. xv. Part 2.
Session 1841-42, Dec. 1842. 4to. Grant and Son.

An unusually thin number, containing only sixty-nine pages; but we have among the contents two papers relating to zoology and botany, both of them illustrated with plates, of the first we have given an abstract at page 126 of the present Number. The second paper alluded to, is on the ultimate secreting structure, and on the laws of its function, by John Goodsir. The conclusions arrived at by the author are: "That all the true secretions are formed by a vital action of the nucleolated cell, and that they are first contained in the cavity of that cell; that growth and secretion are identical,—the same vital process under different circumstances.

Preparing for Publication.

Supplement to Dr. Parnell's Grasses of Scotland, including the Cereal Grain, making the British Grasses complete.

We have much satisfaction in learning that the results of Captain Belcher's Voyage in H.M.S. Sulphur are to be made available to science in the most advantageous manner, Government having advanced a sum of money to provide the requisite illustrations. Richard Brinsley Hinds, Esq. has been appointed by the Admiralty to edit and superintend the publication, and the co-operation of Mr. J. E. Gray, Dr. Richardson, Mr. Gould, &c., has been obtained by that gentleman, to describe respectively the mammalia, fish, birds, &c., the shells being undertaken by himself.

The work is to be published in parts, and at a moderate price.

Part XI. of Taylor's Scientific Memoirs, just published, contains Ehrenberg's important memoir on the Animals of the Chalk Formation.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Feb. 8, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

Some notes on the habits of the Horned Screamer (*Palamedea cornuta*, Linn.), by William Martin, Esq., Secretary to the Clifton Zoological Gardens, were read.

These notes were communicated by the President, the Earl of Derby, and are drawn up from observations made upon a specimen of the *Palamedea* living in the Clifton menagerie.

"The Horned Screamer was presented to the Society early in June 1839, by Capt. Rees of Bristol. On its arrival in this country it was exceedingly thin and weak. It had been fed during the voy-

age principally upon Indian corn, but had a little chopped boiled meat occasionally. The weather being very mild, it was placed in a turfed aviary, used generally for pheasants, some water-cresses and other aquatic plants being procured; but it was soon evident that we had not discovered a proper substitute for its natural food. Thinking one day that it manifested a desire to get at some roses which were trained upon the aviary, I gave it one of the flowers, which it ate eagerly. It was then thought, that, as it was so domesticated and familiar, the feathers of one wing should be cut, and the bird turned loose into the garden and watched, to see what plants it would prefer. The rose-trees were the favourite plants, the flowers, young shoots and leaves being eagerly eaten. Since this time it has always been turned out every morning in mild weather to roam about the garden, and it is very fond of creeping up close to the gardeners, and watching them at work, although it does not appear to be from any desire to obtain worms or insects. It seldom wanders very far from its aviary, and in the afternoon is always found waiting to be let in. In winter it is allowed its liberty in the parrot aviary, which is heated by one of the Arnott stoves, and close to which it may generally be found. Even in moderately sharp weather, if it be dry, we find it better to let it go out for a short time; but then, instead of creeping leisurely about, it bustles off to its favourite plants, and very soon returns; but it will not bear confinement in a cage. At the present time *lettuce* is its principal food, but it has also Indian corn, hemp-seed, sopped bread, and a little boiled sheep's head. Small stones seem also necessary, and it is very fond of swallowing small pieces of the coal used in the stove, which is anthracite. Owing to the difficulty and expense of procuring a sufficient quantity of lettuce during the frost of last winter and that of the year before, the poor bird became very thin and weak, but quickly rallied upon again getting this food. In the summer, when on the lawns, it will eat grass, which it chips off with its beak in a very singular manner. I have tried it several times with a frog, but it has always been refused. When we first had it the horn upon the head was about four inches long; but as it used to stand so close to the stove, it became burnt down to about an inch, and is now grown again considerably.

“The spurs upon the elbows of the wings are nearly two inches long, and of amazing strength and hardness; they are truly formidable weapons. We have several varieties of dogs, which are kept in single kennels, in different parts of the garden, but they always retreat upon the approach of the Screamer; and whilst the bird continues close, nothing will induce them to come out, at least those that have once felt the spur. I have several times seen it standing close to a door of a kennel, with its head erect and looking very proud, making a sound which one could only look upon as a challenge to the dog to come forth. As the mode of attack is so sly and unexpected, none are at first prepared for it. Throwing its neck and head backwards and forwards, and uttering at the same time a low note, it advances sideways up to the dog, and when close enough turns half-way round, and quietly raising its wing, delivers such a

blow that no dog that we have will face it a second time. It is not meant that a dog could not be made to resent such an attack, but only that of their own accord they seem unwilling to do so.

“It is, however, exceedingly familiar, and would become attached to any one that would notice it kindly, and with me will often make a kind of purring noise when being patted and caressed. Still I have seen it run after children when they have been teasing it.

“On one or two occasions it has recovered the use of its wing sooner than expected, but it never flew beyond the garden—alighting upon the top of its aviary, flying off again, wheeling round in a circle and returning. In their wild state I should consider these birds good flyers; their long wings and light bodies, with a most complete apparatus of external air-cells, would conduce to that result. I hardly know why it should be called a screamer; no noise that I have ever heard it make could be called a scream. It has certainly a tolerably sharp cry, and also a lower note or cry, somewhat resembling the trumpet-note of a peacock, but not so loud; both appear to be notes of pleasure and satisfaction, and may generally be called forth in the following manner. If for instance the bird is on the lawn, and any of those known to it should pass close by, it will utter one or two of the lower notes, and if encouraged by the person endeavouring to imitate the same note, it will utter two or three more, and finish with one of the shrill notes; it will then often lie down to be patted and caressed. Its walk is rather ludicrous, partaking both of stateliness and awkwardness. The head is carried high and well, but as its toes are so long it is compelled to raise each foot very high, in order to get it clear of the other, and this produces the appearance described. In standing, the toes of one foot are crossed a good deal over those of the other.

“It has evidently more confidence in man, and seems also to have more intelligence than most birds.”

The reading of Professor Owen's memoir on the Myology of the *Apteryx* was continued.

Mr. Gould then brought before the notice of the Meeting some additional ornithological novelties from Australia, and characterized an *Artamus*, conspicuous for the white colouring of the rump, as

ARTAMUS LEUCOPYGIALIS. *Art. capite, guld, et dorso fuliginoso-cinereis; pectore, partibus inferioribus, et uropygio albis; rostro pallide cæruleo-cinereo.*

Head, throat and back sooty grey; primaries and tail brownish black, washed with grey; chest, all the under surface, and rump, pure white; irides brown; bill light bluish grey at the base, black at the tip; legs and feet mealy greenish grey.

Total length, $5\frac{1}{2}$ inches; bill, $\frac{1\frac{3}{8}}{16}$; wing, $5\frac{1}{8}$; tail, $2\frac{1}{2}$; tarsi, $\frac{5}{8}$.

Hab. Australia.

A new *Pitta*, being the third species of that form from the Australian continent, as

PITTA IRIS. *Pitt. capite, collo, pectore, abdomine, lateribus, et fe-*

moribus nigerrimis; fasciâ superoculari, ad occiput ductâ ferrugineâ; corpore suprâ, alisque ex aureo viridibus, humeris metallice cæruleis et fasciâ inferiore lazulinâ ornatis.

Head, neck, breast, abdomen, flanks and thighs deep velvety black; over the eye, extending to the occiput, a band of ferruginous brown; upper surface and wings golden green; shoulders bright metallic cærulean blue, bordered below with lazuline blue; primaries black, passing into olive-brown at their tips; the third, fourth, fifth and sixth having a spot of white about the centre of the feather; tail black at the base, green at the tip, the former colour running on the inner web nearly to the tip; rump-feathers tinged with cærulean blue; lower part of the abdomen and under tail-coverts bright scarlet, separated from the black of the abdomen by yellowish brown; irides dark brown; bill black; feet flesh-colour.

Total length, 7 inches; bill, $1\frac{1}{8}$; wing, 4; tail, $1\frac{3}{4}$; tarsi, $1\frac{1}{2}$.

Hab. Cobourg Peninsula, north coast of Australia.

Mr. Gould then pointed out the generic characters of two new genera of Finches, the first of which he proposed to designate

Genus EMBLEMA.

Rostrum ferè quàm caput longum, conicum (ut in genere *Ploceus*).

Alæ mediocres; remige primâ parvulâ, quatuor proximis inter se æqualibus; tertiariis elongatis. *Cauda* mediocris, et ferè quadrata, vel paululùm rotundata. *Pedes* plantigradi, digitis gracillimis; digito intermedio externis longiore, illis inter se æqualibus.

EMBLEMA PICTA. *Emb. facie et gulâ saturatè miniaceis; vertice et corpore suprâ fuscis; pectore et corpore subtùs nigris crebrè albiguttatis, abdomine medio miniaceo adperso.*

Face and throat deep vermilion red; the base of all the feathers of the throat black, giving that part a mingled appearance of black and red; crown of the head, all the upper surface and wings, brown; rump deep vermilion-red; tail dark brown; chest and all the under surface jet-black, the flanks numerously spotted with white, and the centre of the abdomen dashed with vermilion-red; feet light red; upper mandible black, under mandible scarlet, with a triangular patch of black at the base.

Total length, $3\frac{1}{8}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{1}{4}$; tail, $1\frac{5}{8}$; tarsi, $\frac{5}{8}$.

Hab. The north-west coast of Australia.

From the collection of B. Bynoe, Esq.

And the second,

Genus POËPHILA.

Gen. char.—*Rostrum* ad basin tumidum, et igitur ferè tam latum et profundum quàm longum. *Alæ* mediocres, remige primâ parvulâ, secundâ tertiâ quartâ et quintâ inter se ferè æqualibus; digitis gracilibus, medio externis longiore, illis inter se æqualibus; digito postico, medio valdè brevior. *Cauda* cuneiformis, rectricibus duabus intermediis productis.

This form is nearly allied to *Erythura* and *Estrelda*.

Type, *P. acuticauda* (*Amadina acuticauda*, Gould in Proc. Zool. Soc., Part VII. p. 143).

POËPHILA PERSONATA. *Poë. rostro ad basin fasciâ irregulari nigerrimâ circumdato, vertice, dorso, alis, caudâque pallidè cinnamomino-fulcis.*

Base of the bill surrounded by an irregular ring of deep velvety black; crown of the head, upper surface and wings, light cinnamon-brown; lower part of the abdomen banded with deep velvety black; lower part of the rump and under tail-coverts white; upper tail-coverts white, striped longitudinally with black on the outer side; tail graduated, and of a deep blackish brown; irides red; bill bright orange; legs and feet flesh-red.

Total length, $3\frac{1}{8}$ inches; bill, $\frac{3}{8}$; wing, $2\frac{1}{4}$; tail, 2; tarsi, $\frac{9}{16}$.

Hab. The northern parts of Australia.

Mr. Gould then characterized two new species of the genus *Ptilinopus*, Swainson, as *P. Swainsonii* and *P. Ewingii*; the first in honour of the founder of the genus, and the second in honour of the Rev. T. J. Ewing, of Van Diemen's Land.

PTILINOPUS SWAINSONII. *Ptil. fronte et vertice splendide coccineis, hoc colore lineâ angustâ flavâ nisi apud frontem cincto; pectore sordidè viridi, singulis plumis ad apicem bifidis, more furculæ, cujus apices maculâ triangulari argenteo-cinereâ notantur; abdomine medio aurantiaco; caudæ apice latè flavissimo.*

Forehead and crown deep crimson-red, surrounded, except in front, with a narrow ring of light yellow; back of the neck greyish green; all the upper surface bright green tinged with yellow, the green becoming deep blue towards the extremities of the tertiaries, which are broadly margined with yellow; primaries slaty grey on their inner webs, green on the outer, very slightly margined with yellow; tail deep green, largely tipped with rich yellow; throat greenish grey, stained on the chin with yellow in some specimens; in others the chin is white; breast dull green, each feather forked at the end, and with a triangular silvery grey spot at either extremity; flanks and abdomen green, with a large patch of orange-red in the centre of the latter; under tail-coverts orange-yellow; thighs green; irides reddish orange; bill greenish black, horn-colour at the tip; feet olive-brown.

Total length, 9 inches; bill, $\frac{5}{8}$; wing, $5\frac{3}{4}$; tail, $3\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. The brushes of the River Clarence and Moreton Bay.

PTILINOPUS EWINGII. *P. fronte et vertice roseis, hoc colore lineâ flavâ nisi ad frontem cincto; pectore virescenti-cinereo plumis bifidis, et ad apicem pallidè cinereis; fasciâ infra pectorali pallidè sulphurè; abdomine medio saturatè aurantiaco, cum lunulâ centrali helvo-cæruleâ; caudæ rectricibus ad apicem flavis, non sine tincturâ viridi presertim in rectricibus duabus intermediis notandâ.*

Forehead and crown of the head rose-pink, bordered, except in front, by a narrow line of yellow; back of the head and neck greenish grey; all the upper surface bright green, passing into deep blue on the tertiaries; primaries, secondaries and tertiaries slightly margined with yellow; tail largely tipped with yellow tinged with green, particularly on the two centre feathers; chin pale yellow; sides of

the neck and chest greenish grey, each feather forked at the end and tipped with grey; below the chest an indistinct band of sulphur-yellow; flanks and lower part of the abdomen green; centre of the abdomen rich orange, in the middle of which is a lunar-shaped mark of lilac; under tail-coverts orange; thighs and tarsi green; irides reddish orange; feet olive.

Total length, $7\frac{3}{4}$ inches; bill, $\frac{3}{4}$; wing, $4\frac{5}{8}$; tail, 3; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

Mr. Gould next instituted a new genus among the *Columbidæ*, under the appellation of

Genus GEOPHAPS.

Gen. char.—*Rostrum* perbreve et robustum. *Oculi* cute denudatâ circumdati. *Alæ* perbreves et rotundatæ, apicibus latis. *Tarsi* mediocres digitis longiores. *Digitus* internus paululùm cæteris longior.

Of this form a new species was described as

GEOPHAPS PLUMIFERA. *Geo. capite cristâ occipitali ornato; hâc sic et vertice, colli lateribus, pectore et alarum paginâ inferiore pallidè ferrugineis; gulâ alternatim albo nigroque fasciato; pectore lunulis duabus albis inter se junctis cuspidemque mediam efficientibus, ornato.*

Lores and orbits naked, and of a yellowish red; head furnished with a lengthened occipital crest, which, with the crown, sides of the neck and chest, and under part of the wing, is light ferruginous; chin black; throat banded alternately with white and black, the latter colour extending to the ear-coverts; on the chest two semilunar marks of white, which, meeting, form a point in the centre; middle of the abdomen light buff; under tail-coverts brown, with lighter edges; back of the neck, back, rump and upper tail-coverts, rufous brown; wings light ferruginous, with the basal half of the feathers silvery grey, the two colours separated by a transverse band of black; primaries rufous brown; secondaries rufous brown, with a large patch of bronzy purple towards their tips; tail black; bill black; feet reddish brown.

Total length, 7 inches; bill, $\frac{3}{4}$; wing, $3\frac{1}{8}$; tail, $2\frac{5}{8}$; tarsi, $\frac{7}{8}$.

Hab. The north-west coast of Australia.

From the collection of B. Bynoe, Esq.

A second genus of this tribe of birds was then characterized as

Genus OCYPHAPS.

Gen. char.—*Caput* cristâ occipitali elongatâ. *Alæ* paulò breves, remige tertiâ gradatim ad apicem coarctatâ. *Cauda* mediocritèr elongata, et rotundata. *Tarsi* et digitus intermedius eadem longitudine. *Digitus* internus externo brevior.

Type, *Columba Lophotes*, Temm.

A second example of the genus *Pedionomus* was described as

PEDIONOMUS MICROURUS. *Ped. à P. Torquato diversus, staturâ minore, collo haud torque circumdato, caudâ ferè carente.*

Crown of the head, back and upper surface mottled with black,

brown, and fawn-colour, the latter occupying the external edge of the feathers, and the black and brown forming alternate circular markings on each feather; throat, neck, chest and flanks dull fawn-colour; the feathers of the neck and chest blotched with brown; flanks marked with the same colour, assuming the form of bars; tail-feathers, which are almost invisible, marked the same as the back; centre of the abdomen and the under tail-coverts buffy white, without spots or markings; irides straw-yellow; bill yellow, passing into black at the point; feet greenish yellow.

Total length, $4\frac{1}{2}$ inches; bill, $\frac{1\frac{1}{8}}$; wing, $3\frac{1}{4}$; tarsi, $\frac{7}{8}$.

The above are the measurements of an old male.

Hab. Plains of the interior of South Australia.

Differs from *P. torquatus* in its smaller size, in the absence of the collar, and in the almost total absence of tail.

Mr. Gould also brought before the notice of the Meeting a new species of *Megapodius*, from the north coast of Australia, which he characterized as *M. Tumulus*, and read a very interesting account of its habits, which tends to confirm the opinion he had previously expressed, that *Megapodius Talegalla* and *Leipoa* form part of one great family of birds, whose range will be found to extend from the Philippines to Australia.

MEGAPODIUS TUMULUS. *M. capite, et cristâ saturatè cinnamomino-fuscis; nuchâ, et corpore subtùs saturatè cinereis; dorso, alisque cinnamomino-fuscis; tetricibus caudæ, crissoque saturatè castaneis; pedibus permagnis.*

Head and crest very deep cinnamon-brown; back of the neck and all the under surface very dark grey; back and wings cinnamon-brown; upper and under tail-coverts dark chestnut-brown; tail blackish brown; irides generally dark brown, but in some specimens light reddish brown; bill reddish brown, with yellow edges; tarsi and feet bright orange, the scales on the front of the tarsi, from the fourth downwards, and the scales of the toes dark reddish brown.

Total length from 15 to 17 inches; bill from $1\frac{1}{8}$ to $1\frac{1}{4}$; wing from $9\frac{1}{2}$ to 10; tail from 4 to $4\frac{1}{2}$; tarsi from $2\frac{1}{2}$ to $3\frac{1}{8}$.

Hab. Cobourg Peninsula, on the north coast of Australia.

GEOLOGICAL SOCIETY.

Feb. 23, 1842.—A memoir was read, entitled, "Report on the Missouriium now exhibiting at the Egyptian Hall, with an inquiry into the claims of the *Tetracaulodon* to generic distinction," by Richard Owen, Esq., F.G.S., &c.

Mr. Owen proceeds to consider the species of animal to which the skeleton is to be referred. It was, he says, a mammiferous animal, and while the anterior extremities disprove the existence of clavicles, they establish that the fossil belonged to the Ungulata. The enormous tusks of the upper jaw further show that it was a member of the proboscidean group of Pachyderms, and that the molar teeth prove it to be identical with the *Tetracaulodon* or *Mastodon giganteum*. With respect to the horizontal position of the

tusks in the skeleton exhibited at the Egyptian Hall, Mr. Owen states, that it may have arisen from compression, the tusk of the Mastodon, like that of the Elephant, being inserted by a nearly straight cylindrical base in a socket of corresponding form, and can be rotated in any given direction when the natural attachments are destroyed by decomposition; and he alludes to the skeleton exhibited in London in 1805, in which the tusks were bent downwards.

Having, by a series of comparisons of the teeth and bones, which the author does not conceive it necessary to recount, arrived at the conclusion that the *Missourium* is either a *Tetracaulodon* or [a] *Mastodon*, he next considers the relations in which these supposed distinct genera stood to each other; premising that Mr. Koch's skeleton illustrates the osteology of the gigantic Mastodon far more completely than has been done by any other collection of North American fossils brought to Europe. The genus *Tetracaulodon* was founded by Dr. Godman on the lower jaw of a young Proboscidean having two tusks projecting from the symphyseal extremities. Mr. W. Cooper of New York, however, suggested that the *Tetracaulodon* was nothing but the young of the gigantic Mastodon, and that the tusks were lost as the animal became adult. This opinion has been also advanced by others, but without being illustrated by any analogies; and it has been opposed by Dr. Isaac Hays, in an elaborate memoir on additional specimens, which he states present all the proofs necessary for refuting the opinion that Dr. Godman had committed the error of describing as a new animal the young of a known species; and he observes with respect to Mr. Titian R. Peale's suggestion that the lower tusks might be only a sexual distinction, "that it is impossible in the existing state of our knowledge, and with our present materials, to confirm or positively refute this suggestion." The most recent opinion on the subject, Mr. Owen states, is contained in the last edition of the '*Ossemens Fossiles*,' in which M. Laurillard, after alluding to the opinion that the lower jaws with tusks may be immature Mastodons, proceeds to say, "others have been led to believe that the lower jaws of every age which have tusks belong to a different species of large Mastodon: some characters taken from the form of the jaw would seem to justify that opinion."—*Oss. Foss.* 8vo. vol. ii. p. 373, 1836.

Mr. Koch's collection of detached bones contains, Mr. Owen states, a number of lower jaws with the molars of *Mastodon giganteum*, which prove the important fact, that an animal of the same size and molar dentition as the Mastodon was characterized in the adult state by a single tusk projecting from the symphyseal extremity of the right ramus, and that the two inferior tusks are manifested only by immature animals.

Mr. Owen then details the evidence by which he arrived at the conclusion that the *Tetracaulodon* of Dr. Godman is the immature state of both sexes of the *Mastodon giganteum*, that in the adult male only one of the lower tusks is preserved, and that in the adult female both are wanting.

A table is given in the memoir of the measurements of six lower

jaws of full-grown animals; three which retained the right tusk or exhibited its socket, and three in which the tusk was wanting, and the socket more or less obliterated; and Mr. Owen says that the dimensions prove the close similarity in size and proportions between the lower jaws of Mastodons with and without the tusks; and further that no individuals of the same species could resemble each other more closely in the conformation of the molar teeth. In both, the inner boundaries of the molar series are parallel, and the interspace is of the same breadth: the general form of the ascending ramus and the symphysis, the place and size of the great foramina for the dental nerves and vessels, are alike. The only differences consist in the *Tetracaulodon** having larger condyles, and the outer side of the horizontal ramus being less convex and prominent; the coronoid process also is higher; and the broad canal, which is impressed upon the upper part of the symphysis, is nearly straight, not sloping down to the deflected part as in the Mastodon; but the breadth of the canal is the same in both, though the symphyseal part of the jaw is larger and broader in the *Tetracaulodon* than Mastodon. These differences, Mr. Owen observes, may relate to the additional motions of the lower jaw, connected with the uses to which the incisor may have been put.

The incisor in full-grown *Tetracaulodons* or male Mastodons is a comparatively small, cylindrical and straight tusk, projecting forwards and a little downwards; its circumference is five inches; the length of the projecting part of the most entire of three specimens was five inches, but an unknown portion had been broken off; the socket was three inches in depth, uniformly one and a half inch in diameter, and slightly concave at its termination.

With regard to these incisor teeth and the importance attached to them as a generic distinction, Prof. Owen says, it must be remembered that in many species, both of Cetacea and Pachyderms, incisors as well as canines vary in relation to the age and sex of the same species of animal. In the male Dugong the upper incisors are protruded, scalpriform, and of unlimited growth, while in the female they are concealed, cuspidate, and solid to their base. In both sexes the lower jaw is provided at its deflected extremity with six incisors, which disappear in mature animals, only one or two remnants being occasionally discoverable in the cancellous sockets. In many of the Hog tribe, incisors are present in the young animal, but are lost in the full-grown. The most remarkable case, Mr. Owen says, of distinct conditions of incisors, teeth or tusks, relative to age and sex, is in the Narwhal. In this animal the young of both sexes have equally developed on each side of the upper jaw a single tusk, one of which grows rapidly in the male, constituting the well-known long, spirally twisted tusk, while the other remains stationary; but both continue rudimental in the female.

Were the Dugong and the Narwhal extinct, and to be judged of only by their fossil remains, the skulls of the two sexes of the herbivorous cetacean, viewed irrelatively, would doubtless, Mr. Owen

* The author retains the term *Tetracaulodon* in his description for the male Mastodon.

observes, be referred to two distinct species, though the identity in the molar teeth might impress the more cautious palæontologist with a strong suspicion of their generic identity; but the cranium of the male Narwhal, with its unsymmetrical distortion, increased by an enormous tusk, would, it can scarcely be doubted, be referred to a genus of Cetaceans quite distinct from that which the edentulous and more symmetrical skull of the female would be considered to represent.

In determining the real nature of differences in these extinct animal remains, Mr. Owen says it is necessary to inquire what other modifications are associated with those of the tusks;—are the more essential parts of the dental system, as the grinding teeth, alike or different in the jaws with tusks and without tusks? Do the jaws themselves and the other parts of the skeleton offer the modifications of form which usually attend distinction of species? Above all, are the same characters presumed to distinguish the genera, present in the young as in the adult skulls? are there, for example, young Mastodons as well as young Tetracaulodons?

The youngest of five full-grown Tetracaulodons or male Mastodons, examined by him, had two molars and half of a third developed in each ramus; the first or antepenultimate having three transverse ridges, each divided into two tubercles; the second also three bicusped ridges; and the third two ridges extricated, and two others within the alveolar cavity. In the next jaw in the order of development, the third ridge of the last molar was extricated; in the third specimen the antepenultimate grinder had been shed, and the last molar exhibited the same degree of development; in the fourth jaw the ultimate molar was fully extricated, exhibiting four bicuspidate ridges and a talon; and the fifth or oldest Tetracaulodon retained its penultimate but worn grinders, the two anterior ridges of the last molars being a little abraded, and the talon being developed into a pair of small tubercles.

A series of jaws of female Mastodons (Mastodon proper of Dr. Godman and Dr. Hays) presented the same order of development.

Having already shown that the molar teeth are identical in number and form in the Mastodon and Tetracaulodon, Mr. Owen proceeds to point out their correspondence in the mode and order of succession. The lower jaws of both present, moreover, those characters by which the *Mastodon giganteum* is distinguished from the genus *Elephas*, namely, by the higher coronoid, the less-rounded angle, the straight inferior margin, the parallel inner alveolar border, and the more produced symphyseal extremity. They present, besides, equally the minor characteristic of the sharp process on the inner side of the neck of the condyle, and the ridge continued from the outer side of the neck. Both have an oblong depression on the outside of the coronoid process, but varying in depth in different Tetracaulodons. In both the posterior aperture of the dental canal commences in the same place; and the inner side of the angle of the jaw is concave, and bounded by an irregular margin, indicating the attachment of the fascia covering the internal pterygoid muscle, the irregularity being stronger in the lower jaws of older individuals. The relative position of the principal anterior outlet of the dental canal is the

same in *Tetracaulodon* as in *Mastodon*, varying in both in its relative position to the teeth as these alter their position in age.

When the striking modifications by which the lower jaw of the *Elephant* differs from that of the *Mastodon* are considered, it cannot be supposed, observes Mr. Owen, that no corresponding differences should be present in the lower jaws of the *Mastodon* and of another genus of Proboscideans characterized by a difference in the number of the teeth, and he says, he knows of no analogy in the whole mammalian series that would justify such a belief. *Tetracaulodons* are as numerous in Mr. Koch's collection as *Mastodons*, yet there are not found in it two forms of humeri, ulnæ, radii, femora or tibiæ, only the merest difference of variety being detectable; whilst the femora of the *Elephas primigenius* associated with them are at once recognizable by modifications which might be expected to accompany true generic differences in the rest of the organization. With the exception of a few bones of the *Elephas primigenius*, all the other remains of proboscidian Pachyderms in Mr. Koch's collection, Mr. Owen is of opinion, belong to the *Mastodon giganteum*; and the great skeleton he considers to be that of a male individual, on account of the size of the tusks and the strongly marked external characters of the principal bones of the extremities; but he points out that the lower jaw belonged to a female, and he states that the proprietor acknowledged that it was not discovered with the other portions of the skeleton. The true height of the animal, taken at the dorsal spines, Mr. Owen estimates at ten feet, and the length, from the intermaxillary bones to the end of the sacrum, at sixteen feet, or four more than that of the Asiatic *Elephant* in the Hunterian Museum.

The supposed spinal column of a man fourteen feet high, Mr. Owen refers to the *Lophiodon*: Mr. Koch's collection also includes some interesting remains of the *Mylodon Harlani*, also portions of large species of *Bos*, *Cervus*, &c.

With respect to the use of the lower incisor, Mr. Owen says, if indeed this diminutive inferior tusk were a generic character constantly associated in both sexes with the enormous upper tusks, no explanation could be given of so apparently useless an appendage; but if regarded as a sexual character, there are in the animal kingdom abundant examples of the functional importance of external distinctions in the male; and such he considers to be the explanation of the persistent single or prominent tusk in the male *Mastodon*. Further, with respect to the question why two tusks should be originally developed, especially in the female, in which neither is to be retained, Mr. Owen replies that there is an equal difficulty with respect to the two rudimental tusks in the female *Narwhal*, and of the single one in the male; to the abortive incisors in the symphyseal part of the lower jaw of the *Dugong*; to the rudimental teeth in the lower jaw of the *Fœtal Whale-bone Whale*; and in the upper jaw of the *Sperm Whale*. In these, and many analogous instances, the author observes, a structure which is merely sketched out, and is functionless in one species, is perfected and performs important uses in another closely allied. Thus the teeth which are shadowed forth in

the lower jaw of the Fœtal Whale are fully developed in the Cachalot. The upper rudimentary maxillary teeth which remain hidden in the gum of the Sperm Whale are functionally developed in the Grampus; and in like manner in the gigantic Dinotherium, discovered by Dr. Kaup, is exhibited the full and functional development of the inferior rudimental tusks of the Mastodon.

The molar teeth of the Mastodons offer, Mr. Owen says, a beautiful transitional modification connecting the lamellated structure of the triturating molar with those having simply a transversely-ridged grinding surface. The interval between the molar teeth of the Elephant and those of the Tapir is too great to have allowed their fundamental resemblance to have been detected in the existing creation; but a study of the extinct Pachyderms brings to light, he says, a beautiful series of gradations leading through the elephantoid Mastodon of Ava and the gigantic Mastodon of the Missouri to the Dinotherium, which it may be remembered was the gigantic Tapir of Cuvier. Moreover, he adds, the indication of the singular armature of the lower jaw of the Dinothere might be most closely discernible in that species of Mastodon which makes the nearest approach to the Dinothere in the form of the grinding teeth.

The report from which the above extracts have been taken had been completed when Mr. Owen received a copy of the notice* of Dr. Hays's description of Mr. Koch's collection. After an attentive perusal of this document, in which the generic distinctness of the Tetracaulodon is maintained, Mr. Owen has been only more convinced of the truth of his own theory; he, however, in justice to Dr. Hays, gives the arguments of that esteemed naturalist. Dr. Hays considers the existence of a single tusk in the lower jaw to be only an accidental occurrence, referring, as examples of two tusks, to the specimen described by Dr. Godman, and to that belonging to the Museum of the University of Virginia. Respecting this statement, Mr. Owen observes, that the jaw described by Dr. Godman is that of an immature individual, retaining on the left side the first small molar, and therefore affords no proof of the persistence of the two inferior tusks in the adult animal, or evidence of the accidental nature of the absence of the left tusk in the mature jaw. With regard to the specimen in the cabinet of the University of Virginia, he says, that if this belong to a mature animal it would be an unique specimen, and might be paralleled with cases on record of two projecting tusks in the male Narwhal, and considered by all naturalists to be accidental. Mr. Owen further calls attention to the figure of the specimen in pl. 27. fig. 2. of the Transactions of the American Philosophical Society (vol. iv.), where only the right tusk is represented, the left being merely indicated by a dark spot of corresponding size, of the nature of which the text is silent.

Respecting the symphyisial portion of the jaw exhibiting the alveoli of two tusks, both much smaller than the alveolus of the right tusk in the presumed male Mastodon's jaws of corresponding size, and considered by Dr. Hays to constitute a distinct variety, if not a new species of Tetracaulodon, Mr. Owen considers it to be the jaw of

* Proceedings, American Phil. Soc. October 1841.

a young female Mastodon in which the obliteration of the tusks had not been completed.

A lower jaw without tusks, considered by Dr. Hays to have been a young Mastodon, but with "the chin slightly broken, so that it is impossible to determine whether it had the foliated termination so conspicuous in the adult;" Mr. Owen remarks, that notwithstanding the prominent end of the symphysial part containing the chief portion of the tusk-socket is wanting, yet "two foramina are recognized at the anterior part of the chin," and these, he observes, must be either portions of the alveoli of the tusks, or the canals of the nerves and vessels for the tusks in these alveoli.

Thus, Mr. Owen says in conclusion, all the examples which seemed to show that the genus Mastodon at no period of life possessed tusks in the lower jaw, and that the genus Tetracaulodon was characterized at all periods of life by two projecting tusks in the lower jaw, become invalidated on a close inspection, and enter into the series of facts which support the proposition that the *Mastodon giganteum* has two lower tusks originally in both sexes, and retains the right lower tusk only in the adult male.

BOTANICAL SOCIETY OF LONDON.

November 18th, 1842.—Adam Gerard, Esq., in the Chair.

A paper was read from George Clarke, Esq., of the Island of Mahé, on the *Lodoicea Sechellarum**. The *Lodoicea* of Sechelles is an inter-tropical plant peculiar to the Sechelles Archipelago, where it grows naturally in two islands only, Praslin and Curiense. Praslin lies north-east of Mahé, distant twenty-one miles; Curiense to the north of Praslin, and is much smaller; a deep arm of the sea, from one to two miles in breadth, separates these two islands. They lie between 4° 15' and 4° 21' S. lat. and 55° 39' and 55° 47' E. long. In the other islands of this Archipelago there are but few *Lodoiceas*, which have all been planted, and only two or three appear to thrive. The trunk or stem of the *Lodoicea* is straight, and runs to the height of eighty or ninety feet, terminated by a splendid crown of winged, palmated leaves; it is only from twelve to fifteen inches in diameter, and so flexible that it waves to the slightest breeze. When the wind is moderately strong the huge leaves of this giant palm are clashed together with an astonishing noise. The outside of the stem is very hard and compact, but the interior is soft and fibrous. The leaves, winged and palmated, open like a fan, and in the early growth are more than fifteen feet long, without reckoning the foot-stalk, which is as much more. In the mature trees the leaf-stalk is not more than eight or ten feet long; and the whole leaf does not exceed twenty feet in length by ten or twelve in breadth, and is entirely destitute of thorns.

The nascent leaves are enveloped, till the period of their expansion, by a thick covering of cottony down of a nankeen colour; but this is occasionally wanting. The unanimous testimony of the in-

[* A very interesting account of this plant by Mr. Clarke, illustrated by wood-cuts, will be found at p. 408, vol. vi. of this Journal.—Eds.]

habitants of Praslin proves that each tree produces only one leaf a year, and "as three leaves occupy about eight inches of the trunk, and twenty years expire before that appears above the surface, a tree of eighty feet in height must be about 400 years old." The flowers, about twenty in number, succeed each other one at a time, but occasionally two. The nuts are two-lobed, and sometimes two nuts are enclosed in one husk. Three-lobed nuts are very rare, but some are met with; and it is said that specimens with five lobes have been found. The form of the nut is very singular, and cannot be compared to that of any other production. Two highly remarkable circumstances in the history of the *Lodoicea* are, the duration of its blossoms and the period necessary for maturing its fruits; for the latter, seven or eight years are required. The *Lodoicea* grows in every variety of soil, but delights most in the vegetable mould of the deep gorges of the mountains. It is, nevertheless, found on the bare mountain-tops, and forms a very conspicuous and remarkable object in such situations. It is curious that the vegetation of the nut is prevented by burying it, but if suffered simply to rest on the earth in a situation not too much exposed to the sun, germination readily takes place. The fruit in its unripe state is an agreeable and refreshing aliment; when ripe it yields oil. Its germ furnishes a very sweet food.

November 29.—Sixth Anniversary Meeting. J. E. Gray, Esq., F.R.S., &c., President, in the Chair.

The Report of the Council was read, from which it appeared that thirteen new members had been elected since the last Anniversary, and that the Society consisted of 152 members. The donations to the library had been very considerable.

Many valuable parcels of British and Foreign plants had been received, and the return parcels sent to the members had given the greatest satisfaction.

Mr. Edwin Lees had forwarded an Herbarium of the Malvern Hills, accompanied by many very valuable remarks upon the geographical distribution of the plants of the neighbourhood; and it was hoped next year to report the receipt of other local herbaria now in course of formation for the Society.

Amongst the most valuable parcels received during the past season, may be mentioned a large collection of British plants, from Mr. Hewett C. Watson, comprising upwards of 5500 specimens; also numerous Jersey plants, from Mr. G. H. K. Thwaites; a large collection of Shropshire *Rubi*, from Mr. H. Bedwell; 300 specimens of *Bupleurum falcatum* collected in Essex, from Mr. E. Doubleday; and numerous specimens of *Lastræa cristata*, collected in Norfolk by Mr. B. D. Wardale, and presented by that gentleman.

Numerous specimens of Mosses, Lichens, and Algæ had been received.

Foreign Plants.—These form a valuable part of the Society's collection, and comprise plants from North and South America, British Guiana, New South Wales, Cape of Good Hope, Sierra Leone, China, and various other parts of the world.

The more interesting plants are 350 species collected by Mr. R.

H. Schomburgk in British Guiana; 250 species collected by Dr. F. Krauss in Natal, South Africa; many thousand specimens collected in North America by Dr. Gavin Watson; and numerous species from South America, presented by Dr. C. F. P. von Martius.

The Museum had been enriched by specimens of sections of wood, seed-vessels, barks, &c. &c.; 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.

The Report was unanimously adopted, and a ballot then took place for the Council for the ensuing year, when the Chairman was re-elected President, and he nominated J. G. Children, Esq., F.R.S. and Hewett C. Watson, Esq., F.L.S., Vice-Presidents. Mr. E. Doubleday, M.E.S., Mr. G. Francis, F.L.S., and Mr. J. G. Mitchell, M.E.S., were elected new members of the Council in the room of Dr. Meeson, Mr. G. Cooper and Mr. W. H. White, who retire from the Council in accordance with the rules of the Society.

Mr. J. Reynolds, Mr. G. E. Dennes, F.L.S., and Mr. T. Sansom were respectively re-elected Treasurer, Secretary, and Librarian.

MICROSCOPICAL SOCIETY OF LONDON.

At a meeting of this Society held December 21st, 1842, Professor Lindley, President, in the Chair, a paper was read from the Rev. J. B. Reade, entitled "Microscopic Chemistry, No. 1, on the Existence of Ammonia in Gum, Sugar, and other 'non-azotized bodies.'" A second paper was read by H. H. White, Esq. of Clapham, "On a new species of *Xanthidium* found in flint which he had named *Xanthidium tubiferum aculeatum*," and was characterized by having the tentacula, which were twelve in number, quite pointed and free from any appendages whatever; it measured $\frac{1}{160}$ th of an inch from the extremities of the opposite tentacula, and the specimen was afterwards exhibited to the Society. Arthur Hill Hassall, Esq. then read a paper entitled "Observations on the Production of Decay in Fruit by means of Fungi" (*continued*). The author, after stating that in order to set aside any doubt which might exist of the power of Fungi in producing decay in fruit, he had inoculated sound fruit whilst on the tree, and found that the decay was as rapid as in those specimens which had been previously removed from the tree. He contended that the mere binding of fruit was not sufficient of itself to cause decay, but that the presence either of fungi or of the sporules of fungi was necessary before the decay could take place.

Jan. 18, 1843.—J. S. Bowerbank, Esq., F.R.S., in the Chair. A paper was read from that gentleman "On the Structure of the Shells of Molluscous and Conchiferous Animals*." The researches of the author into the structure of the organic tissue of the *Corallida*, published in the 'Philosophical Transactions,' part 2, 1842, suggested to him the idea of pursuing a similar course of investigation into the nature and origin of the testaceous coverings of the Mollusca and

[* A paper on the Chemical Components of Shells by Dr. Carpenter was read at one of the late meetings of the Royal Society, which we shall notice in a future Number.—Eds.]

Conchifera. He commenced his researches during the spring of 1842, and the first subject for examination was the young cartilaginous lips of the common Garden Snail, *Helix aspersa*; subsequently he has directed his attention to the testaceous coverings of numerous species of adult univalve and bivalve shells. The general results of the examination of the lips of the Garden Snail were as follows:—The newly-formed lip was found to consist of a thin yellow-coloured horny substance, with a number of minute globular vesicles (incipient cytoblasts and cells) in various stages of development, with a nucleus very visible by means of a power of 600 linear in the greater number of them; these cells were most numerous on the inner side of the lip, or that part in contact with the shell; the young shells were transparent, but in the neighbourhood of these there may be seen aggregated together small patches of a deep yellow colour, which appeared as centres of ossification. Besides these other cytoblasts occur, which are developed in the form of tessellated cellular structure, which ultimately form a minute vascular tissue which is imbedded in bands corresponding in their direction with the lines of growth of the shell; as these tissues approached maturity, the periostracum advancing from the old lip covers them and binds the whole firmly together. The examination by transmitted light of thin sections of univalve shells, made by the lapidary, afforded but little information of their true structure; but fractured surfaces at right angles to the outer and inner planes of the shell, and either parallel or at right angles to the lines of growth, when examined by the Lieberkuhn, exhibited three distinct strata uniform in the nature of their structure but alternating in the mode of their disposition: each structure is formed of innumerable plates composed of elongated prismatic cellular structure, each plate consisting of a single series of cells parallel to each other. The structure of bivalve shells is rather more complicated than that of univalves: the interior surface of some specimens exhibits a thin stratum of columnar basaltiform cells at right angles to the natural surfaces of the shell, whilst the upper is dense, uniform, and composed of numerous thin laminae parallel to the natural planes of the shell; in other species the inner surface of about half the substance of the shell is composed of numerous thin calcareous strata, whilst the outer half presents the appearance of numerous basaltiform columnar cells having their planes at right angles to the surface of the shell: several other differences in the arrangement of the cells in other genera were then given. The author went on to describe a minute vascular tissue which embraced some of the elongated prismatic cells and gave them a striated appearance. Minute canals corresponding to the Haversian canals in bone, only much more minute, were also to be seen in some specimens; the author then alluded to the fact that there must be of necessity some vascular connection between the animal and its shell, although he had at present failed in detecting any. He concluded by describing the mode of reparation of injured parts, which was found to be precisely similar to the formation of the new lip in *Helix aspersa*, as before described.

Beautiful figures of the principal structures described accompanied the communication.

ROYAL SOCIETY OF EDINBURGH.

January 9, 1843.—The following communications were read:—

1. "On the Growth of the Salmon;" by Mr. John Young, Sutherlandshire.

Mr. Young has here taken up the subject of the Salmon's growth where it was necessarily left off by Mr. Shaw. So far as the earliest or freshwater state of the fish is concerned, he entirely agrees with the observer just named. He then states the various opinions which prevail regarding the more or less rapid growth of smolts and grilse, and shows by tabular lists (the result of frequently repeated experiments) that the increase in their dimensions is extraordinary so soon as they descend into the salt water. So far back as the months of April and May 1837, he marked a number of descending smolts, by making a peculiar perforation in the caudal fin by means of small nipping-irons constructed for the purpose. He recaptured a considerable number of them ascending the rivers as grilse in the course of the ensuing months of June and July, and weighing several pounds each more or less, according to the difference in the length of their sojourn in the sea. Again, in April and May 1842 he marked a number of descending smolts by clipping off the little adipose fin upon the back. In June and July he caught several of them returning up the river and bearing his peculiar mark, the adipose fin being absent. Two or three specimens were exhibited to the Society. One marked in April and recaptured on the 25th of July weighed 7 lbs., the other marked in May and recaptured on the 30th of July weighed $3\frac{1}{2}$ lbs. As the season advances grilse increase in size, those being the largest which abide the longest in the sea; they spawn in the rivers after their first ascent, and before they have become adult salmon.

Mr. Young also described various experiments instituted with the view of showing the transition of grilse into salmon. He marked many small grilse after they had spawned in winter and were about to redescend into the sea. He recaptured them in the course of the ensuing summer as finely formed salmon, ranging in weight from 9 to 14 lbs., the difference still depending on the length of their sojourn in the sea. He has tried these experiments for many seasons, but never twice with the same mark. A specimen marked as a grilse of 4 lbs. in January 1842, and recaptured as a salmon of 9 lbs. in July, was exhibited to the Society: it bore a peculiarly twisted piece of *copper* wire in the upper lobe of the caudal fin. Those marked and retaken in 1841 were marked with brass wire in the dorsal fin. With these and other precautions, Mr. Young debarred the possibility of any mistake as to the lapse of time. Both grilse and salmon return uniformly to their native streams; at least it very rarely happens that a fish bearing a particular mark is found, except in the river where it was so marked. Salmon in the perfect state as to form and aspect also increase rapidly in their dimensions on again reaching the sea. A spawned salmon weighing 12 lbs. was marked on the 4th of March, and was recaptured on its return from the sea on the 10th of July, weighing 18 lbs. Mr. Young is of opinion that

salmon rather diminish than increase during their sojourn in rivers, and he illustrates this and other points of his subject by numerous experiments and observations.

2. "On the Geology of Roxburghshire." Part II. By David Milne, Esq.,—the conclusion of a very interesting report.

MISCELLANEOUS.

MAIANTHEMUM BIFOLIUM.

THIS very pretty plant, recorded as British in the 'Annals' for January, is a rediscovery and not altogether new to the British flora. It has been already figured and recorded as English, but a long while ago. In Gerarde's 'Herbal,' 2nd book, 90th chap. p. 409, will be found a very characteristic portrait of it under the name of *Monophyllum* or *One blade*. He classes it with his *Wintergreenes* (*Pyrolæ*), and says "it growth in Lancashire in Dingley Wood, six miles from Preston in Auldirnesse, and in Harwood near Blackburne likewise." "It floureth in May, and the fruit is ripe in September." Let the Lancashire botanists look out for it next spring. It is strange that Gerarde's notice of it should have escaped our older botanists; and stranger still, that in the Linnæan Society's copy it is marked "*Convallaria bifolia*" in Sir James E. Smith's own handwriting, apparently without his having noticed the localities given for it below. In the south of Norway it is very abundant in pine-woods on a gneiss soil*, and should be looked for in similar situations in the north of Britain.—EDWARD FORBES.

DR. PATRICK NEILL.

There are few whose claims to public commendation are stronger than those of Dr. Neill, who has been one of the most useful, but least ostentatious, of Edinburgh's citizens. At a late meeting of the Caledonian Horticultural Society, Lord Murray proposed that the members should at their first meeting in their new hall express their sense of the obligations under which the Society lay to that gentleman for his distinguished and laborious services; which was carried by acclamation. In addition to this, it is proposed to request Dr. Neill to sit for a bust, to be executed by John Steell, Esq., R.S.A. This mark of approbation, however, should not be confined to the members: the Doctor's services as a citizen of Edinburgh, and the interest he has taken in every public and benevolent undertaking, entitle him to a more general compliment.

TO ZOOLOGICAL AND BOTANICAL COLLECTORS.

Mr. William Gardener, Dundee, will prepare during the ensuing summer "Botanical Parcels," each of which "will contain 500 species of Scottish Phænogamic and Cryptogamic plants, including as many of the rarer species as possible, carefully selected, dried, named, and localised; and the charge, inclusive of printed labels, paper and

* It is also a common plant in the neighbourhood of Berlin, where it occurs in profusion in the Park on a sandy soil.—W. FRANCIS.

packing, will be 2*l*." Subscribers are requested to give in their names as early as possible; and we may add, that the good condition and drying of former parcels of plants are borne testimony to by Professor Balfour of Glasgow, J. G. Children, Esq., E. Doubleday, Esq., &c.

THE COLLECTION OF BIRD-SKINS BELONGING TO THE LATE
DR. WILLIAM HOOKER.

This collection of bird-skins is to be disposed of; it consists of from between 800 and 1000 specimens from various countries; but it is chiefly valuable for the number of *Peruvian* and *Chilian* species which served Mr. Swainson for his descriptions in his "Two centenaries and a quarter" and other works, and which would be valuable for consultation in a public museum. Information regarding them will be given by G. Wails, Esq., Newcastle.

PROFESSOR TRAIL'S MINERALOGICAL COLLECTION.

The Mineralogical and Geological collection of Professor Trail of Edinburgh is to be disposed of, containing above 5000 specimens. The mineralogical series contains about 3000 of these. The geological series is particularly illustrative of Scotland, Spain, Brazil, Greenland and the Arctic regions, and among the fossil remains are a set of the fossil fishes of the Orkney Islands, named by Agassiz.

METEOROLOGICAL OBSERVATIONS FOR DECEMBER 1842.

Chiswick.—Dec. 1. Slight rain: overcast. 2. Densely clouded: clear and fine. 3. Foggy. 4. Foggy: overcast. 5. Light haze: very fine: foggy. 6—9. Foggy. 10. Overcast. 11. Foggy: clear and fine. 12. Rain: overcast and mild. 13. Very fine: overcast. 14, 15. Exceedingly fine. 16. Very fine: densely overcast. 17. Very fine. 18, 19. Foggy: clear and fine. 20, 21. Hazy. 22. Very fine. 23. Rain. 24. Very fine. 25. Clear: overcast and fine: stormy at night. 26. Cloudy and windy. 27. Rain: cloudy and damp: frosty. 28. Frosty: clear and fine. 29. Densely clouded. 30. Cloudy and very mild. 31. Very fine.—Mean temperature of the month $4^{\circ}12$ above the average.

Boston.—Dec. 1—3. Cloudy. 4. Foggy. 5. Cloudy. 6. Foggy. 7. Cloudy. 8, 9. Foggy. 10. Foggy: rain early A.M. 11. Cloudy. 12. Rain: rain early A.M. 13. Cloudy. 14, 15. Fine. 16. Cloudy: rain P.M. 17—19. Fine. 20. Cloudy. 21, 22. Fine. 23. Cloudy. 24. Fine. 25. Fine: rain P.M. 26. Windy: rain P.M. 27. Cloudy: rain early A.M. 28. Fine. 29. Windy. 30. Fine. 31. Windy: stormy P.M.

Sandwick Manse, Orkney.—Dec. 1. Rain: cloudy. 2. Showers: cloudy. 3. Clear: showers. 4. Cloudy: drizzle. 5, 6. Bright: cloudy. 7. Cloudy. 8. Drizzle. 9. Fog. 10. Fog: cloudy. 11. Cloudy. 12. Rain: cloudy. 13, 14. Cloudy. 15. Bright: cloudy. 16. Bright. 17, 18. Showers. 19. Showers: clear. 20. Showers: cloudy. 21. Cloudy: drizzle. 22. Showers. 23. Showers: snow. 24. Showers. 25. Rain. 26, 27. Hail-showers. 28, 29. Cloudy. 30. Rain: drizzle. 31. Showers: frost.

Applegarth Manse, Dumfries-shire.—Dec. 1, 2. Rain and wind. 3. Fine and fair. 4. Rain A.M.: cleared. 5, 6. Rain P.M. 7. Fair and fine. 8. Fair A.M.: drizzly P.M. 9. Fair but cloudy. 10. Drizzly. 11. Fair: overcast P.M. 12. Wet all day. 13. Storm: wind: rain: flood. 14. Rain P.M. 15, 16. Storm: wind: rain P.M. 17. Fair. 18—23. Showers P.M. 24. Hoar-frost A.M. 25. Very wet all day. 26. Very wet A.M. 27. Slight shower: frost P.M. 28. Frost A.M.: rain P.M. 29. Rain, but mild. 30. Rain and high wind. 31. Rain: cleared P.M.

The high temperature of December is remarkable, being nearly 10° higher than the mean of the last twenty years, and 7° higher than Dec. 1841.

Meteorological Observations made at the Apartments of the Royal Society, London, by the Assistant Secretary, Mr. Robertson; 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: 9 a.m.	Chiswick.		Boston 8 a.m.	Dumfries-shire. 9 a.m. 9 p.m.	Orkney, Sandwick. 9 a.m. 9 p.m.	London: R.S. Self-reg. Max. Min.	Chiswick. Max. Min.	Boston. 8 a.m. Max. Min.	Dumfries-shire. Max. Min.	Orkney, Sandwick. 9 a.m. 9 p.m.	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.		
1842. Dec.																									
1.	30-062	30-017	29-907	29-56	29-62	29-50	29-38	49-7	51-0	48-3	54	52	44	39	54	44	50	se.	calm	calm	calm	calm	se.	.08	46
2.	30-110	30-070	30-028	29-48	29-58	29-73	29-50	29-62	52-0	49-8	55	32	55	54	40	40	50	sse.	calm	calm	calm	calm	w.	.33	40
3.	30-250	30-322	30-200	29-03	29-14	29-04	29-73	30-00	46-7	56-3	53	42	43	47	46	46	46	w.	calm	calm	calm	calm	w.	.05	46
4.	30-454	30-406	30-311	29-03	29-12	29-76	29-78	29-78	47-7	44-4	52	39	36	49	47	44	43	ssw.	calm	calm	calm	calm	s.	.17	44
5.	30-844	30-207	30-212	29-85	29-98	30-01	29-90	30-06	44-7	52-6	44-6	36	40	51	46	41	43	w.	calm	calm	calm	calm	w.	.08	43
6.	30-264	30-223	30-210	29-73	29-83	30-11	29-95	30-11	39-5	49-8	37-8	39	33	42	47	44	48	w.	calm	calm	calm	calm	w.	.01	39
7.	30-350	30-333	30-309	29-86	30-06	30-11	29-95	30-32	37-3	41-6	36-0	37	31	35	49	45	48	w.	calm	calm	calm	calm	w.	.08	40
8.	30-442	30-404	30-359	29-86	30-22	30-38	30-11	30-32	37-3	41-6	36-0	37	31	35	49	45	48	w.	calm	calm	calm	calm	w.	.08	40
9.	30-494	30-307	30-282	30-00	30-30	30-22	30-30	30-18	30-03	37-5	39	38	43	47	43	44	45	se.	calm	calm	calm	calm	se.	.04	38
10.	30-026	30-017	29-851	29-83	30-07	30-00	29-93	29-80	38-7	45-0	39	38	38	46	38	43	44	se.	calm	calm	calm	calm	se.	.32	38
11.	30-026	30-017	29-851	29-83	30-07	30-00	29-93	29-80	38-7	45-0	39	38	38	46	38	43	44	se.	calm	calm	calm	calm	se.	.32	38
12.	29-820	29-942	29-802	29-34	29-38	29-53	29-42	29-31	50-3	38-8	57	50	47	53	41	46	49	se.	calm	calm	calm	calm	se.	.01	48
13.	30-076	30-017	29-909	29-44	29-58	29-66	29-18	29-58	51-6	50-5	38-8	42	44	55	40	48	48	se.	calm	calm	calm	calm	se.	.37	48
14.	30-144	30-088	30-073	29-56	29-81	29-72	29-74	29-68	49-8	47-2	56	36	47	55	48	48	48	se.	calm	calm	calm	calm	se.	.02	46
15.	30-164	30-106	30-091	29-55	29-81	29-70	29-67	29-67	48-3	55-0	46-6	38	45	56	51	54	50	s.	calm	calm	calm	calm	se.	.06	48
16.	30-002	30-170	30-883	30-37	29-50	30-80	30-34	29-56	50-5	47-7	55	48	48	55	40	43	44	ssw.	calm	calm	calm	calm	w.	.12	48
17.	30-314	30-402	30-281	29-75	29-90	30-10	29-73	29-92	39-4	59-6	39-3	47	35	40	5	4	4	ssw.	calm	calm	calm	calm	w.	.16	42
18.	30-314	30-485	30-448	29-99	30-26	30-12	30-09	29-59	39-3	46-0	39-0	46	45	47	44	48	46	w.	calm	calm	calm	calm	w.	.20	40
19.	30-430	30-397	30-312	29-87	30-12	30-00	29-78	29-57	40-4	39-0	52	46	47	49	44	48	40	w.	calm	calm	calm	calm	w.	.06	43
20.	30-430	30-397	30-312	29-87	30-12	30-00	29-78	29-57	40-4	39-0	52	46	47	49	44	48	40	w.	calm	calm	calm	calm	w.	.06	43
21.	30-328	30-268	30-234	29-78	30-10	30-00	29-97	29-80	51-3	51-4	39-0	55	44	52	45	48	40	w.	calm	calm	calm	calm	w.	.10	46
22.	30-194	30-164	29-853	29-59	29-73	29-42	29-36	29-09	50-2	56-3	49-0	45	47	52	45	48	40	w.	calm	calm	calm	calm	w.	.02	46
23.	29-636	29-614	29-551	29-15	29-27	29-20	28-96	29-43	47-4	53-8	47-6	31	46	48	35	37	34	s.	calm	calm	calm	calm	w.	.18	48
24.	29-636	29-704	29-551	29-15	29-27	29-20	28-96	29-43	46-7	47-4	36-2	50	25	37	48	35	40	s.	calm	calm	calm	calm	n.w.	.08	39
25.	29-848	29-815	29-659	29-47	29-35	29-15	28-83	28-67	36-7	42-4	35-0	48	34	51	31	41	47	ssw.	calm	calm	calm	calm	w.	.36	37
26.	29-566	29-548	29-141	29-07	28-96	29-01	28-67	28-86	48-8	37-3	50	41	51	50	46	40	41	s. var.	calm	calm	calm	calm	w.	.20	45
27.	29-364	29-661	29-324	28-90	29-12	29-32	29-32	29-47	50-6	44-0	47	25	43	47	31	40	40	s.	calm	calm	calm	calm	w.	.31	45
28.	30-030	30-144	29-929	29-53	29-73	29-75	29-61	29-65	39-0	34-7	52	35	45	30	41	39	41	w. & w.n.w.	calm	calm	calm	calm	w.n.w.	.11	36
29.	30-152	30-112	30-112	29-62	29-61	29-83	29-80	29-47	48-2	35-4	52	40	48	51	39	40	43	sw.	calm	calm	calm	calm	w.	.11	42
30.	30-222	30-215	30-161	29-64	29-70	29-75	29-44	29-44	52-3	47-2	52	46	53	54	44	45	45	s. var.	calm	calm	calm	calm	sw.	.06	45
31.	30-144	30-178	30-046	29-45	29-64	29-95	29-45	29-99	51-3	55-4	50-6	30	54	51	50	41	31	s. var.	calm	calm	calm	calm	w.	.57	47
Mean.	30-120	30-130	30-038	29-59	29-755	29-769	29-613	29-657	45-2	50-5	41-9	49-80	38-35	44-1	50-4	42-2	45-27	44-07	Sum. 0-674	0-76	0-88	2-91	4-44	Mean.	44

THE ANNALS
AND
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No. 69. MARCH 1843.

XXV.—*On a new Genus of Algæ belonging to the family of the Nostochinæ.* By GEO. J. ALLMAN, A.B., L.R.C.S.I., Secretary to the Dublin Microscopical Society*.

[With a Plate.]

IN the early part of October 1842, I observed a substance of a pea-green colour abundant in the water of the Grand Canal Docks near Dublin. This substance was unequally distributed, being in some places collected in large quantity, while in others the water was quite free from it. It consisted of flocculent unattached masses varying much in size and occupying very different depths, some floating upon the surface, while others were observed suspended in the water, and might be traced downwards till the depth alone concealed them from the sight.

The general appearance of these masses, so far as their mechanical arrangement was concerned, might remind one of certain substances in the act of precipitation from their solutions, as camphor when undergoing precipitation from alcohol by the addition of water, or soap when separated by an acid from an aqueous or alcoholic solution, or perhaps still more of the curd of milk when diffused through the uncoagulable part of the fluid. In some places the green matter had been left by the retiring water upon the stones of the margin, and, here drying, had assumed a beautiful bluish green or verdigris colour without lustre.

On subsequently visiting the Canal Docks at several different periods, I observed that the substance under consideration appeared sometimes in but very small quantity, while on other occasions it was to be seen much more abundantly. This appearance and disappearance of the green matter would seem to be independent of the direct rays of the sun, and is probably the result of barometrical and other meteorological influences.

* Read before the Society on the 1st of December 1842.

Connected with the Dock is a deep shaft partly filled with water. The shaft is covered over with boards, so that the light is almost totally excluded. Into this some of the green substance had made its way, and on bringing up some of it in a phial, I found that it differed from that in the open dock in being of a duller green; in other respects I could detect no difference. I mention this as it illustrates an important fact in the physiology of the green matter, and would appear to establish the influence of light in the development of its colour.

Under the microscope this singular substance is seen to consist of exceedingly minute, simple, moniliform threads, with the globules composing them of uniform diameter, and the threads themselves variously but elegantly curved, and grouped together without order in a gelatinous matrix.

The green substance of the Dock then is a minute Alga of the family *Nostochinæ*, and evidently comes very near to the genus *Anabaina* of Bory Saint Vincent, and still nearer to an Alga discovered by Mr. Thompson in Ballydrain lake in the county Antrim, and which he names "*Anabaina? spiralis*," referring it doubtfully to Bory Saint Vincent's genus*.

From *Anabaina* of Bory Saint Vincent, the present Alga, as well as that of Mr. Thompson, differs in the uniform size of the articulations, Bory's genus being characterized by larger globules occurring at distinct intervals in the series. Were the size of the filaments to be considered of generic importance, there might perhaps be found in their great minuteness in the plant now under consideration another distinctive character. The mere size however of the filaments is scarcely of sufficient importance to entitle it to the rank of a generic character, yet, when taken in conjunction with others whose importance must be admitted, it may materially assist us in forming an opinion as to the real systematic rank of the Alga. It must be recollected too, that in the minuteness of the filaments the *Anabaina impalpabilis* is perhaps equally remarkable, a fact, which, if the plant last named be a real *Anabaina*, would deprive this peculiarity of all value as a generic distinction.

The absence however of the enlarged articulations in the Alga of the Canal Dock is a very obvious character, and upon the whole I consider myself justified in establishing for it a distinct genus, in which the *Anabaina? spiralis* of Thompson will also find a place. I suspect too that Bory's *A. impalpa-*

* See a very interesting paper by Mr. Thompson "On a minute Alga which colours the waters of Ballydrain lake near Belfast."—Ann. Nat. Hist. vol. v. p. 75.

bilis would be better removed to the new genus, as in the description of the species no allusion is made to the enlarged globules, and as in the minuteness of the filaments as well as in its general habit, it corresponds closely with the subject of the present paper and with the *A.?* *spiralis*. With respect however to the right of *A. impalpabilis* to occupy the ground assigned to it by Bory I speak with no certainty, nor would my present knowledge of the plant at all justify my meddling with it.

The only plant entirely corresponding with Bory's genus which I have had an opportunity of examining in a recent state is the *Anabaina membranacea*, specimens of which I obtained in the neighbourhood of Dublin last spring. This species possesses very distinctly the dilated globules; and in the large size of the filaments, and the general character and habit of the plant, is so completely different from the Alga of the Canal Dock, that I feel certain that any one who has once seen the two will not hesitate as to their complete generic distinction.

To the genus which I propose establishing for the reception of the present Alga, as well as for that of Mr. Thompson, I have given the name *Trichormus*: it may be characterized as follows:—

TRICHORMUS.

Fronde free, of indeterminate figure, consisting of simple, minute, moniliform, curved threads with articulations of uniform size, immersed in a gelatinous matrix. Name from *θρίξ* hair, and *ὄρμος* a necklace.

1. *T. spiralis*, Thompson. Plant either diffused through the water or floating on the surface; filaments of a rich green colour and regularly spiral; when dried on paper of a dull green without lustre.

Colouring the water of Ballydrain lake near Belfast, Mr. W. Thompson. July to October.

2. *T. incurvus*, mihi. Plant either diffused through the water or collected on the surface; filaments of a pea-green colour, crowded together confusedly in a gelatinous mass, variously curved but never regularly spiral, assuming when dried a fine verdigris-green colour without lustre. Pl. V.

In the Grand Canal Dock, Dublin. October.

The difficulty experienced by naturalists in assigning to many of the lower Algæ their exact rank among organized beings, renders any investigations into the structure and physiological history of these doubtful organisms of peculiar interest. So impressed was Bory Saint Vincent with a belief

in the animal nature of the beings which constituted his genus *Anabaina*, that he hesitated not to remove them from the vegetable kingdom. The peculiar motion of reptation which he describes them as possessing, and which he compares to the crawling of worms, would appear to be the chief grounds on which he assumes their animality, and he also tells us that the analysis of Vauquelin and Chaptal is entirely in favour of the animal nature of the *Anabainæ*.

In the Alga which constitutes the subject of the present paper no such motion could be detected, and the same appears to have been the case with the spiral Alga of Mr. Thompson. In all the observations which I have had an opportunity of making upon the green matter of the Canal Docks, the vegetable nature of this substance would appear to be fully borne out. The probability of its green colour depending on the influence of light has been already mentioned, and this fact, though not decisive, would yet go far to abolish any claim to animality. The phænomena attendant on the spontaneous decomposition of the Alga are altogether coincident with the same view. When a large mass is placed in a limited quantity of water, decomposition soon sets in, the green colour becomes duller, and finally assumes a dirty ferruginous hue, while the microscope can now no longer detect any trace of the original moniliform structure. A disagreeable odour is at the same time exhaled; but this odour is altogether different from that of decomposing animal matter, and possesses a purely vegetable character.

In the paper already alluded to, Mr. Thompson makes a similar remark with respect to the Alga of Ballydrain lake, the odour of which, in a state of decomposition, he compares to that of water in which flax had been steeped (see 'Annals,' vol. v. p. 78).

So far observations are in favour of the vegetability of the *Trichormi*; at the same time however it must not be forgotten that these curious organisms would appear to possess the power of changing under circumstances their specific gravity, being sometimes observed collected in large quantities upon the surface, sometimes suspended for a considerable depth through the fluid, and sometimes the whole mass will be found to have sunk to the bottom and disappeared, again to rise to the surface when circumstances favourable to its appearance should occur.

All these phænomena, however, wonderful and unaccountable as they are, would hardly justify us in attributing them to spontaneity; they are in all probability dependent on external causes, possibly of a meteorological character, and are

certainly quite distinct from real animal motion. In an interesting memoir by Morren* on the genus *Aphanizomenon*, this botanist ascribes to the agency of electricity motions somewhat similar to those of the *Trichormus*: Morren's paper is ingenious and well worth perusal, but it must also be admitted that his theory is based on insufficient grounds, and his analogies rather far-fetched and fanciful.

I have to notice also the occurrence in company with the Alga just described of the *Aphanizomenon incurvum* of Morren, the only record of which as a British plant is that of Mr. Thompson of Belfast, who discovered it in Ballydrain lake in July 1838 (see 'Annals,' vol. v.). Shortly after this it was also found in the pond of the Dublin Zoological Gardens by Miss Ball, who possesses specimens from that locality in her collection.

In investigating the subject of the present paper I have been enabled to examine dried specimens of Mr. Thompson's Alga. For the opportunity thus afforded me of comparing my plant with the authentic *A. ? spiralis*, I am indebted to the kindness of Miss Ball, whose valuable collection that lady obligingly allowed me to examine, and by whom I was liberally supplied with any specimens I might require.

XXVI.—*Notice of several Cases of Defective and Redundant Organization observed among the Araneidea.* By JOHN BLACKWALL, Esq., F.L.S.

AMONG the numerous difficulties with which arachnologists have to contend in their endeavours to acquire a correct knowledge of the *Araneidea*, the great liability of those animals to run into varieties, and the close resemblance which some species bear to others, are not the least formidable; indeed, as circumstances conducing largely to the introduction of fictitious species on the one hand, and to the confounding of those which are distinct on the other, they have proved fertile sources of error and perplexity. Ample evidence of the accuracy of this statement may be obtained by a careful comparison of the writings of those naturalists who hold the highest rank as authorities in this department of zoology.

A considerable share of attention having been bestowed upon variations in the colour and size of species, resulting from differences in age, sex, food, climate, and other conditions of a less obvious character, while those arising from ex-

* Histoire d'un genre nouveau de la tribu des Confervées nommé *Aphanizomène*; lu à l'Académie Royale de Bruxelles le 2 Décembre 1837.—See *Annals*, vol. v. p. 82.

traordinary organic modifications, in consequence, perhaps, of their less frequent occurrence, have been almost entirely overlooked, the purport of the present communication is to illustrate by a few examples the importance which cases of the latter description possess in relation to physiology and systematic arrangement.

1. In March 1835, I found, under a piece of rock in a wood near Oakland, Denbighshire, an adult female *Theridion filipes*, Blackw., exhibiting an anomaly in organization which I never witnessed before in this order of animals; it had a supernumerary eye situated between the two small ones constituting the anterior intermediate pair, the total number of eyes possessed by this individual being nine, and their arrangement symmetrical.

2. An immature female *Thomisus cristatus*, captured at Oakland on the 20th of July 1835, had the two lateral pairs of eyes only, the four small intermediate eyes being altogether wanting, not the slightest rudiment of them being perceptible even with the aid of a powerful magnifier. The size of this spider was about one-fourth less than that of an adult.

3. In the summer of 1836, I took an adult female *Lycosa campestris* in my father's garden at Hendre House, Denbighshire, which had a short but perfectly-formed supernumerary tarsus connected with the base of the tarsal joint of the right posterior leg on its outer side.

4. An adult male *Lycosa Cambrica*, Blackw., taken in a marshy piece of land in a wood near Oakland in May 1839, was quite destitute of the right intermediate eye of the anterior row.

5. I captured an adult female *Epeira inclinata* at Oakland on the 29th of August 1842, which was entirely without the left intermediate eye of the posterior row, and the right intermediate eye of the same row was not half the usual size.

6. An adult female *Ciniflo atrox*, Blackw. (*Clubiona atrox*, Walck.*), taken near Hendre House on the 14th of September 1842, wanted the left intermediate eye of the posterior row.

7. A collection of spiders made by Mr. Hamlet Clark near Towcester, Northamptonshire, in the autumn of 1842, and obligingly submitted to my inspection, contained an adult female *Epeira inclinata*, whose right intermediate eye of the

* For the circumstances which have led to the separation of *Clubiona atrox* and other species from the *Drassidæ* and *Theridiidæ*, and to the establishment with them of the new family *Ciniflonidæ*, see the Transactions of the Linnæan Society, vol. xviii. p. 606 *et seq.*

posterior row was not one-eighth of the natural size, being merely rudimentary.

The particulars detailed in the foregoing cases, which serve to establish the fact, that spiders, in common with many other animals, occasionally exhibit instances of anomalous structure, derive no small degree of interest from their novelty ; but when it is borne in mind that all the examples except one have reference to those important organs the eyes, important, not only as regards the function they perform, but also on account of the extensive use made of them in the classification of the *Araneidea*, that interest becomes greatly augmented.

Spiders with six and eight eyes have long been known to arachnologists, and Mr. MacLeay has recently published an account of one or two species discovered by him having two eyes only*. That spiders possessing four eyes will be found at a future period, when this neglected branch of natural science shall be more extensively and zealously cultivated than it has yet been, is highly probable ; it becomes a matter of some consequence, therefore, to caution observers against mistaking a mere defect in structure, like that recorded in case 2, for such a discovery. Had the female *Thomisus cristatus*, in which that defect was noticed, been an undescribed species, and the only individual obtained, not a new genus alone, but a new family and tribe also would probably have been proposed for its reception †.

Whether there are spiders provided with an odd number of eyes or not is a more doubtful conjecture ; should such exist, symmetry in the arrangement of their visual organs certainly may be expected to obtain ; consequently, cases 4, 5 and 6, which present instances of an odd number of eyes disposed irregularly, would be regarded at all times with suspicion. Against case 1, however, no such objection can be urged ; and as the spider there introduced to notice was undescribed when captured by me, I should have felt much perplexity in assigning it a place among the *Araneidea*, had I not been so fortunate as to procure other specimens of it at the same time.

Interesting chiefly in a physiological point of view, cases 3 and 7 show that a liability to irregularity in structure is not limited to the eyes, and that those organs are subject to preternatural variations in size as well as number.

I shall not attempt to speculate upon the cause of the organic modifications which form the subject of this article ; to

* Annals and Magazine of Natural History, vol. ii. pp. 3, 4.

† The difference in the number of eyes with which spiders are provided has been proposed as the basis of their distribution into tribes. Transactions of the Linnæan Society, vol. xviii. p. 602.

attribute them to accidental circumstances would be, not merely to acknowledge ignorance of the matter, but to express that ignorance in most objectionable terms. The obscurity in which the origin of these remarkable phænomena is involved, careful investigation, conducted upon sound philosophical principles, can alone dispel.

XXVII.—*Description of a new species of Carex found near Hebden Bridge in Yorkshire.* By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S., &c.*

[With a Plate.]

It is now nearly two years since Mr. S. Gibson of Hebden Bridge was so kind as to forward to me a *Carex*, which he had reason to believe would prove to be an undescribed species. At that time he had only ventured to publish it in Baines's 'Flora of Yorkshire,' as a variety of *C. cæspitosa* (Gooden.), but in his letters to me he expressed a decided opinion that it was distinct from that species. Although convinced that it was indeed distinct from *C. Goodenovii* (*C. cæspitosa*, Gooden.), it is only within the last few days that I have been enabled to examine its characters with the requisite care to qualify myself to publish it as a true species, and to study the descriptions and figures in the works that treat of this genus, so as to be enabled to say with confidence that it is an undescribed plant. As I have convinced myself of this, I have now the pleasure of naming it in honour of its discoverer, than whom no person can be more deserving of commemoration by means of a plant of this genus, to the careful study of which he has long and successfully applied himself.

CAREX GIBSONI.

C. spica mascula solitaria, femineis 2—4 oblongis basi attenuatis, infima breviter pedunculata, bracteis foliaceis, stigmatibus 2, fructibus lanceolatis in rostrum breve integrum attenuatis multinerviis gluma $\frac{1}{3}$ longioribus, acheniis late-obovatis apice rotundatis apiculatisque. Pl. V.

C. cæspitosa, β . chlorocarpos, *Gibs. in Baines's Fl. of Yorkshire*, p. 143.

Root creeping. Stems 6—8 inches high, triquetrous with flat or concave faces, the angles rough towards the top. Leaves from near the base of the stem, and usually about equalling it in height, flat, slender, slightly rough at the edges and midrib beneath, particularly towards the end. Bracts without

* Read before the Botanical Society of Edinburgh.



Trichormus incurvus.

Carex Gibsoni.



sheaths; lower rather broad, leafy, often overtopping the spikes; second long, setaceous; the rest small, short. Spikes lax below, scarcely an inch long. Glumes oblong, blunt, purplish brown with a broad green band up the midrib, at least one-third shorter than the fruit; on the barren spike paler and obovate-lanceolate. Perigone nearly twice as long as the nut, gradually narrowing from below the middle to the top, pale green, with numerous and rather strongly marked ribs, which do not extend to the apex; beak very short, truncate, entire. Nut compressed, rather longer than broad, widening upwards, rounded above, with a short somewhat conical beak, from which the style is deciduous, pale brown, opaque.

Found at Wood Hey near Hebden Bridge, Yorkshire, in 1840, by Mr. S. Gibson of that place: flowering in June.

In *C. Goodenovii* (*C. cæspitosa*, *Gooden., Sm.*) the fruit is elliptical and very slightly longer than the glumes, the nut roundish and rather broader than long, the glumes purple with a slender pale green keel.

In *C. cæspitosa* (*C. stricta*, *Gooden., Sm.*) the fruit is elliptic-oblong, and the same length as the glumes.

EXPLANATION OF PLATE V.

- a. Glume of the female spikes.
 b. Fruit, pericarp including the nut. c. Nut.

XXVIII.—*Contributions to the Ichthyology of Australia.* By JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

[Continued from p. 28.]

SERIOLA CULTRATA, Knife-edge Seriole.

Sciæna cultrata, G. Forster, No. 212; J. R. Forster, MS. iv. 9, apud Schn.

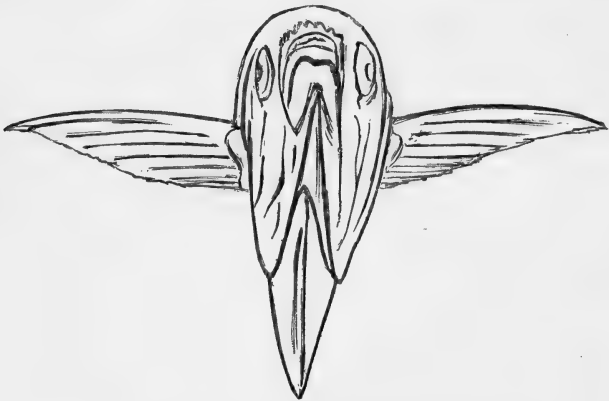
Cichla cultrata, Bl. Schn., p. 343.

Scomber clupeioides, Shaw, Brit. Mus. [The *Sc. clupeioides* of Broussonet is a *Cybium*, C. & V. viii. p. 178.]

THIS fish was taken with a hook off Norfolk Island on Cook's second voyage. It differs from the other *Seriolaë* described in the 'Histoire des Poissons' in the extremely acute under surface of the head, in the first dorsal being continuous with the second, though lower, and in other particulars. We must refer to Schneider for J. R. Forster's account of it, but it is to be regretted that he does not state whether the vomer and palate-bones are toothed or not. The following particulars are drawn from an inspection of George Forster's figure.

The pectoral fins are small and somewhat falcate. The ventrals are also small, and are attached by their internal borders to the belly,

at the fore-part of a groove, which runs backwards to the anus. The first dorsal is low, nearly even, and contains eight spines, which are united to each other and to the second dorsal by a notched membrane that reaches above their middles. The drawing also indicates a short spine at the base of the first ray of the second dorsal, though only eight spines in all are enumerated by Forster. The fore-part of the soft fin is the highest, and forms a rounded peak, rising abruptly one-fourth above the succeeding rays, which become gradually and evenly shorter. The last ray is not elongated. The anal spines are stronger, and nearly as long as the dorsal ones, and are in like manner connected by a notched membrane to the soft part of the fin. This is similar in form to the opposing dorsal, excepting that it wants the projecting peak at its beginning. Both it and the second dorsal stand in a furrow formed by a low fillet of integument on each side. The caudal is deeply forked. The following is Forster's enumeration of the rays:—Br. 6; D. 8|24; A. 3|26; C. 22; V. 5; P. 15. In the figure 26 rays are marked in the soft dorsal. The lateral line is moderately curved over the pectoral. The length of the specimen was $8\frac{1}{2}$ inches, and the figure is of the natural size. The following front view will give some notion of the wedge-shaped form of the head.



CAPROS AUSTRALIS (Nob.), Australian Boar-fish.

In Polack's account of New Zealand, John Dories are enumerated among the fish which frequent the coasts of that promising colony, and there is much probability of his having correctly applied the name, since we find that Dories closely resembling the common species, if not actually the same, exist in the seas of Japan and the Cape of Good Hope, in nearly similar latitudes. Among the drawings which Dr. Lhotsky caused to be made of the fish of Port Arthur in Van Diemen's Land, there is a well-executed figure of a fish

which appears to possess external characters intermediate between those of *Zeus* and *Capros*, but which, from the absence of spiniferous shields at the bases of the dorsal and anal, and on the ventral line, must necessarily be placed in the latter genus. Hitherto only one species of *Capros* has been described; it is an inhabitant of the Mediterranean Sea; but one example of it has been taken on the coast of Cornwall. The Australian species does not seem to have been seen by any of the naturalists of the English or French scientific expeditions, probably because it inhabits great depths, like its Mediterranean congener, and is brought to the surface only by storms.

The body, excluding the trunk of the tail and much of the head, is a regular short oval, whose vertical axis, lying between the first dorsal and anus, is equal to rather more than two-thirds of the longitudinal one. The trunk of the tail is longer and more slender than that of either *Zeus faber* or *Capros aper*.

In the general shape and details of its head the resemblance is greater to the common dory than to the boar-fish, though the snout is more protractile than in the latter. The figure represents the jaws thrust out and extended, and, from the transparency of the integument, the forms of the bony parts are well shown. Their close correspondence with the same parts in *Zeus faber* gives confidence in the general correctness of the artist, though he has doubtless omitted some of the minute details which were not likely to attract the notice of any one except an ichthyologist. The under jaw does not project beyond the upper one when the mouth is open; the maxillary is wider below and more broadly and obliquely truncated than in the dory. The scaly cheek has the high subrhomboidal form of that fish, and the narrow smooth preoperculum makes an angle nearly as obtuse and approaching to a curve: near its anterior end a rounded shoulder is shown, looking backwards. The interoperculum, as large and as long as in the dory, is slightly curved on the edge like an italic *S*. The eye, smaller than that of the European boar-fish, though a little larger than that of the dory, is surmounted by a superciliary crest and cranial ridges, exactly as in the latter, but the little spine on each side of the occiput does not appear in the figure. The gill-flap is rounded; none of the opercular pieces are streaked or furrowed, nor are any spines shown either on the scapular or humeral bones. There are three small scaly patches behind the eye, on the site of the supra-scapular plates.

RAYS:—Br. 6?; D. 7|—18; A. 2|—17; C. 13; V. 1|5.

The pectorals are small and rounded. The ventrals are also rounded, and attached farther back than the pectorals, as in *Capros*: a groove is shown in the belly of the fish, reaching to the anus, for their reception when folded back: the spine is very little shorter than the soft rays, and is not represented as rough. The separation of the two dorsals is as complete as in the common dory. The first dorsal is farther back, and occupies less space than in either the dory or

common boar-fish. It stands over the anus and is very tall, though, as it has been curtailed of its proportions in the figure, owing to the smallness of the paper, its exact height cannot be stated. The first ray is the longest, and the others decrease in succession to the last, which is short: none of them are represented with filamentous tips. The membrane ends at the base of the very short ray which begins the second dorsal. The rays of the second fin increase gradually but slightly as they become more posterior. There appear to be two anals, as in the dory, of which the first is very small, consisting of only two spines: the second spine is only half the length of the first, and no membrane is shown connecting it with the second fin, which resembles the soft dorsal in form. In drawing the simple tapering dorsal or anal rays of a dory the articulations are very likely to be overlooked, as is the case in the figure we are commenting upon. The caudal fin is very slightly rounded, as in the dory.

The scales are represented as considerably smaller than in the common boar-fish. The lateral line is more boldly curved, and approaches nearer the dorsal line anteriorly; posteriorly it descends very gradually to assume a straight course through the tail.

The general colour is a pale straw-yellow, with much metallic lustre, without spots. The fins are pale carmine, and there is a carmine blush on the fore-part of the back, with deeper tints of the same on the tips of the scales, top of the head, scapulars, and some parts of the muzzle. The gill-membrane is deep lake-red, and there are some purplish tints on the gill-flap and humeral bones.

The figure is said to be of the natural size, and measures

DIMENSIONS.		inches.	lines.
From the lips, with the jaws protracted, to the end of caudal..		10	6
..... base of ditto...		9	3
Length of trunk of tail		1	3
Height of ditto		0	7 $\frac{1}{2}$
..... body		4	6
Length of head, jaws protruded		3	9
Diameter of orbit		0	8
From lips to edge of orbit.....		2	3

AMPHACANTHUS NOTOSTICTUS (*Nob.*), The Loorooga.

No. 17. Mr. Gilbert's list.

This *Amphacanthus* is named "Loorooga" by the natives of the country round Port Essington, and is said by Mr. Gilbert to be common to all the shallow parts of the harbour. In general form it resembles *marmoratus*, and still more nearly *guttatus*, but it is unlike the latter and some of the spotted species allied to it in the form of the profile of the forehead, which is not concave above the orbit, but evenly convex. From *dorsalis*, which exhibits a similar disposition of spots, it differs in the spots being black instead of whitish.

The profile, excluding the fins and a small part of the tail, is a regular oval, whose vertical axis rather exceeds half the longitudinal

one, and is equal to one-third of the total length of the fish. The regular curve of the forehead corresponds with the part of the back on which the soft dorsal is set. There is no gibbosity either before or behind the eye, and the space between the eyes is convex transversely as well as longitudinally, its breadth being increased by the projection of the edge of the orbit at its anterior angle. The convex scaroid intermaxillary projects a little from the general curve of the head.

The length of the head is rather more than one-fifth of the total length, or exactly one-fourth when the caudal is excluded. There are about fifteen teeth in each intermaxillary, and one more in each limb of the lower jaw. The upper teeth are notched at the tip, one point being larger, lanceolate and denticulated; the other point, shorter and standing at the shoulder of the other, is concealed by the integument when *in situ*. The lower teeth are also notched, but the points are scarcely so acute, and the larger one does not exceed the other so much. They are also irregularly denticulated. There are two frontal ridges, which are visible in the dried specimen, together with a faint indication of a mesial one, which must be quite imperceptible in a recent fish. The hind head is marked, over the posterior angle of the eye, with short winding lines, forming a sort of rustic-work, and there are also some ridges and pits on the pre-orbital and two following bones of the chain. The projecting anterior edge of the orbit shows faint crenatures under a lens. The posterior half of the cheek is minutely scaly. The limbs of the preoperculum meet at an acute angle, and the upper limb is nearly twice the length of the lower one; the corner is scarcely rounded, and lies under the anterior quarter of the orbit. The surface of the bone is marked by irregular branching streaks and ridges, as is likewise the operculum down to its lower third, which, with the interoperculum and suboperculum, is smooth. The bones of the humeral chain are finely and deeply striated. The gill-opening extends forwards beyond the angle of the preoperculum.

RAYS:—D. 13|10; A. 7|9; C. 17 $\frac{4}{3}$; P. 15; V. 2|3.

The pectoral has an oblique edge and rounded tip, and measures about one-fifth of the total length. The dorsal contains thirteen spines exclusive of the anterior couchant one. The first spine, as in the other species, touches the base of the second one, and is upwards of one-third shorter than the rest, which differ little from each other in height, the eighth, however, being the tallest, and the others decreasing very gradually each way. The spines are transversely compressed, with lateral sharp edges and acute tapering points. They lie alternately to the right and left when recumbent, and the membrane is attached to the alternate edges. Each of them is deeply impressed by two, or even three, longitudinal furrows. The articulated portion of the fin is rounded, its middle rays being highest and overtopping the spines. The anal is similarly formed. The caudal fin when fully spread is lunate on the margin, the depth of the arc being about one-third of the length of the central rays. The height of the trunk of the tail is one-fifth of that of the body. The

lateral line curves like the back, but nears it slightly in its progress, and changes suddenly to a straight course through the tail. It is formed by a series of simple linear elevations which become continuous towards the tail; two or three next the shoulder emit oblique folds upwards. All the scales are small and firmly imbedded in the integument.

The colours of the specimen are faded, but blackish dots are distinctly seen on the sides. They coalesce into short curved lines on the back, become smaller as they descend beyond the lateral line, and disappear altogether above the level of the pectorals. There are vestiges of dark shades on the spinous parts of the dorsal and anal; the rest of the fins appear to have been pale and spotless. A pale band, of a pearly hue in the dried specimen, runs obliquely forwards and downwards from behind the eye, and includes the gill-cover, preoperculum, and the scaly half of the cheek. Two or three short bars run back from the preorbital over the scaly part of the cheek.

DIMENSIONS.		inches.	lines.
Length from upper lip to extremity of upper caudal lobe		8	2
————— under ditto.....		7	11
————— base of caudal.....		6	8
————— beginning of anal		3	10
————— anus		2	11
————— ventrals		2	4
————— dorsal		2	2
————— upper angle of gill-opening		1	8
————— centre of eye		1	1
Long diameter of orbit		0	6
Vertical ditto		0	4
Height of body before anal.....		2	10
————— trunk of tail		0	7
Length of ditto		0	5
————— dorsal fin.....		4	8
————— spinous part of ditto		3	6
————— soft part of ditto.....		1	3
Height of eighth dorsal spine		0	11
————— second ditto.....		0	9
————— thirteenth		0	9½
————— middle rays of soft dorsal		1	0
————— third anal spine		0	11½
————— seventh ditto		0	10¾
————— middle soft rays of ditto		1	0
Length of pectorals.....		1	6
————— exterior ventral spine.....		1	1
————— interior ditto		0	10
————— caudal lobes		1	8
————— central caudal rays.....		1	0
Depth of caudal notch.....		0	4

**AMPHACANTHUS GYMNOPAREIUS (Nob.), Naked-faced
Amphacanthus.**

No. 14. Mr. Gilbert's list.

This species, the 'Nurdoot' of the aborigines of Port Es-

sington, inhabits the quiet secluded bays of the harbour, where the water is shallow and the bottom soft and sandy.

It is a more elongated species than the preceding one, has a more slender tail, and possesses on the whole a neater form, its profile being very similar to that of *Harpurus inermis* of Forster, of which a drawing exists in the Banksian library*. The vertical height of the body is contained thrice and one-third in the total length. The vertical fins are lower than in the preceding, the spines are not so strong nor so acutely furrowed, and the soft parts of the anal and dorsal are less rounded, being rather highest anteriorly. The caudal is forked to the depth of one-third of its length; the pectorals are short and rounded. The profile to the commencement of the dorsal is very slightly arched, or almost straight, and the forehead is flattened transversely. A central ridge running from the occiput to between the nostrils is visible in the dry specimen; it is faintly feathered by minute streaks. The lateral ridges are short and indistinct. The thin, anterior crest of the orbit projects more suddenly and acutely than in the *Amphacanthus notostictus*, and it is more distinctly serrated. The cheek is entirely destitute of scales, and there are very few on the temples. The limbs of the preoperculum meet at a right angle; the upper one is shorter than in *notostictus*, and the more rounded and minutely serrated corner is consequently brought farther back, being placed under the posterior third of the orbit. The occiput may be said to be minutely granulated rather than furrowed, and the pits and streaks of the suborbitals and opercular bones are delicate and indistinct. The furrows are more evident on the humeral bones, but even there they are less deeply impressed than in *notostictus*.

The teeth of the upper jaw are notched with unequal points, the larger point being denticulated. In the lower jaw the points of the teeth are still more unequal, one being placed at the base of the other.

RAYS:—B. 5; D. 13|10; A. 7|9; C. 17½; P. 15; V. 2|3.

If any peculiar patterns of colour are exhibited by the recent fish, they have entirely disappeared in the prepared specimen, the only colour remaining being an uniform dark reddish brown. The fins are colourless and spotless. In the absence of any peculiar markings I have relied on the nakedness of the cheek as a specific character, though I have not been hitherto able to verify its importance by an examination of other species. The fish selected by the authors of the 'Histoire des Poissons' as a type of the genus is described as having the cheek and temples covered by innumerable little scales, and nothing is said of any of the other *Amphacanthi* differing in this respect. We have seen that the *Amph. notostictus* has the anterior half of the cheek naked, and in the present species it is wholly so.

DIMENSIONS.		inches.	lines.
Length from upper lip to tip of caudal lobe		8	2
————— base of caudal fin		6	7½
————— anal		3	5

* *Amphacanthus punctatus*, Bl. Schn. p. 210; Cuv. et Val. x. p. 146.

DIMENSIONS (<i>continued</i>).		inches.	lines.
Length from upper lip to anus		2	8½
————— ventrals.....		2	2
————— dorsal		1	9½
————— tip of gill-cover.....		1	7¼
————— centre of eye.....		1	0
Diameter of orbit.....		0	6
Length of caudal lobe.....		1	11
————— central caudal rays.....		1	0
Depth of caudal fork		0	9
Length of pectorals.....		1	3
————— ventrals		0	10
Height of eighth dorsal spine.....		0	9½
————— first and thirteenth ditto.....		0	5¾
————— anterior soft rays		0	8½
————— third anal spine		0	9
————— seventh and anterior soft rays		0	7½
————— body		2	5
————— trunk of tail		0	5
Length of trunk of tail		0	7½

ACANTHURUS GRAMMOPTILUS (*Nob.*), The Lurgee.

No. 13. Mr. Gilbert's list.

This *Acanthurus* is named 'Lurgee' by the natives of Port Essington, and is very abundant in the bays near the head of the harbour. It appears to have a greater affinity with the *Ac. matoides* than with any other species described in the 'Histoire des Poissons;' but as *matoides* is said to have filiform tips to the ventrals and caudal as well as a pointed dorsal and anal, I am induced to keep them distinct, though I am unable to say how far it is correct to do so, having seen neither figure nor specimen of *matoides*. *Ac. nigro-fuscus* (Forsk.), which resembles the Port Essington fish in colour, has the profile slightly curved in the form of the Italian *f*. The Lurgee has the pale ring round the base of the caudal which exists in *Ac. Blochii*, and seems to agree with that species in some other characters; but the caudal spine, though it is not remarkably large, can scarcely be said to be little.

The profile is fully as convex as that of the *mata* of Russell (82), but the body is more elongated, being less high at the pectorals. The height of the body is equal to half the length of the oval, comprised between the tip of the snout and base of the caudal lancet. The dorsal is less high and more angular behind than that of the *mata*; but the anal and caudal are as represented in Russell's figure. When the latter fin is fully spread out in the Lurgee, the tapering falcate tips project about a fourth part beyond the straight intermediate edge; when only partially displayed, the edge of the membrane is lunate, and the upper tip of the caudal is just perceptibly longer than the under one. The tapering ventrals are acute, but their points are not filiform. Each jaw contains eighteen or nineteen teeth, the upper ones, and the central pair of under ones, being crenated on their sides and rounded tips; while the lateral ones of the lower jaw

are crenated on their obliquely truncated crowns only. The eye is more elevated than in the *mata*, and the descending limb of the preoperculum slopes much more forwards to meet the much shorter horizontal limb at an obtuse angle: the corner of the bone is slightly rounded, and its surface is marked by six or seven diverging lines. The opercular, scapular, and humeral (coracoid) bones are conspicuously furrowed, but no streaks or ridges are visible upon the suboperculum, very small interoperculum or cranium.

RAYS:—D. 9|26; A. 3|24; C. 16 $\frac{1}{4}$; P. 15; V. 1|5.

The first dorsal spine is small, and not easily detected except by dissection; it stands on the fore-part of a subglobular interspinous bone, and acts as a trigger to the second spine, which is articulated to the same bone, the mechanism bearing much resemblance to that of the dorsal spine of a *Monacanthus*. The other spines lengthen gradually as they approach the jointed rays, becoming at the same time more slender. The first anal is small, short, and so much enveloped by integument that it is very likely to be overlooked. The scales on the body are small and strongly ciliated; those on the head and breast are smoother and still smaller. The lateral line is parallel to the back until it assumes a straight course through the tail along the upper lip of the lancet sheath.

Colour of the dried specimen dark yellowish-brown, deepening to chestnut-brown on the head and about the gill-opening. The pectorals are pale, the other fins dusky brown, the anal and posterior part of the dorsal being deeper. There are five dark longitudinal streaks on the dorsal, and some lines more faintly traced on the border of the anal, both these fins being also very narrowly edged with black. An indistinct pale bar crosses the base of the caudal, and there are some very faint transverse lines on the distal end of the fin.

DIMENSIONS.		inches.	lines.
Length from upper teeth to	tips of caudal lobes	9	8
_____	ends of central caudal rays	8	11
_____	base of caudal lancet	7	0
_____	beginning of anal.....	3	11
_____	beginning of dorsal	2	7
_____	ventral spine.....	2	7
_____	gill-openings.....	2	0
_____	pectorals	2	0
_____	eye	1	7
Diameter of eye		0	5 $\frac{1}{2}$
Height of body		3	3
_____	first dorsal spine.....	0	4
_____	eighth ditto.....	1	0
_____	longest articulated rays of dorsal	1	1
_____	third anal spine	0	10
_____	soft rays	1	0
Length of central caudal rays.....		1	4
_____	projection of upper falcate caudal tip	0	9
_____	projection of lower ditto.....	0	6
Length of caudal lancet		0	7
_____	pectorals	1	10
_____	ventrals	1	5

ATHERINA HEPSETOIDES (Nob.), Tasmanian Sauclet.

Several examples of an Atherine, corresponding very closely in external form with the Mediterranean Sauclet, were sent to me from Port Arthur by Mr. Lempriere. Long maceration in spirits and friction against larger fish during the voyage home have destroyed the colours of the specimens, but their forms are tolerably perfect, and a sedulous comparison of the specimens with the figure and detailed description of the Sauclet in the 'Histoire des Poissons' elicited the very few tangible differences which are comprised in the following notice.

The body is rather more elevated than that of the Sauclet, its height forming only the eighth part of the total length; the nape is also a little narrower, but the roundish form of the body, the proportional length of the head, the comparative size of the eye, and its position removed its own breadth from the tip of the snout, the great protractility of the intermaxillaries, the minuteness of the teeth, the total recession of the maxillary beneath the edge of the triangular preorbital when the jaws are closed, and the numbers and form of the dorsal rays, are all exactly as in the Sauclet; the first dorsal has likewise the same relative position above the middle of the ventrals as in that species, but it commences at a point nearer to the tip of the snout than to the base of the caudal, instead of exactly in the middle of the fish. Moreover, the anal fin contains two rays above the number ascribed to *hepsetus* in the 'Histoire des Poissons.' There are four oval cells on each side of the flat forehead and snout, with a lengthened triangular space between the rows, bisected by a slightly elevated, acute, mesial ridge.

The rays of the fins are dotted with black; the silvery lateral band, which retains its colour and form after the scales are removed, is similar in breadth and situation to that of *hepsetus*, and the back is ornamented with black specks ranged round the edges of the scales.

RAYS:—D. 9|—1|11; A. 1|14; C. 15 $\frac{7}{8}$; P. 15; V. 1|5.

The interior of the peritoneum and the ovarium are black. In the specimen examined the ova were numerous and large, occupying more than two-thirds of the cavity of the abdomen. The spine consists of 48 vertebræ, whose bodies have an exact hour-glass form. Several of the anterior spinous processes have dilated semi-membranous edges, which are gradually restricted as they recede from the cranium. At the 20th vertebra the lateral processes are bent downwards, and unite to form a canal for the passage of the vessels, and perhaps for the reception of the point of the air-bladder. At the twenty-fourth vertebra the change from lateral to inferior spinous processes is complete. There is a slight membranous expansion of the intermediate processes, but it is not very evident. In *A. presbyter* the transverse processes, from the 25th to the 30th vertebra, expand and unite below, to form a funnel, which encloses the end of the air-bladder. In *hepsetus* a less conspicuous dilatation of the processes of four vertebræ commences at the thirty-third.

	DIMENSIONS.	inches.	lines.
Length from tip of snout to	point of caudal	4	2
_____	base of caudal	3	7
_____	second dorsal	2	5
_____	anal	2	4½
_____	anus	1	9
_____	first dorsal	1	7
_____	ventrals	1	5½
_____	edge of gill-cover	0	8½
Diameter of eye		0	2¼
Length of snout before eye		0	2½
Height of body		0	6
_____ first dorsal		0	5½
_____ second ditto		0	4
Length of pectorals		0	7
_____ caudal		0	7

ATHERINA PRESBYTEROIDES (Nob.), Tasmanian Roseret.

Three examples of an Atherine, strongly resembling the sandsmelt (*A. presbyter*) so common on the south coast of England in physiognomy and general proportions, were sent to me from Port Arthur by Mr. Lempriere.

The Tasmanian fish is however more elevated, owing to the greater protuberance of its belly; the length of its head and the height of its body are equal to each other, and also to a fifth of the total length of the fish, caudal included. The portion of the snout lying before the orbit is one-fourth of the entire length of the head, and the diameter of the eye is a little greater, being one-third of that length. The mesial ridge of the snout is not prolonged so far back as in *presbyter*, but rises rather higher, forming a short obtuse eminence between the nostrils. The inequalities of the cranium are more rounded than in the sandsmelt just named, and there are oblique pores leading to cells over the orbits, but no open oval pits as in *hepsetoides*. The intermaxillaries have as little protractility as those of *presbyter*; the teeth appear to be of the same size as in that species, and there is an equal correspondence in the depressions of the preorbitals and shapes of the opercular bones.

RAYS:—D. 9|—10 or 11; A. 1|12; C. 15¼; P. 11; V. 1|5.

The first dorsal is small in all its dimensions; its rays slender and flexible: it stands wholly anterior to the anus, commencing just perceptibly behind the ventrals. I could not satisfy myself whether the first ray of the second dorsal was spinous or jointed. The anal spine is short and very flexible. As the pectoral rays are fewer than in the other Atherines, they were repeatedly counted and found to correspond exactly in all the three specimens. All the rays of the ventrals are equally soft and flexible, and the jointed ones split so readily to the base when handled that they might easily be reckoned as exceeding the normal number. The scales are rather large, and there are only two rows of them above the silvery lateral band, while in *presbyter* there are three. The scale on the summit of the back, immediately before the spinous dorsal, embraces the first ray in a narrow notch.

The specimens having been sent home in brine containing much undissolved salt, have suffered injury from the friction, and the original tints of colour cannot be made out, but they appear to have been much darker on the upper parts than the English Atherine. The *A. pectoralis* and *endrachtensis*, which are New Holland species of the same subdivision of the genus with *presbyteroides* and the *lacunosa* of Forster, which frequents the coasts of New Caledonia and New Guinea, and may be expected to be found on the northern shores of Australia, have only five or six rays in the first dorsal, and also differences in the other fins, that readily distinguish them from the Tasmanian Roseret, which moreover shows no traces of the black tip to the pectoral, so characteristic of *pectoralis*. The vertebræ are forty-six in number, and have the same hour-glass form with those of *hepsetoides*.

	DIMENSIONS.	inches.	lines.
Length from tip of snout to points of caudal		3	7
_____ base of ditto		3	1
_____ anus		1	8
_____ first dorsal		1	5
_____ ventrals		1	4 $\frac{3}{4}$
_____ edge of gill-cover		0	8
_____ eye		0	2
Diameter of the eye		0	3
Length of pectorals		0	6
Height of body		0	8
Width of occiput		0	3 $\frac{1}{2}$

ATHERINA NIGRANS (*Nob.*), The Yalgurnda.

No. 9. Mr. Gilbert's list.

Mr. Gilbert informs us that this little fish is a tolerably abundant inhabitant of the freshwater streams that flow into the harbour of Port Essington, and that it is very easily taken with a hook baited with flies or fresh meat. Yalgurnda is its native name. It is a member of that group of Atherines which is characterized by the peculiar angular form of the mouth. Five American examples of the group, and one from New Holland, the *A. Jacksoniana*, are described in the 'Histoire des Poissons.' The Yalgurnda inhabiting the opposite extremity of the Australian continent to *Jacksoniana* is readily distinguished from it by its higher form, fewer rays in the first dorsal, and black lateral band, instead of a bright silvery and green one.

The profile of the Yalgurnda is a pretty regular ellipse, which is terminated anteriorly by the thin jaws, and posteriorly by the trunk of the tail, whose height is about one-tenth of the total length of the fish, while the greatest altitude of the body is one-fourth of that length. The dorsal and anal curves are similar, and the first dorsal fin commences on the summit of the arch of the back, and a little posterior to the anal spine. The first ray of both dorsals, of the anal and of the ventrals, is moderately strong with a pungent tip,

differing in this respect from the same rays in most Atherines, which have them equally slender and flexible with the other rays. *Ath. Humboldtiana* alone, of the species figured in the 'Histoire des Poissons,' seems to have the anterior ray of these fins stiff and pungent. The four posterior rays of the first dorsal are very slender and flexible, and the two nearest to the spine have filamentous tips overtopping it by half their height. The spine of the second dorsal is slightly curved, and but little shorter than the jointed ray which immediately succeeds it. The fin rises somewhat as it runs backwards, and ends in an acute point, which reaches to the base of the caudal. The anal is very similar to the second dorsal and is equally pointed, but its spine is scarcely so long. The naked trunk of the tail, bounded by the three vertical fins, forms more than a seventh part of the entire length of the fish. The ventrals are attached before the middle of the pectorals, and their soft rays end in a thread-like tip, which overlaps the commencement of the anal. The pectoral is acute, its fourth and fifth rays being the longest: the lower ones are short, giving a rounded form to that part of the fin. The caudal is forked.

RAYS:—D. 1|4—1|12; A. 1|18; C. 17 $\frac{1}{2}$; P. 13; V. 1|5.

The head forms a fifth part of the length of the fish; the snout is flat, and the intermaxillaries are horizontal near the symphysis, but their limbs bend at a right angle: the lower jaw has a similar but less acute flexure. The teeth, moderately strong, stiff, and sufficiently visible to the naked eye, form a narrow villiform stripe on each jaw. The edges of the vomer and palate-bones are rough to the touch, but a common eye-glass is insufficient to show their teeth. The diameter of the small eye is just equal to the portion of the snout which lies before it. The preoperculum forms an acute angle, as in the Mulletts, and there are three rows of scales on the triangular cheek enclosed by its limbs, a larger scale covering the corner of the bone. The scales of the body are large, there being only thirty on the lateral line, exclusive of several small ones on the base of the caudal. A vertical row on the most elevated part of the side contains ten scales, of which four are above the lateral line and five below it. The disposition of the scales is in very regular longitudinal rows, the exposed disc of each forming a vertical ellipse acute at both ends, and approaching to a hexagon. The lateral line is marked by a pore in the disc of each of its scales, which are similar in size and form to the others on the body. An even black stripe, coincident with the scales of the lateral line, terminates at the base of the caudal, and is continued forwards over the gill-cover, upper half of the eye, and sides of the snout. This black stripe replaces the usual silvery lateral band, of which there is no other vestige. All the scales above it have narrow black borders, which produce rows of meshes. The scales below the band are destitute of dark markings. There are some blackish tints on the fins, most evident on the dorsals.

	DIMENSIONS.	
	inches.	lines.
Length from upper teeth to tip of caudal fin	3	2
————— base of caudal	2	8

DIMENSIONS (<i>continued</i>).		inches.	lines.
Length from upper teeth to beginning of second dorsal		1	8
_____ first ditto		1	4
_____ anal		1	3
_____ ventrals		1	11 $\frac{1}{2}$
_____ pectorals		0	8
_____ edge of gill-cover		0	7 $\frac{3}{4}$
Diameter of the eye		0	2
Length of snout before the eye		0	2
Height of body		0	9
Length of naked part of tail		0	4 $\frac{1}{2}$

[To be continued.]

XXIX.—On the Structure and Functions of the Pollen Granules. By WILLIAM WILSON, Esq.

IN the 'London Journal of Botany' for November 1842, the results of a sedulous inquiry into the true structure and functions of the pollen-collectors of *Campanula* were presented to its readers; and in the following month a letter from Arthur Hill Hassall, Esq. appeared in the same Journal, directing my attention to his own remarks on the same topic, published in the 'Annals and Magazine of Natural History' for October last.

In acknowledging Mr. Hassall's courtesy, I beg to say that I had not seen his paper, or it would have been discussed when mine was written.

Mr. Hassall has misunderstood me. I endeavoured to state that the pollen granules are taken bodily into the interior of the collecting hairs, and are ultimately lodged in the imbedded cavities; but Mr. Hassall supposes that I allude only to the pollen tubes. Having met with only one instance of tubes from a pollen granule thus imbedded, I did not insist upon it as a fact, but reserved that point for future inquiry.

I must entirely dissent from Mr. Hassall's views. In the first place, I cannot admit the propriety of terming that part where the collecting hairs are found, a "stigma." He says that the papillæ of the stigmatic branches "resemble the hairs in everything save length;" but if the views of physiologists are right, as I believe them to be, there must be an essential difference between these *papillæ* (rounded sides of vesicles of cellular stigmatic tissue, according to Lindley,) and the *collecting hairs*, concerning the anatomy of which Mr. Hassall considers Brongniart to have given a satisfactory account; for the hairs are regarded by the latter as an extension of the cuticle covering the whole surface of the style.

In the second place, I deem it premature and hazardous,

especially after Brongniart's statement in reference to the stigmatic tissue as the proper passage for the pollen tubes, to advance the opinion that they "penetrate the interspaces between the hairs;" and I would ask, is not the cuticle a barrier to any such penetration? If the fact be as he supposes, I consider it quite capable of being demonstrated by careful and minute dissection. The formation of pollen tubes is by no means conclusive; for Mr. Hassall has elsewhere said (p. 103) that this occurs "on parts of the flower distant from the stigma." In one case I observed a cluster of pollen granules upon the style, with pollen tubes so completely interlaced as to form an entangled mass of flocculent matter; but none of these tubes seemed to have any intimate connexion with the style. I dare not even assert that they were not produced under the influence of the stigmatic fluid; for, since the publication of my paper, I have seen that the stigmatic branches ultimately become revolute, and their papillose surfaces are thus brought into contact with the pollen adhering to the style; but this takes place long after the emission of the pollen, so that it is difficult to regard the evolution of the stigmatic branches as marking the precise time of fecundation.

Mr. Hassall's intended experiment on the flowers of *Campanula pyramidalis*, interesting as it will be, will not prove that fecundation is not effected by means of the collecting hairs. In opposition to Brongniart, I have shown that they are really the recipients of the pollen granules, and that traces of a foramen exist at the extremity of each hair which has performed its function. I cannot suppose that all this singular mechanism is intended merely to astonish the microscopic observer, and the conclusion is to my mind irresistible, that there must be an important relation between this function of the hairs and the fecundation of the plant; and this even if the pollen tubes cannot be traced from the base of the hair to the ovarium. Notwithstanding all that has yet been advanced on the subject, I confess myself to be somewhat sceptical as to the necessity for the introduction of pollen tubes into the ovarium of any plant.

I have only to add, that subsequent observations on the flowers of another species, *Campanula Rapunculoides*, confirm what I have already published in the 'Journal of Botany' on this subject.

W. WILSON.

January 18, 1843.

XXX.—Descriptions of Chalcidites discovered in the Isle of Chonos by C. Darwin, Esq. By FRANCIS WALKER, Esq., F.L.S.

Lamprotatus Numitus, Mas. *Niger, abdomen æneum, antennæ nigrae, pedes fulvi, femora nigra, alæ sublimpidæ.*

Corpus breve, convexum, nigrum, parum nitens, scitissime squameum, parce hirtum: caput transversum, breve, thoracis latitudine; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigrae, graciles, filiformes, thorace non longiores; articulus 1^{us} longus, gracilis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, usque ad 10^{um} paullo curtantes: thorax longi-ovatus: prothorax transversus, brevis, antice angustus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatae; paraptera et epimera magna; scutellum subconicum: metathorax brevis, declivis, postice angustus: petiolus brevis: abdomen æneum, brevi-ovatum, nitens, læve, glabrum, thorace multo brevius; segmentum 1^{um} magnum; 2^{um} et sequentia brevissima: pedes fulvi, simplices, subæquales; coxæ nigrae; femora nigra, apice fulva; tarsi apice fusci: alæ sublimpidæ; squamulæ piceæ; nervi fusci; nervus humeralis ulnari fere duplo longior, radialis ulnari non brevior, cubitali multo longior; stigma mediocre. (Corp. long. lin. 1 $\frac{1}{3}$; alar. lin. 2 $\frac{1}{4}$.)

Pteromalus? Oxyntes, Fem. *Ater, antennæ nigrae, pedes nigri, tarsi fusci, alæ subfuscae.*

Corpus angustum, convexum, atrum, nitens, subtilissime squameum, parce hirtum: caput transversum, breve, thorace vix latius; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigrae, subclavatae, graciles, thorace non longiores; articulus 1^{us} longus, linearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, usque ad 10^{um} curtantes; clava longiconica, acuminata, articulo 10^o plus duplo longior: thorax ovatus: prothorax transversus, brevissimus: mesothoracis scutum longitudine latius; parapsidum suturæ non bene determinatæ; paraptera et epimera magna; scutellum subconicum: metathorax brevis, declivis, postice angustus: petiolus brevissimus: abdomen fusiforme, læve, supra planum, subtus carinatum, apice acuminatum, thorace multo longius: pedes nigri, simplices, subæquales; trochanteres picei; genua picea; tarsi fusci, apice picei: alæ subfuscae; squamulæ piceæ; nervi fusci; nervus humeralis ulnari multo longior, radialis ulnari non brevior, cubitali multo longior; stigma parvum. (Corp. long. lin. 1; alar. lin. 1 $\frac{1}{2}$.)

Entedon Ufens, Fem. *Viride, abdomen nigro-purpureum, antennæ nigrae, pedes fulvi fusco-cincti, femora viridia, alæ sublimpidæ.*

Corpus sublineare, convexum, viride, nitens, scitissime squameum, parce hirtum: caput transversum, breve, thoracis latitudine; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigrae: thorax ovatus: prothorax transversus, brevis: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatae; scutellum subconicum: metathorax mediocris, obconicus, declivis: petiolus brevis: abdomen brevi-ovatum, læve, supra depressum, subtus carinatum, apice acuminatum, thorace multo brevius; discus nigro-purpureus; segmentum 1^{um} sat magnum; 2^{um} et sequentia breviora, subæqualia: pedes fulvi, simplices, subæquales; coxæ virides; femora viridia; tarsi apice fusci; mesopedum et metapedum tibiæ apice fuscae: alæ sublimpidæ; squamulæ piceæ; nervi fulvi; nervus ulnaris humerali longior, radialis ulnari brevior, cubitalis brevissimus; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1 $\frac{1}{4}$.)

Closterocerus Pelor, Mas. *Viridis, abdomen purpureum, antennæ nigrae, pedes flavo-fulvi, femora nigra, alæ sublimpidæ.*

Corpus angustum, sublineare, convexum, viride, nitens, scitissime squameum, parce hirtum : caput transversum, brevissimum, impressum, thorace paullo latius ; vertex latus ; frons abrupte declivis : oculi picei, mediocres, non extantes : antennæ nigrae, subfiliformes, hirtæ, graciles, thorace non longiores ; clava fusiformis, acuminata, articulo præcedente plus duplo longior : thorax ovatus : prothorax brevissimus, supra vix conspicuus : mesothoracis scutum longitudine latius ; parapsidum suturæ bene determinatæ, postice approximatae ; scutellum subconicum : metathorax mediocris, declivis, obconicus : petiolus brevissimus : abdomen sublineare, depressum, læve, purpureum, basi viride, thorace paullo brevius et angustius : pedes fulvi, graciles, subæquales ; coxæ nigrae ; femora nigra, apice fulva ; tarsi flavi, apice fusi : alæ sublimpidæ ; squamulæ piceæ ; nervi fulvi ; nervus ulnaris humerali duplo longior, radialis vix ullus, cubitalis brevissimus in alæ discum abrupte declivis ; stigma minutum. (Corp. long. lin. $\frac{1}{2}$; alar. lin. 1.)

XXXI.—*Descriptions of Chalcidites discovered in Coquimbo by C. Darwin, Esq.* By FRANCIS WALKER, Esq., F.L.S.

Lamprotatus Tubero, Fem. *Ater, abdomen nigro-purpureum, antennæ fusca, pedes fulvi, femora picea, alæ limpidæ.*

Corpus breve, robustum, convexum, atrum, nitens, scitissime squameum, parce hirtum : caput transversum, breve, thorace latius ; vertex latus ; frons impressa, abrupte declivis : oculi picei, mediocres, non extantes : antennæ fusca, extrorsum crassiores, thorace non longiores ; articulus 1^{us} niger, longus, gracilis ; 2^{us} piceus, longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes usque ad 10^{um} breves, approximati ; clava conica, acuminata, articulo 10^o duplo longior : thorax ovatus : prothorax transversus, mediocris, antice angustus : mesothoracis scutum longitudine multo latius ; parapsidum suturæ sat bene determinatæ ; scutellum subconicum ; paraptera et epimera magna : metathorax magnus, obconicus, declivis : petiolus sat longus : abdomen subrhombiforme, læve, nigro-purpureum, supra planum, subtus carinatum, thoracis dimidio vix longius : pedes fulvi, simplices, subæquales ; coxæ nigrae ; femora picea, apice basique fulva ; tarsi apice fusi : alæ limpidæ ; squamulæ piceæ ; nervi fulvi ; nervus humeralis ulnari multo longior, radialis ulnari vix brevior, cubitali multo longior ; stigma minutum. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 2 $\frac{1}{4}$.)

Var. β. Antennis articulus 1^{us} viridis : abdomen æneum : femora nigra ; tibiæ piceæ.

Lamprotatus? Nævolus, Mas? *Viridis, antennæ piceæ, pedes piceo-virides, tarsi flavi, alæ limpidæ.*

Corpus angustum, convexum, viride, nitens, scitissime squameum, parce hirtum : caput transversum, breve, thorace latius ; vertex latus ; frons impressa, abrupte declivis : antennæ subfiliformes, graciles, piceæ, thorace paullo longiores ; articulus 1^{us} longus, linearis, nigro-viridis ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes usque ad 10^{um} breves, approximati ; clava longiconica, acuminata, articulo 10^o plus duplo longior : thorax ovatus : prothorax transversus, mediocris, antice angustus : mesothoracis scutum longitudine latius ; parapsidum suturæ bene determinatæ, postice approximatae ; scutellum subconicum : metathorax mediocris, obconicus, declivis : abdomen ademptum : pedes virides, graciles, subæquales ; trochanteres picei ; genua flava ; tibiæ piceo-virides ; tarsi flavi, apice fusi : alæ limpidæ ; squamulæ piceæ ; nervi fusi ; nervus humeralis ulnari multo

longior, radialis ulnari non brevior, cubitali multo longior; stigma minutum. (Corp. long. lin. 1?; alar. lin. 1 $\frac{3}{4}$.)

Gastrancistrus Polles, Fem. *Viridis, abdomen nigro-cupreum, pedes piceo-virides, tarsi fulvi, alæ limpidae.*

Corpus angustum, convexum, viride, nitens, læve, parce hirtum: caput transversum, breve, thorace paullo latius; vertex latus; frons impressa, abrupte declivis: oculi rufi, mediocres, non extantes: antennæ nigrae, clavatae, submoniliformes, thorace non longiores, articulus 1^{us} longus, gracilis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, approximati, usque ad 10^{um} latescentes: thorax ovatus: prothorax transversus, brevissimus: mesothoracis scutum longitudine latius; parapsidum suturæ bene determinatæ, postice approximatae; scutellum subconicum: metathorax mediocris, obconicus, declivis: petiolus brevissimus: abdomen fusiforme, nigro-cupreum, basi viride, supra depressum, subtus carinatum, apice acuminatum, thorace paullo longius et multo angustius: pedes virides, simplices, subæquales; trochanteres picei; genua fulva; tibiæ piceæ, apice fulvæ; tarsi fulvi, apice fuscii: alæ limpidae; squamulæ piceæ; nervi fuscii; nervus humeralis ulnari multo longior, radialis ulnari non brevior, cubitali multo longior; stigma sat magnum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1 $\frac{1}{4}$.)

Platyterma Nephelæ, Mas. *Viridis, abdomen cupreo-æneum, antennæ flavæ, pedes flavi, alæ limpidae.*

Corpus sublineare, sat angustum, convexum, læte viride, nitens, scitissime squameum, parce hirtum: caput transversum, breve, thorace paullo latius; vertex latus; frons abrupte declivis: oculi rufi, mediocres, non extantes: antennæ subclavatae, flavæ, thorace paullo longiores; articulus 1^{us} longus, gracilis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes breves, approximati, usque ad 10^{um} curtantes; clava ovata, articulo 10^o multo latior et plus duplo longior: thorax ovatus: prothorax transversus, brevissimus: mesothoracis scutum longitudine paullo latius; parapsidum suturæ vix conspicuæ; scutellum subconicum: metathorax brevis, declivis, postice angustus: petiolus brevissimus: abdomen depressum, læve, sublineare, cupreo-æneum, thorace paullo brevius et angustius: pedes flavi, simplices, subæquales; coxæ virides; tarsi apice fuscii: alæ limpidae; squamulæ fulvæ; nervi flavi; nervus humeralis ulnari multo longior, radialis ulnari vix brevior, cubitali multo longior; stigma minutum. (Corp. long. lin. $\frac{3}{4}$ -1; alar. lin. 1 $\frac{1}{4}$ -1 $\frac{3}{4}$.)

Pteromalus Toxeus, Fem. *Cupreus, antennæ nigrae, pedes fulvi, femora nigra, alæ limpidae.*

Corpus robustum, convexum, cupreum, parum nitens, scitissime squameum, parce hirtum: caput transversum, breve, thoracis latitudine; vertex latus; frons impressa, abrupte declivis: oculi picei, mediocres, non extantes: antennæ nigrae, subclavatae, thorace non longiores, articulus 1^{us} longus, sublinearis; 2^{us} longicyathiformis; 3^{us} et 4^{us} minimi; 5^{us} et sequentes usque ad 10^{um} breves, approximati; clava conica, acuminata, articulo 10^o plus duplo longior: thorax ovatus: prothorax brevissimus: mesothoracis scutum longitudine latius; parapsidum suturæ vix conspicuæ; scutellum brevi-obconicum: metathorax brevis, declivis, postice angustus: abdomen ademptum: pedes fulvi; coxæ nigrae; femora nigra, apice fulva; tarsi apice fuscii: alæ limpidae; squamulæ piceæ; nervi fulvi; nervus humeralis ulnari duplo longior, radialis ulnari non brevior, cubitali multo longior; stigma minutum. (Corp. long. lin. 1 $\frac{1}{2}$?; alar. lin. 2 $\frac{1}{4}$.)

Pteromalus Sestius, Fem. *Niger, abdomen cupreum, antennæ nigrae, pedes fulvi, femora nigra, alæ limpidae.*

Corpus robustum, convexum, nigrum, parum nitens, scitissime squameum,

parce hirtum : caput transversum, breve, thorace paullo latius ; vertex latus ; frons impressa, abrupte declivis : oculi mediocres, picei, non extantes : antennæ nigræ, subclavatæ, thorace non longiores ; articulus 1^{us} longus, gracilis ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes usque ad 10^{um} breves, approximati ; clava conica, acuminata, compressa, articulo 10^o latior et multo longior : thorax ovatus : prothorax transversus, brevissimus : mesothoracis scutum longitudine latius ; parapsidum suturæ sat bene determinatæ, postice approximatae ; scutellum subconicum : metathorax brevis, declivis, postice angustior : petiolus brevissimus : abdomen longi-ovatum, cupreum, nitens, læve, supra depressum, subtus carinatum, apice acuminatum, thorace paullo longius et angustius : pedes fulvi, simplices, subæquales ; coxæ nigræ ; trochanteres picei ; femora nigra, apice fulva ; tarsi apice fusci : alæ limpidae ; squamulæ piceæ ; nervus humeralis ulnari duplo longior, radialis ulnari non brevior, cubitali multo longior ; stigma minutum. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 2.)

Pteromalus Rhæbus, Fem. Niger, abdomen nigro-æneum, antennæ nigræ, pedes fulvi, femora nigra, alæ limpidae.

Corpus convexum, nigrum, scitissime squameum, parum nitens, parce hirtum : caput transversum, breve, thorace paullo latius ; vertex latus ; frons impressa, abrupte declivis : oculi picei, mediocres, non extantes : antennæ nigræ : thorax ovatus : prothorax transversus, brevissimus : mesothoracis scutum longitudine latius ; parapsidum suturæ vix conspicuæ ; scutellum brevi-conicum : metathorax brevis, declivis, postice angustior : petiolus brevissimus : abdomen ovatum, nigro-æneum, nitens, læve, supra depressum, subtus carinatum, thorace paullo longius : pedes fulvi, simplices, subæquales ; coxæ nigræ ; femora nigra, apice fulva ; tarsi apice fusci : alæ limpidae ; squamulæ piceæ ; nervi fulvi. (Corp. long. lin. 1 ; alar. lin. 1 $\frac{3}{4}$.)

Pteromalus Vitula, Mas. Cupreus, abdomen viride, discus purpureus, antennæ piceæ, pedes nigri, tarsi fulvi, alæ limpidae.

Corpus cupreum, convexum, parum nitens, scitissime squameum, parce hirtum : caput transversum, breve, thorace latius ; vertex latus ; frons abrupte declivis : oculi picei, mediocres, non extantes : antennæ piceæ, subclavatæ, thorace non longiores ; articulus 1^{us} longus, gracilis ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes breves, approximati, usque ad 10^{um} curtantes et latescentes ; clava conica, acuminata, articulo 10^o latior et duplo longior : thorax ovatus : prothorax transversus, brevissimus : mesothoracis scutum longitudine latius ; parapsidum suturæ sat bene determinatæ ; scutellum subconicum : metathorax brevis, declivis, postice angustior : petiolus brevissimus : abdomen sublineare, depressum, nitens, læve, viride, thorace angustius et paullo brevius ; discus obscure purpureus : pedes nigri ; trochanteres picei ; genua fusca ; tibiæ apice fulvæ ; tarsi fulvi, apice fusci : alæ limpidae ; squamulæ piceæ ; nervi fulvi ; nervus humeralis ulnari fere duplo longior ; radialis ulnari non brevior, cubitali multo longior ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1 $\frac{1}{4}$.)

Pteromalus Cænoe, Fem. Nigro-æneus, abdomen æneum, antennæ nigræ, pedes nigri, tarsi flavi, alæ limpidae.

Corpus crassum, convexum, nigro-æneum, nitens, scitissime squameum, parce hirtum : caput transversum, breve, nigrum, thorace paullo latius ; vertex latus ; frons impressa, abrupte declivis : oculi picei, mediocres, non extantes : antennæ nigræ, clavatae, thorace non longiores ; articulus 1^{us} longus, gracilis ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} minimi ; 5^{us} et sequentes breves, usque ad 10^{um} curtantes et latescentes ; clava ovata, articulo 10^o multo latior et plus duplo longior : thorax ovatus : prothorax brevissimus : mesothoracis scutum longitudine latius ; parapsidum suturæ vix conspicuæ :

scutellum obconicum : metathorax brevis, declivis, postice angustus : petiolus brevissimus : abdomen longi-ovatum, æneum, læve, supra planum, subtus profunde carinatum, apice acuminatum, thorace paulo longius et angustius ; segmentum 1^{um} sat magnum ; 2^{um} et sequentia brevia : pedes nigri, simplices, subæquales ; trochanteres picei ; genua fulva ; tibiæ apice flavæ ; tarsi flavi, apice fusci ; propedum tibiæ piceæ, tarsi fulvi : alæ limpidæ, mediocres ; squamulæ piceæ ; nervi flavi ; nervus humeralis ulnari duplo longior, radialis ulnari brevior, cubitali longior ; stigma minutum. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 2.)

Tetrastichus Narcæus, Fem. *Niger, antennæ nigræ, pedes flavi, femora picea, alæ limpidæ.*

Corpus sat latum, convexum, nigrum, nitens, læve, parce hirtum : caput transversum, brevissimum, thoracis vix latitudine ; vertex sat latus ; frons impressa, abrupte declivis : oculi rufi, mediocres, non extantes : antennæ nigræ, subclavatæ, thorace non longiores : thorax ovatus : prothorax transversus, supra non conspicuus : mesothoracis scutum longitudine vix latius ; parapsidum suturæ remotæ, bene determinatæ, postice approximata ; scutellum obconicum, bisulcatum : metathorax transversus, brevis, postice angustus : petiolus brevissimus : abdomen longi-ovatum, supra planum, subtus carinatum, apice acuminatum, thorace paulo angustius et multo longius : pedes flavi, simplices, subæquales ; coxæ nigræ ; femora picea, apice flava ; tarsi apice fusci : alæ latæ, limpidæ ; squamulæ piceæ ; nervi fulvi ; nervus ulnaris humerali duplo longior, radialis vix ullus, cubitalis longus ; stigma minutum. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1 $\frac{1}{2}$.)

Platygaster Sylea, Fem. *Atra, antennæ nigræ, pedes nigri, tarsi picei, alæ subfuscæ.*

Corpus convexum, atrum, nitens, læve, parce hirtum : caput transversum, breve, thoracis latitudine ; vertex latus ; frons abrupte declivis, non impressa : oculi picei, parvi, non extantes : antennæ nigræ, subfiliformes, graciles, ad os insertæ, thorace multo longiores ; articulus 1^{us} longus, subclavatus ; 2^{us} longicyathiformis ; 3^{us} et 4^{us} longi, subæquales ; 5^{us} et sequentes usque ad 10^{um} breves, subrotundi : thorax longi-ovatus : prothorax brevissimus, supra vix conspicuus : mesothoracis scutum longitudine non latius ; parapsidum suturæ vix conspicuæ ; scutellum subrotundum, non productum : metathorax mediocris, obconicus, declivis : petiolus brevissimus : abdomen subfusiforme, thorace longius et angustius ; segmentum 1^{um} magnum ; 2^{um} et sequentia brevia : pedes nigri, simplices, subæquales, femoribus tibiisque clavatis, trochanteribus genubus tarsisque piceis : alæ subfuscæ ; squamulæ piceæ. (Corp. long. lin. $\frac{3}{4}$; alar. lin. 1 $\frac{1}{4}$.)

Omalerodius intrepidus (Betthylo affine, n. g. Haliday MSS.). *Niger, antennæ fuscæ, pedes fusci, alæ limpidæ.*

Corpus angustum, sublineare, nigrum, planum, læve, nitens, fere glabrum : caput oblongum, thorace paulo latius : oculi picei, laterales, anteriores, sat magni : ocelli 3 picei, capite postico insidentes, approximati, triangulum fingentes ; medius perparum antepositus : antennæ fuscæ, 14-articulatæ ?, graciles, moniliformes, thorace non longiores ; articulus 1^{us} validus, 2^{us} minor ; 3^{us} et sequentes usque ad 14^{um} parvi, breves, subæquales : thorax longi-ovatus : prothorax sat magnus, conicus, postice incurvus : mesothoracis scutum brevissimum, longitudine plus duplo latius ; parapsidum suturæ bene determinatæ, parallelæ ; scutellum obconicum, parvum : metathorax magnus, obconicus : petiolus brevis : abdomen longi-ovatum, thorace paulo brevius ; segmenta transversa, subæqualia : pedes fusci, simplices, subæquales ; coxæ nigræ ; tarsis articuli 1^o ad 5^{um} curtantes : alæ angustæ, limpidæ ; squamulæ piceæ ; nervi fulvi, proalis areolas cubitales 3 et subcubitales 2 fingentes. (Corp. long. lin. 1 $\frac{1}{4}$; alar. lin. 1 $\frac{1}{4}$.)

XXXII.—*Some Rectification of the Nomenclature of Australian Birds.* By GEORGE ROBERT GRAY, Esq.

MY DEAR SIR,

British Museum, Dec. 14, 1842.

THE Earl of Derby having kindly lent me the three volumes of the drawings of Australian birds which were made by Mr. White, the author of the 'Journal of New South Wales,' formerly in the library of the late Mr. A. B. Lambert, from whence Dr. Latham described most of the Australian species published in the Supplement to the 'Synopsis of Birds and Index Ornithologicus,' my brother has examined for me the synonyma of these species, and I send you for insertion in the 'Annals' the result of his labours, as they must be of considerable use to those ornithologists who have not the opportunity of consulting the original drawing.

Mr. Strickland kindly assisted my brother in comparing some of the figures with the specimens in the collection of the British Museum.

I am, my dear Sir,

Yours very truly,

J. E. GRAY.

R. Taylor, Esq.

Names proposed.

VULTUR *audax*, Lath.

SYN. *Aquila fucosa*, Cuv.; *Aquila albirostris*, Vieill.

Aquila audax.

FALCO *axillaris*, Lath.

Circus *axillaris*, Vieill.; *Elanus melanopterus*, V. & H.; *Elanus notatus*, Gould.

Elanus axillaris.

FALCO *nisus*, Lath.

Falco *canus*, Lath. MS.; *Sparvius cirrocephalus*, Vieill.; *Astur torquatus*, Gould.

Astur approximans.

FALCO *radiatus*, Lath.

Sparvius radiatus, Vieill.; nec *Astur radiatus*, V. & H., Gould.

Astur radiatus.

FALCO *connivens*, Lath.

Falco *glaucopis*, Lath. MS.; *Buteo connivens*, Vieill.; *Athene? fortis*, Gould.

Athene connivens.

FALCO *lunulatus*, Lath.

Sparvius lunulatus, Vieill.; Falco *frontatus*, Gould; Falco *longipennis*, Swains.

Falco lunulatus, Lath.

LANIUS *torquatus*, Lath., Vieill.

Vanga destructor, juv., Temm.

Cracticus torquatus.

LANIUS *robustus*, Lath., Vieill.

Graucalus — ?

LANIUS *erectus*, Lath., Vieill.

Falcunculus — ?

	Names proposed.
LANIUS <i>frontatus</i> , Lath.	<i>Falcunculus</i> * <i>frontatus</i> , Vieill.
LANIUS <i>flavigaster</i> , Lath., Vieill., very doubtful if an Australian species?	<i>Tyrannus</i> ? — ?
CORVUS <i>versicolor</i> , Lath., Vieill.	— ? — ?
CORVUS <i>cyanoleucus</i> , Lath.	<i>Grallina cyanoleuca</i> .
Cracticus cyanoleucus, Vieill.; Grallina melanoleuca, Vieill.; Tanypus australis, Opp.; Grallina australis, G. R. Gray.	
CORVUS <i>melanoleucus</i> , Lath.	<i>Cracticus melanoleucus</i> , Vieill.
CORVUS <i>olivaceus</i> , Lath.	<i>Psophodes crepitans</i> .
Corvus auritus, var. Lath. MS.; Muscicapa crepitans, Lath. Suppl.; Pica olivacea, Vieill.	
CORACIAS <i>sagittata</i> , Lath.	<i>Mimeta viridis</i> , ♀.
Philemon sagittatus, Vieill.	
CORACIAS <i>pacifica</i> , Lath.	<i>Eurystomus pacificus</i> .
Galgulus pacificus, Vieill.; Coracias australis, Swains.	
GRACULA <i>viridis</i> , Lath., Vieill.	<i>Mimeta viridis</i> , King.
CUCULUS <i>cianocephalus</i> , Lath., Vieill.	<i>Eudynamys orientalis</i> , ♀?
CUCULUS <i>phasianus</i> , Lath.	<i>Centropus phasianus</i> , V. & H.
Corydonix phasianus, Vieill.	
CUCULUS <i>palliolatus</i> , Lath., Vieill.	<i>Chrysococcyx</i> — ?
CUCULUS <i>plagosus</i> , Lath., Vieill.	<i>Chrysococcyx plagosus</i> .
Nec C. lucidus, Gm., V. & H.	
SITTA <i>chrysoptera</i> , Lath.	<i>Sittella chrysoptera</i> , Sw.
Neops chrysoptera, Vieill.	
TODUS <i>rubecula</i> , Lath.	<i>Myiagra rubecula</i> .
Platyrhynchus rubecula, Vieill.; Platyrhynchus ruficollis, Vieill. ?; Myiagra rubeculoides, V. & H.	
MEROPS <i>chrysopterus</i> , Lath.	<i>Anthochaera mellivora</i> , V. & H.
Philemon chrysopterus, Vieill.	
MEROPS <i>auritus</i> , Lath.	— ? — ?
Philemon auritus, Vieill.	
MEROPS <i>cyanops</i> , Lath.	<i>Entomyza cyanotis</i> , V. & H.
Philemon cyanops, Vieill.	
MEROPS <i>garrulus</i> , Lath.	<i>Manorhina garrula</i> .
Philemon garrulus, Vieill.; Myzantha garrula, V. & H.	
MEROPS <i>ornatus</i> , Lath.	<i>Merops ornatus</i> , Lath.
Copied by Lath. Syn.	
Philemon ornatus, Vieill.; Merops melanura, V. & H.	

* *Falcunculus gutturalis*, V. & H. *Oreica cristata*.
Turdus cristatus, Lewin; *Oreica gutturalis*, Gould.

Names proposed.

- CERTHIA melanops**, Lath. *Glyciphila melanops*.
 Melithreptes melanops, *Vieill.*; *Certhia mellivora*, *Shaw*; *Meliphaga albiventris*, *Steph.*; *Meliphaga melanops*, *V. & H.*
- CERTHIA tenuirostris**, Lath. *Acanthorhynchus tenuirostris*, *Gould*.
 Copied by *Vieill.* O. D. t. 60, and by Lath.
 Syn.
Melithreptes tenuirostris, *Vieill.*; *Certhia cucullata*, *Shaw*; *Melithreptes cucullatus*, *Vieill.*; *Meliphaga tenuirostris*, *V. & H.*
- CERTHIA leucophæa**, Lath. *Glyciphila ? leucophæa*.
Glyciphila subocularis, *Gould*.
- CERTHIA pipilans**, Lath. *Melithreptes atricapillus*, *juv. ?*
Melithreptes pipilans, *Vieill.*
- CERTHIA mellivora**, Lath. *Anthochara mellivora*,
 Copied by *Vieill.* O. D. t. 88. *V. & H.*
Creadion mellivora, *Vieill.*; *Certhia goruck*,
Shaw.
- CERTHIA atricapilla**, Lath. *Melithreptes atricapillus*, *Vieill.*
Certhia lunulata, *Shaw*; *Meliphaga lunulata*,
V. & H.; *Gymnophrys torquatus*, *Swains.*;
 nec *Meliphaga atricapilla*, *Jard. & Selby*.
- CERTHIA sanguinolenta**, Lath. *Myzomela* — ?
Meliphaga sanguinolenta, *Temm.*; *Melithreptes sanguinolenta*, *Vieill.*
- CERTHIA dibapha**, Lath. *Myzomela dibapha*.
Melithreptes dibapha, *Vieill.*; *Le Kugameta*,
Vieill. O. D. t. 58; *Scarlet Creeper*, *Lewin*.
- CERTHIA canescens**, Lath. *Meliphaga* — ?
Melithreptes canescens, *Vieill.*
- CERTHIA pyrrhoptera**, Lath. *Meliornis Australasiana ?*
Melithreptes pyrrhopterus, *Vieill.*
- CERTHIA agilis**, Lath. *Glyciphila* — ?
Melithreptes agilis, *Vieill.*
- CERTHIA cærulescens**, Lath. *Zosterops cærulescens*.
 Copied by *Vieill.* O. D. t. 83.
Melithreptes cærulescens, *Vieill.*; *Zosterops tenuirostris*, *Gould*.
- CERTHIA chrysotis**, Lath. *Ptilotis chrysotis*.
 Very similar to *Vieill.* O. D. t. 84.
Philemon chrysotis, *Vieill.*; *Ptilotis fusca*,
Gould; nec *Meliphaga chrysotis*, *Lewin*; *Ptilotis Lewinii*, *Sw.*
Ptilotis chrysotis, *Gould*.
- TURDUS inquietus**, Lath., *Vieill.* *Seisura inquieta*.
Seisura volitans, *V. & H.*

	Names proposed.
TURDUS <i>melanops</i> , Lath., Vieill. Meliphaga melanops, Temm.; Muscicapa my- stacea, Lath.; Certhia auriculata, Shaw; Phi- lemmon erythrotis, Vieill.; Meliphaga aurico- mis, V. & H.; nec Muscicapa auricomis, Lath.	<i>Ptilotis melanops</i> .
TURDUS <i>dubius</i> , Lath., Vieill.	<i>Seisura inquieta</i> , ♀ ?
TURDUS <i>dilutus</i> , Lath., Vieill. Colluriocinclla strigata, Sw., juv. ?	<i>Colluriocinclla diluta</i> .
TURDUS <i>gutturalis</i> , Lath., Vieill. Musc. pectoralis, Lath.	<i>Pachycephala gutturalis</i> , V. & H.
TURDUS <i>harmonicus</i> , Lath., Vieill.	<i>Colluriocinclla</i> — ?
TURDUS <i>prasinus</i> , Lath., Vieill.	<i>Pachycephalus</i> — ?
TURDUS <i>volitans</i> , Lath., Vieill. Nec Seisura volitans, V. & H.	<i>Seisura volitans</i> .
TURDUS <i>cyaneus</i> , Lath., Vieill.	<i>Entomyza cyanotis</i> , Sw.
TURDUS <i>tenebrosus</i> , Lath., Vieill.	<i>Artamus</i> — ?
TURDUS <i>lunulatus</i> , Lath., Vieill. Oreocinclla Novæ Hollandiæ, Gould; Meliphaga lunulata, Temm.	<i>Oreocinclla lunulata</i> .
TURDUS <i>fuliginosus</i> , Lath., Vieill.	<i>Turdus</i> — ?
TURDUS <i>melanophrys</i> , Lath., Vieill. Manorhina viridis, Vieill.; Myzantha flaviros- tris, V. & H.	<i>Manorhina melanophrys</i> .
TURDUS <i>musciicola</i> , Lath., Vieill.	<i>Seisura inquieta</i> .
TURDUS <i>cycanocephalus</i> , Lath., Vieill.	<i>Cuculus</i> — ?
TURDUS <i>maxillaris</i> , Lath., Vieill.	<i>Meliphaga maxillaris</i> , Temm.
TURDUS <i>frivolus</i> , Lath., Vieill.	<i>Pomatorhinus</i> — ?
TURDUS <i>sordidus</i> , Lath. Artamus albo-vittatus, Val.; Artamus lineat- us, Vieill.	<i>Artamus sordidus</i> , Gould.
TURDUS <i>brachypterus</i> , Lath., Vieill. Malurus brachypterus, Temm.; Dasyornis au- stralis, V. & H.	<i>Sphenura brachyptera</i> , Licht.
TURDUS <i>mellinus</i> , Lath., Vieill.	<i>Meliphaga</i> — ?
LOXIA <i>fascians</i> , Lath. Coccothraustes fascians, Vieill.	<i>Estrellda</i> — ?
LOXIA <i>bella</i> , Lath. Fringilla bella, Vieill.; Coccothraustes bella, Vieill.	<i>Amadina</i> — ?
LOXIA <i>nitida</i> , Lath. Copied though altered by Lath. Coccothraustes nitida, Vieill.	<i>Amadina</i> — ?
FRINGILLA <i>nitida</i> , Lath., Vieill.	<i>Amadina</i> — ?
MUSCICAPA <i>coccinogaster</i> , Lath., Vieill. Copied by Lath.	<i>Petroica</i> — ?
MUSCICAPA <i>barbata</i> , Lath., Vieill.	<i>Rhipidura</i> — ?

	Names proposed.
MUSCICAPA <i>rhodoptera</i> , Lath., Vieill.	<i>Rhipidura</i> — ?
MUSCICAPA <i>crepitans</i> , Lath., Vieill.	<i>Psophodes crepitans</i> , V. & H.
MUSCICAPA <i>pectoralis</i> , Lath., Vieill.	<i>Pachycephalus gutturalis</i> , V. & H.
MUSCICAPA <i>cucullata</i> , Lath., Vieill.	<i>Petroica bicolor</i> ? Gould.
MUSCICAPA <i>rhodogaster</i> , Lath., Vieill.	<i>Petroica</i> — ?
MUSCICAPA <i>flavigastra</i> , Lath., Vieill.	<i>Eöpsaltria australis</i> .
Muscicapa australis, Lath.; Pachycephalus australis, V. & H.; Todus flavigaster, Lath.; Platyrhynchus flavigaster, Vieill.; Sylvia flavigastra, Lath.? Eöpsaltria flavicollis, Sw.	
MUSCICAPA <i>malachura</i> , Lath.	<i>Stipiturus malachurus</i> .
Malurus palustris, Vieill.; Malurus malachurus, Temm.	
MUSCICAPA <i>melanocephala</i> , Lath., Vieill.	<i>Malurus melanocephalus</i> , V. & H.
Sylvia dorsalis, Lewin.	
MOTACILLA <i>atricapilla</i> , Lath., Vieill.	<i>Rhipidura</i> ? V. & H.
MOTACILLA <i>cærulescens</i> , Lath., Vieill.	<i>Motacilla</i> — ?
SYLVIA <i>sagittata</i> , Lath., Vieill.	<i>Acanthiza sagittata</i> .
Anthus minimus, V. & H.?	
SYLVIA <i>inornata</i> , Lath.	<i>Melithreptes</i> ? — ? juv.
Motacilla inornata, Vieill.	
SYLVIA <i>chrysops</i> , Lath., Vieill.	<i>Ptilotis chrysops</i> .
Meliphaga chrysops, V. & H.	
SYLVIA <i>rufiventris</i> , Lath., Vieill.	<i>Pachycephalus rufiventris</i> .
Turdus pectoralis, Lewin; Pachycephalus pectoralis, V. & H.; nec Muscicapa pectoralis, Lath.	
SYLVIA <i>flavigastra</i> , Lath., Vieill.	<i>Eöpsaltria australis</i> .
SYLVIA <i>rubricata</i> , Lath., Vieill.	<i>Origma rubricata</i> .
Motacilla solitaria, Lewin; Saxicola solitaria, V. & H.; Origma solitaria, Gould.	
SYLVIA <i>casta</i> , Lath., Vieill.	<i>Poëphila</i> ?
SYLVIA <i>leucophæa</i> , Lath., Vieill.	<i>Muscicapa</i> or <i>Petroica</i> ♀
SYLVIA <i>rubricollis</i> , Lath., Vieill.	<i>Dicæum hirundinaceum</i> .
Motacilla hirundinacea, Shaw; Sylvia hirundinacea, Lath.; Pipra gularis, Lewin; Pipra Desmarestii, Leach; Dicæum atrogaster, Less.; Malurus hirundinaceus, Vieill.; Pardalotus gularis, Temm.	
SYLVIA <i>lateralis</i> , Lath.	<i>Zosterops lateralis</i> .
Malurus hirundinaceus, var. Vieill.; Zosterops dorsalis, V. & H.	
SYLVIA <i>versicolor</i> , Lath., Vieill.	<i>Chrysococcyx</i> — ?
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	Names proposed.
PIFRA <i>superciliosa</i> , Lath.	<i>Pardalotus superciliosus</i> , Vieill.
PIFRA <i>cærulescens</i> , Lath. Pifra <i>cærulea</i> , Vieill.	<i>Pardalotus</i> — ?
HIRUNDO <i>caudacuta</i> , Lath., Vieill.	<i>Acanthylis caudacuta</i> .
HIRUNDO <i>pacifica</i> , Lath., Vieill.	<i>Cypselus</i> — ?
CAPRIMULGUS <i>vittatus</i> , Lath., Vieill. <i>Ægotheles lunulatus</i> , Jard. & Selby.	<i>Ægotheles Novæ Hollandiæ</i> , V. & H.
CAPRIMULGUS <i>strigoïdes</i> , Lath., Vieill. Podargus <i>humeralis</i> , V. & H.	<i>Podargus strigoïdes</i> .
CAPRIMULGUS <i>megacephalus</i> , Lath., Vieill.	<i>Podargus</i> — ?
CAPRIMULGUS <i>gracilis</i> , Lath., Vieill. Podargus <i>humeralis</i> (V. & H.), Gould.	<i>Podargus</i> — ?
COLUMBA <i>melanoleuca</i> , Lath., Vieill.	<i>Carpophaga melanoleuca</i> .
COLUMBA <i>pallida</i> , Lath., Vieill.	<i>Columba</i> — ?
PERDIX <i>varius</i> , Lath. Hemipodius <i>varius</i> , Gould.	<i>Turnix varius</i> , Vieill.
ARDEA <i>maculata</i> , Lath.	<i>Nycticorax caledonica</i> , juv.
NUMENIUS <i>rostratus</i> , Lath. MS. Numenius <i>australasianus</i> , Gould.	<i>Numenius cyanopus</i> , Vieill.
TRINGA <i>aurita</i> , Lath., Vieill.	<i>Tringoïdes hypoleucus</i> ?
RECURVIROSTRA <i>americana</i> , Lath. MS. Recurvirostra <i>Novæ Hollandiæ</i> , Vieill.	<i>Recurvirostra rubricollis</i> , Temm.
SCOLOPAX <i>australis</i> , Lath. Scolopax <i>Hardwickii</i> , J. E. Gray.	<i>Gallinago australis</i> .
CHARADRIUS <i>magnirostris</i> , Lath.	<i>Burhinus magnirostris</i> , Ill.
CHARADRIUS <i>grallarius</i> , Lath., Vieill. ♀ } CHARADRIUS <i>frenatus</i> , Lath., Vieill. ♂ } Charadrius <i>longipes</i> , Vieill.	<i>Ædicnemus grallarius</i> .
CHARADRIUS <i>griseus</i> , Lath., Vieill.	<i>Hiaticula</i> — ?
CHARADRIUS <i>fuscus</i> , Lath., Vieill.	<i>Hiaticula</i> — ?
RALLUS <i>tabuensis</i> , Lath. MS. Nec R. <i>tabuensis</i> , Gm. ; <i>Crex plumbea</i> , J. E. Gray; <i>Gallinula immaculata</i> , Sw.	<i>Porzana plumbea</i> .
LARUS <i>pacificus</i> , Lath., Vieill. Larus <i>leucomelas</i> , Vieill. ; Larus <i>Georgii</i> , Vig.	<i>Larus pacificus</i> , Lath.
ANAS <i>melanoleuca</i> , Lath., Vieill. } ANAS <i>semipalmata</i> , Lath., Vieill. }	<i>Anseranus melanoleucus</i> , Less.
ANAS <i>rhynchotis</i> , Lath. Rhynchaspis <i>maculatus</i> , Gould.	<i>Spatula rhynchotis</i> .

XXXIII.—*Descriptions of several new Genera and Species of Crinoidea.* By THOMAS AUSTIN, Esq., and THOMAS AUSTIN, Jun., Civil Engineer.

IN deference to the recommendation of the British Association for the Advancement of Science, we have endeavoured, in establishing our new genera and species, to adhere as closely as possible to the rules which have been sanctioned by that body; and though we have experienced considerable difficulty in extricating some groups from the confusion in which they were involved, we trust on the whole that our labours will be found to be in accordance with the liberal and enlightened views propounded by the Committee appointed to report on the means of rescuing the nomenclature of Zoology from the almost inextricable confusion it has fallen into.

Family POTERIOCRINIDÆ, *Austin*,

containing the following genera: *Poteriocrinites*, *Cladocrinites*, and *Synbathocrinites*.

Genus *Poteriocrinites*, Miller.

The generic characters defined by its founder.

Sp. *P. dudleyensis*, Austin, sp.

Definition.—The plates surrounding the body agree in number and arrangement with the generic character. The upper series or ray-bearing plates are abruptly truncated on their superior edges, which are excavated and have central ridges for the articulation of the rays. These ridges extend the whole width of the plates. The unique specimen examined somewhat resembles *P. granulosus* in figure, but the dorso-central plates are less dilated; and it differs from that species in the absence of granulæ, all the plates being quite smooth. Column and rays unknown.

This is the only instance in which the genus *Poteriocrinites* has been met with in other strata than the carboniferous limestone. The specimen is in the cabinet of J. Johnson, Esq.

P. isacobus, Austin, sp.

Def.—The plates surrounding the body accord in number and arrangement with the generic type. Main rays five, each composed of a single joint. These are succeeded by others until the last series amount to forty. Each subdivision, like the main rays, is composed of a single joint. Column unknown.

This is an exceedingly minute species, from which circumstance we had given it the specific name *minimus* in our pro-

posed list of *Crinoidea*, which appeared in No. 63 of the 'Annals and Magazine of Natural History'; but as this term came within the objection pointed out by the British Association, we have not hesitated in proposing one less objectionable, and perhaps more characteristic.

P. radiatus, Austin, sp.

Def.—Dorso-central plates (pelvis) much elongated, with several highly raised narrow ridges which run across the sutures, and uniting with similar ridges on the adjoining plates form series of triangles around the body. Ray-bearing plates broad, with nearly circular excavations for the insertion of the rays. Column and rays unknown.

P. rostratus, Austin, sp.

Def.—The plates forming the cup of this species are identical in number and arrangement with the generic type. The upper portion is elongated into a proboscis or oral tube, situated centrally, of considerable length, and covered with plates which are ornamented with reticulating ridges. The proboscis terminates at its apex with several tooth-like plates. Main rays five, once subdivided, making ten. Tentacula somewhat distant from each other. Column composed of large and small joints alternately.

P. quinquangularis, Austin, sp.

Def.—Dorso-central plates more conical than in the generic type. Proboscis elongated, with elevated ridges crossing the plates transversely. Main rays five, with one or more subdivisions. Column quinquangular near its attachment to the body, but gradually becoming circular as it recedes from that point.

P. plicatus, Austin, sp.

Def.—Form and arrangement of the body-plates coincide with the generic type. Five broad, elevated, strongly defined ridges or folds run upwards from the dorso-central plates, through the first series of perisomic plates: when near the upper edges of these plates the ridges divide and branch outwards at an angle of about 45° , terminating at the base of the rays, and forming a figure approaching to the letter Y. A similar ridge then crosses from each horn of the letter, and terminates also at the base of the rays. Rays unknown, but their points of attachment are nearly circular, with a central ridge. Column circular, slightly enlarging at its attachment to the dorso-central plates.

P.? *dactyloides*, Austin, sp.

Def.—The perisomic plates appear to coincide with the generic character of *Poteriocrinites*. Rays five and undivided. The ray-joints are long near the body, but go on gradually diminishing in size to their terminations. The proboscis shows the reticulated structure peculiar to *Poteriocrinites*. This species appears to be small.

Genus *Cladocrinites**.

This genus includes the species which Mr. Phillips named provisionally *Isocrinites*, but as Von Meyer had previously founded a genus of that name, composed of quite a distinct suite of fossils, we have ventured to remove the so-called *Isocrinites* of Mr. Phillips into our proposed new genus.

Generic definition.—Dorso-central plates five?, resembling a tumid supra-columnar joint. First series of perisomic plates (costals) five; second series or ray-bearing plates five: all these plates are remarkably short in comparison with the length and size of the rays. Column generally enlarging at its junction with the body, and apparently devoid of auxiliary side-arms.

C. Egertoni, Phill. sp.

The specific definition has already been given by Mr. Phillips; we however differ in opinion with respect to the portion of the fossil which is to be considered as the body and which the rays. We consider all the joints above the second series of perisomic plates as belonging to the rays. Mr. Phillips, on the contrary, counts the rays only as commencing at the cuneiform joints.

C. nobilis, Phill. sp.

Mr. Phillips included this beautiful species amongst the genus *Poteriocrinites*?

C. tuberculatus, Mill. sp.

Miller described this Crinite as a Cyathocrinite, to which genus it does not belong.

C. longidactylus, Austin.

Def.—The perisomic plates conform to the generic type. The five main rays are each composed of two joints only, from which proceed two secondary rays; these again subdivide, the inner branches extending a considerable distance before the last bifurcation takes place; but the outer branches divide at about half the distance that the inner rays do. The total

* From *klados*, a branch.

divisions amount to forty. The rays are remarkably long in proportion to the size of the body. Column circular.

C. brevidactylus, Austin.

The plates forming the cup agree with the typical character. The rays are shorter and less numerous than in the preceding species. Main rays five, divisions amounting to twenty or more. Column circular, and varying in different stages of growth.

C. pentagonus, Austin.

Def.—The perisomic plates answer to the typical character. Main rays five, subdivisions fourteen. Proboscis or oral tube large and central, and covered with five vertical bands of plates. Rays fourteen? Column: upper portion pentagonal, gradually becoming circular and moniliform.

C. macrodactylus, Phill. sp.

Family ENCRINIDÆ, Austin,

contains the genera *Encrinites*, Mill.; *Eucalyptocrinites*, *Cupressocrinites*, Goldf., and *Euryocrinites*, Phill.

Family PENTACRINIDÆ.

P. rotundus, Austin, sp.

Def.—The only portion of this species known is a columnar fragment, which differs from all other *Pentacrinites* in being circular, but it still retains the peculiar generic character, in the stellated crenulations on the articulating facets of the columnar joints. These pentapetalous figures are more dilated, to suit the circular form of the joints, than in others of the genus.

Family MARSUPIOCRINIDÆ,

consisting of *Marsupiocrinites* and *Crotalocrinites*.

Genus *Crotalocrinites**.

Def.—Dorso-central plates five; first series of perisomic plates five; second series five. On the latter are a series of wedge-shaped plates which bear the rays: the exact number of these plates is unascertained. Column with a pentapetalous perforation.

C. rugosus, Miller, sp.

Def.—The plates surrounding the body agree with the generic character. Rays numerous, probably amounting to one hundred. Column composed of thin joints articulating into each other by radiating striæ. The columnar canal is penta-

* From *krotalon*, a bell.

petalous. The rays are remarkably small in proportion to the size of the animal.

Miller has fallen into such important errors respecting this Crinite, that it is difficult to believe the fossil he describes to be identical with this which we are now describing; but having access to the specimens he founded the species on, and comparing them with others, we cannot doubt their identity.

Miller placed it with his genus *Cyathocrinites* as *C. rugosus*. The plates he erroneously described as scapulars with a single excavation for the articulation of the arm-joints have no excavation whatever, for there is a regular series of wedge-shaped plates resting on them, and from which the rays, amounting to nearly one hundred, proceed.

Family PLATYCRINIDÆ,

containing the genera *Platycrinites*, *Cyathocrinites*, and *Caryocrinites*.

Genus *Platycrinites*, Miller.

Genus erroneously described by its founder as having a divided pelvis. On referring to Miller's own specimens it is evident the fossils we are about to describe belong to the genus *Platycrinites*, which has in reality an undivided dorso-central plate, though Miller thought otherwise. This can be demonstrated by numerous well-preserved specimens, both in our own cabinet and in other collections also.

P. mucronatus, Austin, sp.

Definition given in the first portion of our Monograph now in course of publication.

P. antheliontes, Austin, sp.

Described in our Monograph now in the press.

P. spinosus, Austin, sp.

Defined in Monograph.

P. trigintidactylus, Austin, sp.

Def.—Perisomic plates agree with the generic character, but are somewhat broader than in the typical species *lævis*. Main rays and subdivisions thirty, closely tentaculated to their ends. Proboscis or oral tube long, central, and plated to its apex with rather small, smooth, hexagonal plates. Column circular at its attachment to the body, but gradually becoming elliptical as it recedes from it.

Family ACTINOCRINIDÆ, Austin,

contains the following genera: *Actinocrinites*, *Rhodocrinites*, *Melocrinites*, and *Tetracrinites*.

Genus *Actinocrinites*, Miller.

Described by its founder.

A. elephantinus, Austin, sp.

The perisomic plates agree with the generic type in number and arrangement, but the radiating folds or ridges which ornament them are less strongly marked and fewer in number. The plates are also smaller in proportion to the size of the animal. Proboscis or oral tube much elongated, in some specimens exceeding two inches in length. Proboscoidal plates hexagonal, with an elevated ridge in the centre of each, and which is surrounded by a circle of minute tubercles. Main rays and subdivisions fifty, furnished with numerous tentacula. Column circular, with two small joints intervening between those of larger size.

A. cataphractus, Austin, sp.

Def.—The plates surrounding the body agree with the typical character in number and arrangement. The proboscis or oral tube of this species presents many interesting points of structure. It is covered from its base to the apex with a set of abruptly conical plates arranged spirally. The intermediate spaces are covered with smaller plates slightly elevated in their centres. Both sets, as well as the plates between the rays and proboscis, are beautifully embossed with minute mammiform eminences. The perisomic plates radiate in single ridges. Rays thirty, furnished with long and close-set tentacula. Column: it is impossible to define the structure of the column, as no certainty exists respecting it in this or other species, for it is evident that at different seasons considerable modifications took place.

There is a strongly marked difference between this species and the *triacontadactylus*, although each possess the same number of rays. The *triacontadactylus* has its proboscis covered with exceedingly minute plates, while those of the *cataphractus* are of striking peculiarity.

A. aculeatus, Austin, sp.

Def.—Perisomic plates answer to the generic type in number and general arrangement. The radiations are less strongly marked than in some other species. Oral tube elongated and covered with minute plates, most of which are furnished with a thorn-like projection in their centres. Rays and subdivisions forty. Two rows of minute tubercles ornament the outer sides of each of the rays. Column varying according to the period of the year in which the animal died.

A. crassus, Austin, sp.

The plates surrounding the body agree with the typical character in number and arrangement, but they are comparatively broader and devoid of the radiated markings. Rays numerous, but their number unknown. Column unascertained.

A. granulatus, Austin, sp.

Def.—The perisomic plates agree in number with the generic type. The first series of plates are larger in proportion to the size than in the typical species; the upper series are also broader. The plates covering the portion above the rays are finely granulated, excepting the six plates surrounding the valvate anal pore, which are smooth. Mouth not quite central, but situated below the large dome-shaped plate which crowns the centre. Total number of rays unknown, but they were probably numerous, as indicated by their points of attachment to the body. Columnar articulation large and circular. Column unknown.

This is a highly interesting specimen as showing the valvate anus, and is supposed to be unique in that respect.

A. levissimus, Austin, sp.

Def.—Body-plates answer to the typical character in number and arrangement, but they are comparatively larger than in any other known species. The first and second series are flat and smooth, the remainder are slightly rounded, and have faint and partial radiations. Plates covering the viscera furnished with conical projections in their centres. Divisions of the rays fifty, closely tentaculated. Column as in other species, varying at different periods of growth.

A. longispinosus, Austin, sp.

Def.—The plates surrounding the body agree with the generic type, but the radiations are less strongly marked. The coronal plates, or those protecting the upper portion, are elongated into spines of very great length. Oral tube long and covered with minute plates. Rays forty. Column varying at different seasons.

Genus *Rhodocrinites*, Miller.

This is another genus of Miller's which requires an emended definition. He describes the dorso-central plates (pelvis) as composed of three instead of five pieces, and the first series of plates resting on them as quadrilateral, when, in fact, they are hexagonal. These mistakes were no doubt owing to the smallness of the specimens examined by Miller, which rendered them liable to be misunderstood. In consequence of

these errors Mr. Phillips has repudiated the genus altogether, and endeavoured to found a new one under the name of *Gilbertsocrinus*. We have carefully examined Miller's specimens and compared them with the species from the Yorkshire limestone which have been described by Mr. Phillips, and we are quite convinced that they are generically identical with each other; it is therefore evident that either the genus *Rhodocrinites* or the *Gilbertsocrinus* must be suppressed.

Though Miller was unquestionably wrong in his generic definition, there can be no possible doubt as to the identity of the fossils on which he founded his genus; we therefore, on mature consideration, think it just that the merit of priority should be conceded to him; and we trust that Mr. Phillips will coincide in this opinion.

If this principle is not to be recognised, every trifling error of an observer may be taken advantage of, like a flaw in an indictment, and the slightest mistake in his definitions be sufficient to annul a long-established genus. In this manner we might claim the right to rename the genus *Platycrinites* on the plea that the dorso-central plate is undivided instead of tripartite, as in Miller's generic character.

Def.—Dorso-central plates five, quadrilateral, with a small perforation at each of their inner angles, which, when the plates are united, form the pentapetalous opening into the column.

First series of plates resting on the dorso-central five, hexagonal; second series five, heptagonal; these latter support five hexagonal plates, which are succeeded by a like number of pentagonal ones. On the upper edges of each of these plates rest two lengthened hexagons, to which the ray-bearing plates are attached. Between these latter are several pentagonal and hexagonal plates.

Mr. Phillips appears to consider the pentagonal plates below the lengthened hexagons as the scapulæ or ray-bearing plates; but this we consider erroneous, as all the plates we have described as perisomic clearly envelope and form part of the body, above which the rays become distinctly developed, and were possessed of flexure, which their lower portions must have been deficient in had they been as described by Mr. Phillips.

R. costatus, Austin, sp.

Def.—Plates surrounding the body agree in number with the generic type. A strong rib or fold extends from each of the five angles of the dorso-central plates to about two-thirds the distance between those points and the rays; they then

divide, each branch ending at the base of the rays. All the perisomic plates are radiated. Abdominal plates small and mammiform. Mouth lateral. Rays forty. Columnar joints alternately thicker and thinner.

R. granulatus, Austin, sp.

Def.—Perisomic plates agree as to number and arrangement with the generic type, but instead of elevated ribs, as in the last species, the same end—strength—is attained by the superior thickness of the plates lying in the line of the rays. In consequence of this increased solidity, these plates are more elevated than the adjoining ones, the elevations being greatest in their centres. All the perisomic plates are minute, elevated, and finely granulated. Mouth lateral. Rays probably twenty. Columnar joints alternately larger and smaller.

Genus *Tetramerocrinites**, Austin.

Def.—Dorso-central plates four, pentagonal. First series of perisomic plates eight, four of which are heptagonal, and the remaining four pentagonal, alternating with each other; second series or ray-bearing plates eight, with a double excavation in each for the insertion of the ray-joints; several intervening plates occur, but the number is unknown.

T. formosus, Austin.

Def.—Little is known of this species beyond the description given in the generic definition. The unique specimen obtained of this species departs from the usual quinary type in the arrangement of its rays, which are in four groups of four each, instead of five, as is more generally observed in the *Crinoidea*. The depressions in the quadripartite dorso-central plates for the attachment of the column are small but deep. The body plates are all beautifully radiated from their centres. Column and rays unknown.

Family PERIECHOCRINITES†, Austin,

comprising the genera *Periechocrinites* and *Sagenocrinites*.

Genus *Periechocrinites*, Austin.

Def.—Dorso-central plates three. It is difficult to define the perisomic plates in this genus in the same manner as in other genera, because they do not occur in regular series as in *Actinocrinites*, but are regular only in the line of plates which run from the dorso-central plates to those bearing the rays. These may be considered as the principal plates, as they are

* From *tetrameres*, consisting of four parts. † From *periecho*, to surround.

more equally developed than the intervening ones, and divide the body into compartments. These series are easily distinguished by their prominence from the intermediate plates. A series of three traverse the lower portion of the body; these are succeeded by two other series of three each, which branch off at a considerable angle and form the points of attachment for the rays. Within the forks formed by these branches are groups consisting of three or more smaller and less prominent plates than those already described. In each of the compartments between the ray-bearing series is a group of several irregularly shaped hexagonal and pentagonal plates, sometimes amounting to seventeen or eighteen; in other cases the number is less, for greater irregularity is observable in this genus than in any other yet described. Rays composed of double series of joints.

P. articulatus, Austin.

The perisomic plates agree with the generic description, which has, in fact, been taken from this the typical species. Rays eighty, composed of double series of joints: the rays may really exceed the number specified above, but we have clearly seen their development up to that amount. Column circular, and subject to the same periodical changes as in other genera.

P. costatus.

The perisomic plates agree with the generic definition. Mr. Phillips has in Murchison's 'Silurian System' erroneously described this species as *Actinocrinites (moniliformis)*. To that genus it bears no resemblance either in the number or arrangement of the plates forming the calcareous framework. To bring this species within the generic character of *Actinocrinites*, it is necessary to consider the scapulæ as situated at least three series of plates below the true ray-bearing plates. It is scarcely necessary to remark, that such a method of determining species is quite unsatisfactory in every point of view, and must lead to important errors if adhered to.

Miller originally admitted it into the genus *Actinocrinites*, on the evidence of a columnar fragment; but as the form of the column possesses no peculiarity of structure sufficiently striking to warrant specific distinction, we have altogether re-named it.

P. globosus.

The number and arrangement of the perisomic plates answer to the generic type. Rays and column unknown.

Genus *Sagenocrinites**, Austin.

Def.—Dorso-central and perisomic plates unknown, as the only portions hitherto discovered are the rays and plated integument, which extends between their lower divisions in the same manner as the membranous web is stretched between the toes of many aquatic birds. The peculiar construction of these portions clearly proves them to belong to an undefined genus.

S. expansus, Phillips, sp.

Mr. Phillips has defined this species as far as the existing knowledge respecting it warranted in Murch. 'Sil. Syst.'; but he has placed it provisionally with the *Actinocrinites*, to which it in no respect appertains.

S. giganteus, Austin.

Body-plates unknown. Rays unequally developed and varying in their diameters; secondary rays composed of a double series of thin joints articulating by radiating striæ as in various columns. A plated integument connects the lower portions of the rays.

Family MEROCRINIDÆ, Austin,

contains the genera *Dimerocrinites* and *Tetramerocrinites*.

Genus *Phænicocrinites*†.

Def.—Dorso-central plates three? First series of perisomic plates, or those in the line of the rays, five; second series five; third series, or ray-bearing plates, five and cuneiform. Between these, the principal series, are several smaller plates, the number unascertained.

P. simplex, Phillips? sp.

Def.—The arrangement of the perisomic plates agrees with the generic type. Rays ten, composed of single series of joints, and furnished with plumose tentacula. The column is short as compared with *Actinocrinites*. No indication of auxiliary side-arms has been observed in this species. Base furnished with several fibres of attachment.

This is supposed to be the *Actinocrinites simplex* of Phillips, who states that "the pelvic, costal, and other plates of the body agree with Miller's technical formula of *Actinocrinites*." We cannot discover this agreement in any of the essential points, and have therefore removed it into a new genus.

Family ASTRACRINIDÆ‡,

consisting of the genera *Astracrinites* and *Aporocrinites*.

* From *sagene*, a fishing-net.

† From *phoenix*, a palm-tree.

‡ From *astron*, a star.

Genus *Astrocrinites*, Austin.

Def.—Dorso-central plate quadrangular, to which four pairs of elongated plates are attached, imparting a lobed shape to the fossil. In the retiring angles at the base of the four lobes are a like number of ambulacra. Mouth central. Anus lateral.

A. tetragonus, Austin.

Def.—The plates of this species agree with the generic definition. Each of the elongated plates has two or three rows of minute tubercles around its outer margin, apparently for the attachment of spines. The ambulacra have each a double row of pores placed centrally, with marginal tubercles. Near the centre of the dorso-central plate is an oval eminence, apparently analogous to the *madreporiform tubercle* on the dorsal surface of the true Starfishes.

Genus *Sycocrinites**, Austin.

Def.—Dorso-central plates three, forming a pentagon. First series of perisomic plates five, on which rest other series of plates, answering, though larger in proportion, to the abdominal (pectoral) plates of those Crinites which possess rays. Mouth central, anal pore lateral. Column unknown.

S. clausus, Austin.

Def.—Dorso-central plates three; perisomic plates five, on which rest a second series of five plates which answer to the interscapular plates of those Crinites possessing rays; a third series of five plates close in the apex, excepting a minute central opening which is considered to be the mouth, and which was probably valvate. The anus is situated laterally at a point between the first and second series of plates. Column unknown.

S. Jacksoni, Austin.

Def.—Dorso-central plates three, forming a pentagon. Perisomic plates five. Apex closed in by five plates. Mouth central and valvate, anal pore lateral. Columnar attachment small. Column unknown.

S. anapeptamenus, Austin.

Def.—Dorso-central plates three, forming a pentagon. First series: perisomic plates five, all hexagons. The second series of plates arch over the apex, leaving a central opening which was probably protected by a plated integument. Anal pore lateral and projecting. Column unknown.

* From *sukon*, a fig.

Genus *Echinocrinus*, Agassiz.*E. spinosus*, Austin, sp.

Def.—Body conico-globose, with five double rows of ambulacral plates, and the like number of interambulacral spaces. The five pairs of avenues run from the mouth to the columnar point of attachment. The ovarian plates surround the mouth instead of the anal opening, as in the recent *Echini*, but which organ is as yet undiscovered in these fossil animals. The whole surface is covered with spines, but these are of two sorts; the one kind, though few in number, are long and furrowed longitudinally. The prominences near their bases are circular, and in their ends are cup-like excavations by which each one fits on to the tubercle in the centre of each plate. The second sort of spines are short, and are rather numerous but irregularly scattered over the plates and around the central spine. Column unknown.

E. anceps, Austin, sp.

The only part of this species yet discovered is a beautiful fragment showing the internal structure of the ambulacra and a few of the adjoining plates. On showing the specimen to Professor Agassiz some time since, he pronounced it to be the internal surface of a portion of the *E. pomum*. Though the Professor's name ranks deservedly high in science, and however presumptuous it may appear to dissent from such an authority, we are compelled in this instance to do so, for the following reasons:—the ambulacral pores of the specimen in question are much wider asunder than in the *E. pomum*, the plates themselves are much larger, and above all, are beyond comparison thinner than in the species Prof. Agassiz assigned them to.

Since Professor Agassiz saw the specimen in question, we have had many opportunities of examining the internal structure of the *E. pomum*, and we can find no resemblance whatever between the two species.

It appears to us that the name of our genus *Sycocrinites* and that of the *Echinocrinus* of Professor Agassiz require amendment, as their terminations imply affinities which do not exist.

A great majority of the new species defined in the foregoing paper were discovered and collected from the strata in which they occur by the authors.

Kingsdown, Bristol, January 18, 1843.

XXXIV.—On two new species of British Musci. By THOMAS TAYLOR, M.D., Dunkerron, Kenmare. Communicated by William Gourlie, Jun.*

TRICHOSTOMUM SAXATILE, MSS.

Specific character.—Caule subramoso, abbreviato, erecto, conferto; foliis ovato-lanceolatis, concavis, margine reflexis, integerrimis, epiliferis, apice obtusiusculis, nervo sub summo apice evanescente; peristomii dentibus brevibus, laciniis alternatim angustioribus, operculo suberecto, calyptra hinc fissa.

Hab. In locis montosis, saxa majora coronans. Comitatus Kerriensis, Hiberniæ.

Caules $\frac{1}{2}$ —1 unciales, aggregati, innovationibus binis. Folia flavo-virescentia, anni præteriti fusciscentia, nunquam, uti multis congeneribus solenne, in acumen elongatum producta. Capsula oblonga aut obovata. Peristomium breve, trabeculis dentium lacinias vix jungentibus. Operculi rostrum inclinatum. Calyptra fissura unica cæteris altior; unde genus vix firmum.

This plant, in the 'Flora Hibernica,' has been referred to a variety of *Trichostomum fasciculare*, Schrader, growing on stones at Carig Mountain. Subsequent careful examination of better specimens shows it to be very distinct in the want of fascicled branches, but especially by the short peristome, whose teeth are united at their bases by a pale membrane rising above the mouth of the capsule. The inclined rostrum of the lid and nearly dimidiate calyptra are unusual in the genus.

BRYUM RECURVIFOLIUM, MSS.

Spec. char.—Caule erecto, subsimplici, subflexuoso; foliis oblongo-ovatis, acutis, laxis, ex amplexante basi recurvantibus, marginibus flexuosis, minutissime serrulatis.

Apud montem Knockavohila, prope Dunkerron in Comitatu Kerriensi, Hiberniæ. Anno 1842.

Habitus *Dicrani squarrosi*, Schrader, 2—4 uncialis, inter *Hypna* aliosve muscos ascendens, vix cæspitosa, luteo-viridis. Caules sæpius duos surculos annotinos erigentes, atque ex eodem puncto radices setaceas, purpureo-nigricantes paucas demittentes. Folia canaliculata, substantia squarrosa, caulis apicem versus conferta atque majora, dense cellulosa, nervo valido pallidiori in cuspidem brevem excurrente; marginibus pallidis minutissime celluloso-serrulatis.

Although the fructification is not known, yet there can be little hesitation in referring this remarkable species to the genus *Bryum*. With the habit of *Dicranum squarrosum*, Schrad., it has the structure of *Bryum cuspidatum*, Schreber. A very small quantity, and only in one spot, has hitherto been found.

* Read before the Botanical Society of Edinburgh.

BIBLIOGRAPHICAL NOTICES.

Natural History of New York. Zoology, or the New-York Fauna, comprising detailed descriptions of all the Animals hitherto observed within the state of New York, with brief notices of those occasionally found near its borders, and accompanied by appropriate illustrations. By James E. De Kay. Part I. Mammalia. 4to. Albany, 1842.

THE appearance of the advertisement of a zoological work in America extending to ten quarto volumes, devoted to the natural productions of a particular province, induced us, in these days of cheap publications, to procure a sight of the first part of the undertaking. It is the result of one of those State-Surveys, several of which have been previously completed by other districts, and it tells much for the enterprise of the country that an examination on such a scale should have been undertaken, and still more so that the results should be so early commenced to be laid before the public, thereby repaying to the state value for the employment it had given to its scientific men; and it might stand as an example to the governments of older countries, not to store up the results of the expensive labours of years for the unlikely probability of rendering them perfect after the generation of their projectors shall have ceased to exist: "go ahead" may sometimes be taken as a useful motto.

By authority of acts of the Assembly the above-mentioned Survey was made: "William L. Marcy, governor, arranged the plan of the Survey in the summer of 1836, and assigned its departments as follows: the Zoological department to James E. De Kay; the Botanical department to John Torrey; the Mineralogical and Chemical departments to Lewis C. Beck; the Geological department to William W. Mather, Ebenezer Emmons, Timothy A. Conrad, and Lardner Vanuxem. This arrangement was subsequently altered by the institution of a Palæontological department, under the care of Mr. Conrad, and by the appointment of James Hall to supply his place as a geologist. The results of the Survey appear in the following volumes, and in eight several collections of specimens of the animals, plants, soils, minerals, rocks and fossils found within the state, one of which collections constitutes a museum of natural history at the capital of the state, and the others are distributed among its collegiate institutions." The volume before us, being the first of the series, is prefaced by an introduction of 188 pages, which will prove interesting to the general reader; it gives a rapid sketch of the present condition of the arts and sciences, of the progress of agriculture, internal navigation, railroads, horticulture, newspaper-press, history of the antiquities, and of the Aborigines; in fact, touching on almost every topic.

The real commencement of the book, or of the Zoological part, has a short preface devoted to the description of the surface and boundary of the state, with a tabular view of the mammalia indige-

nous to it, comprised in forty-five genera, including fossil as well as recent and introduced animals. New York lies wholly within the temperate zone, and contains more than 46,000 square miles. Although situate within the same parallels of latitude which include the greater part of Italy, the south of France, and the northern parts of Spain, yet, from the well-established facts of the more southerly position of the isothermal lines on the western shores of the Atlantic, its mean annual temperature cannot be compared with that of the above-mentioned countries, but rather with those lying from 15° to 20° farther north. The result of ten years' observations at New York gives 165 days, or about five months, as the mean duration of winter. Few mountains in the state exceed 5000 feet, yet, from the peculiarity of climate, their summits have a temperature much lower than mountains of even higher altitude in corresponding parallels in Europe. The great inland seas, Erie and Ontario, have also their influence on the climate and the productions, while the long gut of land known by the name of Long Island, reaching to the Atlantic, is the extreme southern limit of the migrations of the arctic species, and the most northern termination of the wanderings of the birds of the torrid zone.

Through the Zoological part the descriptions appear to be carefully made out. The synonyms are chiefly taken from works relating to the fauna of North America, a more extended list, perhaps, being not called for in a work of comparatively provincial character; but the remarks on the habits of the animals, or their æconomical and commercial utility, are extremely limited; these in one view may not be considered *strictly* scientific, at the same time they are very important. In the description of the beaver it is stated, that in the state of New York this animal is now nearly extirpated, while in little more than 200 years previously (1635), 14,891 skins were exported; such is the passing away of many of formerly abundant species. The New York and European beavers are considered identical.

Among several of the North American animals which have been considered specifically the same with those of Europe by various authors, it is to be regretted that any doubt should still exist in a matter so interesting in their geographical distribution, especially when the communication between the two continents has become so speedy and regular. The *Mustela vulgaris*, Rich. Faun. Bor. Am., there considered identical with that of Europe, is given as *M. pusilla*; but of the ermine, *M. Erminea*, auct., though given under the specific designation of "Noveboracensis," there still seems to exist a doubt. The sable is given as *M. Martes* and European synonyms quoted; and the observation (with which we feel inclined to agree) is made—"I am inclined to believe that the American sable is very distinct from the pine marten of Europe, with which it is usually arranged," and to which is added, "I have no means of making the direct comparison." The *American black rat*, *Mus Americanus*, is given as a new species different from the *M. Rattus* introduced, varying from it in its dentition, relative length of ears and tail; it is very rare, only one specimen having been obtained. The new

genus OTISOREX is proposed, differing from *Sorex* in the large and prominent ears; it rests on two small species, one northern, another southern. The characters given are—"Ears large, prominent, beyond the fur; nose elongated; eyes distinct; tail quadrangular; teeth 33*."

A short list of the extra-limital species is given at the end of each genus.

The volume is illustrated with thirty-three engraved and lithographed plates, but they in general do not equal the beautiful title-page and the style of the other parts of the work. The engraving workmanship is finely executed, of which the first two plates, the lower figure on plate 6, and plate 16, are good examples; but the drawing of all the large animals particularly, and many of the others, is bad and stiff. Plates 13 and 18, the latter a lithograph, should not have been admitted. Notwithstanding these criticisms, we wish well to this undertaking, and trust that some of our societies, or public libraries, will import the work, its price excluding it from the reach of many of our private zoologists.

Icones Plantarum. By Sir W. J. Hooker, K.H., &c. Part IX.
Baillièrè, London, 1843.

We rejoice to find, by the appearance of this, the first part of the sixth volume, that Sir W. J. Hooker is determined to continue so peculiarly valuable a work as that before us. It must be quite unnecessary for us to enter upon its praises, as no botanist can now require any further observation than to be informed of its appearance. We will only say that Sir W. Hooker deserves the gratitude of all botanical students for having boldly commenced it in so cheap, and although cheap, so excellent a form, and at the same time so complete in its execution. This part contains, if possible, even a larger proportion than its predecessors of new and highly interesting plants.

Flora Italica. By A. Bertoloni, Eq. Aur., M.D. Bononiæ, 1842.

The first part of the fifth volume of this justly celebrated work has reached us. As we have referred to it on previous occasions, we wish only to record the commencement of another volume for the benefit of our botanical readers. It contains the order *Dodecandria* and a part of that of *Icosandria* (including in the former the genus *Euphorbia*), and fully supports the high character acquired by its predecessors.

BOOKS RECEIVED.

Transactions of the Berwickshire Naturalist's Club. Vol. ii. Part 1.
8vo. 1842. Privately printed by the Club.

This commences the second volume of the Club's Transactions, and contains an excellent address by the late President, Mr. Darling, detailing the acts, &c. of the past year, together with one or two papers of local interest; among them a short notice of the discovery of *Smilacina bifolia* in the woods at Howick and Kenwood.

* *Delphinus phocæna*, *orca*, and *Delphis* are considered specifically identical in the North American and British seas.

Illustrations of the Zoology of South Africa. By Dr. Andrew Smith. Parts 16 & 17. 4to. Smith, Elder and Co., 1843.

The ornithological part of these numbers is devoted to the genus *Drymoica*, of which fifteen species are described and figured, only two being considered identical with the birds represented by Le Vaillant. We have also a very interesting series of figures of a species of *Naiia*, exhibiting its variations and its young state, some of which are so very dissimilar that we cannot wonder at their being kept distinct by persons who have only seen specimens in spirits. We consider the illustrative department improved, and some of the figures very well finished.

PREPARING FOR PUBLICATION.

Mr. Gray and Dr. Richardson are preparing a work on the fishes of China, to be illustrated with figures taken from the living specimens. It will appear in quarterly parts, in small folio.

A new Dictionary of Natural History has been undertaken in Paris under the auspices of M. Ch. D'Orbigny, entitled "*Dictionnaire universel d'Histoire Naturelle.*" The new articles, not in any of the previous dictionaries, are said to be not less than 20,000. The etymology of scientific terms is to be given. There will be an atlas of plates, and the whole will be preceded by an introduction containing a detailed plan of the work, with the ancient history of the sciences.

Mr. J. C. Bellamy, Author of "*Natural History of South Devon,*" has announced a work entitled, *The Housekeeper's Guide to the Fish-Market for each Month of the year; and an account of the Fishes and Fisheries of Devon and Cornwall, in respect of Commerce, Economy, Natural History, and Statistics.*

Hodgson's Zoology of Nipal: Mammalia.

The prospectus is as follows:—"Mr. Brian Houghton Hodgson, who has for some years past resided in an advantageous situation for the collection and study of the various quadrupeds and birds of the hills, proposes to publish by subscription a work, calculated alike to satisfy the scientific and the sporting communities.

"The drawings are admirably faithful, and comprise some 850 birds, and 132 species and varieties of quadrupeds and their allies. The text will furnish all procurable information as to the habits and instincts of the subjects portrayed by the pencil; and the author will have the assistance of able co-operation in England*, where the work will be got up in the best style, under the superintendence of Mr. Frank Howard, who has produced Capt. W. C. Harris's '*Portraits of African Animals.*'

"The first division of this work will contain 100 lithographic plates, printed on super royal, folio, carefully coloured from the original drawings, to appear in parts, each containing twenty plates, every

* As it has been mentioned in the Indian Journals that Sir W. Jardine would superintend the publication of Mr. Hodgson's work, it may be proper to state here that there is no foundation for such a report.—Ed.

alternate month, which, together with an 8vo volume of letter-press, will form a complete illustration of the Mammalia of Nipal."

Mr. James Hamilton Fennell, author of a very entertaining and instructive History of Quadrupeds, is preparing to publish by subscription a volume on "Shakespeare's Knowledge of the Works and Phænomena of Nature." From among the authorities given in the Prospectus in favour of such a work, we select the following:—

"All the images of nature were ever present to Shakespeare, and he drew them not laboriously, but luckily."—*Dryden*.

"Whatever object of nature, or branch of science, he either speaks of or describes, it is always with competent, if not extensive knowledge; his descriptions are still exact; all his metaphors appropriate, and remarkably drawn from the true nature and inherent qualities of each subject."—*Pope, in the Preface to his edition of Shakespeare's Works, 1725 and 1728.*

"Mr. Fennell's subject is a delightful one, and when finished in the manner that portion of it is treated which I have seen, cannot fail to make a very popular volume. It is an appendix to the text which many readers of Shakespeare must have felt the want of."—*William Yarrell, Esq. in a Letter to a Friend, dated Jan. 29, 1838.*

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

February 22, 1842.—William Horton Lloyd, Esq., in the Chair.

The reading of the Second Part* of Prof. Owen's Monograph on the *Apteryx australis*, Shaw, including its Myology, was completed.

The following is the descriptive portion of this communication:—

MUSCLES OF THE SKIN.

No detailed description of the muscles of the skin in Birds has been given either in the systematic works on comparative anatomy, or in particular treatises; these muscles appear indeed in general to be too irregularly or too feebly developed to have attracted much attention; brief notices are recorded of some peculiarly developed cutaneous muscles, as those which spread the plumes of the peacock, and erect the hackles of the cock; the compressors of the subcutaneous air-cells are noticed in the anatomical account of the Gannett (*Sula Bassana*†), and a more constant cutaneous muscle, viz. that which supports the crop in gallinaceous birds, is briefly mentioned and figured by Hunter‡.

In the *Apteryx*, the subject of the present Myography, the cutaneous system of muscles presents a more distinct and extensive

* See Transactions of the Zoological Society, vol. ii. part 4. p. 257, Splanchnology and Osteology.

† Proceedings of Zoological Society, 1832, p. 91.

‡ In description of pl. 10, vol. i. of Physiological Catalogue of Hunterian Collection, by Owen, 4to. 1833-1841.

development than has hitherto been met with in the class of Birds—a condition which is evidently connected with the peculiar thickness of the integument, and probably with the burrowing habits of the present species, which possesses in this structure the power of shaking off the loose earth from its plumage, while busy in the act of excavating its chamber of retreat and nidification.

Constrictor colli.—The whole of the neck is surrounded by a thin stratum of muscular fibres, directed for the most part transversely, and extending from an attachment along the median line of the skin at the back of the neck, to a parallel raphé on the median line of the opposite side: this muscle is strongest at its commencement or anterior part, where the fibres take their origin in a broad fasciculus from the outer part of the occipital ridge; these run obliquely downwards and forwards on each side of the neck, but are continued uninterruptedly with those arising from the dorsal line of the skin above mentioned; the direction of the fibres insensibly changing from the oblique to the transverse. The outer surface of this muscle is attached to the integument by a thin and dense layer of cellular tissue, devoid of fat; the under surface is more loosely connected with the subjacent parts by a more abundant and finer cellular tissue.

Use.—To brace the cervical integument, raise the neck feathers, and in combination with the following muscle to shake these parts.

Sterno-cervicalis.—*Origin.* Fleishy, from the posterior incurved process of the sternum, from the ensiform prolongation and middle line of the outer and posterior surface of the same bone. *Insertion.* The fibres pass forward, and diverging in gently curved lines, ascend upon the sides of the broad base of the neck, and are inserted by a thin but strong fascia into the median line of the dorsal integument. This muscle is a line in thickness at its origin, but becomes thinner as it expands; the anterior part is covered by the posterior fibres of the *constrictor colli*.

Use.—To retract the skin of the neck, and brace that portion which covers the base of the neck; when these are the fixed points, it will depress and protract the sternum, and thus aid in inspiration.

Obs.—In its position and the general course of the fibres, this muscle is analogous to that which supports and assists in emptying the crop in the common fowl; but the œsophagus presents no partial dilatation in the *Apteryx*, and the situation of the crop is occupied by a large mass of fat enclosing one or two absorbent glands.

Sterno-maxillaris.—This muscle appears at first view to be the anterior continuation of the preceding, but is sufficiently distinct to merit a separate description and name. *Origin.* Fleishy; from the anterior part of the middle line of the sternum. *Ins.* It passes directly forwards along the under or anterior part of the neck, expanding as it proceeds, and gradually separating into two thin symmetrical fasciculi, which are insensibly lost in the integument covering the throat and the angle of the jaw. It adheres pretty closely to the central surface of the *constrictor colli*, along which it passes to its insertion.

Use.—To retract the fore-part of the skin of the neck, and also

the head. Each lateral portion acting alone would incline the head to its own side: the whole muscle in action would bend the neck; but the movements of the head and neck are more adequately and immediately provided for by the appropriate deeper-seated muscles, and the immediate office of the present muscle is obviously connected with the skin. Nevertheless, in so far as this muscle acts upon the head, it produces the same movements as the *sterno-mastoideus* in Mammalia; and it is interesting to observe, that in the long-necked Ruminants (as the Giraffe), the sterno-mastoid muscles arise by a common origin, and the insertion is by an extended fascia into the angles of the jaw: I consider, therefore, that the sterno-mastoid is represented by the *sterno-maxillaris* in the *Apteryx*, the only bird in which this muscle has hitherto been described.

Dermo-transversalis.—The skin covering the dorsal aspect of the lower two-thirds of the neck, besides being acted upon by the *constrictor colli*, is braced down by a thin stratum of oblique and somewhat scattered fibres, which take their origins by fasciæ attached to the inferior transverse processes of the sixth to the twelfth cervical vertebræ inclusive; the fibres pass obliquely upwards and backwards, and are inserted by a thin fascia into the median line of the skin, covering the back of the neck.

Platysma myoides.—The representative of this cutaneous muscle is a thin triangular layer of muscular fibres, taking their origin from the outer side of the ramus of the jaw, and diverging as they descend to spread over the throat, and meeting their fellows at a middle raphé of insertion beneath the upper larynx and beginning of the trachea, which they thus serve to compress and support.

Dermo-spinalis.—*Origin*. By a thin fascia from the ends of the spinous processes of the three anterior dorsal vertebræ. *Ins*. The fibres slightly converge to be attached to the integument covering the scapular region.

Dermo-iliacus.—*Origin*. Fleishy, from the anterior margin of the ilium. *Ins*. The fibres pass forwards and slightly converge to be inserted into the scapular integument.

Dermo-costalis.—A muscle resembling the preceding in form. *Origin*. Fleishy, from the costal appendages of the seventh and eighth ribs. *Ins*. The fibres pass forwards and join those of the preceding muscle, to be inserted into the scapular integument.

Obs. The three preceding muscles are broad and thin, but well-defined; they would appear to influence the movements of the rudimentary spur-armed wing through the medium of the integument, as powerfully as do the rudimental representatives of the true muscles of the anterior extremity.

There are also two muscles belonging to the cutaneous series, and inserted directly into the bones of the wing. One of these, the *dermo-ulnaris*, is a small, slender, elongated muscle, which takes its origin from the fascia beneath the *dermo-costalis*; its fibres pass backwards, and converge to terminate in a very slender tendon which expands into a fascia, covering the back part of the elbow joint. *Use*. To extend the elbow joint and raise the wing.

The *dermo-humeralis* is also a long and narrow strip, deriving its

origin from scattered tendinous threads in the subcutaneous cellular tissue of the abdomen: it passes upwards, outwards and forwards, and is inserted fleshy into the proximal part of the humerus, which it seems to depress*.

MUSCLES OF THE TRUNK.

A. On the Dorsal Aspect.

The muscles on the dorsal aspect of the vertebral column in Birds have only of late years received any attention from Comparative Anatomists: they have been mentioned rather than described by Tiedemann and Meckel: Carus has given a side-view of the superficial layer of muscles in the Sparrow-hawk; their best description is contained in the second edition of the 'Leçons d'Anatomie Comparée' of Cuvier.

The muscles of the back are in general so feebly developed in birds of flight, that they were affirmed by Cuvier to be wanting altogether in the first edition of the 'Leçons.' And this is almost true as respects their carneous portion, for they are chiefly tendinous in Birds of Flight. In the Struthious birds, and in the Penguin, in which the dorsal vertebræ are unfettered in their movements by ankylosis, these muscles are more fleshy and conspicuous; but they attain their greatest relative size and distinctness in the *Apteryx*.

From the very small size of the muscles which pass from the spine to the scapula and humerus in the *Apteryx*, the true muscles of the back, which correspond to the second layer of the dorsal muscles in Man, become immediately visible on removing the dorsal integuments and fasciæ; they consist of the *sacro-lumbalis*, *longissimus dorsi*, and *spinalis dorsi*. The first two muscles are blended together at their posterior origins, but soon assume the disposition characteristic of each, as they advance forwards.

* The *sacro-lumbalis* is a strong and fleshy muscle, six lines in breadth, and three or four lines in thickness: it is, as usual, the most external or lateral of the muscles of the back, and extends from the anterior border of the ilium to the penultimate cervical vertebra. *Origin*. By short tendinous and carneous fibres from the outer half of the anterior margin of the ilium, and by a succession of long, strong, and flattened tendons from the angles of the fifth and fourth ribs, and from the extremities of the transverse processes of the third, second, and first dorsal vertebræ; also by a shorter tendon from the transverse process of the last cervical vertebra; these

* In Mammalia the cutaneous muscles form a more continuous stratum than in the *Apteryx* and other birds, and hence have been grouped together under the common term *panniculus carnosus*; they have also, in general, both their origins and insertions in the integument; but in Birds, in which the integument supports so extraordinary an abundance of the epidermic material under the form of feathers, the muscles destined to its especial motions require a more fixed attachment from which to act. The Rhinoceros, in which the integuments, from the thickness and density of its corium, is in a similar condition as regards the resistance to be overcome by the skin-muscles, presents an analogous condition of its *panniculus carnosus*, having it divided into several distinct muscles, most of which take their origin from bone or fasciæ attached to bone.

latter origins represent the *musculi accessori ad sacro-lumbalem*; they have not hitherto been described in the class of Birds: to bring them into view, the external margin of the *sacro-lumbalis* must be raised. These accessory tendons run obliquely forward, expanding as they proceed, and are lost in the under surface of the muscle.

Insertion. By a fleshy fasciculus with very short tendinous fibres into the angle of the sixth rib, and by a series of corresponding fasciculi, which become progressively longer and more tendinous, into the angles of the fifth, fourth, third and second ribs, and into the lower transverse processes of the first dorsal and last two cervical vertebræ; the last insertion is fleshy and strong; the four anterior of these insertions are concealed by the upper and outer fleshy portion of the *sacro-lumbalis*, which divides into five elongated fleshy bundles, inserted successively into the upper transverse processes of the first three dorsal and last two cervical vertebræ. These last insertions seem to represent the continuation of the *sacro-lumbalis* in Man, which is termed the *cervicalis descendens* or *ascendens*.

Longissimus dorsi.—This muscle is blended posteriorly both with the *sacro-lumbalis* and the *multifidus spinæ*, and anteriorly with the outer portion of the *spinalis dorsi*. It extends as far forward as the thirteenth cervical vertebra. *Origin.* From the inner or mesial half of the anterior margin of the ilium; from a strong aponeurosis attached to the spines of the eighth, seventh and sixth dorsal vertebræ; and from the transverse processes of the sixth, fifth, fourth and third dorsal vertebræ. *Ins.* The carneous fibres continued from the second origin, or series of origins, incline slightly outwards as they pass forward, and are inserted into the posterior articular processes of the first three dorsal vertebræ, receiving accessory fibres from the *spinalis dorsi*. The fasciculi from the transverse processes above mentioned incline inwards, and are also inserted into the posterior oblique processes of the vertebræ anterior to them; they soon begin to form a series of oblique carneous fasciculi, which become more distinct as they are situated more anteriorly; they are at first implanted in the vertebra next in front of that from which they rise, and then into the vertebra next but one in front; so that the most anterior of these tendons of insertions, to which can be traced any of the fibres of the main body of the *longissimus dorsi*, is that which is implanted into the thirteenth cervical vertebra; it is this fasciculus which is joined by the first or most posterior of the fasciculi of the *longus colli posticus*.

A series of oblique carneous fasciculi, evidently a continuation of, or part of the same system with those in which the *longissimus dorsi* terminates anteriorly, is continued between the upper transverse and the oblique processes of the vertebræ as far forward as the fourth cervical vertebra. This series of muscles seems to represent the *transversalis colli**, which is the anterior continuation of the *longissimus dorsi* in Mammalia, but it differs in being inserted into the oblique, instead of the transverse processes. In the direction of their fibres

* It is the '*grand transverse*' of Cuvier, loc. cit. p. 282; but he describes it as passing from the anterior articular process of one vertebra to the posterior articular process of the next in front.

these fasciculi resemble the *semispinalis colli*, but are inserted into the oblique processes instead of the spines of the vertebræ. There are no other muscles with which they can be compared in the Mammalia than these two, with neither of which however do they precisely correspond; they seem however clearly to represent the second series of oblique muscular fasciculi in the trunk of Fishes. Rather than hazard expressing an incomplete or false analogy, I shall term these collectively the *fasciculi obliqui*.

Obliquus colli.—The fasciculi which rise from the first two dorsal and five lower cervical vertebræ are joined near their tendinous terminations by corresponding fasciculi of the *longus colli posticus*, and the strong round tendons continued from the points of convergence of these fascicles are inserted successively into the posterior oblique processes of the twelfth to the sixth cervical vertebra inclusive; the two fasciculi next in succession receive no accessory fibres from the *longus colli posticus*; the anterior one derives an extensive origin from the upper transverse processes of the eighth, seventh, and sixth cervical vertebræ. It must be observed, however, that the whole of each fasciculus is not expended in the strong round tendinous insertion above described; the portion which arises from the anterior ridge of the transverse process passes more directly inwards than the rest, and is attached to the tendon which terminates the fasciculus immediately behind; at the middle of the neck these accessory fibres approach to the character of distinct origins. The tendons of insertion, moreover, severally receive accessory fleshy fibres from the base of the oblique processes of the two vertebræ next behind; and thus they become the medium of muscular forces acting from not less than five distinct points, the power of which is augmented by each tendon being braced down by the oblique converging series of muscles immediately anterior to it. The fasciculus from the eighth cervical vertebra, besides its insertion by the ordinary tendon, sends off externally a small pyramidal bundle of muscular fibres, which soon terminates in a long and slender tendon which is inserted into the oblique process of the third cervical vertebra. Corresponding portions of muscle are detached from the two anterior fasciculi, which converge and terminate in a common slender tendon inserted into the posterior oblique process of the fourth cervical vertebra; and thus terminates this complex muscle or series of muscles.

Longus colli posticus.—The most internal or mesial of the superficial muscles of the dorsal aspect of the thoracic and cervical regions, called *cervicalis ascendens* by Meckel, and compared in part with the *spinalis dorsi* by Cuvier, cannot be the representative of either of these muscles, since they both co-exist separately with it in the *Apteryx*. At its posterior part the muscle in question seems to be rather a continuation of the *longissimus dorsi*; its anterior part offers a strong analogy with the mesial portion of the *complexus* and *biventer cervicis*; it appears to me to be evidently the analogue of the first, or mesio-dorsal series of oblique fibres of the muscular system in Fishes, but I shall adopt the name of the *longus colli posticus* applied to it by Cuvier*. It commences by long and slender, but

* Leçons d'Anat. Comp., 2nd edit. vol. i. p. 284.

strong, subcompressed tendons from the spines of the sixth, fifth and fourth dorsal vertebræ: these tendons gradually expand as they proceed forwards and downwards, and send off from their under surface muscular fibres which continue in the same course, and begin to be grouped into distinct fasciculi at the base of the neck: the first of these bundles joins the fasciculus of the *longissimus dorsi*, which is inserted into the posterior articular process of the thirteenth cervical vertebra; the succeeding fasciculi derive their origins from a broad and strong aponeurotic sheet attached to the spines of the fourth, third and second dorsal vertebræ: the second to the eighth fasciculi inclusive are compressed, broad and fleshy, and are inserted in the strong round tendons described in the preceding muscle, and attached to the oblique processes of the twelfth to the sixth cervical vertebræ inclusive: the ninth fasciculus, which forms the main anterior continuation of the *longus colli posticus**, is larger than the rest, and receives, as it advances, accessory fibres from the spinous processes of the seventh to the third cervical vertebræ inclusive, and is inserted, partly fleshy, partly by a strong tendon, into the side of the broad spine of the *vertebra dentata*. A slender fasciculus is detached from the mesial and dorsal margin of the *longus colli posticus*, near the base of the neck, which soon terminates in a long round tendon: this tendon is braced down by short aponeurotic fibres to the spines of the fifth to the second cervical vertebræ inclusive, immediately beyond which it again becomes fleshy, and expands to be inserted into the occipital ridge: this portion is the *digastrique* or *biventer capitis* of Cuvier.

Spinalis dorsi.—The displacement of the dorsal portion of the preceding muscle and the *longissimus dorsi* brings into view the *spinalis dorsi*, which is a well-developed and distinct muscle in the *Apteryx*. *Origin*. By two long, narrow, flattened tendons, from the spines of the eighth and seventh dorsal vertebræ: these pass obliquely downwards and forwards, expanding as they proceed, and terminate in two fasciculi of muscular fibres: the posterior one passes forwards beneath the anterior one, and inclining inwards and upwards divides into two portions, inserted by long tendons into the spines of the second and first dorsal vertebræ; it then sends a few fibres forwards to join the outer and anterior fasciculus, which is partly inserted by a slender tendon into the spine of the last cervical vertebra: the rest of the fibres of the second fasciculus join the portion of the *longissimus dorsi* which is implanted into the oblique process of the last cervical vertebra. The three inserted tendons of the *spinalis dorsi* are also the medium of attachment of fibres continued from the *multifidus spinæ*, beneath them.

Multifidus spinæ.—The series of muscles so called arises by fleshy fibres from the transverse processes of the five last dorsal vertebræ, which pass upwards, forwards and inwards, to be inserted by four flat tendons into the spines of the seventh to the third dorsal vertebræ inclusive, and by the tendons of the *spinalis dorsi* into the two anterior dorsal spines.

Obliquo-spinales.—The removal of this muscle brings into view

* 'Accessoires du long postérieur du cou,' Cuvier, *loc. cit.* p. 284.

a series of long, narrow, flat tendons, coming off from the spines of all the dorsal vertebræ, and slightly expanding as they proceed forwards and obliquely downwards and outwards; they become fleshy half-way from their origin, and are inserted into the posterior oblique and transverse processes of the six anterior dorsal vertebræ, and into the posterior oblique processes of the three last cervical vertebræ.

Interspinales.—The *interspinales* muscles do not exist in the region of the back, unless we regard the preceding oblique fibres as a modified representation of them. The most posterior fasciculus of muscular fibres, which is directly extended between the spinous processes, commences at the interspace of the spines of the two last cervical vertebræ, and the series is continued as far as the *vertebra dentata*.

Interarticulares.—The muscles which form the more direct continuation of the *obliquo-spinales* are continued from the posterior oblique or articular processes of one vertebra to the posterior articular process of the next in front.

Obliquo-transversales.—A third series of deep-seated intervertebral muscles is situated external to the preceding, and passes obliquely between the upper transverse process and the posterior articular process of the vertebra in front. These fasciculi appear to be a continuation of the *multifidus spinæ* in the neck.

Intertransversales.—There are also two series of short carneous fasciculi passing the one between the upper, and the other between the lower transverse processes.

Levatores costarum.—The first or most anterior of this series of muscles seems to represent the *scalenus medius*; it arises from both the upper and lower transverse processes of the last cervical vertebra, and expands to be inserted into the first rib, and into the upper and outer part of the second rib. The remaining *levatores* successively diminish in size as they are placed backwards; they come off from the transverse processes of the six first dorsal vertebræ; those from the first and second expand to be inserted into the rib attached to the same transverse process and to the one next behind; the rest have a single insertion: the angle and the part of the rib immediately beneath are the situations of their attachments.

B. In Front of the Neck.

Longus colli.—This muscle is represented by a series of closely succeeding long, narrow fasciculi, arising from the hæmapophyses of the sixth to the first dorsal and from the ten posterior cervical vertebræ; and sending narrow tendons, which increase in length as they are given off more anteriorly, obliquely forwards and outwards, to be inserted into the costal processes of all the cervical vertebræ save the two first: the highest or foremost tendon is attached to the tubercle at the under part of the ring of the atlas; but this tendon is also the medium of insertion of a fasciculus of muscular fibres arising from the upper transverse processes of the sixth, fifth, fourth, third and second cervical vertebræ.

The *Rectus capitis anticus major* is continued, or arises by as many

distinct tendons, from the five superior tendons of insertion of the preceding muscle; these origins soon become fleshy, converge, and coalesce previous to their insertion into the base of the skull.

The *Rectus capitis anticus minor* is a strong fleshy triangular muscle arising from the anterior part of the body of the first four cervical vertebræ.

The *Rectus capitis lateralis* arises from the upper transverse processes of the sixth to the second cervical vertebra inclusive.

The *Intertransversales* are short, ill-defined muscles, blended with aponeurotic processes which pass from one transverse process longitudinally to the next in advance.

C. Muscles of the Tail.

Levator caudæ.—*Origin*. From the posterior and superior extremity of the ischium. *Ins*. Into the spines of the caudal vertebræ.

Adductor caudæ superior.—This muscle is smaller than the preceding, with which it runs parallel; it rises below from the posterior extremity or tuber of the ischium, and is inserted into the transverse processes of the caudal vertebræ.

Adductor caudæ inferior.—*Origin*. From the tuber ischii, and the ligament connecting this with the posterior extremity of the pubis. *Ins*. Into the transverse processes of the caudal vertebræ.

Depressor caudæ.—*Origin*. From the under part of the middle line of pelvis. *Ins*. Into the inferior spines of the caudal vertebræ.

-D. Muscles of the Abdomen.

Obliquus externus abdominis.—*Origin*. Fleshy, from the second and third ribs, and by a strong aponeurosis from the succeeding ribs near the attachment of the costal processes, and from those processes. *Ins*. The fleshy fibres are continued from this aponeurotic origin to nearly opposite the ends of the vertebral ribs; they run almost transversely, very slightly inclined towards the pubis, to within half an inch of the *linea alba*, and there terminate, by an almost straight, parallel line, in their aponeurosis of insertion. The fibres of this aponeurosis decussate those of the opposite side, and adhere to the tendinous intersections of the *rectus* beneath. The aponeurosis from the last rib passes to be inserted into a strong ligament extending between the free extremities of the *ossa pubis*, leaving the abdomen behind the last rib defended only by the *internal oblique* and *transversalis*.

Obliquus internus abdominis.—*Origin*. From the whole of the anterior and outer surface of the pubis; aponeurotic from the upper part, fleshy for half an inch from the lower or ventral extremity: the carneous fibres run longitudinally, and cannot be distinctly defined from the *intercostales* on their outer border, or from the *rectus abdominis* on their inner or mesial border, which forms the medium of the insertion of the internal oblique.

Rectus abdominis.—I give this name to the mesial continuation of the preceding muscle, which arises by a strong, flat, triangular tendon from the lower or ventral extremity of the pubis and from the inter-pubic ligament: it soon becomes fleshy; the carneous portion is interrupted by three broad, oblique, but distinct aponeurotic inter-

sections, and is finally inserted into the xiphoid and lateral processes of the sternum and the intervening fascia.

Transversalis abdominis.—A layer of loose, dark-coloured cellular tissue divides the internal oblique from the transverse abdominal, except at its origin from the pubis, and for half an inch anterior to that part.

The *transversalis* then proceeds to derive carneous fibres from the inner surface of the vertebral ribs near their lower third; they pass obliquely upwards and forwards, and terminate by a regular, slightly concave line midway between their origins and the extremities of the ribs; a strong aponeurosis passes thence to the linea alba, but becomes thin at the pubic region, where a mass of fat is interposed between it and the peritoneum.

Diaphragm.—This muscle presents more of its normal mammalian character in this than in any other known bird. It is perforated by vessels only, in consequence of the non-development of the abdominal air-cells. The origin corresponding to that of the lesser muscle in Mammalia is by two strong and distinct, short tendinous pillars from the sides of the body of the last costal vertebra; they are united by a strong tendon or fascia, forming the anterior boundary of the aortic passage. The tendinous pillars may be traced forward for some way in the central aponeurosis, expanding without crossing; they are then lost in that aponeurosis, which is perforated by the gastric arteries and veins; divides anteriorly to give passage to the gullet and the apex of the heart; the aponeurosis expands over the anterior part of the thoracic air-cells, and becomes, at its lateral circumference, the point of attachment of muscular fibres arising from the inner surface of the anterior ribs, and forming apparently a continuation of the *transversalis abdominis*.

Intercostales externi.—*Origin*. From the posterior edge and extremity of the costal processes or appendages. *Ins*. They run down to be inserted severally into the rib posterior to that to which the process affording them origin is attached. These processes are supported by strong triangular aponeuroses continued from their anterior and upper margins, severally, to the rib anterior to them.

A strong muscle arises from the anterior or costal angle of the scapula, and passes backwards to be inserted into the extremity of the third vertebral rib and its corresponding sternal portion. This muscle is a direct inspirator.

MUSCLES OF THE ANTERIOR EXTREMITY.

Serratus magnus anticus.—This muscle consists of three portions; the first and anterior portion arises by a short, strong aponeurosis from the last cervical rib, and is inserted into the lower edge of the anterior two-thirds of the scapula: the second middle portion arises from the lower end of the second vertebral rib, near the attachment of the costal process, and from the anterior margin of the same rib, and is inserted into the lower edge of the posterior two-thirds of the scapula: the third, posterior and smallest portion rises from the costal process of the third rib, and ascends to be inserted into the posterior extremity of the scapula.

This muscle is a direct inspirator : by drawing down the scapula it depresses the sternum through the medium of the strong coracoideum, increases the angle between the vertebral and sternal ribs, and dilates the thoracic air-cells.

Levator scapulae.—This seems to be the most anterior portion of the series of muscles which constitute the *serratus magnus*. *Origin*. Two flat fleshy strips from the inferior transverse and costal processes of the last and penultimate cervical vertebræ. *Ins*. Into the inner and upper side of the middle third of the scapula. It depresses as well as draws forwards the scapula, and thus aids the *serratus* in the action of inspiration.

Serratus anticus minor.—*Origin*. From the outer part of the costal process of the sternum. *Ins*. Into the posterior part of the base of the coracoideum.

Trapezius.—This flattened oblong quadrilateral muscle arises from the fascia, extending upon the back from the spinous processes of the posterior cervical vertebræ, and is inserted into the conjoined extremities of the scapula and coracoideum.

There is no representative of the *rhomboidei*.

Latissimus dorsi.—This muscle consists, as usual in Birds, of two portions, both of which have their origin from a continuation of the fascia (attached to the dorsal spines) which also gives origin to the trapezius : the fibres of the smaller and anterior slip converge to their insertion : the fibres of the posterior and broader strip are slightly twisted, the posterior edge being folded inwards as they also converge to join the preceding, and to be inserted with it into the posterior and inner side of the proximal extremity of the humerus.

Deltoides.—This is a single long and narrow triangular muscle, of which the base is attached to the conjoined extremities of the scapula and coracoid, and to the capsule of the shoulder-joint ; the apical insertion is into the upper and outer third of the humerus, which this muscle directly raises.

Infraspinatus.—A muscle which may be compared either to the *infraspinatus* or *teres major* comes off from the lower margin of the anterior two-thirds of the scapula, passes behind the shoulder-joint, where it is closely attached to the scapula, and is inserted into the inner and posterior part of the proximal end of the humerus.

Musculi pectorales.—The pectoral muscles, which present their feeblest condition and lowest development in the *Apteryx*, are nevertheless similar in number and arrangement to those which in some birds of flight are known to outweigh all the other muscles of the body.

The *pectoralis major* is represented by two very thin triangular layers of muscular fibres, the anterior of which is three lines broad at its base, and is attached to the sternum immediately exterior to the perforation of that bone : the second, posterior, and somewhat narrower portion, rises immediately behind the preceding, from the osseous bridge separating the perforation from the notch ; the two portions converge as they extend upwards and outwards to unite and be inserted into the anterior and internal surface of the proximal third of the humerus.

The *pectoralis medius seu secundus* is a similar, thin, feeble, but broader triangular layer of carneous fibres; which arise anterior to the preceding, just below the coracoid socket of the sternum, and converge as they wind over the shoulder-joint to be inserted into the upper surface of the proximal extremity of the humerus, of which they thus become an elevator.

The *pectoralis minor seu tertius* arises above and between the origins of the *pectoralis secundus* and the anterior strip of the *pectoralis major*, also partly from coracoid process; its fibres converge to be inserted into the proximal end of the humerus, above and behind the *pectoralis major*.

Coraco-brachialis.—This is represented by two small strips of muscular fibres which rise from the posterior part of the coracoideum, and are inserted, one directly below the other, into the proximal third of the humerus.

Obs.—The close adherence to the ornithic type of the muscular system of the anterior extremity in the *Apteryx* is very remarkable, especially as regards the position and course of the *pectoralis medius*, since the physiological conditions of the circumstances attending that muscle are wanting in the *Apteryx*.

Here we have a true bird, exhibiting a remarkable modification of the whole ornithic structure, in reference to exclusively terrestrial life and nocturnal habits; and we learn, I think, from this adherence to a typical organization, in a very rare exception, that the teleological conclusions respecting that typical construction, as it is manifested in the general rule, are in no ways affected by such an exception; because the modification of one part necessarily affects that of many others, perhaps of the whole body. If, for example, the fixation and structure of the lungs require a broad sternum and concomitant modifications of the coracoid and scapula for the mechanical part of the respiratory process, then it may be more convenient for the levator of the humerus to rise below that bone from the sternum, and act in the due direction by a modification of its course; although the locomotion of the bird may in no way be facilitated by the aggregation of muscle beneath the centre of gravity, nor the size of the levator be such as to render its particular position a matter of any consequence in regard to that centre.

The motions of the rudimental wing and its terminal hook would seem to be produced as much by the cutaneous muscles which converge to be inserted into the integument connected with it, as by the feeble representatives of the true wing-muscles above described.

MUSCLES OF THE POSTERIOR EXTREMITY.

The most superficial of the muscles on the outer side of the leg is that broad thin expanded one which combines the functions of the *tensor vaginæ* and *rectus femoris*, and also, according to some anatomists, as Cuvier and Meckel, those of the *glutæus maximus*; since however it is exclusively inserted into the leg, I shall describe it with the other muscles moving that segment of the posterior extremity. The removal of this muscle, of the *sartorius*, and the *biceps cruris*, is requisite to bring into view the *glutæi*.

Gluteus externus.—The external *gluteus* (*gluteus medius* of Meckel), as in most Mammalia, is smaller than the middle or internal *glutei*, but is relatively larger in the *Apteryx* than in birds of flight, in which it is described as the *pyriformis* by Cuvier. This muscle, however, besides its origin from the outside of the pelvis, overlaps part of the *gluteus medius*, and has its insertion into the femur at some distance below the great trochanter, all of which are marked characteristics of the *gluteus magnus*. *Origin*. It takes its origin from the superior margin of the *os innominatum*, extends along an inch and a quarter of that margin, directly above the hip-joint, and is chiefly attached by distinct short tendinous threads, which run down upon the external surface of the muscle: it rises also by carneous fibres from the external surface of the innominatum for three lines below the superior margin. *Insertion*. The fibres converge and pass into a tendinous sheet, beginning on the external surface of the muscle half-way down its course, which ends in a broad, flat, strong tendon, inserted into a rising on the outer side of the femur nearly an inch below the great trochanter. It abducts and raises the femur.

Gluteus medius.—*Origin*. A large triangular, strong and thick muscle, has an origin of three inches extent from the rounded anterior and superior margin of the ilium, and from the contiguous outer surface of the bone for an extent varying from an inch to eight lines. *Ins*. Its fibres converge to a strong, short, broad and flat tendon, implanted in the external depression of the great trochanter, having a bursa mucosa interposed between the tendon and the bony elevation anterior to the depression.

Gluteus minimus.—*Origin*. It rises below the preceding muscle from the anterior and inferior extremity, and from one inch and three-fourths of the inferior and outer margin of the ilium, and contiguous external surface, as far as the origin of the *gluteus medius*; also by some fleshy fibres from the outside of the last rib. *Ins*. These fibres slightly converge as they pass backwards to terminate in a broad flat tendon which bends over the outer surface of the femur, to be inserted into the elevation anterior to the attachment of the *gluteus magnus*.

A muscle which may be regarded either as distinct, or a strip of the preceding one, arises immediately behind it from half an inch of the outer and inferior part of the ilium; its fibres run nearly parallel with those of the *gluteus minimus*, and terminate in a thin flat tendon, which similarly bends round the outer part of the femur, to be inserted into the outer and under part of the trochanter immediately below the tendon of the *gluteus medius*. This muscle is peculiar to the *Apteryx*, and the preceding portion, or *gluteus minimus*, is absent in most birds.

Use.—All the preceding muscles combine to draw the femur forwards, and to abduct and rotate it inwards.

Iliacus internus.—This is a somewhat short thick muscle, of a parallelogrammic form, fleshy throughout; rising from the tuberosity of the innominatum in front of the acetabulum immediately below the *gluteus minimus*, and inserted at a point corresponding to the inner trochanter, into the inner side of the femur near the head of that

bone, which it thus adducts and rotates outwards. This muscle is present both in the Ostrich and Bustard, but Meckel says it is wanting in the Cassowary.—Arch. xiii. 261.

Pyramidalis.—The same kind of modification which affects the *iliacus internus*, viz. the displacement of its origin from the inner surface of the ilium to a situation nearly external, affects this muscle, which, from its insertion and triangular form, I regard as the analogue of the *pyramidalis*. It arises fleshy from the outer surface of the extended ischium for the extent of an inch, and converges to a broad flat tendon which is inserted into the *trochanter femoris* opposite, but close to, that of the *glutæus minimus*, which it opposes, abducting and rotating the femur outwards.

Adductor brevis femoris.—A small, long and slender muscle arises from the innominatum immediately behind the acetabulum, passes over the back part of the great trochanter, becomes partially tendinous, and is inserted into the back part of the femur in common with the following muscle.

Adductor longus.—A long broad and thin muscle, separated from the preceding by the ischiadic nerve and artery. The origin of this muscle extends one inch and a quarter from near the upper margin of the innominatum which is behind the acetabulum; it is joined by the preceding strip, and is inserted into the whole of the lower two-thirds of the back part of the femur.

Adductor magnus.—This broad and flat muscle has an extensive origin (two inches) from the outer edge of the ischium and the obturator fascia; its fibres slightly diverge as they pass downwards to be inserted into the back part of the lower half of the femur, and into the upper and back part of the tibia.

Obturator internus.—This arises from the inner side of the opposite margins of the pubis and ischium, where they form the posterior boundary of the *obturator foramen*, and from the corresponding part of the *obturator fascia*; the fleshy fibres converge in a slightly peniform manner to the strong round tendon which glides through the notch, separated from the rest of the foramen by a short, strong, transverse, unossified ligament, and is inserted into the posterior part of the base of the trochanter. In its length and size this muscle resembles the corresponding one in the Ostrich and other Struthious birds.

Gemellus.—This is represented by a single small fleshy strip arising from the margin of the *obturator foramen*, close to the emergence of the tendon of the *obturator internus*, with which it is joined, and co-inserted into the femur.

Quadratus.—I consider a broad fleshy muscle which arises from the pubis, below the *obturator foramen*, and which increases in breadth to be inserted into the femur internal and posterior to the obturator tendon, to be the true analogue of the *quadratus femoris*.

MUSCLES OF THE LEG.

Tensor vaginæ and *Rectus femoris*.—The largest and most remarkable of the muscles which act upon the bones of the leg is that already alluded to as the most superficial of those on the outer side of the thigh. It has a broad, thin, triangular form, arises from

the spines of the sacrum by a strong but short aponeurosis which soon becomes fleshy; the carneous fibres converge as they descend*, and pass into a thin aponeurosis at the lower third of the thigh: this is closely attached to the muscles beneath (*vastus externus* and *cruræus*), then spreads over the outer and anterior part of the knee-joint, is inserted into the patella, and into the anterior process of the head of the tibia.

Owing to the great antero-posterior extent of the origin of this muscle, its anterior fibres are calculated to act as a flexor, its posterior ones as an extensor of the femur: all together combine to abduct the thigh and extend the leg, unless when this is in a state of extreme flexion, when a few of the posterior fibres glide behind the centre of motion of the knee-joint.

Sartorius.—The origin of this muscle is proportionally as much extended as that of the preceding, with which it is posteriorly continuous: it comes off aponeurotic, from the anterior and superior margin or labrum of the ilium; the fibres soon become fleshy, and the muscle diminishes in breadth and increases in thickness as it descends: it is inserted by short and strong tendinous filaments obliquely into the anterior part of the tendon of the broad rectus, and into the upper and anterior end of the tibia. Its insertion is partly covered by the internal head of the *gastrocnemius*.

It bends and adducts the thigh, and extends the leg.

Biceps flexor cruris.—This is a single muscle, corresponding with the preceding in the characteristic modifications of its extended origin, in relation to the great antero-posterior development of the pelvic bones. It is exposed by the removal of the broad *rectus*. *Orig*. By a broad and thin aponeurotic tendon, which at first is confluent with that of the rectus, but soon becomes distinct. *Ins*. The fleshy fibres converge as they descend along the back and outer part of the thigh, and finally terminate in a strong round tendon, which glides through a loop formed here principally by a splitting of the tendinous origin of the *gastrocnemius externus*, and is inserted into the process on the outside of the fibula one inch from its proximal extremity. By means of the loop† the weight of the hinder parts of the body is partially transferred, when the leg is bent, to the distal end of the femur; and the biceps is enabled, by the same beautiful and simple mechanism, to effect a more rapid and extensive inflection of the leg than it otherwise could have produced by the simple contraction of its fibres.

Semimembranosus.—*Origin*. From the side of the coccygeal vertebræ, and from the posterior end of the ischium; it crosses the

* They are not divided into a superficial and deep layer, as in the Ostrich, but form a simple stratum, as in the Cassowary. Meckel regards the rectus as entirely wanting in the Cassowary, supposing the present muscle to be the analogue of the *glutæus maximus* and *tensor vaginæ* united. He says that Professor Nitzsch observed a like absence of the *rectus femoris* in the Emeu. The muscle which these anatomists call the *rectus* in other birds, is a strip of the *cruræus*, arising high up from the femur, and which in the Ostrich takes its origin from the *os pubis*.

† Which in the common fowl is formed chiefly by a ligament extended from the back of the outer condyle of the femur to the head of the tibia.

superficial or internal side of the *semitendinosus*. *Ins.* Into the fascia covering the *gastrocnemius* and the inside of the tibia.

Semitendinosus.—This muscle arises from the posterior and outer part of the *sacrum* and *ischium*: it is a flattened triangular muscle, which receives the square *accessorius* muscle from the lower and posterior part of the femur. It gradually diminishes as it descends, and having passed the knee-joint, sends off at right angles a broad and square sheet of aponeurosis, which glides between the two origins of the *gastrocnemius internus*, and is inserted into the lower part of the angular ridge continued from the inside of the head of the tibia. The terminal tendon, continued from the apex of the muscle, then runs along the outer or fibular margin of the internal head of the *gastrocnemius*, and becomes confluent with the terminal tendon of that muscle.

Cruræus.—This is a simple but strong muscle: it commences at the upper and anterior part of the thigh by two extremities, of which the outer and upper one has its origin extended to the base of the trochanter; the inner and inferior comes off from the inner side of the femur, beneath the insertion of the *gluteus magnus*; the two portions blend into one muscle much earlier than in the Ostrich.

Gracilis.—On the inner side of the *cruræus*, but more superficially, lies a narrow, compressed, long muscle, which rises by two heads, one from the anterior and upper part of the femur, the other from the os pubis; both soon become blended together and transmit a broad thin tendon to be inserted into the lower and lateral part of the patella with the *cruræus*.

Vastus internus.—Two other muscles succeed the preceding, and rise beneath it from the inner and anterior part of the femur; they have a similar insertion, and obviously represent the *vastus internus*. The fibres converge to a middle aponeurosis, which increases to a strong short tendon, inserted into the upper and anterior projection of the tibia.

Popliteus.—This small muscle is brought into view when the superficial muscles of the leg which are inserted into the foot are removed. Its carneous fibres extend from the fibula inwards and downwards to the tibia. It is of relatively smaller extent than in the Cassowary.

Gastrocnemius.—This consists, as in other birds, of several distinct portions, the chief of which correspond with the external and internal origins of the same muscle in the Mammalia. The *gastrocnemius externus* has two strong, narrow, rather flattened tendinous origins, which are attached, one about a line below the other, to the external ridge above the outer condyle of the femur; they are continued into each other about an inch below their bony attachments, and thus form a loop or pulley (lined by a synovial sheath) through which the tendon of the biceps glides; a strong ligament from the outer ridge of the fibula passes backwards to be attached to the confluence of the two tendons. The carneous fibres of the external *gastrocnemius* come off from the outer side of the inferior of these tendons, and from the fascia covering the outer surface of the muscles of the leg: they are continued in a somewhat penniform arrangement two-thirds down the leg, upon the inner surface of the

muscle, where they end in a strong subcompressed tendon. This joins its fellow tendon, from the internal *gastrocnemius*, behind the ankle-joint, and both expand into a thick, strong, ligamentous aponeurosis, which extends over three-fourths of the posterior part of the tarso-metatarsal joint. The lateral margins of this fascia are bent down under the flexor tendons behind the joint, and become continuous with a strong ligamentous layer gliding upon the posterior surface of the distal condyles of the tibia, and attached to the tendons of the *peroneus* and *tibialis anticus*; the conjunction of the thickened tendons of the *gastrocnemii* with this deeper-seated layer of ligamentotendinous substance constitutes a trochlear sheath lined by synovial membrane, through which the flexor tendons of the toes glide. The synovial membrane of the ankle-joint is continued upwards half an inch above the articular surface of the bone, between it and the cartilaginous pulley. Below the joint the margins are inserted into the lateral ridges of the tarso-metatarsal bone, becoming gradually thinner as they descend, and ending below in a thin semilunar edge directed downwards.

The *gastrocnemius internus* has two powerful heads, one from the femur, the other from the tibia; the first arises fleshy from the internal condyle of the femur, expands as it descends, and receives additional fibres from the lower edge of the *accessorius semitendinosi*. About one-fifth down the tibia, this muscular origin, in the right leg, terminated in a short flattened tendon, which became attached to the inner side of the tibial portion of the *gastrocnemius internus*. In the left leg the tendon soon divided; one portion passed to the soleus, the other went to join the tibial portion of the *gastrocnemius internus*. The second head, which is separated from the preceding by the insertion of the *semitendinosus*, arises partly from the internal and anterior part of the strong fascia of the knee-joint by short tendinous fibres, which almost immediately become fleshy, and partly from a well-defined triangular surface on the inner and anterior aspect of the head of the tibia: the fleshy fibres converge, receive the tendinous slip from the femoral portion, and end on the inner side of the muscle in a strong flattened tendon, about two-thirds down the leg: this joins the tendon of the *gastrocnemius externus*, and is inserted as described above.

Soleus.—A slender flattened muscle arising from the inner and posterior side of the tibia, the tendon of which joins that of the *gastrocnemius internus*, behind the tarsal joint.

The *flexor perforatus* of the inner toe lies immediately anterior to the external *gastrocnemius*; it arises fleshy from the outer condyle of the femur, below the tendinous origin of that muscle, and terminates in a slender flat tendon half-way down the leg. Its tendon glides behind the tarsal joint through the sheath of the *gastrocnemius*, expands beneath the metatarsal joint, perforates the flexor of the proximal phalanx of the third toe, and then bifurcates to be attached to the sides of the second phalanx, giving passage to the perforans tendon of the last phalanx.

Flexor perforatus of the middle toe.—This arises by very short tendons from the proximal end of the fibula, and from the ligament

attached to the bicipital pulley : it continues to derive a thin stratum of fleshy fibres from the fascia covering the anterior surface of the muscles of the leg : the fleshy fibres terminate half-way down the leg in a flattened tendon, which pierces the tendon of the first *perforatus* of the middle toe, then runs forward to the outer toe, expands into a thick ligamentous substance beneath the proximal phalanx, and sends off two tendinous attachments on each side, one to the proximal, the other to the second phalanx, and is continued to be finally inserted into both sides of the third phalanx.

Flexor perforatus digitorum pedis is the strongest of the three ; it arises fleshy from the posterior part of the distal extremity of the femur, above the external condyle, and also by a distinct flattened tendon, one inch in length, from the proximal end of the tibia : this tendon moreover receives the long slender tendon sent off obliquely across the front of the knee-joint from the *pectineus*, by which its origin is extended to the pelvis. This accessory tendon perforates the inner fleshy surface of the muscle, and is finally lost about half-way down the carneous part. Before the *flexor digitorum* is joined by the tendon of the *pectineus*, it subdivides posteriorly into four muscular fasciculi : the anterior division receives principally the above tendon. The muscle becomes wholly tendinous two-thirds down the leg ; its tendon passes through the posterior part of the pulley of the *gastrocnemius*, and expands as it passes along the metatarsus : a thick ligamentous substance is developed in it, opposite the joint of the proximal phalanx of the second toe, into the sides of which it is inserted, dividing for that purpose, and giving passage to the two other flexor tendons of that toe. The second portion of the present muscle terminates in a tendon situated behind the preceding, which passes through a distinct sheath behind the tarsal joint, expands into a sesamoid fibro-cartilage beneath the corresponding expansion of the previous tendon, which it perforates, and then becomes itself the perforated tendon of the second phalanx of the second toe, in the sides of which it is inserted. The third portion of this muscle ends in a somewhat smaller tendon than the preceding. The fourth and most posterior portion soon becomes a distinct muscle ; its fleshy fibres cease on the inner side, one-fourth down the leg, but on the outside they are continued three-fourths down the leg : its tendon passes through the gastrocnemial pulley behind the ankle-joint, and divides to form a sheath for the first *perforatus* of the fourth toe ; it is then joined by a tendon passing through a pulley across the external malleolus, and finally becomes the perforated tendon of the first metacarpal bone of the middle or third toe.

Pectineus (Rectus anticus femoris of Meckel).—This is a long, thin, narrow strip of muscle arising from the spine of the pubis, anterior to the acetabulum, and passing straight down the inner side of the thigh ; it degenerates into a small round tendon near the knee, which tendon traverses a pulley, formed by an oblique perforation in the strong rotular tendon of the extensors of the leg, and thus passing across the knee-joint to the outer side of the leg, finally expands, and is lost in the *flexor perforatus digitorum* last described. It is this muscle which causes the toes to be bent when the knee is bent.

Peroneus longus.—*Origin*: tendinous from the head of the tibia, and by carneous fibres from the upper half of the anterior margin of the tibia; these fibres pass obliquely to a marginal tendon, which becomes stronger and of a rounded form where it leaves the muscle. The tendon gives off a broad, thin, aponeurotic sheath to be inserted into the capsule of the tarsal joint; it is then continued through a synovial pulley on the side of the outer malleolus, and is finally inserted or continued into the perforated tendon of the middle toe.

Tibialis anticus.—This muscle is overlapped and concealed by the peroneus; it arises partly in common with that muscle, and partly by separate short tendinous threads from the outer part of the head of the tibia; it gradually becomes narrower, and finally tendinous two-thirds of the way down the leg; its strong tendon glides through the oblique pulley in front of the distal end of the tibia, expands as it passes over the ankle-joint, and is inserted into the anterior part of the proximal end of the tarso-metatarsal bone, sending off a small tendinous slip to the aponeurosis covering the extensor tendons of the toes, and a strong tendon which joins the fibular side of the following muscle.

Extensor longus digitorum.—This lies between the *tibialis anticus* and the front and outer facet of the tibia, from which it derives an extensive origin; its tendon commences half-way down the leg, runs along the anterior part of the bone, first under the broad ligamentous band representing the anterior part of the annular ligament, then through a ligamentous pulley, and inclines to the inner or tibial side of the anterior surface of the metatarsal bone, where it expands and divides into three tendons. Of these the innermost is given off first, and subdivides into two tendons, one of which goes to be inserted into the base of the last phalanx of the second toe; the other portion is principally inserted into the middle toe, but also sends off a small tendon to the inner side of the proximal phalanx of the second toe. The second tendon is inserted by distinct portions into the second, third and last phalanges of the middle toe. The third tendon supplies the outer toe.

Extensor brevis digitorum.—A small extensor muscle arises from the insertion of the *tibialis anticus*, and sends its tendon to the outer side of that of the great *extensor digitorum*.

Extensor pollicis brevis.—An extensor of the small innermost toe arises from the upper and inner side of the tarso-metatarsal bone.

Flexor perforans digitorum.—This strong penniform muscle arises fleshy from nearly the whole of the outer surface of the fibula, also from the posterior part of the tibia and the interosseous space; the tendon of the biceps perforates its upper part in passing to its insertion. It ends in a strong flat tendon at the lower third of the leg, which tendon runs through a particular sheath at the back part of the tarsal pulley, becomes thickened and expanded as it advances forwards beneath the tarsus, receives a strong accessorial tendon from the muscle which bends the innermost toe, and finally divides into three strong perforating tendons, which bend the last joints of the three long toes.

In the outer, or fourth toe, both the *perforans* and *perforatus* ten-

dons are confined by a double annular ligament; the exterior one being continued from the adjoining toe, the inner and stronger one from the sides of the proximal phalanx of the outer toe.

The second and third toes have two perforated tendons; one inserted into the sides of first, and the other into sides of second phalanx.

Mr. Gould then proceeded to characterize a new species of *Peramèles* from Port Essington, and a new species of *Dasyurus* from the same locality.

PERAMELES MACROURA. *Per. corpore suprâ nigro et flavescenti-albo penicillato, infrâ sordidè albo; pilis rigidis obsito; caudâ pilis parvulis parcè tectâ, longitudine dimidio corporis æquante; suprâ nigrd, infrâ fuscescenti-albd; auribus mediocribus.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin . . .	16	3
———— caudæ	7	3
———— ab apice rostri ad basin auris . . .	3	4
———— tarsi digitorumque	3	1
———— auris	1	2

Hab. Port Essington.

The *P. macroura* greatly resembles the *P. nasuta*, having the same elongated form of head, character of fur and colouring, but is distinguishable by its longer tail.

DASYURUS HALLUCATUS. *Das. suprâ flavescenti-fuscus, nigro-penicillatus, maculis albis ornatus; corpore infrâ albo; caudâ im-maculatâ ad apicem nigrd.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin . . .	11	0
———— caudæ	9	0
———— ab apice rostri ad basin auris . . .	2	6
———— tarsi digitorumque	1	1½
———— auris	1	0

Hab. Port Essington.

This species most nearly resembles the *Dasyurus Geoffroi*, but is of a smaller size, and has the thumb of the hind-foot more developed.

Accompanying the specimen from which the above description is taken was another individual, which differs only in having the ground-colour of the body nearly black; hence it would appear that the present species is subject to the same kind of variation in its colouring as the *Dasyurus Maugei*, the black variety of which has received the name *viverrinus*.

LINNÆAN SOCIETY.

June 7, 1842.—The Lord Bishop of Norwich, President, in the Chair.

Read "An Account of a Fish, nearly allied to the genus *Hemiramphus*, taken in Cornwall." By Jonathan Couch, Esq., F.L.S., &c.

Mr. Couch states, that in the month of August 1841, several individuals of this little fish were found swimming at the surface of a large pool in the rocks near Polperro, where they had been left by the receding tide, having been swept thither by a continued south-west wind, which had also driven in many individuals of *Motella*

glauca and other fishes that do not ordinarily select such a situation. Their length was half an inch; the head proportionately large, especially across; the body slender; eye large; snout in front of it short and abrupt; upper jaw arched; under stout, projecting to a considerable extent, but in some specimens more than in others, the point declining, and the sides not appearing to be formed of parallel rami of the jaw, but rather of a cartilaginous substance; vent placed posteriorly; body, which is equal from the head to this point, tapering thence to the tail; lateral line, so far as could be distinguished, straight; dorsal and anal fins single, posterior, opposite, the latter beginning close behind the vent, and both reaching nearly to the tail, their membrane at first broader, but narrowing in its progress; pectoral fins and tail round. The colours of different specimens varied greatly, some being dark with a tint of green, others cream-coloured but sprinkled with specks; regular and thickly set narrow stripes passed from the back obliquely forward, breaking into dots at the sides, in the darker coloured specimens; belly dark.

Mr. Couch was unable to discover ventral fins even with the aid of a lens. He has no doubt of the specimens being in a very early stage of their existence, but cannot refer them to any known species. He thinks it indeed doubtful whether they really belong to the genus by the name of which he has provisionally designated them, or even to the same family, some parts of their structure seeming to indicate an affinity with the genus *Ammodytes*.

The paper was accompanied by magnified figures.

June 21.—Edward Forster, Esq., V.P., in the Chair.

Read "Observations on the Growth and Reproduction of *Enteromorpha intestinalis*." By Arthur Hill Hassall, Esq.

Mr. Hassall states that, in the earliest stage of their development, the tapering filaments consist of a single series of cells placed end to end. Each of these cells afterwards becomes bisected by a longitudinal line, and other lines subsequently appear, so that the original cells are ultimately divided into several, each of which in its turn enlarges and is in like manner divided. From the continued growth and unlimited division of the cells, the filaments increase to an indefinite size, soon lose their original confervoid character, present a reticulated appearance, and instead of being attenuated become cylindrical and hollow.

Mr. Hassall proceeds to state, that in each articulation of the filaments, and often when they are not thicker than a horse-hair, a dark central nucleus is gradually developed, which is the reproductive germ. He thinks there can be little doubt that this, as well as the cell in which it is contained, undergoes repeated division in the same manner as the reproductive globules of the *Ulva*. These reproductive bodies germinate while still inclosed within the cells in which they were developed, and while the parent filament retains all its freshness and vigour, giving rise to the jointed and tapering filaments first described; which in this state, after the rupture of the parent cell, and while their bases are still fixed within it, bear a strong resemblance to a parasitic *Conferva*. This development, division and growth of cells and reproductive bodies appears, Mr. Hassall adds,

to be going on continually and successively, so that most specimens of the plant present examples of each different stage of its formation.

These observations lead Mr. Hassall to regard *Enteromorpha intestinalis* as having a twofold relation, viz. to the *Confervæ* in its young articulated filaments, and to the *Ulvæ* in its reproduction from globules which undergo repeated division. He objects to the tautology of the specific name, and proposes that of *lacustris* in its place.

Read also the conclusion of Mr. Clark's paper "On the Sea Cocoa-nut of the Seychelles, *Lodoicea Sechellarum*, Comm. and Labill."

[The substance of this paper has been already given in vol. vi. p. 408, and also in the Proceedings of the Bot. Soc. of Lond., p. 153 of our last Number.]

November 1.—R. Brown, Esq., V.P., in the Chair.

Read "A Notice of the African Grain called Fundi or Fundungi." By Robert Clarke, Esq., Senior Assistant Surgeon to the Colony of Sierra Leone. Communicated by Jacob Bell, Esq., F.L.S.

This Lilliputian grain, which is described by Mr. Clarke as being about the size of mignonette-seed, is stated to be cultivated in the village of Kissy and in the neighbourhood of Waterloo by industrious individuals of the Soosoo, Foulah, Bassa and Joloff nations, by whom it is called "hungry rice." The ground is cleared for its reception by burning down the copse-wood and hoeing between the roots and stumps. It is sown in the months of May and June, the ground being slightly opened and again lightly drawn together over the seed with a hoe. In August, when it shoots up, it is carefully weeded. It ripens in September, growing to the height of about eighteen inches, and its stems, which are very slender, are then bent to the earth by the mere weight of the grain. They are reaped with hooked knives. The patch of land is then either suffered to lie fallow, or planted with yams or cassada in rotation. Manure is said to be unnecessary or even injurious, the plant delighting in light soils and being raised even in rocky situations, which are most frequent in and about Kissy. When cut down it is tied up in small sheaves and placed in a dry situation within the hut, for if allowed to remain on the ground or to become wet the grains become agglutinated to their coverings. The grain is trodden out with the feet, and is then parched or dried in the sun to allow of the more easy removal of the chaff in the process of pounding, which is performed in wooden mortars. It is afterwards winnowed with a kind of cane fanner on mats.

In preparing this delicious grain for food, Mr. Clarke states that it is first thrown into boiling water, in which it is assiduously stirred for a few minutes. The water is then poured off and the natives add to it palm oil, butter or milk; but the Europeans and negroes connected with the colony stew it with fowl, fish or mutton, adding a small piece of salt pork for the sake of flavour, and the dish thus prepared is stated to resemble kous-kous. The grain is also made into a pudding with the usual condiments, and eaten either hot or cold with milk; the Scotch residents sometimes dressing it as milk-porridge. Mr. Clarke is of opinion that if the fundi grain were raised for exportation to Europe, it might prove a valuable addition to the

list of light farinaceous articles of food in use among the delicate or convalescent.

Specimens of the grass accompanied Mr. Clarke's communication, and were examined by Mr. Kippist, Libr. L.S., who added some observations on its botanical characters.

It is a slender grass with digitate spikes, which has much of the habit of *Digitaria*, but which, on account of the absence of the small outer glume existing in that genus, must be referred to *Paspalum*. Mr. Kippist regards it as an undescribed species, although specimens collected at Sierra Leone by Afzelius are in the collections of Sir James E. Smith and Sir Joseph Banks, on the former of which Afzelius has noted that it is much cultivated by the negroes in Sierra Leone.

Mr. Kippist distinguishes the species by the following characters:—

Paspalum exile, glaberrimum, caule filiformi, racemis subternis digitatis, axi partiali spiculis singulis angustiore, spiculis parvis sub-biserialibus pedicellatis, glumis ovatis acutiusculis paleis æqualibus, foliis linearilanceolatis margine serrulatis.

Gramen sub-bipedale, infernè ramosum; racemi tenues, 3—4-pollicares, subsessiles; axes partiales angustissimæ, planæ, margine minutè denticulatæ; spiculæ vix lineales; glumæ exterioris respectu racheos, (valvulæ floris masculi superstitis) nervi 7—9 æquidistantes, interioris 5, quorum laterales approximati; paleæ minutissimè striatæ; folia plana; vaginæ longissimæ; ligulæ truncatæ integræ.

Read also a letter from N. B. Ward, Esq., F.L.S., containing a statement furnished to him by Mrs. Williams, the widow of the late missionary of that name, respecting the transportation of the *Musa Cavendishii* to the Navigators' Islands, and its culture there. Mr. Williams left England on the 11th of April 1839, and arrived at Upolu, one of the Navigators' Islands, at the end of November. He carried with him, in one of Mr. Ward's glazed cases, a young plant of *Musa Cavendishii*, which bore the voyage well. It was transplanted into a favourable situation, and in May 1840 a cluster of fine fruit (in number exceeding 300) was produced; after which the parent plant died, leaving behind more than thirty suckers, which were distributed to various parts of the island. In May 1841, when Mrs. Williams left to return to England, the greater part of these were in a fructifying state, so that there cannot be a doubt of this valuable plant quickly becoming abundant, not only in Upolu, but also in the neighbouring islands. Mrs. Williams further states that the fruit is highly prized by the natives as being much finer and very different in flavour from any of the species or varieties previously growing in these islands.

November 15.—E. Forster, Esq., V.P., in the Chair.

Read a Note "On the permanent varieties of *Papaver orientale*, L." By T. Forster, M.B., F.L.S., &c.

Dr. Forster states, that ever since the introduction of *Papaver bracteatum*, Lindl., into England, he has regarded it as a permanent variety of *P. orientale*, of which *P. bracteatum*, as having fertile seeds, while those of *P. orientale* are usually sterile, was to be considered the original plant. He retains, however, the name of *orientale* for

the species, both as being the earlier and as being applicable to all the varieties, four of which he now distinguishes as permanent by the following characters:—

1. *P. orientale bracteatum*, characterized by its height, its bractææ, its large and deep red petals, and its uniformly perfect seeds.

2. *P. orientale præcox*, the common "Monkey Poppy" of the old gardeners, and the most common variety in England, distinguished by its somewhat depressed capsule and sterile seeds. It flowers along with the former, generally about the 10th of May, the flowers being of a fine deep orange inclining to cinnabar.

3. *P. orientale serotinum*, resembling the last except in that its petals incline more to what is called salmon-colour, but principally characterized by its flowering nearly a month later, along with *P. somniferum*, L., early in June. Dr. Forster has several times tried in vain to make it flower with the commoner sort. The seeds are always imperfect, and the flower and capsule of the same shape as in the last.

4. *P. orientale, capsulæ et floribus longioribus*, which are its principal distinguishing characters. It flowers in May a few days after the old English sort, but is only met with on the Continent: the petals are of the same colour, but the leaves are rather smaller. Dr. Forster states it to be common in the gardens of Belgium as the only variety cultivated, the two last-named varieties being there unknown. It holds a middle rank between them and *P. orientale bracteatum*, being tall and bearing seeds, which are sometimes prolific, and well deserves to be introduced into English gardens.

Dr. Forster adds, that about ten years ago Mr. Curtis showed him a bed of seedlings of the second year in full flower in May, which had round capsules and orange flowers like *P. orientale*, but which he stated to have been derived from seeds of *P. bracteatum*. Mr. Curtis attributed the change to the bees having transported the pollen of that plant, but the uniform appearance of the whole bed led Dr. Forster to think this explanation doubtful. He further states, that he has been assured in the South of Europe that the best opium and in the largest quantity is obtained from *P. orientale bracteatum*; and as this plant suits the English soil and seeds freely, he thinks it might often be advantageously substituted for *P. somniferum*.

Read also a Note "On *Secale cornutum*, the *Ergot* of Rye;" and "On a species of *Asplenium*, related to *A. Trichomanes*, L." By A. Haro, M.D., of Metz, communicated by the Secretary.

In the latter communication Dr. Haro calls attention to a fern discovered by himself in the well of an old castle. The well in which it was found is described as being large, four-cornered, and having at the top on one side a square window, freely admitting air and light. The opposite wall is lined with the fern, which lies flat upon the stones, to which the fronds are said to be attached throughout their length by slender roots, rendering it difficult to remove them even with a knife. Dr. Haro submitted the plant to a Professor of the faculty of Nancy, who regarded it as a new species, more distinct from *A. Trichomanes* than *A. viride* or *A. Petrarchæ*, and supplied the following descriptive characters of these four species:—

A. Trichomanes, frondes *patulæ, glabræ, impari-pinnatæ*; stipes nigres-

centi-vernicosus, suprâ membranulâ crenulatâ et ab insertione pinnularum utrinque decurrente manifestè *appendiculatus*; pinnulæ mediæ *ovatæ* inæquilaterales, superiores oblongæ et basi obliquè cuneatæ, impar crenulata, omnes obtusæ *obtusè*que crenatæ.

A. HAROVII, frondes *decumbentes* saxoque fibrillis tenuissimis adfixæ, *glabræ*, impari-pinnatæ; stipes nigrescenti-vernicosus, suprâ membranulâ obsoletâ et ab insertione pinnularum utrinque decurrente *appendiculatus*; pinnulæ mediæ *hastato-rhomboidæ*, *trilobatæ*, superiores oblongæ basi obliquè attenuatæ vel cuneatæ, impar pinnatifida, omnes obtusæ sed *acutè* dentatæ.

A. *viride*, frondes *erecto-patulæ*, *glabræ*, impari-pinnatæ; stipes viridis, suprâ canaliculatus, *inappendiculatus*; pinnulæ mediæ ferè omnes ovato-rhomboidæ, inæquilaterales, impar crenulata incisa, omnes obtusæ *obtusè*que crenulatæ.

A. *Petrarchæ*, frondes *erecto-patulæ*, *glanduloso-villosæ*, impari-pinnatæ; stipes obscurè nigrescens, suprâ applanato-caliculatus, *inappendiculatus*; pinnulæ mediæ *oblongæ* basi obliquè truncatæ vel *cuneatæ* et inde valdè inæquilaterales, pinnatifidæ, lobulis obtusis inæqualiter crenulatis, superiores supra rachin decurrentes.

MISCELLANEOUS.

ON THE PRESENCE OF THEINE IN THE LEAVES OF ILEX PARAGUYENSIS.

RECENT chemical researches have proved that the bitter tonic substance called *Theine*, found in the leaves of tea, is identical with *Caffeine*, obtained from the seeds of coffee. On this subject Liebig remarks—"We shall never, certainly, be able to discover how men were led to the use of the hot infusion of the leaves of a certain shrub (tea), or of a decoction of certain roasted seeds (coffee). Some cause there must be, which would explain how the practice has become a necessary of life to whole nations. But it is surely still more remarkable that the beneficial effects of both plants on the health must be ascribed to one and the same substance, the presence of which in two vegetables, belonging to different natural families and the produce of different quarters of the globe, could hardly have presented itself to the boldest imagination."

It is curious to remark, that a beverage called Guarana, used by the people on the banks of the Amazon, and in all probability procured from the leaves of *Paullinia sorbilis*, should yield a crystalline matter also identical with Theine, and that Theobromine, or the principle yielded by chocolate, should be in many respects analogous. Mr. John Stenhouse of Glasgow has recently detected Theine in the leaves of the *Ilex paraguayensis*, Yerba Maté, or Paraguay Tea, which is the common beverage of a large portion of the inhabitants of South America.

This is a fact of great interest, when taken in connexion with the previous discoveries above alluded to, as tending to show that the same principle is found in many of those substances which are employed by mankind in different parts of the world to furnish a tonic and refreshing beverage. Theine is procured easily according to Mr. Stenhouse, by making an infusion of tea, precipitating by acetate of lead, filtering, evaporating the clear solution to a thickish consistence, and then subliming (?) from a sand-bath. In this way he has been able to procure $1\frac{1}{3}$ per cent. from Assam tea without the use of

alcohol or æther. The best test for Theine is ammonia, which, when added and heated to dryness, gives a beautiful rose-colour precisely similar to murexide. From the facility with which Theine is obtained and its tonic qualities, it is probable that it may be ere long used medicinally as a substitute for quinine and other remedial agents of a similar nature.—J. H. B.

SULA MELANURA.

“In our ornithological memoranda we neglected to state that during our stay at St. Kilda, a black-tailed Solan Goose was mentioned to us as being occasionally seen intermingled with the other and more common kind. We at first regarded this as an accidental variety, but we have since recalled to mind that there is a distinct species described by naturalists under the title of *Pelecanus melanurus*, so called from the character in question. We believe that this is the first ascertained instance of its occurrence in any of the British Islands.”—*J. Wilson, Voy. round West. Isles*, vol. ii. p. 113, note.

CAPTURE OF BOTTLE-NOSED WHALES.

There has been recently a considerable capture of bottle-nose whales at the island of Eday, amounting to between sixty and seventy. They were generally of fair dimensions, about fourteen feet long on an average; and on being sold by public roup on the Monday following, brought 146*l.*—*Inverness Courier*.

NOTE ON PAGURUS PRIDEAUXII.

There is an omission in my notice of this species in the last Number of the ‘Annals,’ p. 103, which, in consequence of the obscurity thereby occasioned, is perhaps worth correcting. The comment on Dr. Leach’s observations should have been, not to the effect that it was singular that *P. Prideauxii* inhabits so many different species of shells, but, that there should be no allusion to its connexion with *Adamsia* (*Actinia*) *maculata*, with which species I have always found it associated. I had already mentioned in this Journal (vol. v. p. 251) the occurrence of the *Pagurus* in *Trochi* [*T. cinereus*, &c.] and *Bulla lignaria*:—to these may now be added *Buccinum undatum* and *Natica Alderi*. The smaller shells thus resorted to, as the last-named, and *Trochus cinereus*, may be said to have merely formed the apex of the tenement, as “the thin horny expansion attached to the aperture of the shells, and forming as it were an extension of the body-whorl in a spiral form*,” constituted from one-half to two-thirds of the entire habitation of the crab.

Dr. Coldstream, in treating of the *Actinia maculata* obtained by him at “Torbay, and in Rothsay and Kames bays in Bute,” remarks, that the shell which it covered was “always found inhabited by a variety of the hermit-crab.” The “variety” thus alluded to was probably *P. Prideauxii*. By Dr. Coldstream and also by myself, the *Actinia* and *Pagurus* under consideration have always been found associated. Dr. Leach makes no mention of their connexion; and Mr. Edw. Forbes states that not a single specimen of the *Actinia* taken

* Dr. Coldstream in *Edin. New Phil. Journ.* vol. ix., and copied in Johnston’s *British Zoophytes*, p. 219.

in the course of a season by him about the Isle of Man "had either hermit-crab or horny disk." (Annals, vol. v. p. 183.) It would thus appear, that on the British coasts this strange companionship is not invariably constant. By Dugès the two species have been found associated on the coast of France.

Dr. Coldstream enters pretty fully into the subject of the "horny expansion," and after speculating upon its formation, thinks that it is probably "produced by the *Actinia*." Opposed to this view however is the fact, that shells possessing the horny expansion are frequently dredged in localities where the *Actinia* was never met with—and where the *P. Prideauxii* never occurred. I have often found them tenanted instead by *Pagurus Bernhardus*.

On examining such shells with horny expansions as are preserved in my cabinet, I find the expansions to consist simply of a development, or continuation of the *Alcyonium echinatum* (and which it occurred to Dr. Coldstream might be the case) beyond the shell itself after this is covered, or nearly so, by the zoophyte. May not this *Alcyonium* be selected by the *Actinia* as a base upon which to fix itself, on account of its papillary eminences thereby enabling it—the parasite—to retain a firmer hold or "seat"?—WM. THOMPSON.

Belfast, Feb. 10, 1843.

METEOROLOGICAL OBSERVATIONS FOR JAN. 1843.

Chiswick.—January 1. Clear and fine. 2, 3. Frosty: fine. 4. Rain: clear. 5. Clear: rain and sleet. 6. Frosty: overcast. 7, 8. Cloudy. 9. Clear and frosty. 10. Stormy and wet: very boisterous. 11. Clear and frosty: very fine. 12. Hazy: clear: hurricane at night. 13. Stormy and wet: very boisterous: barometer at noon exceedingly low. 14. Clear and windy: densely overcast: snow at night. 15. Cloudy: clear and frosty. 16. Cold and dry: fine. 17. Overcast. 18. Hazy: dense fog. 19. Dense fog. 20—22. Hazy. 23. Very fine: overcast: stormy, with rain at night. 24. Overcast. 25. Very fine. 26, 27. Cloudy. 28. Cloudy: clear and fine. 29. Overcast. 30. Very fine. 31. Uniformly overcast: stormy, with rain at night.—Mean temperature of the month 3° above the average. The barometer on the 13th was lower than it has been observed in the neighbourhood of London since 1821.

Boston.—Jan. 1—3. Fine. 4. Rain. 5. Cloudy: rain and snow early A.M. 6. Fine. 7. Cloudy. 8. Cloudy: rain early A.M. 9. Fine. 10. Windy: rain early A.M.: stormy P.M., with snow. 11. Windy. 12. Cloudy: rain P.M. 13. Stormy: rain early A.M. (barometer 2 P.M. 27°·80): rain P.M.: stormy night. 14. Stormy: snow P.M. 15—18. Cloudy. 19. Foggy. 20—23. Cloudy. 24. Cloudy: rain early A.M. 25. Fine. 26. Cloudy: rain early A.M. 27. Cloudy. 28. Windy. 29. Cloudy. 30. Cloudy: stormy P.M. 31. Fine.

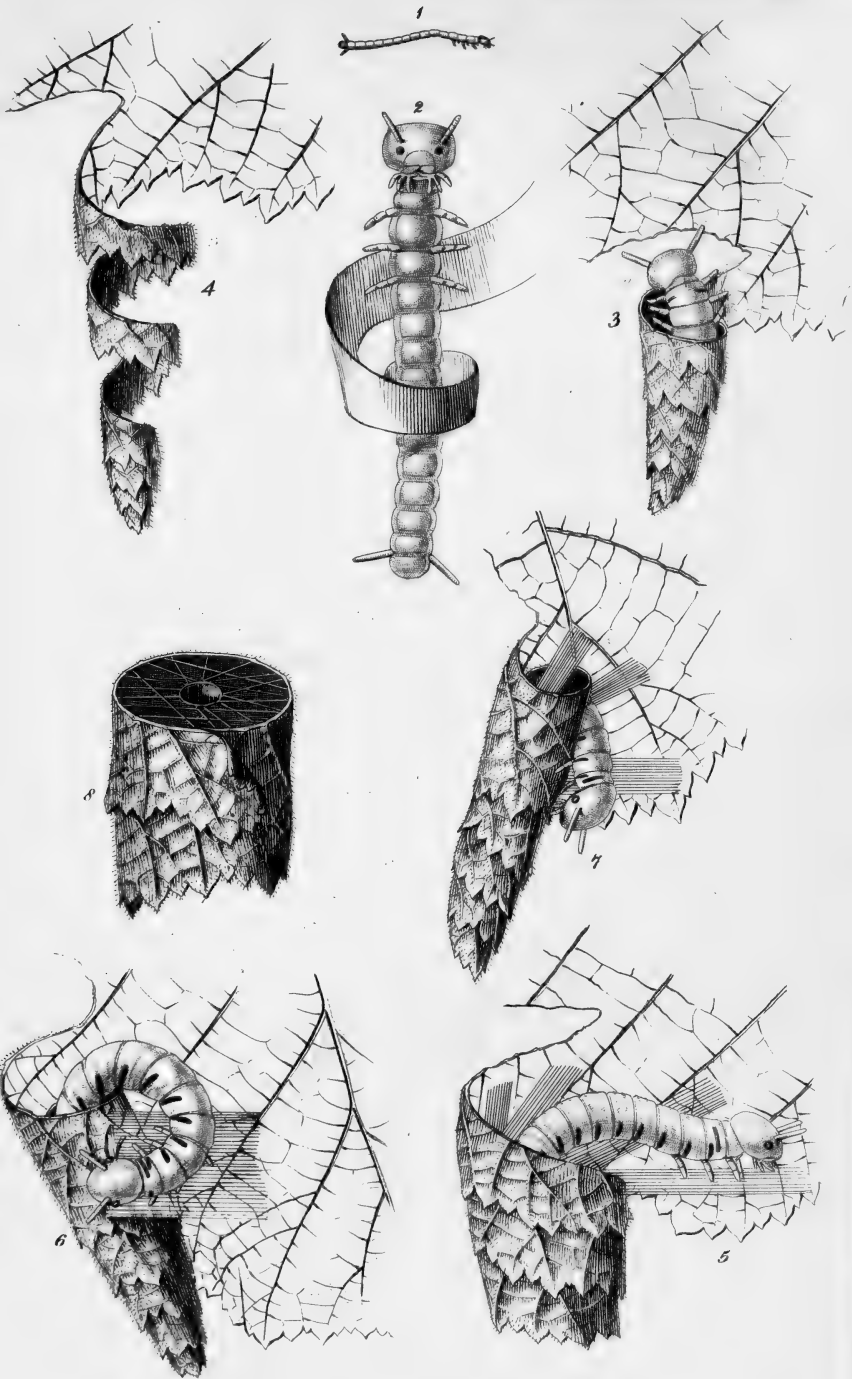
Sandwick Manse, Orkney.—Jan. 1. Hail-showers. 2. Snow. 3. Cloudy. 4. Showers: large hail—broke windows. 5. Hail-showers. 6. Showers. 7. Hail-showers—broke windows: thunder and lightning. 8. Snow-showers and hail. 9. Snow-showers: rain. 10. Snow-showers. 11. Snowing at noon: clear at night. 12. Clear: frost and snow. 13. Snow: thaw-showers. 14. Frost: thaw-showers. 15. Showers. 16. Showers: cloudy. 17. Drizzle. 18. Cloudy: drizzle. 19. Showers: clear. 20—22. Clear. 23. Clear: drops. 24. Cloudy. 25. Cloudy: drizzle. 26. Clear: rain. 27. Rain: showers. 28. Drizzle: showers. 29—31. Showers.

Applegarth Manse, Dumfries-shire.—Jan. 1. Frost A.M.: shower: frost P.M. 2. Frost A.M.: frost P.M. 3. Showers. 4. Snow and rain. 5. Frost: high wind. 6. Drizzling rain. 7. Rain and wind. 8. Snow: frost. 9. Snow: rain: wind. 10. Snow: frost. 11. Frost: lunar halo. 12. Hard frost. 13—15. Frost: drifting snow. 16. Thaw A.M.: frost P.M. 17, 18. Thaw: rain. 19. Thick fog and thaw. 20. Fair, but cloudy. 21. Fair A.M.: drizzly P.M. 22. Rain early A.M.: cleared. 23. Rain. 24. Fair, but misty. 25. Rain P.M. 26. Wet A.M. 27. Wet P.M. 28. Storm of wind and rain. 29. Wet and stormy. 30. Heavy showers. 31. Rain.

Meteorological Observations made at the Apartments of the Royal Society, LONDON, by the Assistant Secretary, Mr. Robertson; 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.									
	London: 9 a.m.	Chiswick.		Boston 8½ a.m.	Dumfries-shire.	Orkney-Sandwick.		London: R.S.		Chiswick.	Boston 8½ a.m.	Dumfries-shire.	Orkney-Sandwick.	London: 9 a.m.	Chiswick 1 p.m.	Boston.	Dumfries-shire.	Orkney-Sandwick.	London: 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney-Sandwick.				
		Max.	Min.			Max.	Min.	Self-reg.	Mm.															Max.	Min.	9 a.m.	5 p.m.
1843.																											
Jan.																											
1.	30.298	30.257	30.131	29.85	30.14	30.03	30.00	30.01	38.2	55.7	38.5	39	27½	34	33	nw.	calm	n.	nw.	013	06	38					
2.	30.060	30.065	30.017	29.67	30.07	30.01	30.09	30.11	36.0	39.6	33.6	38	19	32	35	w.	calm	nw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
3.	30.226	30.205	30.107	29.87	30.00	29.74	29.83	29.53	30.7	38.3	29.8	43	27	27½	35	w.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
4.	30.888	30.777	30.684	29.49	29.63	29.60	29.36	29.22	41.3	42.2	30.5	43	31	40	31	sw.	w.	w.	.....	.....	.....	.....	.....	.....	.....	.....	.....
5.	30.836	30.020	29.772	29.38	29.65	29.94	29.61	29.93	38.8	44.3	35.6	31	31	36	38	sw.	calm	w.	.....	.....	.....	.....	.....	.....	.....	.....	.....
6.	30.134	30.080	29.997	29.75	29.92	29.74	29.61	29.53	36.7	42.5	34.0	31	34	35	40	w.	calm	w.	.....	.....	.....	.....	.....	.....	.....	.....	.....
7.	29.946	29.917	29.569	29.53	29.51	29.20	29.17	28.75	41.8	44.9	37.0	46	36	40	44	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
8.	29.688	29.559	29.206	29.30	29.37	28.79	28.05	28.42	46.3	40.3	42	30	36	36	33	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
9.	29.684	29.559	29.206	29.30	29.37	28.79	28.05	28.42	41.4	32.8	47	32	31	43	23	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
10.	28.892	29.006	29.068	28.49	28.47	28.70	28.32	28.48	47.0	34.8	42	30	36	5	37	w.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
11.	29.114	29.108	28.796	28.71	28.78	28.74	28.76	28.79	31.3	43.0	34.2	40	31	33	36	sw.	w.	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
12.	28.738	29.120	28.706	28.56	28.73	28.70	28.64	28.82	32.5	33.0	43	23	24	39	28	n.	calm	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....
13.	28.354	28.649	28.181	28.10	28.00	28.03	28.57	28.51	41.0	42.8	31.2	46	37	36	31	sw.	e & w.	e.	.....	.....	.....	.....	.....	.....	.....	.....	.....
14.	29.040	28.700	28.700	28.51	28.59	28.63	28.52	28.51	36.8	45.4	36.7	39	28	37	35	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
15.	29.022	29.070	28.826	28.63	28.63	28.60	28.62	28.94	34.5	41.0	32.2	40	26	27	34	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
16.	30.214	30.198	30.214	29.83	29.38	29.85	29.62	29.90	38.3	39.0	31.0	41	30	36	41	n.	ne.	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....
17.	30.354	30.214	30.182	29.83	29.58	29.92	29.64	29.69	36.8	41.7	35.6	42	37	34	43	nw.	calm	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....
18.	30.366	30.454	30.436	29.95	30.06	30.19	29.84	30.02	43.4	44.4	37.0	49	33	42	46	w.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
19.	30.538	30.454	30.436	30.10	30.25	30.28	30.16	30.18	36.8	49.4	36.8	44	34	41	45	w.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
20.	30.332	30.337	30.086	30.00	30.13	29.98	30.11	30.00	38.8	44.7	36.6	39	29	41	45	w.	calm	e.	.....	.....	.....	.....	.....	.....	.....	.....	.....
21.	30.032	30.030	30.008	30.64	29.78	29.75	29.56	29.71	38.3	40.4	34.2	41	34	37	37	e.	calm	e.	.....	.....	.....	.....	.....	.....	.....	.....	.....
22.	30.060	30.038	30.003	29.74	29.71	29.75	29.71	29.69	40.8	41.8	34.2	44	34	40	45	e.	calm	e.	.....	.....	.....	.....	.....	.....	.....	.....	.....
23.	30.062	30.027	29.892	29.63	29.69	29.40	29.62	29.43	42.7	44.0	41.2	48	34	41	45	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
24.	29.896	29.969	29.837	29.42	29.41	29.50	29.31	29.30	45.3	47.0	42.4	48	39	45	43	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
25.	30.046	30.039	30.019	29.55	29.65	29.70	29.42	29.66	42.6	49.6	42.8	49	44	39	47	e.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
26.	30.040	30.038	30.010	29.50	29.74	29.72	29.78	29.40	47.7	49.6	42.7	51	45	48	43	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
27.	29.992	29.901	29.901	29.44	29.59	29.60	29.12	29.06	50.2	48.0	45.0	53	50	53	43	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
28.	29.984	29.907	29.772	29.16	29.36	29.60	29.06	29.37	51.8	56.2	51.0	56	45	53	45	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
29.	30.954	30.911	30.826	29.38	29.50	29.40	29.30	29.12	49.4	57.7	47.3	55	48	46	52	sw.	w.	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
30.	29.768	29.905	29.724	29.16	29.26	29.56	28.86	29.12	51.3	55.3	49.7	55	36	51	50	sw.	calm	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
31.	29.964	29.931	29.854	29.40	29.36	29.30	29.24	28.89	45.3	49.8	42.3	51	44	40	50	sw.	w.	sw.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean.	29.772	29.831	29.659	29.35	29.462	29.476	29.346	29.343	40.4	45.7	37.7	43.3	38.4	44.15	34.03	38.4	43.3	38.3	39.88	39.91	Sum.	1.38	1.34	3.02	6.35	38	
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A Tentredo Forming its Case.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY.

No. 70. APRIL 1843.

XXXV.—*Observations on the Habits of a Tenthredo or Saw-fly.* By PIERRE HUBER*.

[With a Plate.]

THE insect which is the subject of this memoir is, I conclude, somewhat rare in our country [Geneva], as I have not yet observed it except in the larva state; and these larvæ are so uncommon, that in looking diligently for them, I have scarcely found more than one or two every year. My design is to make known the first period of its history, looking for the time when more favourable circumstances may enable me to complete it. I especially regret my inability to give the description of the perfect insect; but, as we know with respect to a great number of insects, all the philosophic interest attaches to the history of the larvæ. It is these indeed which most frequently exhibit to our sight that industry which so justly excites our admiration.

This insect belongs to that division of the Saw-flies (*Tenthredinidæ*), the larvæ of which, not furnished with membranous feet (prolegs), have only six coriaceous feet belonging to the thorax, and whose hind part or abdomen is armed laterally with two hard and horny processes which diverge from one another nearly in a straight line. These very prominent processes, I believe, are attached to the last ring but one. The last ring did not appear to have organs like the anal prolegs of caterpillars; it is, on the contrary, of a coriaceous and solid substance, variegated with a brown colour above; it terminates in an oval margin, and opens upwards in order to serve as a passage for the rejectamenta of the insect; but in some cases it also performs the office of a foot. The head is wholly coriaceous, its eyes are very distinct and prominent; it is furnished with strong and rather short jaws, with two antennæ placed near the eyes, and with two or three pairs of palpi, the length of which exceeds that of the jaws, and which serve the purpose

* From the Mémoires de la Société de Physique et d'Histoire Naturelle de Genève, tom. ix. part 2, 1842.

of a hand for holding the leaf upon which the insect is feeding or working. The length of this larva varies from six to eight lines, it is half a line thick; its ordinary colour is bluish green, the head is yellowish, and the feet are black; there is a small black spot on the first ring. In its first stage this insect lives upon the hazel-tree.

Most larvæ of *Tineæ* and other insects expert in forming for themselves cases (*fourreaux*) carry them about with them, but (during the early period of its life at least) the larva in question is obliged to leave its case fixed to the leaf out of which it has been formed; it therefore preserves all the verdure of the leaf itself; at last, however, comes the time when this larva separates the case from the leaf and carries it from place to place. The case in which it envelopes itself is of a very singular form; it is a very much lengthened hollow cone, very narrow at the end with a rather wide mouth; it is made of a strip or band of a hazel-leaf rolled in a spiral form and composed of a number of variable whorls; this strip, very narrow at the lower extremity, at first produces only very narrow whorls and of small diameter, for at first the larva wants but a very narrow case. When complete it is from twelve to fourteen lines in length, and two lines in diameter at its orifice; it is composed of more than ten turns, the exterior part of the case presenting the upper surface of the leaf, the serrated edge of which is preserved entire, turned towards the point of the cone. This dwelling is very spacious for our larva, and it can turn itself about in it with the greatest ease.

It forms this cone by cutting along the edge of the leaf a narrow strip, which it then winds spirally around itself by a method which I shall presently describe. When this portion has taken the desired form or position, it goes on cutting the band a little further up, and always nearly parallel with the edge of the leaf. By little and little it rolls around itself a fresh portion, and so on during all the time of its growth; so that the cone, which was at first very short, lengthens every time that the larva works at it. But it is not content with clothing itself; it feeds as it goes on, it even eats prodigiously; only, while eating, it takes good care to attend to the arrangement of the strip or band necessary for its clothing; it eats according to method, and with the double object of providing itself at once with board and lodging; I say lodging, for this case, being too roomy to be justly considered as a mere garment, serves it rather as an asylum than as a defence against the inclemency of the weather.

Another part of the skill of this insect consists in knowing how to roll this bandage round itself, which unsupported would

fall by its own weight like a shred of the leaf. It will be supposed that it is by means of its silk, skilfully employed, that it succeeds in giving it the requisite position and fixing it in its place.

I shall give a full description of the method which it practises, a process in some degree analogous to that of the rolling caterpillars, which consists in carrying threads from the surface of the rolled portion to that part of the leaf which they wish to join to their work. The weight of their body, resting on the first threads, brings the leaf near to the centre of the roll, and fresh threads tend to keep it in this position. But the manner in which our larva works every time that a fresh portion of leaf is to be added to his case deserves greater detail.

There are generally three skeins or wefts* stretched from the mouth of its case to the leaf. The first weft or skein is situated on the body of the case; this is the shortest, and reaches the leaf by the shortest course; the second proceeds from the middle of the last whorl and also goes to the leaf; and the third is fastened on still higher up, that is to say, at the point where the rolling of the band begins. These wefts are composed of threads parallel to each other, and nearly perpendicular to the orifice. After the larva has bitten the leaf so far as to separate enough for rolling up, it comes half out of its case, mounts on the first weft and produces a fresh one which I shall call No. 1 *bis*, similar, except that the threads are fixed higher on the roll and on the leaf. After this operation it re-enters its funnel, and comes out again at the space which lies between the second and the third older wefts; it mounts upon the second, makes it bend with its weight, or perhaps by the contraction of its body, and establishes a weft No. 2 *bis*, composed of a score of silk threads; lastly it places itself on the third, and from thence makes a new weft No. 3 *bis*. By this means the work of rolling up goes on in succession, and the whole portion cut off is rolled up at once, the spiral cone acquiring a quarter of a whorl at each time; it gains each day a complete whorl. In fact, it is the cone which is rolled successively on the bandage. Now the three wefts *bis* become fundamental, and serve as types for three new wefts, which in their turn will be succeeded by others. Such is the tenor of this process so far as I have been able to ascertain. The roll turns during the operation of fixing the threads, and not at all while the larva cuts out the bandage. We should mention

* A row of parallel threads is obviously intended. The word *trame* of the original has been rendered *weft*, with some doubt however of its being the proper term.—R. T.

that the rolling caterpillars make cylinders with leaves, whereas in the present case the rolling up must be oblique in order to produce a spiral, and this, probably, is what renders necessary the complex process which the larva of the Saw-fly of the hazel employs.

The axis of the cone or case of our larva is frequently placed at right angles to the tangent which might be drawn at the edge of the leaf; yet the orifice is not parallel to this edge; on the contrary, this opening is very oblique, and such as it should be in order that the band of which it is formed in rolling up may only cover over the last spiral by its edge, so as to form a prolongation of the case, and not a simple coating.

It sometimes happens that this larva, whether by chance or by design, detaches its case from the leaf: this especially occurs when the leaf withers; for then it is obliged to seek for a fresher one, a thing which frequently happened to those which I had under my observation at home. I have often amused myself by cutting the little bands and suspending the case underneath the leaf, by means of some one of the scattered silks which remained at the mouth, as the larva itself does when its case is wholly finished. But I operated before the time, and it had still several whorls to add to its cone: had I left but a single thread, it would have been sufficient to bring back its case towards the leaf, for this larva, of a slender form, is gifted with an unequalled agility and suppleness. Coming more than three-fourths out of its cone, it bent itself in a thousand ways, and by its skill succeeded in reaching the leaf, to which it fastened some imperceptible threads of silk; it clung to these threads, then drawing its body forwards, it made the case approach the leaf by help of the side legs and the two processes near its hinder extremity; then bound it with new and shorter threads of silk, so that it nearly touched the lower surface of the leaf.

The cone had now to be made to travel in this situation. The process which it employs is most ingenious: it leans forward out of its case on the side to which it intends to direct it, and, as far as it can reach, stretches threads of silk from the leaf to the case. This latter, held back by former threads, does not as yet move at all; but the caterpillar, with its accustomed ingenuity, cuts the former threads with its jaws; if they resist too much, it stretches its body so as to force away the cone, when the last attachments break: in this way the cone is suspended only by the new threads, its centre of gravity is now displaced and is carried forward. A fresh similar manœuvre effects a new step; thus travels this heavy load, sustained by threads of silk which are substituted for each other

in succession. Our traveller at last arrives at the end of its journey, that is to say, at the end of the leaf. It then brings its case near its under surface, and adjusts it or places it in such a way as to be situated in the plane of the leaf; but on the outside he sets it up as sailors raise a mast on its base, only so as to be placed horizontally in the air, and that instead of drawing the cords on the side where it wishes to make it fast, it finds the means of establishing shorter and shorter threads of silk, and bursts the old threads that kept it in a vertical position. It has, in short, the art to lead the spiral tube to the suitable place and into the position requisite for again beginning its rolling up. It cuts off the inequalities and adjusts it so neatly to the edge of the leaf, which is also prepared beforehand for this purpose, that the junction of the two pieces shall be imperceptible. The leaf fits exactly at the edge of the case; threads of silk, carefully stretched within, sew together (if we may so speak) the two parts, and the caterpillar then setting itself to gnaw the leaf, eats it parallel to its edge, so as to give it the dimensions of the bandage of the case.

I shall conclude this notice with the last experiment that I made on one of these larvæ, and the result of which presents some very curious particulars. It was still young, it had composed its case of twelve whorls, and I saw that it had added one or two turns of new ribbon. It was working at it when I took it out in order to lay it bare; I then perceived that the portion of the case newly added being looser than it ought, and consequently the whorl being too wide at this part, the insect had obviated this inconvenience by spinning around itself such a number of threads that they formed a narrow sheath at the orifice of the case.

The larva being exposed, was gently laid upon a fresh and tender hazel-leaf, the underside of the leaf being turned upwards. At first it appeared embarrassed; it tried to turn upon its back, and it was only after many trials and efforts that it succeeded in effecting this; from this time it regained courage, and sought to carry its head from right to left of its body in order to reach the leaf in this position; but the want of a *point d'appui* for a long time hindered it from accomplishing this. However, by dint of twisting itself about, it at last succeeded, placing its spinneret upon the leaf on its right side; by a circular movement of the head, it led a thread from thence to its left side passing above its body; from that time it no longer appeared embarrassed; the movements became quicker and quicker; it had soon made a lace-work of silk above itself, fitting well enough to hold it closely against the leaf, yet without cramping it. By help of these threads it became

easier and easier to raise up the anterior part of its body, and to stretch longer or more oblique threads, at its choice; in order to do this, it bent its body in the form of an arch above the leaf, so as to make supports of all the threads which it had stretched above it. The play and muscular strength of its rings made of all these threads so many ladders, which helped its body to advance on the cordage which it had spread; and the plaited nature of the rings of its belly, and especially the large size of the last ring but one, greatly contributed to the success of its efforts: the motion begins at the tail, it advances, the rings swell and contract successively, they quit the threads to which they correspond in order to rest on other more advanced threads, and the whole body travels two lines in advance. The caterpillar then spreads fresh threads above itself, and by the same process gains a little ground every time; in short, it attains the object of its efforts, being always turned on its back; when it has reached the edge of the leaf it stops. Such is its way of proceeding when naked.

I was very curious to know how it would repair the loss of its covering at an age when the size of its body differs from what it was at first, and when a turn of ribbon two lines in width is not sufficient for it. I had the satisfaction of seeing this work done, which was worthy of some skilful tailor in a desert island who might be obliged to make his own garment. I will explain it in two words: the caterpillar had the tact to make itself a complete covering out of a single fold, which it cut to its measure, after having rolled it around itself. For that purpose, after having made a deep fold in the leaf around itself, it made a hole in the middle of the leaf, enlarged it by degrees, and rolled this wide shred about itself, just as we should draw a covering over us. The covering folded upon itself forms a double envelope, which the insect converts to its use in this position, by sewing it with numerous threads at the two ends.

Nature, as we see, is rich in ingenious expedients: so much originality in the means, so much variety in the processes, so much skill and depth in her views, what do these declare? what do they proclaim,—if not the indisputable, the infinite wisdom of the Creator of all things?

EXPLANATION OF PLATE VI.

Fig. 1. The caterpillar, natural size.

Fig. 2. The same, magnified.

Fig. 3, 4. Different appearances of the rolling-up of the case before the caterpillar forms its threads.

Fig. 5, 6, 7. Various positions of the caterpillars in forming the case by means of their threads.

Fig. 8. The closed case.

XXXVI.—*Descriptions of new species of Coleopterous Insects belonging to the Genus Apocyrthus, collected by Hugh Cuming, Esq., in the Philippine Islands.* By G. R. WATERHOUSE, Esq., Assistant Secretary and Curator to the Zoological Society.

[Continued from vol. ix. p. 311.]

Order COLEOPTERA.

Sect. CURCULIONIDES.

Div. PACHYRHYNCHIDES, Schönh.

Genus APOCYRTUS, Erichson.

IN the 'Annals of Natural History' for June 1842, seventeen new species of *Apocyrthus* are characterized; descriptions of others I had prepared, but as they extended the paper to too great a length for a monthly journal, I was not sorry to lay aside the latter half of my work for revision, especially as I found several of the species exceedingly difficult to determine. Those already described, for the most part, present well-marked characters; there are some, however, which upon re-examination I think are doubtful. The *Ap. metallicus* and *Ap. levicollis*, notwithstanding the differences in their markings, I am now inclined to regard as varieties.

Apocyrthus gibbirostris and *A. subfasciatus*.—The insect described under the former of these names I am now convinced is a female, the abdomen is somewhat convex beneath, and the terminal segment is conical; the apex of the elytra is slightly produced, and there is a small depression immediately in front of the prominent point. The male has the abdomen slightly concave, the terminal segment semicircular and coarsely punctured (in the female it is less distinctly punctured); the apex of the elytra is rounded, and the extreme point does not form a kind of tubercle as in the female; the thorax is rather larger in proportion to the elytra, and the rostrum is destitute of the hump; it is thickly punctured, and has a broadish longitudinal groove extending from the base and terminating about half-way towards the apex; on each side immediately in front of the eye is an oblong fovea joining the transverse groove which separates the rostrum from the head. This is the insect, I feel little doubt, described by M. Chevrolat under the name *Apocyrthus Erichsoni**, a name which has priority over mine. The specimens upon which I founded the *Ap. subfasciatus* are all males, and possibly are varieties of the *Ap. gibbirostris* (or rather *Erichsoni*); they, however, differ from those, which are *certainly* the males of *gibbirostris*, in having the thorax tuberculated instead of being punctured, and also in the markings, as pointed out in the published description.

Ap. geniculatus.—The rostrum in this species is shorter and broader than others of the genus; it is rather longer than broad, and the sides are parallel; the transverse groove at the base is rather more strongly marked in the female than in the male, where it is in the

* See 'Revue Zoologique,' No. 7. 1841, p. 226.

form of a sharply indented line; the surface is convex, punctured and glossy, and has a longitudinal line on the basal half; in front of the eye is an oblong fovea, broad near the eye and pointed in front; this fovea is bounded above and below by a ridge, the lower ridge forming the upper boundary of the groove for the antenna. The male *Ap. geniculatus* has the terminal segment of the abdomen semicircular and punctured, and this is preceded by two very short transverse segments as usual; but in the female the hindermost of these two transverse segments undergoes a singular modification in form, being produced posteriorly so as completely to hide the terminal segment, and having a deep emargination, and terminating in two spines behind; the last segment is smooth and very glossy. In one other species of *Apocyrthus* (*Ap. inflatus*), I have found the same sexual peculiarities in the abdominal segments.

Apocyrthus rufipes.

Ap. niger, nitidus; pedibus splendide rufis, genibus tarsisque nigris; capite punctato; rostro crebre punctato; thorace globoso, antice posticeque truncato, tuberculis rotundatis crebre obsito: elytris rugoso-punctatis. Long. corp. $5\frac{1}{4}$ — $4\frac{1}{4}$ lin.

Mas: thorace valde globoso; elytris thorace angustioribus, postice rotundatis; rostro supra concavo.

Fœmina: elytris thorace latioribus, subovatis, ad apicem spinis duabus armatis; rostro supra convexiusculo.

The male of this species is remarkable for the large size and nearly spherical form of its thorax. The head has some scattered punctures, and a distinct longitudinal groove between the eyes; the rostrum is thickly punctured, and its upper surface presents a large, but somewhat shallow concavity; this occupies the whole width of the rostrum in front, between the antennæ, but becomes gradually narrower towards the transverse depression at the base; on each side, in front of the eyes, are two foveæ, one above the other; the upper one is the largest, and joins the transverse groove at the base of the rostrum. The legs are of a very bright red colour; the tip of the femora, the coxæ, apex of the tibiæ, and the tarsi are black. The thorax is thickly covered with glossy, rounded tubercles, and has a slight longitudinal channel. The elytra are scarcely dilated in the middle, convex, and distinctly punctured; the punctures are confluent, and have a tendency to arrange themselves in striæ. The terminal segment of the abdomen is semicircular and coarsely punctured.

An insect agreeing with the above in all essential characters, and which I feel no doubt is the female, is remarkable for the possession of two spines at the apex of the elytra,—a character which I have found in a female of another species of the present genus. It differs, moreover, in having the thorax proportionately smaller, and the elytra rather broader than the thorax, being more dilated in the middle. They have a small subapical hump on the suture, out of which springs a brush of hairs, as in the female *Ap. geniculatus* and some others of the genus, and the terminal segment of the abdomen is conical and presents numerous irregular rugæ. The rostrum, instead

of being concave above, as in the male, is slightly convex, more densely punctured, and is slightly humped behind: in the middle is a shallow longitudinal groove. The elytra are more thickly punctured—this is also the case in the females of some other species.

Apocyrthus Germari.

Ap. niger, femoribus, ad basin, antennisque piceo-rubris; capite inter oculos et rostro rugosis; thorace antice posticeque truncato, lateribus rotundato, tuberculis minutis, nitidis, crebre obsito; marginibus anticis lateralibusque squamis viridibus ornato, fascia postice eodem colore: elytris globoso-ovatis, thorace conspicue latioribus, rugosis, fasciis tribus subinterruptis, lineisque duabus longitudinalibus ad apicem viridibus. Long. corp. 4 lin.; lat. $1\frac{3}{4}$ lin.

This species departs somewhat from the rest of the genus in its proportions, which nearly resemble those of *Otiorhynchus gemmatus*, but the thorax is rather broader; the antennæ are rather shorter than in other *Apocyrti*. The size is equal to that of *Otiorhynchus scabrosus*.

The rostrum is separated from the head by a transverse groove in front of the eyes, and is very nearly equal to the head in length; the upper surface is rugose, and has two irregular ridges which converge behind, but do not meet. The head is rugose between the eyes, where there is a distinct longitudinal impression. The eyes are round and but little prominent. The thorax is subglobose, and truncated before and behind; it is thickly covered above with glossy tubercles, has a green band in the anterior margin, and a second transverse band towards the posterior margin; these bands, which are formed of scales, are joined on the sides of the thorax by a longitudinal series of scales. The elytra are of a short, oval form, or subglobose, but acuminate at the apex; the surface is rugose and subtuberculated: they have a narrowish transverse band near the base, a second in the middle, and a third towards the apex, besides two oblong marks on the apical portion; these bands are formed of green scales, and are somewhat interrupted in parts: the antennæ and legs are pitchy; the thighs are reddish, excepting at the apex, where they are nearly black.

Apocyrthus inflatus.

Ap. inflatus, *Erichson*, Act. Acad. Cæs. Leop. &c. vol. xvi. Suppl. p. 378. pl. 48. f. 8; *Schönh.*, v. pt. 2. p. 824.

This species is readily distinguished from others described in this paper by the great size of its almost spherical body as compared with the head and thorax, and by its more prominent eyes. The head, thorax, abdomen beneath, base of the thighs, and tarsi are black, and the elytra are red or pitchy red, but broadly margined with black. Between the eyes are some green scales, and there is a small patch of these scales on each side of the thorax, and sometimes they form an interrupted line on the middle above; near the outer margin of each elytron are three spots, one at the base, another near the middle, and the third towards the apex, also formed of green scales; the sides of the meso- and metathorax are likewise

adorned with scales. The legs are bright red. The rostrum is finely punctured above, and has a short central impressed line at the base, and a large fovea on each side at the base. The head is separated from the thorax by a deep transverse impression, and has a longitudinally impressed line and some punctures between the eyes, which are round and prominent. The thorax is subglobose, but contracted and somewhat produced before and behind; the surface is covered with largish, rounded, glossy tubercles, and there is an indistinct dorsal channel. The elytra are twice as broad as the thorax, very convex and nearly spherical, but they are produced into a kind of neck in front to meet the thorax, and near the apex they are suddenly contracted; at the apex they are pointed. The upper surface is coarsely sculptured, rugose and subtuberculated, and the impressions, though irregular, have a tendency to be arranged in lines. Length, 5 to $6\frac{1}{2}$ lines; width $2\frac{1}{2}$ to 3 lines.

The specimens before me are females. They have the antepenultimate segment of the abdomen extremely narrow in the antero-posterior direction, and the penultimate segment is large, produced over the last segment and deeply emarginated, and terminating in two spines or pointed processes behind.

Apocyrus impius.

Ap. impius, *Erichson*, l. c. p. 380. pl. 48. f. 9.

Ap. niger, opacus, squamulis virescentibus adspersis; elytris ovatis, convexis, rugulosis, punctatis. Long. corp. 4 lin. *Erichs.*

The above description, from *Erichson*, is applicable to the female sex of a species which *Mr. Cuming* found in great abundance in the Philippine Islands. It is very closely allied to the *Ap. profanus*, but differs in form and in sculpturing. It is of a dullish black colour and sprinkled with blue-green scales; the thorax is globose, and thickly studded with glossy rounded tubercles; the elytra are thickly, but not very coarsely punctured. In the male, the rostrum is rugosely punctured, somewhat concave at the base, and has a moderately broad and deep longitudinal furrow in the centre, and a deepish oblong fovea on each side in front of the eye—the transverse furrow at the base of the rostrum runs into this. The head is punctured and has an impressed line between the eyes, which are but little prominent. The thorax is as broad or broader than the elytra—these are nearly cylindrical, or but indistinctly swollen in the middle, from whence they become gradually narrower, and are rounded at the extremity. The abdomen is punctured beneath, and is tolerably well-clothed with minute ash-coloured hairs; the terminal segment is semicircular and rather coarsely punctured. The female has the rostrum convex above, more thickly punctured than the male, and with the longitudinal impression indistinct; the transverse impression at the base is very deep, and suddenly curves in front of each eye to join the lateral fovea, which is deep. The sides of the thorax are boldly rounded, but this segment is narrower than the elytra—these are distinctly dilated in the middle and acuminate behind; the apex is somewhat produced. The abdomen is convex beneath, and the terminal segment is smooth, glossy, and slightly

concave. This sex is more densely clothed with scales than the other; the males, indeed, are often almost destitute of scales.

Apocyrthus profanus.

Ap. profanus, *Erichs.* l. c. p. 379; *Schönh.* v. pt. 2. p. 852.

Sphærogaster profanus, *Eschsch.*

Oblongus, fuscus, parum nitidus, thoracis pectorisque lateribus parce viridissquamosis; fronte canaliculata, thorace granulis nitidis crebre adperso; elytris subovatis, subconvexis, thorace parum latoribus, crebre granulatis, margine basali dense viridissquamosis, femoribus ferrugineis.

Var. β. Elytris tibiisque etiam ferrugineis.

The above description, which is from Schoenherr, very well characterizes an insect brought home in tolerable abundance by Mr. Cuming. I have before me specimens exhibiting three distinct varieties: the first is black, and well-clothed with green scales; the second is pitchy, has the femora reddish at the base, and is less densely clothed with scales, and the third is of a pitchy red colour, almost destitute of scales; these being chiefly confined to a narrow band across the base of the elytra. I may add, of the first variety there are both sexes, of the second variety there are but females, and of the red variety* there are no females.

This species greatly resembles the *Ap. impius*, but is usually rather smaller, and the elytra differ in having minute glossy tubercles.

The rostrum is rugose above, has a broad and shallow longitudinal impression in the middle, and another on each side of this, which is broad at its commencement, near the transverse line at the base of the rostrum, and becomes gradually narrower to its point of termination, which is in a line with the point of insertion of the antennæ: on the side of the rostrum is a deep longitudinal groove which runs into the groove for the antennæ. The thorax is globose and covered with minute glossy tubercles: in the male it is very nearly equal in width with the elytra; in the female the sides are less boldly rounded, and it is decidedly narrower than the elytra—these are covered with rugæ and minute tubercles. In the male the elytra are rounded at the extremity, and the terminal segment of the abdomen is semicircular and rugose. In the female the elytra are ovate, and attenuated and pointed behind; they have a subapical prominence on the suture. The terminal segment of the abdomen is conical, glossy, and has a large shallow fovea. Length from $3\frac{3}{4}$ to 5 lines.

Apocyrthus Chevrolatii.

Ap. niger, femoribus rubris, antennis, tibiis, genibusque piceis: capite inter oculos punctato et linea longitudinali impressa; rostro rugoso, basi canaliculato; thorace subgloboso, tuberculis crebris obsito, dense viridissquamoso, linea transversa in mediam denudata; elytris convexis, ovatis, rugosis et tuberculis minutis obsitis, squamis viridibus ornatis, fasciis duabus, et plaga utrinque subapicali, denudatis. Long. corp. 4—5 lin.

This species is about equal in size to the *Ap. profanus*, which it very nearly resembles also in form; it is readily distinguished by the

* The difference of colour certainly does not arise from immaturity.

beautiful bands of golden green, or blue scales with which it is adorned. The thorax is nearly covered with scales, the only denuded parts being a band across the centre and a small space following the posterior margin. On the elytra is a coloured band at the base, and a second in the middle, and the apical third of the elytra is covered with scales, with the exception of an oblong space on each side between the suture and outer margin. The antennæ are pitchy, and sometimes reddish at the base; the legs are also pitchy, but the femora are red at the base; sometimes the red extends almost to the joint, and in some specimens the apical half of the femora is dusky. The rostrum is rugose above, and has two irregular ridges at the base; these nearly meet near the transverse impression which separates the head from the rostrum, but diverge in front; on the side of the rostrum is a deep longitudinal groove, which commences at the anterior angle of the eye and runs into the groove for the antenna. In the male the thorax is scarcely narrower than the elytra, and the terminal segment of the abdomen is semicircular, coarsely punctured, and has a fovea in the middle. In the female the elytra are more ovate, decidedly broader than the thorax, and pointed at the apex; the terminal segment of the abdomen is conical, has a few punctures and some irregular little grooves near, and running for the most part parallel with, the margin.

Apocyrus acutipennis.

Ap. niger, parum nitidus; rostro rugoso, linea longitudinali ad basin impressa; capite inter oculos squamis viridibus ornato; thorace convexo, lateribus rotundatis, tuberculis nitidis crebre obsito, fascia antica, lateribus, maculisque duabus, squamis viridibus vestito; elytris ovatis, tuberculis minutis subacutis crebre obsito, fasciis duabus, maculisque tribus subapicalibus viridibus. Long. corp. $4\frac{1}{4}$ —5 lin.

Fœm.: elytris ad apicem divergentibus, et acutis.

Mas: elytris ad apicem subrotundatis.

This species is very closely allied to the *Ap. Chevrolatii*, but is at once distinguished by the black colour of its legs and antennæ, by its having a spot on the suture towards the apex of the elytra, the space between the eyes is broader, &c. The rostrum is very rugose, has a longitudinal depression in the middle and another on each side of this: on the side in front of the eye is a longitudinal groove, which posteriorly joins that which separates the rostrum from the head, and anteriorly it partially runs into the antennal groove; not so distinctly joining that groove as in *Ap. Chevrolatii*. The thorax is globose in the male and but little narrower than the elytra, which are slightly dilated in the middle and somewhat rounded at the apex. In the female the thorax is less globose, proportionately smaller, and the elytra larger, more ovate, and at the apex they slightly diverge, are curved downwards and acutely pointed: here the terminal segment of the abdomen is impunctate and remarkable for a deep and largish fovea at the apex, a character which the female *Ap. Chevrolatii* does not exhibit, neither has the corresponding sex of that species the acute apex to the elytra. In the male of the present species the terminal segment of the abdomen is semicircular and rugose. As re-

gards the markings, which are formed of bluish green scales, they consist of a narrow line on the front and sides of the thorax and two spots, one on each side of the centre: on the elytra are two bands, one at the base and the other in the middle, a spot on the suture between this last band and the apex of the elytra, and a subapical patch on each side, which sends out a branch to join the central fascia at the outer margin of the elytron, which has an almost uninterrupted band of scales. In the female insect I have further to notice that the elytra have a hump on the suture situated rather behind the apical third.

Apocyrtus concinnus.

Ap. niger, parum nitidus; rostro rugoso; thorace subgloboso, crebre tuberculato, pone medium linea transversa, marginibus anticis lateralibusque aureo-viridibus; elytris ovatis, crebre tuberculatis, ad apicem fasciisque duabus, aureo-viridibus. Long. corp. 4 lin.

This species very closely resembles the *Ap. acutipennis* (like that, differing from *Ap. Chevrolatii* in having black legs), but differs in having the markings of a golden-green colour, a narrow band on the thorax rather behind the middle, and the whole apex of the elytra covered with scales; these, though somewhat scattered, do not arrange themselves into spots as in *acutipennis*. In form and sculpturing there are moreover some points of distinction. The rostrum is very rugose, and does not exhibit any longitudinal channel; the elytra in the female are not produced into an acute angle at the apex as in *acutipennis*, and the terminal segment of the abdomen in this sex is destitute of the large fovea, and is rather coarsely punctured. The elytra are more thickly tuberculated. The space between the eyes is considerably broader and more distinctly punctured than in *Ap. Chevrolatii*.

Apocyrtus bispinosus.

Ap. niger, squamis viridibus adpersis; thorace valde globoso, tuberculis crebre obsito; elytris rugosis, subseriatim tuberculatis, ad apicem bispinosis; femoribus rufescentibus. Long. corp. 3½ lin.

This species is less than the *Ap. impius* of Erichson, and has the elytra more constricted at the base. The rostrum is thickly punctured, and has a broadish but shallow longitudinal impression; it is separated from the head by a transverse groove, which runs on each side into a large fovea situated immediately in front of the eye; these lateral pits contract the hinder part of the rostrum, which is somewhat humped and raised above the plane of the head. The head is distinctly punctured between the eyes, where there is a longitudinal groove; the eyes are large and but little convex. The thorax is truncated before and behind, but nearly of a spherical form; above it is thickly studded with glossy, rounded tubercles, and rather sparingly sprinkled with bright green scales. The elytra are very convex and of a short ovate form; the apex of each elytron is produced into a spine, which is evident to the naked eye, and there is a small hump at the suture at a short distance from the apex; the surface of the elytra is very rough, being broken up into rugæ and tubercles—the latter form longitudinal striæ. Bright green scales are

as it were sprinkled on the elytra. The antennæ have a slight pitchy hue, and so have the tibiæ; the femora are red, but blackish at the extremity.

The specimen from which this description is taken is a female, and has the terminal segment of the abdomen conical and covered with rugæ. The insect, which I suspect to be the male, differs in having the elytra narrower and rounded at the extremity, the rostrum rather coarsely punctured, and has three oblong furrows at the base.

Apocyrthus adpersus.

Ap. ater; squamis viridibus adpersis; tibiis antennisque piceo-nigris, femoribus rufescentibus; rostro rugoso, ad basin distincte transversim impresso, foveis tribus oblongis impresso; capite inter oculos punctato atque linea longitudinali impresso; thorace subgloboso, antice posticeque truncato, tuberculis nitidis crebre obsito. Elytris thorace paulo latioribus, rugosis et tuberculis minutis crebris. Long. corp. 3 lin.

The form of this insect is very nearly the same as in *Apocyrthus profanus*, Eschsch., but the elytra are rather shorter in proportion. The rostrum is rugose, punctured, has a very distinct transverse impression at the base, a broadish and shallow longitudinal groove in the middle, extending from the base and terminating nearly in a line with the antennæ, and on each side of this is a similar groove. The head, between the eyes, is distinctly punctured, and has a longitudinally impressed line; the eyes are round and but little convex. The thorax is nearly globose, but truncated before and behind; its surface is thickly studded with glossy tubercles. The elytra are about half as long again as the thorax; they are truncated in front, increase in width in the middle, where they attain a diameter very slightly exceeding that of the thorax, and at the apex they are somewhat acuminate, but rounded at the point; their surface is subsulcated, very rough, having coarse confluent punctures and small pointed tubercles. Numerous round bright green scales are scattered on the thorax and elytra, and there are a few on the head between the eyes. The tibiæ and antennæ are pitchy, and the thighs are of an obscure red colour, excepting at the apex, where they are dusky.

This is a small species about equal in size to *Phyllobius argentatus*, and less than the *Ap. bispinosus*; the female is readily distinguished from the corresponding sex of the insect last mentioned by the want of the spines at the apex of the elytra; the thorax is smaller in proportion. The male differs from the supposed male of *Ap. bispinosus* in having the rostrum more coarsely sculptured, and in the longitudinal groove in front of the eye being distinctly joined with the antennal groove; this groove is represented in ♂ *bispinosus* by an oblong fovea which does not run into the antennal groove; the thorax is smaller in proportion to the elytra.

Apocyrthus pulverulentus.

Ap. niger, squamis viridibus minutissimis dense pulverulentis; pedibus rufo-testaceis, vel piceo-testaceis, pilis minutis albis vestitis; antennis piceis; rostro rugoso, canaliculato; thorace subgloboso, tuberculis nitidis

crebris; elytris ovatis, thorace paulo latioribus, tuberculis minutis crebris obsitis. Long. corp. $2\frac{3}{4}$ — $3\frac{1}{4}$ lin.

This species is a trifle less than the last, from which it may be distinguished by the very minute size of the scales with which it is covered, or as it were powdered, for they do not completely cover the body; the minute tubercles on the thorax and elytra are free from scales; the abdomen beneath is rather sparingly furnished with whitish hairs. The legs are shorter, and the femora are less clavate than in *Ap. adpersus*.

XXXVII.—*Descriptions of new Shells from the Collection of Captain Sir Edward Belcher, R.N., C.B.* By RICHARD BRINSLEY HINDS, Esq., Surgeon R.N.

[Continued from p. 21.]

Mitra Belcheri. Testa fusiformi, turrata, elongata, solida; anfractibus lævigatis, transversim inæqualiter sulcatis vel exaratis, divisionibus duabus superioribus majoribus; epidermide nigro induta sed infra lactea; columella quadriplicata; labio externo tenui. Axis 48 lin.

Geog. Gulfs of Nicoya and Papagayo, Central America; dredged from a muddy floor in 17 fathoms.

This fine shell approaches in size the largest species of the genus, and is surpassed by none in symmetry and outline. In shape it is fusiform and turreted, the spire rather produced, and the last whorl not occupying more than half the entire length. The shell itself is milky white, but is everywhere covered by a smooth black epidermis. The whorls are ploughed with deep channels or sulci at unequal distances, of which the two superior divisions have the greatest breadth, but the inferior of the two is the broadest; and they overlap each other more than is usual in the genus. The columella is furnished with four plaits, the upper being somewhat distant, and the lower not very distinct. The outer lip is thin and uneven, by reason of the sulci which terminate on its margin; the inner is slightly developed.

The shell is named after the Commander of the expedition, and, handsome as it is, commemorates but feebly his devotion to conchology. Two specimens, an adult and a young shell, are in the collection; a third is in my own collection, and I know of the existence of no others.

Ranella Californica. Testa ovata, ventricosa, fusca; anfractibus uniseriatim tuberculatis, transversim granoso-striatis, tuberculis conicis subdistantibus; varicibus magnis cavernosis; anfractu ultimo multiseriatim obsolete tuberculato, fasciis duabus angustis pur-

pureis indistinctis cincto; apertura alba; labio externo crenato et dentato, interno transversim striato. Axis 52 lin.

Geog. San Diego, California.

There is some chance that this shell may be confounded with *R. ventricosa*, as the more prominent features of both have only a comparative value. This, however, is a much larger shell, is without any disposition to tuberculation near the suture, the varices are much bolder and cavernous, the tubercles on the spire fewer and larger, and the pillar lip is set with many small transverse ridges.

1. *Conus marchionatus*. Testa oblonga, turbinata, alba, fusco angulate reticulata; spira depressa, ecoronata, mucronata, spiralliter striata; anfractibus sulcatis; apertura inferne paululum effusa, ad basin striata; epidermide diaphano lævi induta. Axis 16 lin.

Geog. Port Anna Maria, Nuhuhiva, Marquesas; dredged from a sandy floor in 7 to 10 fathoms.

A difference of opinion seems to exist as to what is the base colour of this and similar species. My own opinions were open to proof, till a specimen with a repaired fracture appears to me to decide it. After repairing the injury, the animal for a time has discontinued the reticulation, and a portion of a pure white has been produced. After awhile the meshes are again continued. A variety of this shell occurs in which the reticulation is of a pale yellow colour.

2. *C. patricius*. Testa pyriformi, tumida; spira acuminata, minute tuberculata vel coronata; anfractu ultimo striato, superne plicifero, inferne valde contractato; apertura lineari; labio externo tenui, acuto; epidermide fulvo lævi induta. Axis 13 lin.

Geog. Gulf of Nicoya, Central America; dredged from sandy mud in 7 fathoms.

Shell much contracted in the lower portion of the last whorl, somewhat tumid below the shoulder; spire moderately produced, minutely coronated, at the angle of the last whorl thrown into small folds; aperture narrow and linear; the outer lip very thin. Epidermis of a clear fulvous colour, beneath which the shell is of a uniform fawn-colour.

3. *C. cælebs*. Testa pyriformi, alba; spira retusa, conica, ecoronata; anfractu ultimo lineis elevatis equidistantibus transversim dispositis; apertura lineari, inferne paululum effusa, alba; columellæ basi et spiræ apice violaceo; epidermide olivacea, fragili. Axis 12 lin.

Geog. Ambow, Feejee Islands. A single specimen was captured on the coral reefs.

CYRTULUS*, n. g.

Testa fusiformis; anfractus ultimus et penultimus turbinatus; spira per saltum ascendens; apertura linearis in canali brevi effuso de-

* κυρτός *incurvus*, στήλος *columna*.

sinens; columella valde arcuata, superne callosa; labium externum acutum; umbilicus parvus. Epidermis lævis.

C. serotinus.

Geog. Port Anna Maria, Nuhuhiva, Marquesas.

Shell somewhat fusiform, the last two whorls turbinate, whence a spire, less than half the length of the body-whorl, suddenly ascends; everywhere smooth, except the spire, which is nodulose and transversely ridged, and covered with the remains of a brown epidermis. The last whorl much lengthened, squarish, flattened, and not at all ventricose; the aperture terminating in a short effuse canal, and towards the centre expanded, from the conformation of the columella. Outer lip thin and sharp; inner not at all produced. Columella with a large callosity above, arcuate in the centre, corresponding to a contraction which occupies the circumference of the last whorl. A smaller callosity below assists to cover the umbilicus. Axis 39 lines.

I am disposed to place this new genus among the *Pyru-lidæ*, in which group it holds an analogous situation to Swainson's genus of fossil shells, *Clavalithes*, among the *Turbinellidæ*. The structure of the spire, formation of the canal, and peculiar convolution of the lower whorls seem to display its affinities here. But as the plaits on the columella are variable in *Clavalithes*, and *Cyrtulus* may still be confounded with it, the points of difference will be found in the short expanded canal, deeply incurved columella, and in the absence of the papillary spire,—a character on which Mr. Swainson dwells, as being indispensable to the existence of his genus.

1. *Phos Veraguensis.* Testa ovata, elongata, costulata; costulis numerosis æqualibus, lineis elevatis decussatis et cancellatis; anfractibus subplanulatis, superne fuscis, inferne albidis; ultimo albo fasciato. Axis 15 lin.

Geog. Pueblo Nueva, coast of Veragua; dredged in some numbers from 26 fathoms, mud.

This may be regarded as the American analogue of the Asiatic shell, *Phos senticosus*.

2. *P. crassus.* Testa ovata, elongata, solida, costata; costis rudibus subdistantibus, lineis impressis decussatis; labio externo grandidentato, interno prorsum producto.

Geog. Panama and Gulf of Fonseca; dredged as solitary shells in from 3 to 14 fathoms, mud.

The characters of this shell are all prominent. It is solid, the ribs large and coarse, crossed by prominent lines; teeth on the outer lip large, internal ridges strongly marked; inner lip considerably produced forwards. The colour is a lightish brown, somewhat deeper on the ribs.

XXXVIII.—On *Fumaria micrantha*, Lag., and *F. calycina*, Bab. By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S., &c.*

THE difference of opinion which has for some time existed between Dr. Arnott and myself concerning the identity of the *Fumaria micrantha* (Lag.) and the *F. calycina* (Bab.) having been now set at rest, I feel myself bound to communicate the fact to the public at the earliest opportunity. In the original paper upon these plants by Dr. Walker Arnott (published by the Bot. Soc.) he expressly states that he had not seen and did not know of an authentic specimen of *F. micrantha*, and there appearing to me to be many weighty reasons for not considering the *F. calycina* as identical with it, I have, up to the present time, resisted the application of La Gasca's name to my plant. The reasons referred to have been already communicated to the Botanical Society, but will not now be published, as they are quite superseded by information which I have recently obtained.

Learning accidentally that, in a small but valuable work, entitled 'Introduction à une Flore analytique de Paris,' a *Fumaria* was noticed under the name of *F. micrantha* (Lag.), I applied to Dr. A. Weddell, one of its authors, for information concerning that plant, sending at the same time a specimen of the Edinburgh *F. calycina*. In reply he informs me that Prof. Parlatore, Curator of the Grand-ducal Herbarium at Florence, who, it is well known, has long been employed upon a monograph of the *Fumariaceæ*, compared the French plant "with authentic samples" of that of La Gasca, and thus with certainty determined their identity. Dr. Weddell has now carefully examined my specimen from Edinburgh of *F. calycina*, and sent to me a portion of one of his own specimens of the French *F. micrantha*, at the same time giving his opinion that the Parisian and Scottish specimens belong to the same species. In this opinion I fully concur; and as it is clear, from what has been already stated, that they agree with the plant of La Gasca, the Scottish plant must be denominated *F. micrantha*, and the name which I applied to it will sink into a synonym. I may add, that Dr. Weddell refers *F. prehensilis* (Kitaib.) to this species (on the authority of authentic specimens), not to *F. capreolata*, as was done by Dr. Arnott.

In the course of the summer of 1842 my valued friend Mr. Borrer observed that the *F. micrantha* was plentiful near Guildford in Surrey, and it is probable that it will prove to be far from a rare plant in Britain.

* Read before the Botanical Society at Edinburgh.

XXXIX.—*Series of Propositions for rendering the Nomenclature of Zoology uniform and permanent, being the Report of a Committee for the consideration of the subject appointed by the British Association for the Advancement of Science*.*

ALL persons who are conversant with the present state of Zoology must be aware of the great detriment which the science sustains from the vagueness and uncertainty of its nomenclature. We do not here refer to those diversities of language which arise from the various methods of classification adopted by different authors, and which are unavoidable in the present state of our knowledge. So long as naturalists differ in the views which they are disposed to take of the natural affinities of animals there will always be diversities of classification, and the only way to arrive at the true system of nature is to allow perfect liberty to systematists in this respect. But the evil complained of is of a different character. It consists in this, that when naturalists *are* agreed as to the characters and limits of an individual group or species, they still disagree in the appellations by which they distinguish it. A genus is often designated by three or four, and a species by twice that number of precisely equivalent synonyms; and in the absence of any rule on the subject, the naturalist is wholly at a loss what nomenclature to adopt. The consequence is, that the so-called commonwealth of science is becoming daily divided into independent states, kept asunder by diversities of language as well as by geographical limits. If an English zoologist, for example, visits the museums and converses with the professors of France, he finds that their *scientific* language is almost as foreign to him as their *vernacular*. Almost every specimen which he examines is labeled by a title which is unknown to him, and he feels that nothing short of a continued residence in that country can make him conversant with her science. If he proceeds thence to Germany or Russia, he is again at a loss: bewildered everywhere amidst the confusion of nomenclature, he returns in despair to his own country and to the museums and books to which he is accustomed.

If these diversities of scientific language were as deeply rooted as the vernacular tongue of each country, it would of course be hopeless to think of remedying them; but happily this is not the case. The language of science is in the mouths of comparatively few, and these few, though scattered over distant lands, are in habits of frequent and friendly intercourse with each other. All that is wanted then is, that some plain and simple regulations, founded on justice and sound reason, should be drawn up by a competent body of persons, and then be extensively distributed throughout the zoological world.

The undivided attention of chemists, of astronomers, of anatomists, of mineralogists, has been of late years devoted to fixing their respective lan-

* From the Report of the Association for 1842, p. 105. The Committee appointed by the Council, Feb. 11, 1842, consisted of the following members:—Mr. Darwin, Prof. Henslow, Rev. L. Jenyns, Mr. Ogilby, Mr. J. Phillips, Dr. Richardson, Mr. H. E. Strickland (reporter), and Mr. Westwood: to whom were subsequently added Messrs. Broderip, Prof. Owen, Shuckard, Waterhouse and Yarrell. The Report states that an outline of the proposed rules having been drawn up, copies were sent to eminent zoologists at home and abroad, with a request that they would favour the Committee with their comments; and that many valuable suggestions had already been thus obtained.—Ed.

guages on a sound basis. Why, then, do zoologists hesitate in performing the same duty? at a time, too, when all acknowledge the evils of the present anarchical state of their science.

It is needless to inquire far into the causes of the present confusion of zoological nomenclature. It is in great measure the result of the same branch of science having been followed in distant countries by persons who were either unavoidably ignorant of each other's labours, or who neglected to inform themselves sufficiently of the state of the science in other regions. And when we remark the great obstacles which now exist to the circulation of books beyond the conventional limits of the states in which they happen to be published, it must be admitted that this ignorance of the writings of others, however unfortunate, is yet in great measure pardonable. But there is another source for this evil, which is far less excusable,—the practice of gratifying individual vanity by attempting on the most frivolous pretexts to cancel the terms established by original discoverers, and to substitute a new and unauthorized nomenclature in their place. One author lays down as a rule, that no specific names should be derived from geographical sources, and unhesitatingly proceeds to insert words of his own in all such cases; another declares war against names of exotic origin, foreign to the Greek and Latin; a third excommunicates all words which exceed a certain number of syllables; a fourth cancels all names which are complimentary of individuals, and so on, till universality and permanence, the two great essentials of scientific language, are utterly destroyed.

It is surely, then, an object well worthy the attention of the Zoological Section of the British Association for the Advancement of Science, to devise some means which may lessen the extent of this evil, if not wholly put an end to it. The best method of making the attempt seems to be, to entrust to a carefully selected committee the preparation of a series of rules, the adoption of which must be left to the sound sense of naturalists in general. By emanating from the British Association, it is hoped that the proposed rules will be invested with an authority which no individual zoologist, however eminent, could confer on them. The world of science is no longer a monarchy, obedient to the ordinances, however just, of an Aristotle or a Linnæus. She has now assumed the form of a republic, and although this revolution may have increased the vigour and zeal of her followers, yet it has destroyed much of her former order and regularity of government. The latter can only be restored by framing such laws as shall be based in reason and sanctioned by the approval of men of science; and it is to the preparation of these laws that the Zoological Section of the Association have been invited to give their aid.

In venturing to propose these rules for the guidance of all classes of zoologists in all countries, we disclaim any intention of dictating to men of science the course which they may see fit to pursue. It must of course be always at the option of authors to adhere to or depart from these principles, but we offer them to the candid consideration of zoologists, in the hope that they may lead to sufficient uniformity of method in future to rescue the science from becoming a mere chaos of words.

We now proceed to develop the details of our plan; and in order to make the reasons by which we are guided apparent to naturalists at large, it will be requisite to append to each proposition a short explanation of the circumstances which call for it.

Among the numerous rules for nomenclature which have been proposed by naturalists, there are many which, though excellent in themselves, it is not now desirable to enforce*. The cases in which those rules have been overlooked or departed from, are so numerous and of such long standing, that to carry these regulations into effect would undermine the edifice of zoological nomenclature. But while we do not adopt these propositions as authoritative laws, they may still be consulted with advantage in making such additions to the language of zoology as are required by the progress of the science. By adhering to sound principles of philology, we may avoid errors in future, even when it is too late to remedy the past, and the language of science will thus eventually assume an aspect of more classic purity than it now presents.

Our subject hence divides itself into two parts; the first consisting of *Rules* for the rectification of the present zoological nomenclature, and the second of *Recommendations* for the improvement of zoological nomenclature in future.

PART I.

RULES FOR RECTIFYING THE PRESENT NOMENCLATURE

[*Limitation of the Plan to Systematic Nomenclature.*]

In proposing a measure for the establishment of a permanent and universal zoological nomenclature, it must be premised that we refer solely to the Latin or systematic language of zoology. We have nothing to do with vernacular appellations. One great cause of the neglect and corruption which prevails in the scientific nomenclature of zoology, has been the frequent and often exclusive use of vernacular names in lieu of the Latin binomial designations, which form the only legitimate language of systematic zoology. Let us then endeavour to render perfect the Latin or Linnæan method of nomenclature, which, being far removed from the scope of national vanities and modern antipathies, holds out the only hope of introducing into zoology that grand desideratum, an universal language.

[*Law of Priority the only effectual and just one.*]

It being admitted on all hands that words are only the conventional signs of ideas, it is evident that language can only attain its end effectually by being permanently established and generally recognized. This consideration ought, it would seem, to have checked those who are continually attempting to subvert the established language of zoology by substituting terms of their own coinage. But, forgetting the true nature of language, they persist in confounding the *name* of a species or group with its *definition*; and because the former often falls short of the fullness of expression found in the latter, they cancel it without hesitation, and introduce some new term which appears to them more characteristic, but which is utterly unknown to the science, and is therefore devoid of all authority†. If these persons were to object to such names of men as *Long*, *Little*, *Armstrong*, *Golightly*, &c., in cases where they fail to apply to the individuals who bear them, or should complain of the names *Gough*, *Lawrence*, or *Harvey*, that they were devoid of meaning, and should hence propose to change them for more characteristic appella-

* See especially the admirable code proposed in the 'Philosophia Botanica' of Linnæus. If zoologists had paid more attention to the principles of that code, the present attempt at reform would perhaps have been unnecessary.

† Linnæus says on this subject, "Abstinendum ab hac innovatione quæ nunquam cessaret, quin indies aptiora detegerentur ad infinitum."

tions, they would not act more unphilosophically or inconsiderately than they do in the case before us; for, in truth, it matters not in the least by what conventional sound we agree to designate an individual object, provided the sign to be employed be stamped with such an authority as will suffice to make it pass current. Now in zoology no one person can subsequently claim an authority equal to that possessed by the person who is the first to define a new genus or describe a new species; and hence it is that the name originally given, even though it may be inferior in point of elegance or expressiveness to those subsequently proposed, ought as a general principle to be permanently retained. To this consideration we ought to add the injustice of erasing the name originally selected by the person to whose labours we owe our first knowledge of the object; and we should reflect how much the permission of such a practice opens a door to obscure pretenders for dragging themselves into notice at the expense of original observers. Neither can an author be permitted to alter a name which he himself has once published, except in accordance with fixed and equitable laws. It is well observed by Decandolle, "L'auteur même qui a le premier établi un nom n'a pas plus qu'un autre le droit de le changer pour simple cause d'impropriété. La priorité en effet est un terme fixe, positif, qui n'admet rien, ni d'arbitraire, ni de partial."

For these reasons, we have no hesitation in adopting as our fundamental maxim, the "law of priority," viz.

§ 1. The name originally given by the founder of a group or the describer of a species should be permanently retained, to the exclusion of all subsequent synonyms (with the exceptions about to be noticed).

Having laid down this principle, we must next inquire into the limitations which are found necessary in carrying it into practice.

[*Not to extend to authors older than Linnæus.*]

As our subject matter is strictly confined to the *binomial system of nomenclature*, or that which indicates species by means of two Latin words, the one generic, the other specific, and as this invaluable method originated solely with Linnæus, it is clear that, as far as species are concerned, we ought not to attempt to carry back the principle of priority beyond the date of the 12th edition of the 'Systema Naturæ.' Previous to that period, naturalists were wont to indicate species not by a *name* comprised in one word, but by a *definition* which occupied a sentence, the extreme verbosity of which method was productive of great inconvenience. It is true that one word sometimes sufficed for the definition of a species, but these rare cases were only binomial by accident and not by principle, and ought not therefore in any instance to supersede the binomial designations imposed by Linnæus.

The same reasons apply also to generic names. Linnæus was the first to attach a definite value to genera, and to give them a systematic character by means of exact definitions; and therefore although the *names* used by previous authors may often be applied with propriety to modern genera, yet in such cases they acquire a new meaning, and should be quoted on the authority of the first person who used them in this secondary sense. It is true, that several of the old authors made occasional approaches to the Linnæan exactness of generic definition, but still these were but partial attempts; and it is certain that if in our rectification of the binomial nomenclature we once

trace back our authorities into the obscurity which preceded the epoch of its foundation, we shall find no resting-place or fixed boundary for our researches. The nomenclature of Ray is chiefly derived from that of Gesner and Aldrovandus, and from these authors we might proceed backward to Ælian, Pliny, and Aristotle, till our zoological studies would be frittered away amid the refinements of classical learning*.

We therefore recommend the adoption of the following proposition:—

§ 2. The binomial nomenclature having originated with Linnæus, the law of priority, in respect of that nomenclature, is not to extend to the writings of antecedent authors.

[It should be here explained, that Brisson, who was a contemporary of Linnæus and acquainted with the ‘*Systema Naturæ*,’ defined and published certain genera of birds which are *additional* to those in the 12th edition of Linnæus’s work, and which are therefore of perfectly good authority. But Brisson still adhered to the old mode of designating species by a sentence instead of a word, and therefore while we retain his defined genera, we do not extend the same indulgence to the titles of his species, even when the latter are accidentally binomial in form. For instance, the *Perdix rubra* of Brisson is the *Tetrao rufus* of Linnæus; therefore as we in this case retain the generic name of Brisson and the specific name of Linnæus, the correct title of the species would be *Perdix rufa*.]

[*Generic names not to be cancelled in subsequent subdivisions.*]

As the number of known species which form the groundwork of zoological science is always increasing, and our knowledge of their structure becomes more complete, fresh generalizations continually occur to the naturalist, and the number of genera and other groups requiring appellations is ever becoming more extensive. It thus becomes necessary to subdivide the contents of old groups and to make their definitions continually more restricted. In carrying out this process, it is an act of justice to the original author, that his generic name should never be lost sight of; and it is no less essential to the welfare of the science, that all which is sound in its nomenclature should remain unaltered amid the additions which are continually being made to it. On this ground we recommend the adoption of the following rule:—

§ 3. A generic name when once established should never be cancelled in any subsequent subdivision of the group, but retained in a restricted sense for one of the constituent portions.

[*Generic names to be retained for the typical portion of the old genus.*]

When a genus is subdivided into other genera, the original name should be retained for that portion of it which exhibits in the greatest degree its essential characters as at first defined. Authors frequently indicate this by selecting some one species as a fixed point of reference, which they term the “type of the genus.” When they omit doing so, it may still in many cases be correctly inferred that the *first* species mentioned on their list, if found accurately to agree with their definition, was regarded by them as the type. A specific name or its synonyms will also often serve to point out the particular species which by implication must be regarded as the original type of a genus. In such cases we are justified in restoring the name of the old genus

* “*Quis longo ævo recepta vocabula commutaret hodie cum patrum?*”—Linnæus.

to its typical signification, even when later authors have done otherwise. We submit therefore that

§ 4. The generic name should always be retained for that portion of the original genus which was considered typical by the author.

Example.—The genus *Picumnus* was established by Temminck, and included two groups, one with four toes, the other with three, the former of which was regarded by the author as typical. Swainson, however, in raising these groups at a later period to the rank of genera, gave a new name, *Asthenurus*, to the former group, and retained *Picumnus* for the latter. In this case we have no choice but to restore the name *Picumnus*, Tem., to its correct sense, cancelling the name *Asthenurus*, Sw., and imposing a new name on the 3-toed group which Swainson had called *Picumnus*.

[When no type is indicated, then the original name is to be kept for that subsequent subdivision which first received it.]

Our next proposition seems to require no explanation:—

§ 5. When the evidence as to the original type of a genus is not perfectly clear and indisputable, then the person who first subdivides the genus may affix the original name to any portion of it at his discretion, and no later author has a right to transfer that name to any other part of the original genus.

[A later name of the same extent as an earlier to be wholly cancelled.]

When an author infringes the law of priority by giving a new name to a genus which has been properly defined and named already, the only penalty which can be attached to this act of negligence or injustice, is to expel the name so introduced from the pale of the science. It is not right then in such cases to restrict the meaning of the later name so that it may stand side by side with the earlier one, as has sometimes been done. For instance, the genus *Monaulus*, Vieill. 1816, is a precise equivalent to *Lophophorus*, Tem. 1813, both authors having adopted the same species as their type, and therefore when the latter genus came in the course of time to be divided into two, it was incorrect to give the condemned name *Monaulus* to one of the portions. To state this succinctly,

§ 6. When two authors define and name the same genus, both making it exactly of the same extent, the later name should be cancelled *in toto*, and not retained in a modified sense*.

This rule admits of the following exception:—

§ 7. Provided however, that if these authors select their respective types from different sections of the genus, and these sections be afterwards raised into genera, then both these names may be retained in a restricted sense for the new genera respectively.

Example.—The names *Ædemia* and *Melanetta* were originally co-extensive synonyms, but their respective types were taken from different sections which are now raised into genera, distinguished by the above titles.

[No special rule is required for the cases in which the later of two generic

* These discarded names may however be *tolerated*, if they have been afterwards proposed in a totally new sense, though we trust that in future no one will *knowingly* apply an old name, whether now adopted or not, to a new genus. (See proposition *q*, *infra*.)

names is so defined as to be *less extensive* in signification than the earlier, for if the later includes the type of the earlier genus, it would be cancelled by the operation of § 4; and if it does not include that type, it is in fact a distinct genus.]

But when the later name is *more extensive* than the earlier, the following rule comes into operation:—

[*A later name equivalent to several earlier ones is to be cancelled.*]

The same principle which is involved in § 6, will apply to § 8.

§ 8. If the later name be so defined as to be equal in extent to two or more previously published genera, it must be cancelled *in toto*.

Example.—*Psarocolius*, Wagl. 1827, is equivalent to five or six genera previously published under other names, therefore *Psarocolius* should be cancelled.

If these previously published genera be *separately adopted* (as is the case with the equivalents of *Psarocolius*), their original names will of course prevail; but if we follow the later author in combining them into one, the following rule is necessary:—

[*A genus compounded of two or more previously proposed genera whose characters are now deemed insufficient, should retain the name of one of them.*]

It sometimes happens that the progress of science requires two or more genera, founded on insufficient or erroneous characters, to be combined together into one. In such cases the law of priority forbids us to cancel *all* the original names and impose a *new* one on this compound genus. We must therefore select some one species as a type or example, and give the generic name which it formerly bore to the whole group now formed. If these original generic names differ in date, the oldest one should be the one adopted.

§ 9. In compounding a genus out of several smaller ones, the earliest of them, if otherwise unobjectionable, should be selected, and its former generic name be extended over the new genus so compounded.

Example.—The genera *Accentor* and *Prunella* of Vieillot not being considered sufficiently distinct in character, are now united under the general name of *Accentor*, that being the earliest. So also *Cerithium* and *Potamides*, which were long considered distinct, are now united, and the latter name merges into the former.

We now proceed to point out those few cases which form exceptions to the law of priority, and in which it becomes both justifiable and necessary to alter the names originally imposed by authors.

[*A name should be changed when previously applied to another group which still retains it.*]

It being essential to the binomial method to indicate objects in natural history by means of *two words* only, without the aid of any further designation, it follows that a generic name should only have one meaning, in other words, that two genera should never bear the same name. For a similar reason, no two species in the same genus should bear the same name. When these cases occur, the later of the two duplicate names should be cancelled, and a new term, or the earliest synonym, if there be any, substituted. When it is necessary to form new words for this purpose, it is desirable to make them bear some analogy to those which they are destined to supersede, as where the genus of birds, *Plectorhynchus*, being preoccupied in Ichthyology,

is changed to *Plectorhamphus*. It is, we conceive, the bounden duty of an author when naming a new genus, to ascertain by careful search that the name which he proposes to employ has not been previously adopted in other departments of natural history*. By neglecting this precaution he is liable to have the name altered and his authority superseded by the first subsequent author who may detect the oversight, and for this result, however unfortunate, we fear there is no remedy, though such cases would be less frequent if the detectors of these errors would, as an act of courtesy, point them out to the author himself, if living, and leave it to him to correct his own inadvertencies. This occasional hardship appears to us to be a less evil than to permit the practice of giving the same generic name *ad libitum* to a multiplicity of genera. We submit therefore, that

§ 10. A name should be changed which has before been proposed for some other genus in zoology or botany, or for some other species in the same genus, when still retained for such genus or species.

[*A name whose meaning is glaringly false may be changed.*]

Our next proposition has no other claim for adoption than that of being a concession to human infirmity. If such proper names of places as Covent Garden, Lincoln's Inn Fields, Newcastle, Bridgewater, &c., no longer suggest the ideas of gardens, fields, castles, or bridges, but refer the mind with the quickness of thought to the particular localities which they respectively designate, there seems no reason why the proper names used in natural history should not equally perform the office of correct indication even when their etymological meaning may be wholly inapplicable to the object which they typify. But we must remember that the language of science has but a limited currency, and hence the words which compose it do not circulate with the same freedom and rapidity as those which belong to every-day life. The attention is consequently liable in scientific studies to be diverted from the contemplation of the thing signified to the etymological meaning of the sign, and hence it is necessary to provide that the latter shall not be such as to propagate actual error. Instances of this kind are indeed very rare, and in some cases, such as that of *Monodon*, *Caprimulgus*, *Paradisea apoda* and *Monoculus*, they have acquired sufficient currency no longer to cause error, and are therefore retained without change. But when we find a Batrachian reptile named in violation of its true affinities, *Mastodonsaurus*, a Mexican species termed (through erroneous information of its habitat) *Picus cafer*, or an olive-coloured one *Muscicapa atra*, or when a name is derived from an accidental monstrosity, as in *Picus semirostris* of Linnæus, and *Helix disjuncta* of Turton, we feel justified in cancelling these names, and adopting that synonym which stands next in point of date. At the same time we think it right to remark that this privilege is very liable to abuse, and ought therefore to be applied only to extreme cases and with great caution. With these limitations we may concede that

§ 11. A name may be changed when it implies a false proposition which is likely to propagate important errors.

[*Names not clearly defined may be changed.*]

Unless a species or group is intelligibly defined when the name is given, it cannot be recognized by others, and the signification of the name is conse-

* This laborious and difficult research will in future be greatly facilitated by the very useful work of M. Agassiz, entitled "Nomenclator Zoologicus."

quently lost. Two things are necessary before a zoological term can acquire any authority, viz. *definition* and *publication*. Definition properly implies a distinct exposition of essential characters, and in all cases we conceive this to be indispensable, although some authors maintain that a mere enumeration of the component species, or even of a single type, is sufficient to authenticate a genus. To constitute *publication*, nothing short of the insertion of the above particulars in a printed book can be held sufficient. Many birds, for instance, in the Paris and other continental museums, shells in the British Museum (in Dr. Leach's time), and fossils in the Scarborough and other public collections, have received MS. names which will be of no authority until they are published*. Nor can any unpublished descriptions, however exact (such as those of Forster, which are still shut up in a MS. at Berlin), claim any right of priority till published, and then only from the date of their publication. The same rule applies to cases where groups or species are published, but not defined, as in some museum catalogues, and in Lesson's 'Traité d'Ornithologie,' where many species are enumerated by name, without any description or reference by which they can be identified. Therefore

§ 12. A name which has never been clearly defined in some published work should be changed for the earliest name by which the object shall have been so defined.

[*Specific names, when adopted as generic, must be changed.*]

The necessity for the following rule will be best illustrated by an example. The *Corvus pyrrhcorax*, Linn., was afterwards advanced to a genus under the name of *Pyrrhcorax*. Temminck adopts this generic name, and also retains the old specific one, so that he terms the species *Pyrrhcorax pyrrhcorax*. The inelegance of this method is so great as to demand a change of the specific name, and the species now stands as *Pyrrhcorax alpinus*, Vieill. We propose therefore that

§ 13. A new specific name must be given to a species when its old name has been adopted for a genus which includes that species.

N.B. It will be seen, however, below, that we strongly object to the further continuance of this practice of elevating specific names into generic.

[*Latin orthography to be adhered to.*]

On the subject of orthography it is necessary to lay down one proposition,—

§ 14. In writing zoological names the rules of Latin orthography must be adhered to.

In Latinizing Greek words there are certain rules of orthography known to classical scholars which must never be departed from. For instance, the names which modern authors have written *Aipunemia*, *Zenophasia*, *poioccephala*, must, according to the laws of etymology, be spelt *Æpynemia*, *Xenophasia* and *pœocephala*. In Latinizing modern words the rules of classic usage do not apply, and all that we can do is to give to such terms as classical an appearance as we can, consistently with the preservation of their etymology. In the case of European words whose orthography is fixed, it is best to retain the original form, even though it may include letters and combinations unknown in Latin. Such words, for instance, as *Woodwardi*,

* These MS. names are in all cases liable to create confusion, and it is therefore much to be desired that the practice of using them should be avoided in future.

Knighti, Bullocki, Eschscholtzi, would be quite unintelligible if they were Latinized into *Vudvardi, Cnichti, Bulloci, Essolzi*, &c. But words of barbarous origin, having no fixed orthography, are more pliable, and hence, when adopted into the Latin, they should be rendered as classical in appearance as is consistent with the preservation of their original sound. Thus the words *Tockus, awsuree, argoondah, kundoo*, &c. should, when Latinized, have been written *Toccus, ausure, argunda, cundu*, &c. Such words ought, in all practicable cases, to have a Latin termination given them, especially if they are used generically.

In Latinizing proper names, the simplest rule appears to be to use the termination *-us*, genitive *-i*, when the name ends with a consonant, as in the above examples; and *-ius*, gen. *-ii*, when it ends with a vowel, as *Latreille, Latreillii*, &c.

In converting Greek words into Latin the following rules must be attended to:—

Greek.	Latin.	Greek.	Latin.
<i>ai</i> becomes	<i>æ</i> .	<i>θ</i> becomes	<i>th</i> .
<i>ei</i> „	<i>i</i> .	<i>φ</i> „	<i>ph</i> .
<i>os</i> terminal,	<i>us</i> .	<i>χ</i> „	<i>ch</i> .
<i>ov</i> „	<i>um</i> .	<i>κ</i> „	<i>c</i> .
<i>ov</i> becomes	<i>u</i> .	<i>γχ</i> „	<i>nch</i> .
<i>oi</i> „	<i>œ</i> .	<i>γγ</i> „	<i>ng</i> .
<i>v</i> „	<i>y</i> .	„	<i>h</i> .

When a name has been erroneously written and its orthography has been afterwards amended, we conceive that the authority of the original author should still be retained for the name, and not that of the person who makes the correction.

PART II.

RECOMMENDATIONS FOR IMPROVING THE NOMENCLATURE IN FUTURE.

The above propositions are all which in the present state of the science it appears practicable to invest with the character of laws. We have endeavoured to make them as few and simple as possible, in the hope that they may be the more easily comprehended and adopted by naturalists in general. We are aware that a large number of other regulations, some of which are hereafter enumerated, have been proposed and acted upon by various authors who have undertaken the difficult task of legislating on this subject; but as the enforcement of such rules would in many cases undermine the invaluable principle of priority, we do not feel justified in adopting them. At the same time we fully admit that the rules in question are, for the most part, founded on just criticism, and therefore, though we do not allow them to operate retrospectively, we are willing to retain them for future guidance. Although it is of the first importance that the principle of priority should be held paramount to all others, yet we are not blind to the desirableness of rendering our scientific language palatable to the scholar and the man of taste. Many zoological terms, which are now marked with the stamp of perpetual currency, are yet so far defective in construction, that our inability to remove them without infringing the law of priority may be a subject of regret. With these terms we cannot interfere, if we adhere to the principles above laid down; nor is there even any remedy, if authors insist on infringing the rules of good taste by introducing into the science words of the same inelegant or unclassical character in future. But that which cannot be enforced by law may, in some

measure, be effected by persuasion; and with this view we submit the following propositions to naturalists, under the title of *Recommendations for the improvement of Zoological Nomenclature in future.*

[*The best names are Latin or Greek characteristic words.*]

The classical languages being selected for zoology, and words being more easily remembered in proportion as they are expressive, it is self-evident that

§ A. The *best* zoological names are those which are derived from the Latin or Greek, and express some distinguishing characteristic of the object to which they are applied.

[*Classes of objectionable names.*]

It follows from hence that the following classes of words are more or less objectionable in point of taste, though, in the case of *genera*, it is often necessary to use them, from the impossibility of finding characteristic words which have not before been employed for other genera. We will commence with those which appear the least open to objection, such as

a. Geographical names.—These words being for the most part adjectives can rarely be used for *genera*. As designations of *species* they have been so strongly objected to, that some authors (Wagler, for instance) have gone the length of substituting fresh names wherever they occur; others (*e.g.* Swainson) will only tolerate them where they apply *exclusively*, as *Lepus hibernicus*, *Troglodytes europæus*, &c. We are by no means disposed to go to this length. It is not the less true that the *Hirundo javanica* is a Javanese bird, even though it may occur in other countries also, and though other species of *Hirundo* may occur in Java. The utmost that can be urged against such words is, that they do not tell the *whole truth*. However, as so many authors object to this class of names, it is better to avoid giving them, except where there is reason to believe that the species is chiefly confined to the country whose name it bears.

b. Barbarous names.—Some authors protest strongly against the introduction of exotic words into our Latin nomenclature, others defend the practice with equal warmth. We may remark, first, that the practice is not contrary to classical usage, for the Greeks and Romans did occasionally, though with reluctance, introduce barbarous words in a modified form into their respective languages. Secondly, the preservation of the trivial names which animals bear in their native countries is often of great use to the traveller in aiding him to discover and identify species. We do not therefore consider, if such words have a Latin termination given to them, that the occasional and judicious use of them as scientific terms can be justly objected to.

c. Technical names.—All words expressive of trades and professions have been by some writers excluded from zoology, but without sufficient reason. Words of this class, *when carefully chosen*, often express the peculiar characters and habits of animals in a metaphorical manner, which is highly elegant. We may cite the generic terms *Arvicola*, *Lanius*, *Pastor*, *Tyrannus*, *Regulus*, *Mimus*, *Ploceus*, &c., as favourable examples of this class of names.

d. Mythological or historical names.—When these have no perceptible reference or allusion to the characters of the object on which they are conferred, they may be properly regarded as unmeaning and in bad taste. Thus the generic names *Lesbia*, *Leilus*, *Remus*, *Corydon*, *Pasiphae*, have been applied to a Humming bird, a Butterfly, a Beetle, a Parrot, and a Crab respectively,

without any perceptible association of ideas. But mythological names may sometimes be used as generic with the same propriety as technical ones, in cases where a direct allusion can be traced between the narrated actions of a personage and the observed habits or structure of an animal. Thus when the name *Progne* is given to a Swallow, *Clotho* to a Spider, *Hydra* to a Polyp, *Athene* to an Owl, *Nestor* to a grey-headed Parrot, &c., a pleasing and beneficial connexion is established between classical literature and physical science.

e. Comparative names.—The objections which have been raised to words of this class are not without foundation. The names, no less than the definitions of objects, should, where practicable, be drawn from positive and self-evident characters, and not from a comparison with other objects, which may be less known to the reader than the one before him. Specific names expressive of comparative size are also to be avoided, as they may be rendered inaccurate by the after-discovery of additional species. The names *Picoides*, *Emberizoides*, *Pseudoluscinia*, *rubeculoides*, *maximus*, *minor*, *minimus*, &c. are examples of this objectionable practice.

f. Generic names compounded from other genera.—These are in some degree open to the same imputation as comparative words; but as they often serve to express the position of a genus as intermediate to, or allied with, two other genera, they may occasionally be used with advantage. Care must be taken not to adopt such compound words as are of too great length, and not to corrupt them in trying to render them shorter. The names *Gallopavo*, *Tetraogallus*, *Gypaetos*, are examples of the appropriate use of compound words.

g. Specific names derived from persons.—So long as these complimentary designations are used with moderation, and are restricted to persons of eminence as scientific zoologists, they may be employed with propriety in cases where expressive or characteristic words are not to be found. But we fully concur with those who censure the practice of naming species after persons of no scientific reputation, as curiosity dealers (e. g. *Caniveti*, *Boissoneauti*), Peruvian priestesses (*Cora*, *Amazilia*), or Hottentots (*Klassi*).

h. Generic names derived from persons.—Words of this class have been very extensively used in botany, and therefore it would have been well to have excluded them wholly from zoology, for the sake of obtaining a *memoria technica* by which the name of a genus would at once tell us to which of the kingdoms of nature it belonged. Some few personal generic names have however crept into zoology, as *Cuvieria*, *Mulleria*, *Rossia*, *Lessonia*, &c., but they are very rare in comparison with those of botany, and it is perhaps desirable not to add to their number.

i. Names of harsh and inelegant pronunciation.—These words are grating to the ear, either from inelegance of form, as *Huhua*, *Yuhina*, *Craxirex*, *Eschscholtzi*, or from too great length, as *chirostrongylostinus*, *Opetiorhynchus*, *brachypodioides*, *Thecodontosaurus*, not to mention the *Enaliolimnosaurus crocodilocephaloides* of a German naturalist. It is needless to enlarge on the advantage of consulting euphony in the construction of our language. As a general rule it may be recommended to avoid introducing words of more than five syllables.

k. Ancient names of animals applied in a wrong sense.—It has been customary, in numerous cases, to apply the names of animals found in classic authors at random to exotic genera or species which were wholly unknown to the ancients. The names *Cebus*, *Callithrix*, *Spiza*, *Kitta*, *Struthus*, are examples. This practice ought by no means to be encouraged. The usual

defence for it is, that it is impossible now to identify the species to which the name was anciently applied. But it is certain that if any traveller will take the trouble to collect the vernacular names used by the modern Greeks and Italians for the Vertebrata and Mollusca of southern Europe, the meaning of the ancient names may in most cases be determined with the greatest precision. It has been well remarked that a Cretan fisher-boy is a far better commentator on Aristotle's 'History of Animals' than a British or German scholar. The use however of ancient names, *when correctly applied*, is most desirable, for "in framing scientific terms, the appropriation of old words is preferable to the formation of new ones*."

l. Adjective generic names.—The names of genera are, in all cases, essentially substantive, and hence adjective terms cannot be employed for them without doing violence to grammar. The generic names *Hians*, *Criniger*, *Cursorius*, *Nitidula*, &c. are examples of this incorrect usage.

m. Hybrid names.—Compound words, whose component parts are taken from two different languages, are great deformities in nomenclature, and naturalists should be especially guarded not to introduce any more such terms into zoology, which furnishes too many examples of them already. We have them compounded of Greek and Latin, as *Dendrofalco*, *Gymnocorvus*, *Monoculus*, *Arborophila*, *flavigaster*; Greek and French, as *Jacamaraleyen*, *Jacamerops*; and Greek and English, as *Bullockoides*, *Gilbertsocrinites*.

n. Names closely resembling other names already used.—By Rule 10 it was laid down, that when a name is introduced which is *identical* with one previously used, the later one should be changed. Some authors have extended the same principle to cases where the later name, when correctly written, only approaches in form, without wholly coinciding with the earlier. We do not, however, think it advisable to make this law imperative, first, because of the vast extent of our nomenclature, which renders it highly difficult to find a name which shall not bear more or less resemblance in sound to some other; and, secondly, because of the impossibility of fixing a limit to the degree of approximation beyond which such a law should cease to operate. We content ourselves, therefore, with putting forth this proposition merely as a recommendation to naturalists, in selecting generic names, to avoid such as too closely approximate words already adopted. So with respect to species, the judicious naturalist will aim at variety of designation, and will not, for example, call a species *virens* or *virescens* in a genus which already possesses a *viridis*.

o. Corrupted words.—In the construction of compound Latin words, there are certain grammatical rules which have been known and acted on for two thousand years, and which a naturalist is bound to acquaint himself with before he tries his skill in coining zoological terms. One of the chief of these rules is, that in compounding words all the radical or essential parts of the constituent members must be retained, and no change made except in the variable terminations. But several generic names have been lately introduced which run counter to this rule, and form most unsightly objects to all who are conversant with the spirit of the Latin language. A name made up of the first half of one word and the last half of another, is as deformed a monster in nomenclature as a Mermaid or a Centaur would be in zoology; yet we find examples in the names *Corcorax* (from *Corvus* and *Pyrrhocorax*), *Cypsnagra*

* Whewell, Phil. Ind. Sc. v, i. p. lxxvii.

(from *Cypselus* and *Tanagra*), *Merulaxis* (*Merula* and *Synallaxis*), *Loxigilla* (*Loxia* and *Fringilla*), &c. In other cases, where the commencement of both the simple words is retained in the compound, a fault is still committed by cutting off too much of the radical and vital portions, as is the case in *Bucorvus* (from *Buceros* and *Corvus*), *Ninox* (*Nisus* and *Noctua*), &c.

p. Nonsense names.—Some authors having found difficulty in selecting generic names which have not been used before, have adopted the plan of coining words at random without any derivation or meaning whatever. The following are examples: *Viralva*, *Xema*, *Azeca*, *Assiminia*, *Quedius*, *Spisula*. To the same class we may refer *anagrams* of other generic names, as *Dacelo* and *Cedola* of *Alcedo*, *Zapornia* of *Porzana*, &c. Such verbal trifling as this is in very bad taste, and is especially calculated to bring the science into contempt. It finds no precedent in the Augustan age of Latin, but can be compared only to the puerile quibblings of the middle ages. It is contrary to the genius of all languages, which appear never to produce new words by spontaneous generation, but always to derive them from some other source, however distant or obscure. And it is peculiarly annoying to the etymologist, who after seeking in vain through the vast storehouses of human language for the parentage of such words, discovers at last that he has been pursuing an *ignis fatuus*.

q. Names previously cancelled by the operation of § 6.—Some authors consider that when a name has been reduced to a synonym by the operations of the laws of priority, they are then at liberty to apply it at pleasure to any new group which may be in want of a name. We consider, however, that when a word has once been proposed in a given sense, and has afterwards sunk into a synonym, it is far better to lay it aside for ever than to run the risk of making confusion by re-issuing it with a new meaning attached.

r. Specific names raised into generic.—It has sometimes been the practice in subdividing an old genus to give to the lesser genera so formed, the names of their respective typical species. Our Rule 13 authorizes the forming a new specific name in such cases; but we further wish to state our objections to the practice altogether. Considering as we do that the original specific names should as far as possible be held sacred, both on the grounds of justice to their authors and of practical convenience to naturalists, we would strongly dissuade from the *further continuance* of a practice which is gratuitous in itself, and which involves the necessity of altering long-established specific names.

We have now pointed out the principal rocks and shoals which lie in the path of the nomenclator; and it will be seen that the navigation through them is by no means easy. The task of constructing a language which shall supply the demands of scientific accuracy on the one hand, and of literary elegance on the other, is not to be inconsiderately undertaken by unqualified persons. Our nomenclature presents but too many flaws and inelegancies already, and as the stern law of priority forbids their removal, it follows that they must remain as monuments of the bad taste or bad scholarship of their authors to the latest ages in which zoology shall be studied.

[*Families to end in idæ, and Subfamilies in inæ.*]

The practice suggested in the following proposition has been adopted by many recent authors, and its simplicity and convenience is so great that we strongly recommend its universal use.

§ B. It is recommended that the assemblages of genera termed *families* should be uniformly named by adding the termination *idæ* to

the name of the earliest known, or most typically characterized genus in them; and that their subdivisions, termed *subfamilies*, should be similarly constructed, with the termination *inæ*.

These words are formed by changing the last syllable of the genitive case into *idæ* or *inæ*, as *Strix*, *Strigis*, *Strigidæ*, *Buceros*, *Bucerotis*, *Bucerotidæ*, not *Strixidæ*, *Buceridæ*.

[*Specific names to be written with a small initial.*]

A convenient *memoria technica* may be effected by adopting our next proposition. It has been usual, when the titles of species are derived from proper names, to write them with a capital letter, and hence when the specific name is used alone it is liable to be occasionally mistaken for the title of a genus. But if the titles of *species* were *invariably* written with a *small* initial, and those of *genera* with a *capital*, the eye would at once distinguish the rank of the group referred to, and a possible source of error would be avoided. It should be further remembered that all species are *equal*, and should therefore be written all *alike*. We suggest, then, that

§ C. Specific names should *always* be written with a small initial letter, even when derived from persons or places, and generic names should be always written with a capital.

[*The authority for a species, exclusive of the genus, to be followed by a distinctive expression.*]

The systematic names of zoology being still far from that state of fixity which is the ultimate aim of the science, it is frequently necessary for correct indication to append to them the name of the person on whose authority they have been proposed. When the same person is authority both for the specific and generic name, the case is very simple; but when the specific name of one author is annexed to the generic name of another, some difficulty occurs. For example, the *Muscicapa crinita* of Linnæus belongs to the modern genus *Tyrannus* of Vieillot; but Swainson was the first to apply the specific name of Linnæus to the generic one of Vieillot. The question now arises, Whose authority is to be quoted for the name *Tyrannus crinitus*? The expression *Tyrannus crinitus*, Lin., would imply what is untrue, for Linnæus did not use the term *Tyrannus*; and *Tyrannus crinitus*, Vieill., is equally incorrect, for Vieillot did not adopt the name *crinitus*. If we call it *Tyrannus crinitus*, Sw., it would imply that Swainson was the first to describe the species, and Linnæus would be robbed of his due credit. If we term it *Tyrannus*, Vieill., *crinitus*, Lin., we use a form which, though expressing the facts correctly, and therefore not without advantage in particular cases where great exactness is required, is yet too lengthy and inconvenient to be used with ease and rapidity. Of the three persons concerned with the construction of a binomial title in the case before us, we conceive that the author who *first* describes and names a species which forms the groundwork of later generalizations, possesses a higher claim to have his name recorded than he who afterwards defines a genus which is found to embrace that species, or who may be the mere accidental means of bringing the generic and specific names into contact. By giving the authority for the *specific* name in preference to all others, the inquirer is referred *directly* to the original description, habitat, &c. of the species, and is at the same time reminded of the date of its discovery; while genera, being less numerous than species, may be carried in the memory, or

referred to in systematic works without the necessity of perpetually quoting their authorities. The most simple mode then for ordinary use seems to be to append to the original authority for the species, when not applying to the genus also, some distinctive mark, such as (*sp.*) implying an exclusive reference to the *specific* name, as *Tyrannus crinitus*, Lin. (*sp.*), and to omit this expression when the same authority attaches to both genus and species, as *Ostrea edulis*, Lin.* Therefore,

§ D. It is recommended that the authority for a specific name, *when not applying to the generic name also*, should be followed by the distinctive expression (*sp.*).

[*New genera and species to be defined amply and publicly.*]

A large proportion of the complicated mass of synonyms which has now become the opprobrium of zoology, has originated either from the slovenly and imperfect manner in which species and groups have been originally defined, or from their definitions having been inserted in obscure local publications which have never obtained an extensive circulation. Therefore, although under § 12, we have conceded that mere insertion in a printed book is sufficient for *publication*, yet we would strongly advise the authors of new groups always to give in the first instance a full and accurate definition of their characters, and to insert the same in such periodical or other works as are likely to obtain an immediate and extensive circulation. To state this briefly,

§ E. It is recommended that new genera or species be *amply* defined, and *extensively* circulated in the first instance.

[*The names to be given to subdivisions of genera to agree in gender with the original genus.*]

In order to preserve specific names as far as possible in an unaltered form, whatever may be the changes which the genera to which they are referred may undergo, it is desirable, when it can be done with propriety, to make the new subdivisions of genera agree *in gender* with the old groups from which they are formed. This recommendation does not however authorize the changing the gender or termination of a genus already established. In brief,

§ F. It is recommended that in subdividing an old genus in future, the names given to the subdivisions should agree in gender with that of the original group.

[*Etymologies and types of new genera to be stated.*]

It is obvious that the names of genera would in general be far more carefully constructed, and their definitions would be rendered more exact, if authors would adopt the following suggestion:—

§ G. It is recommended that in defining new genera the etymology of the name should be always stated, and that one species should be invariably selected as a type or standard of reference.

In concluding this outline of a scheme for the rectification of zoological nomenclature, we have only to remark, that almost the whole of the propositions contained in it may be applied with equal correctness to the sister science of botany. We have preferred, however, in this essay to limit our views

* The expression *Tyrannus crinitus* (Lin.) would perhaps be preferable from its greater brevity.

to zoology, both for the sake of rendering the question less complex, and because we conceive that the botanical nomenclature of the present day stands in much less need of distinct enactment than the zoological. The admirable rules laid down by Linnæus, Smith, Decandolle, and other botanists (to which, no less than to the works of Fabricius, Illiger, Vigors, Swainson, and other zoologists, we have been much indebted in preparing the present document), have always exercised a beneficial influence over their disciples. Hence the language of botany has attained a more perfect and stable condition than that of zoology; and if this attempt at reformation may have the effect of advancing zoological nomenclature beyond its present backward and abnormal state, the wishes of its promoters will be fully attained.

(Signed)	H. E. STRICKLAND.	J. S. HENSLOW.
June 27, 1842.	JOHN PHILLIPS.	W. E. SHUCKARD.
	JOHN RICHARDSON.	G. R. WATERHOUSE.
	RICHARD OWEN.	W. YARRELL.
	LEONARD JENYNS.	C. DARWIN.
	W. J. BRODERIP.	J. O. WESTWOOD.

XL.—*On the History and Habits of the Rook, Corvus frugilegus, Linn.* By the Rev. DAVID LANDSBOROUGH.

To the Editors of the Annals of Natural History.

GENTLEMEN,

THOUGH birds were my early favourites, I have never made much progress in ornithology. In some future communication, however, I may attempt to give a list of the birds found in the south-west of Scotland. Before doing so I shall venture to give you some notices of a few of them, though they will be unworthy of appearing even as short addenda to the highly interesting ornithological articles, furnished from time to time by that accurate observer of the works of nature—Mr. W. Thompson of Belfast. I have little leisure for such pursuits, and I shall merely subjoin a brief sketch of a pet Rook with which I have the pleasure of being acquainted.

I visited him a few days ago at Ardrossan, and was glad to find, that though a dozen winters have passed over his head, he has all the vivacity of early life. He is a crow of aristocratic extraction; at all events he is of *high descent*, having been reared on one of the highest trees at Shieldhall, where his ancestors, it is believed, had their favourite residence for many generations. When he was well fledged he was brought down to the abodes of men by one of the aspiring youths of Shieldhall (George Oswald, Esq., now in India) as a present to his aunt Miss Oswald, and by her the pet crow, prized for his

own good qualities, and loved for the donor's sake, was brought down to her sweet villa at Ardrossan. Her villa was contiguous to that of Miss Hamilton of Holmhead, and as our rook had then the free use of his wings, and was of a social disposition, he paid frequent visits to his neighbours, and soon formed acquaintance with the occupants of Miss Hamilton's poultry-yard, consisting of a cock and two hens. The intimacy increased; the visits became longer and longer, till at last the crow became domiciled along with them; and when Miss Oswald left Ardrossan, being unwilling to break asunder the ties of affectionate friendship, she left the crow in its adopted dwelling-place. The longer they were acquainted the stronger did the friendship become, though it was evidently most ardent on the part of the crow. He was exceedingly attentive to his chosen friends the hens, and would often arrange their feathers and dress them to his own taste, so that his officious services were sometimes rejected as troublesome. The cock was still a greater favourite, and he roosted every night beside him, nestling under his wing.

After this platonic friendship had subsisted for several years, one of the hens became sick and died. During her illness he was unremitting in his attentions, waiting on her most affectionately; but he could not ward off the stroke of death. A still greater calamity awaited him, for the favourite cock also died. He was unceasing in his attention to him during his trouble, and when he died he was so disconsolate that he would not taste food for several days.

At last old age, which indeed had carried off the others, crept on the remaining hen. When she became feeble and helpless he scarcely ever left her for a moment, striving to cheer her by innumerable little acts of kindness. There were two steps up from the poultry-yard to the house in which they roosted, and when she became too weak to mount the steps, as he could not himself lift her up he always came to the kitchen-window, and kept up an incessant clamour till some of the servants came out and lifted her up.

For two days before her death she could not leave the roosting-house, and he remained along with her bringing her food, laying it down before her, and coaxing her to eat it.

Notwithstanding his unwearied assiduity and affectionate attentions the poor hen died, and it was thought that he would not long have survived her. He was quite disconsolate. Life had lost its charm. He scarcely tasted food and became altogether changed; so that from being lively and cheerful and active, he drooped and became timid and spiritless.

Some young poultry were purchased in the hope that they

might cheer him, but he seemed quite afraid of them and avoided their company.

After months had passed away he gradually recovered his spirits, and he is now as brisk and lively a bird as you can look upon. He is no longer afraid of the inmates of the poultry-yard; but though he associates with them, they have not succeeded in gaining his affections. He knows all the inmates of the house, and takes with pleasure a bit of bread or of cold meat from their hands. Unfortunately he is so much of an epicure as to be particularly fond of a new-laid egg, and when the exulting cackle of a hen proclaims that she has deposited a treasure, there is generally a race between the servant and the rook, each being eager to seize the prize.

For a long time he was allowed the free use of his wings, but complaints were lodged against him by the proprietors of the neighbouring villas that he was in the habit of perching on the roofs of their houses, and of picking the lime from the *skews*, casting it up into the air. This frolic was an overt act of mischief; but his accusers did not take into account that it was conjoined with another act of utility, for it was only the loosened pieces of lime that he removed, and chiefly, we doubt not, that he might get at the vermin concealed underneath. As no person would become bound for his more sober demeanour when he got into his altitudes, the poor fellow was condemned to have one of his wings clipped, that as a degraded biped, he might, like his accusers, walk on the face of the earth. It is vexing to see him, when he attempts to fly with the remaining wing, falling down to the ground after being provokingly twirled round.

The only way in which he can now taste some of the departed joys of exalted station is by mounting an old apple-tree in the garden, the lowest branches being within his reach, and when he has reached the highest he shows how delighted he is by proud cawings and cacklings.

He is a very cleanly bird, as his glossy plumage shows. When a pail of water is placed within his reach, he immediately enters it and splashes it about with great delight. He is still more delighted when there is a fall of snow, for he rolls in it, flaps and flutters amongst it, taking it up in his bill and throwing it about with the greatest glee and merriment.

Long live this kind-hearted rook! and as *we* have reason and revelation to guide, may we remember that we are bound to surpass him in his amiable qualities.

I am, dear Sirs, yours &c.,

DAVID LANDSBOROUGH.

Manse of Steverston, Ayrshire,
Feb. 13, 1843.

XLI.—*Note in reply to Dr. Griffith's Remarks on the Pitted Tissue of Plants, on Muscle, &c.** By MARTIN BARRY, M.D., F.R.SS. L. & E.

I HAVE to acknowledge the courtesy shown in the remarks of Dr. Griffith, and regret that his opinions differ so widely from my own; but am compelled to say, I find nothing in his communication that alters in any particular my views, or that requires more than *general* notice at my hands.

"The appearances observed by Dr. Barry in the blood," which Dr. Griffith thinks were "misinterpreted," I cannot suppose that Dr. Griffith ever *saw*; if I may judge from the description he has given. That they are however visible, is proved by the following description given by another, who did see the appearances in question. Whether they have been "misinterpreted," the future may determine.

"Bristol, August 19, 1842.

"Dr. Barry has pointed out to me, among the corpuscles of newt's blood, preserved in their own serum, without any reagent having been applied to them, many which had the form of a flask with a projecting neck, or which might be still better compared to the body of a pair of bellows with its projecting nozzle. The projecting portion appeared to be a filament, having a much higher refracting power than the general substance of the corpuscle. He also showed me, in a portion of blood to which corrosive sublimate had been added, a corpuscle which was evidently destitute of the ordinary nucleus; and which contained what appeared to be a filament which presented transverse markings that resembled those of muscular fibrillæ, the interspaces being oblique. The appearance resembled that of Dr. Barry's fig. 9 β . [Phil. Trans. 1842, plate 5.], except that there was no trace of nucleus.

(Signed)

"W. B. CARPENTER."

My preparations of muscle have been seen by many, to whom I could refer for their opinions regarding them. Among our own countrymen may be mentioned Robert Brown, D.C.L., and Professors Owen and Sharpey, besides the gentlemen from whom I have received the testimonials at foot. To the kindness of Professor Sharpey I am indebted for the beautiful preparation of muscle from the tail of the tadpole mentioned by Dr. Griffith. The following note was sent me by one who had closely examined that preparation.

"6 Holles Street, Cavendish Square, Oct. 13, 1842.

"MY DEAR SIR,—On returning home today after seeing your exquisite preparations of muscular tissue, I was anxious to express my thanks for your kindness and patience in exhibiting the series to me. I went to your house by no means prepared to admit the existence of

* Annals of Natural History, No. 68, for Feb. 1843, p. 95.

the spiral fibre ; on the contrary, somewhat prepossessed against such a theory ; for while I had already made up my mind as to the non-existence of the discs advocated in Mr. Bowman's very ingenious paper in the 'Philos. Trans.,' I had not been able to bring my belief to the idea of substituting a spiral thread or fibre to account for the peculiar markings on the muscular fasciculi. You have, however, convinced me, for in several instances I was enabled to follow the spiral thread *round* its axis, and to see the continuity of *both* sides of the chain. In one or two instances I observed it drawn out or separated so far as not to leave a doubt of its reality. In the same way I distinctly recognised the double spiral (especially in one preparation where the two spirals had not an equal obliquity), and I can conceive that the longitudinal lines or fibrillated appearance of the larger fasciculi depends upon the even juxtaposition of many minute spirals.

"The reason, probably, I had failed in previously making out this structure, resulted from my expectation of seeing this appearance throughout the whole length of a filament ; but I now observe how minute is the care necessary to separate parts, and how small often is the portion favourably situated or sufficiently isolated to admit of a distinct view of this curious structure.

"There are also many circumstances connected with the different refrangibility of objects of great importance in explaining why a spiral fibre should be so much more easily seen in one tissue than another ; and thus it is that reagents are often most usefully applied where different parts of the same object refract the light nearly equally. I *think*, through your help, I have at last settled my belief as to the true character of the markings of muscle, and for which I beg you to accept the thanks of

"Yours faithfully,

(Signed)

"JOHN DALRYMPLE."

"To Martin Barry, M.D."

The following, connected with the same subject, was received from Dr. Carpenter, bearing the same date as his testimonial above given.

"I have this day had the opportunity, through Dr. Barry's kindness, of examining several of his preparations of muscular fibre, especially those from the heart of the turtle and from the shrimp. I have *distinctly seen* single spiral threads continuous with fasciculi ; in one or two instances so little elongated as to resemble a corkscrew ; in others drawn out more or less straightly. In several fibrillæ, which had been isolated without disturbance of their structure, I have seen appearances closely corresponding with those represented by Dr. Barry in figs. 52 and 56 of his last paper [Phil. Trans. 1842]. I may add, that I have seen these appearances even more distinctly under my own microscope, which is furnished with one of Powell's *latest* 1-16th objectives, than under Dr. Barry's instrument, in which lower powers were used.

(Signed)

"WILLIAM B. CARPENTER."

The microscope I use is one of Schiek's achromatics, si-

milar to those employed by Professors Ehrenberg, Schwann, and R. Wagner. On this subject I cannot refer to a higher authority than that of Joseph Jackson Lister, who, after a close examination, describes my deeper object-glasses as "very finely corrected every way."

XLII.—On a new British Starfish of the genus *Goniaster*.

By Prof. EDWARD FORBES, V.P.W.S., F.L.S., F.B.S. &c.

[With a Plate.]

THE very splendid addition to the catalogue of British Starfishes, the only one found since the publication of my work on those animals, which I am about to describe, was discovered by an active naturalist, Mr. Robert Maclaurin of Coldingham, who exhibited it to the Berwickshire Naturalists' Club at their meeting held December 21, 1842, where he pointed it out as distinct from any recorded British species. It was found between St. Abb's Head and the Isle of May, and was brought up on the lines of the fishermen from a depth of about 30 fathoms.

It belongs to the same group of *Goniasters* with the *G. equestris*, to which species it is nearly allied, but differs remarkably in form from any species of the genus. The arrangement and form of the granulations, tubercles, marginal plates, and those remarkable bodies to which I have in the description applied the name of stomata, further distinguish it from its immediate ally.

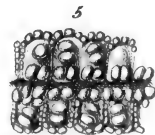
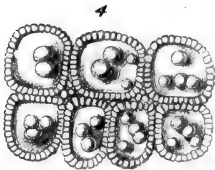
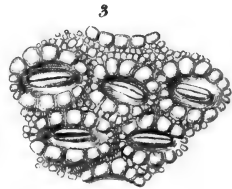
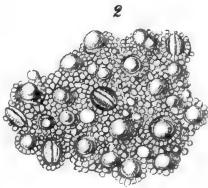
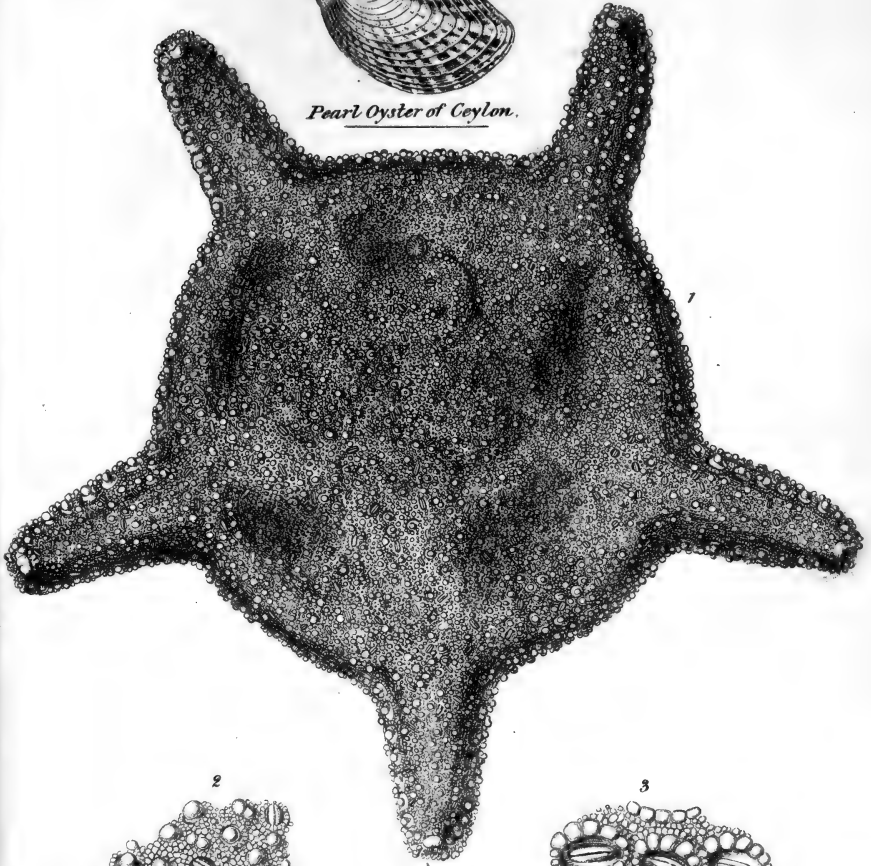
Sp. Ch. *Goniaster abbensis*. G. corpore planiusculo, orbiculari, angulis in brachiis productis, infra et supra tuberculis, granulis stomatibusque vestito.

Description.—*Upper surface*.—Disc round, interrupted by the bases of five short arms, each of which is as long as a third of the breadth of the disc. Surface plane, thickly covered by granules, among which are irregularly interspersed numerous mammilliform tubercles (transformed spines), and at intervals spinules in pairs forming stomata (transformed pedicellariæ?) of an ovate form. No appearance of an anal pore. Madreporiform tubercle nearer the margin than centre, large, rugose. Upper surface of arms (which are prolongations of the angles of disc) similarly covered with the centre.

Margin bordered by a double series of irregularly quadrate plates, somewhat arched at their free borders, and each edged by a single row of minute square granules. The upper series bear from one to four mammiform tubercles: when more than



Pearl Oyster of Ceylon.





one, two are usually larger than the rest. On the lower series the tubercles are usually more numerous than on the upper.

Under surface.—The triangular spaces between the avenues are granulated; among the granulations numerous large stomata, in form linear and compressed, each placed in a smooth space surrounded by a close border of flattened mammiform tubercles, those forming the lateral borders largest. The avenues are linear, contracting towards the arms. Suckers biserial. Border of avenues formed by transverse plates, each bearing four or five elongated tubercles, two of which face the avenue. These plates are each bordered by a series of granules.

Eye-cover formed of one large transversely-ovate tubercle terminating the ray, and three or four smaller ones on each side, with a circle of minute granules immediately surrounding the (red) eye.

Dimensions.—Breadth across the disc $5\frac{1}{2}$ inches; length of arm $1\frac{3}{4}$ inch; breadth of arm at base $\frac{9}{10}$ inch.

Colour.—When fresh Mr. Maclaurin states it was of an orange-yellow, which with crimson-red, are the usual hues of the Cushion-stars. Dried, it is of a pale yellow.

EXPLANATION OF PLATE VII.

Fig. 1. The starfish, seen from above.

Fig. 4. Marginal plates.

Fig. 2. Portion of upper surface.

Fig. 5. Border of avenue.

Fig. 3. Ditto of under surface.

Fig. 6. Eye-cover.

XLIII.—*Description of a new genus of Carabideous Insects brought from the Falkland Islands by Charles Darwin, Esq. By G. R. WATERHOUSE, Esq., Assistant Secretary and Curator to the Zoological Society, &c.*

Section GEODEPHAGA.

Fam. FERONIIDÆ.

LISSOPTERUS*, nov. gen.

Corpus depressum, elongatum; lateribus elytrorum subparalleliis.

Labrum transversum, antice emarginatum.

Labium profunde emarginatum, dente in medio paulo producto, ad apicem truncato.

Palpi filiformes, articulo ultimo ad apicem truncato.

Mandibulæ mediocres, edentulæ, acutæ.

Antennæ mediocres, articulis subæqualibus.

Pedes mediocres; tibiæ anteriores in maribus incrassatæ, et tarsi articulis quatuor dilatati.

This genus is founded upon an insect discovered by Mr. Dar-

* Λισσοῦς *smooth*, and πτερόν, in allusion to the almost total absence of sculpturing on the elytra.

win in the Falkland Islands. Some of the specimens were found in the month of March under a dead bird on the sea-coast in E. Falkland Island. Both by myself and Mr. Darwin this insect was upon a cursory inspection supposed to be a species of *Sphodrus*, but upon examination it was found to exhibit characters which separate it from that and other published genera. The more conspicuous are, the swollen anterior tibiæ of the male; the femora are also stouter in this sex, and the *four* basal joints of the anterior tarsi are dilated, and (with the exception of the basal joint, which is triangular,) they are broader than long. The antennæ do not exhibit the short second and long third joint as in *Sphodrus*, but have the joints all nearly equal in length, the second joint being scarcely shorter than the third, which is not longer than the following joints. In size the present insect is about equal to the *Oma-seus melanurus*, and an idea of its proportions may perhaps be best conveyed by comparing the two: the body is more depressed than in *O. melanurus*, the head is a trifle broader, and the antennæ are more slender; the thorax presents nearly the same outline, but the sides are not rounded quite to the base as in that insect. The elytra also present nearly the same outline, but besides being less convex, they have the reflected margin much broader and more distinct; the legs are nearly of the same proportions; the dilated tarsi of the male are broader, the tibiæ stouter, and the internal emargination much less distinct, and situated nearer to the apex of the tibiæ. The principal specific characters may be thus expressed:—

Lissopterus quadrinotatus. Liss. niger subnitidus; antennis pedibusque piceis, vel rufo-piceis; thorace supra paulo convexo, subquadrato postice angustiore, lateribus indistincte rotundatis, foveis duabus oblongis impresso, medio canaliculato; elytris elongato-ovatis, lateribus subparallelis postice rotundatis, supra subdepressis, lævibus, indistinctissime striatis, notis quatuor rufis ornatis.

Long. corp. $6\frac{3}{4}$ —8 lin.; lat. $2\frac{2}{3}$ —3 lin.

Var. β . Elytris immaculatis, pedibus nigris.

Colour black; head and thorax glossy, elytra dull; head rather broad and subdepressed, with a slight transverse groove in front marking the posterior boundary of the clypeus, which is transverse and slightly emarginated in front, where it is of a pitchy hue; two shallow foveæ situated partly on the clypeus and partly on the head; eyes rather small, rounded and convex; labrum and mandibles pitchy; antennæ and palpi pitchy-red. Thorax about one-fourth broader than long; in front but little narrower than the elytra, and behind about one-fifth narrower than in front; the sides slightly rounded, but becoming nearly straight and parallel towards the posterior

angles, which are nearly right angles; the upper surface is but little convex, the reflected lateral margins are rather broad, the dorsal channel moderately distinct, but obliterated near the anterior and posterior margins of the thorax; on each side, behind, are two oblique, long, smooth foveæ, between which is a transverse impression situated at about one-fourth of the distance from the base towards the apex of the thorax—this transverse impression is not strongly marked. Elytra elongate-ovate, above subdepressed, the lateral reflected margins broad and distinct, the surface nearly smooth but exhibiting indistinct striæ, and these are most faintly punctured; two smallish red spots are observable on each elytron near the outer margin, one towards the base of the elytron, and the other on the apical fourth; the legs are pitchy or pitchy-red. Sometimes the red spots on the elytra are obliterated, the legs are nearly black, and the antennæ and palpi are pitchy.

Obs.—As regards one of the characters upon which I found the present genus, I allude to the male sex having *four* of the joints of the anterior tarsi distinctly dilated, I may call attention to the remark by Dejean in his observations on the *Feronia*, viz. that this group is distinguished from the *Harpali* by the structure of the intermediate tarsi (*i. e.* they are not dilated), and by the fourth joint of the anterior tarsus, which is *never dilated in the male sex*. The genus *Lissopterus* therefore affords a remarkable exception to a general rule.

XLIV.—The Birds of Ireland By WM. THOMPSON, Esq.,
Pres. Nat. Hist. Society, Belfast,

[Continued from vol. x. p. 179.]

THE RING-DOVE*—*Columba Palumbus*, Linn.—is common throughout the wooded districts of the island.

Mr. Waterton is rather disposed to believe that in his part of Yorkshire there is an annual increase by migration to the numbers of native birds. Mr. Selby states, in general terms, that there is not any such increase. The great numbers that congregate in autumn, and remain together during winter in Ireland, I have always considered as our indigenous birds only, collected together in their choicest haunts, however widely separated they may have been in the breeding-season.

Belvoir Park near Belfast, with its fine and extensive woods, is quite a preserve for these birds, and throughout the autumn and winter they may be daily seen there in the afternoon, in multitudes.

* Commonly called Wood Quest and Wood Pigeon in the north of Ireland.

nous numbers, occasionally not less than five hundred appearing in one flock. Mr. Selby remarks that the ring-dove prefers fir and ash-trees to roost in, but in this park, the beech apparently is preferred above all other species. Not only is a wood consisting of these trees their chief resort, but in mixed plantations their tops may be seen dotted with these birds, when none appear on other equally lofty deciduous trees, pines, or firs. It was a very pleasing sight on one occasion here to see a number of these birds descend from the highest trees to drink at the river Lagan—which bounds the demesne at one side—before retiring to roost. On November 30, 1838, which was a very dark day, several hundreds were settled on the trees apparently for the night, so early as half-past two o'clock in the afternoon. The immense flocks here, rising *en masse* from their roosting-places with thundering noise, remind us of the vast flights of the passenger pigeon in North America, of which we are so fully informed in the graphic narrations of Wilson and Audubon.

The earliest date in my journal, with reference to large flocks roosting in Belvoir Park, is Sept. 16, 1840, and in the spring of the preceding year, they are noted as seen in very large flocks so late as the 25th of March.

But they breed here fully as early as in the north of England, occasionally even earlier than the latter end of February—the time mentioned by Mr. Selby; lofty trees are generally selected for the nest, but in a locality where the species was protected I have in more than one instance known the nest to be placed not more than seven feet from the ground, in young fir-trees. Their cooing, with which the woods resound in the early spring, and their singular flight at this season, rising and falling suddenly in the air, render the ring-dove highly attractive. Although this bird will, where protected, display little fear of man, particularly in the breeding-season, it is generally very wary, and when assembled in flocks, extremely so: its sense of hearing must be remarkably acute, as the slightest noise, even at a distance, will alarm a flock, and cause the temporary desertion of its intended roosting-place.

The large flocks alluded to divide into foraging parties in the morning, though some few may be seen about their roosting-places at all times of the day. In severe frosts they are driven to the turnip-fields, to feed upon the green tops of the plant. I have seen large flocks regaling on beech-mast; and they are partial to ploughed fields, on account of the seeds and other vegetable matter turned up. Useful in consuming the seeds and roots of weeds injurious to the crops, yet Mr. Waterton, who looks upon all the feathered race in the most favourable light that truth will warrant, does not consider the ring-dove of any service to man. A friend, whose country-seat is in the valley of the Lagan, and near to Belvoir Park, where the species is so numerous, reports, that he has often seen ring-doves pluck gooseberries and currants from the bushes in his garden, but never knew them to attack his cherries. They are very destructive to young plants of the cabbage tribe, which are preferred to the tender tops of turnips. Quantities of all kinds of his grain, when ripe, are stated to be de-

stroyed by these birds, which are accused of flying against the standing stalks, and prostrating them, to feed upon the pickles, and alighting with the same evil intent on the masses prostrated by storm or rain, as well as on the "stooks." Wheat is their favourite—and it is said that for it "they will fly a mile farther" than for any other grain.

Though the ring-dove is prized in the north of Ireland, the young are not regularly sought after for the table, as they are stated by Mr. Waterton to be in Yorkshire. This gentleman in his 'Essays on Natural History,' and Mr. Macgillivray in his 'British Birds,' give full and interesting accounts of the species. In France and Switzerland I have, in summer and autumn, observed the ring-dove to be equally common as in the British Islands*.

ROCK-DOVE, *Columba Livia*, Brisson†.—About the rock-bound and caverned coasts on all sides of Ireland, and the adjacent islands, this species has occurred to me. It is likewise to be found at inland caves and grottos, such as in limestone districts especially are not unfrequent. Some authors speak of the sea-coast only as frequented by the rock-dove, but from personal observation it can be stated, that caverns, be they inland or marine, are its natural abiding-places; and whether situated in the inland solitude, close by the din of the water-fall, or the "roar of ocean's waves," are equally resorted to.

* The Stock-Dove, *C. Œnas*, is unknown both to Ireland and Scotland. In England it is said to frequent only the midland and eastern counties.

† This bird is the parent of the common tame pigeon. When the dove-cot is not far distant from the nestling-places of the wild birds in the rocks, the tame ones often resort thither and pair with them, and the mottled produce seen frequenting wild localities often puzzle the tyro ornithologist. It may be mentioned, on account of the period of time that elapsed on the occasion, that a tame pigeon taken from Belfast to the Falls, two miles distant, and shut up in a room for twelve months, immediately on being liberated flew back to its old quarters.

The following paragraph on carrier pigeons appeared in the *Leinster Express* newspaper in Dec. 1842:—"One of these pigeons was let loose from Palmerston-house, near Chapelizod, the seat of the Earl of Donoughmore, when it accomplished the journey to Castle Bernard, which is upwards of sixty-two miles, in two hours; yet the flight was much impeded, as the day was both dark and hazy, accompanied with a strong head wind at the time. At the late fair of Ballinasloe, Thomas Bernard, Esq. took with him one of these birds, which he let go in the town at eleven o'clock A.M. with a note appended, directing dinner to be ready at Castle Bernard at the given time, as he purposed being home that day, when the bird took its flight, and the message was delivered in eleven minutes after, having travelled twenty-three miles Irish in that wonderful short space of time, or, in other words, at the rate of $125\frac{1}{2}$ miles an hour. These pigeons, of which Mr. Bernard has a large flock, are so domesticated, that he can handle them as he pleases, and so very tractable are they, that whenever he calls, they attend the call promptly."

An interesting note on the attachment shown by a tame pigeon to her mate, which had been shot and gibbeted in a pea-field, is related by Mr. Jesse, in his 'Gleanings of Natural History,' p. 112, 1st series.

On examining the crop of some of these birds shot in the month of June 1832, at the wild peninsula of the Horn (co. Donegal), where they are very common, they were found to be filled with the seeds of rushes. When visiting the island of Achil, on the 29th of June 1834, in company with Mr. R. Ball, we saw several rock-doves feeding on the low sandy tract near Keil, and approached them within about twenty-five paces. On remarking to Lieut. Reynolds, R.N. of the Coast Guard service, then stationed there, how near they permitted the approach of our party, he stated that on the preceding day he killed twenty-one of them about the same place, and that he had killed as many as fifty and fifty-two in one day there, although more than two were never procured at one shot. In this wild district they are seldom molested, and consequently exhibit little fear of man. In the level tract alluded to there is no ambush to conceal the sportsman, who must walk up directly within sight of the birds until within shooting distance. It is only at a particular season that they are seen here, when, according to my informant, they are attracted to the locality by a "small pea" which is abundant, and is always found in the crops of those killed. We requested to be shown the plant, and found it to be the common bird's-foot trefoil (*Lotus corniculatus*). When walking along the top of the fine marine cliffs about Portpatrick, in Wigtonshire, in Aug. 1838, in company with Capt. Fayerer, R.N., he remarked, on some rock-doves being sprung, that he had shot many of them there as they came to feed on the "wild liquorice," a favourite kind of food—this also I found to be the *Lotus corniculatus*. About the marine cliffs near Ballantrae, in the adjoining county of Ayr, I have remarked these birds to be common, and have seen flocks of them alight in the fields of green or unripe corn, near the coast*.

In August 1826, when visiting the celebrated cascade at Tivoli, near Rome, rock-doves presented a singular and beautiful appearance, as numbers of them kept flying in and out of the gloomy recesses of the rock, close to where the mass of waters was precipitated: viewed from the heights above, they looked so remarkably small, that at first sight I was deceived as to their species.

At the end of April 1841, I observed rock-doves to be numerous about the precipitous and caverned cliffs of the island of Sphacteria, forming part of the western boundary of the noble bay of Navarino. When there on the 29th and 30th of that month, the officers of H.M.S. Beacon set out in a boat for the purpose of entering the caves to shoot them, and returned on each day with several brace. They remarked, that of the great numbers seen, all were on the western or *sea* side of the island, although as fine caverns are on the eastern or *bay* side. Again, when becalmed in the Ægean Sea on the 10th of June in H.M.S. Magpie, a likely place for these birds presenting itself in a rocky islet, N.E. of Port Nousa, in the island of Paros, a boat was lowered for the commander and myself to go in pursuit of them. A few were seen about its caves and cliffs, and a young bird of the year which was shot on wing was in full plu-

* Mr. Macgillivray gives a full and excellent account of this species from personal observation in Scotland.

mage, but still retained some fragments of down about the head. On this occasion I could not but think how very different was the scene and climate from that in which I first became initiated in rock-dove shooting, by thus visiting marine caves for the purpose. This was in the snow-white range of caverned cliffs extending for some distance westward of Dunluce Castle, near the Giant's Causeway. The rock-dove was equally common in both localities.

THE TURTLE-DOVE—*Columba Turtur*, Linn.—is an occasional visitant to Ireland, and has been obtained in the counties ranging farthest to the south-west and north-west. It has appeared in spring, summer and autumn, and probably visited the island in some instances to increase its species, although no instance of its breeding here is known to me*. In four or five successive years it has occurred.

Mr. Templeton records the turtle-dove as "seen at Cranmore and Shanes-Castle;" the former his own residence near Belfast, the latter that of Earl O'Neil, situated on the borders of Lough Neagh. About the year 1820, one of these birds was seen by a friend at Fisherwick Lodge; which, with the two localities just named, is in the county of Antrim. The collection of J. V. Stewart, Esq. of Rockhill, Letterkenny, contains a specimen shot in the north-west of the county of Donegal. About Youghal, the species has two or three times been met with by R. Ball, Esq. I have been informed by Dr. Harvey of Cork, that "Mr. Fennell of Ballibrado, near Cahir, county of Tipperary, shot a turtle-dove there in the spring of 1830, when several of them were seen during a few weeks about his place; in the following year, likewise, he saw three or four of these birds in the same locality." In March 1834, a turtle-dove shown me by Mr. Glennon, bird-preserved, Dublin, was said to have been shot at Carton, the seat of the Duke of Leinster; and at the same time it was mentioned that the species had for two or three summers visited Simpson's nursery-grounds, near the metropolis. By the late T. F. Neligan, Esq. of Tralee, one of these birds was obtained near that town on September 20, 1834; its crop was filled with wheat. To T. W. Warren, Esq. of Dublin, I am indebted for notes to the effect, that in the year 1834 he saw a recent example of this species, which was shot in the county of Wexford; that two specimens in his collection were shot near Malahide, county of Dublin, in the summers of 1835 and 1836—two or three years before this time, he more than once met with a bird of this species feeding in a field of vetches, in the locality whence the specimens were procured, but it was too wary to admit of his approach within gun-shot. H. H. Dombrain, Esq. states, that one was shot in the summer of 1836, in Lord Roden's demesne, Dundalk. On the 10th of July 1837, I saw a

* Since the above was written, I have been credibly informed that a pair of turtle-doves bred in a plantation near Downpatrick in the summer of 1842. They remained to a late period in the locality, one of them having been killed on the 12th of November. Dr. Burkitt of Waterford mentions two specimens obtained near that town—in 1834 and 1836.

turtle-dove in the shop of Mr. Glennon, who assured me that it had been killed about three weeks previously near Donnybrook, a few miles from Dublin. George Selby, Esq. of Alnwick, Northumberland, (brother to the distinguished naturalist, and imbued with similar tastes,) on visiting Belfast in October 1837, informed me that one of these birds, which admitted of a close approach, was seen by him on the road-side between Armagh and Aghnacloy in the first week of that month.

When on a tour in Holland and Switzerland in the summer of 1826, the turtle-dove was met with, and in the former country was very tame. When proceeding in H.M.S. Beacon from Malta to the Morea in the spring of 1841, a few of these birds appeared on the 24th, 25th, 26th, and 27th of April, coming from the south on their way from Africa to Europe. They generally came singly, and not more than two were seen in company*. On the 29th of April I saw one near Navarino; and again on the 6th of May in the island of Syra:—at the end of this month, numbers were observed in the spacious gardens of the old seraglio at Constantinople.

THE PHEASANT—*Phasianus Colchicus*, Linn.—is a species, which, having unquestionably been introduced to Ireland, has only claims to be considered in a supplementary note. The period of its introduction is unknown to me †. Smith would seem to have imagined that it was indigenous to the island, as in his 'History of Cork' it is observed—"They are now [about 1749] indeed very rare, most of our woods being cut down." This splendid bird has for a long time past been common in many parts of the country, where it is carefully preserved and protected. In Down and Antrim the ring-necked variety is not uncommon; and I have seen a few examples (shot in a wild state) of the female in the assumed plumage of the male, but, although his colours were there, they were always dull in hue compared with the gloss and splendour of the adult plumage of the veritable cock—on the dissection of one of these, the eggs were observed to be not larger than clover-seed.

I have often remarked the aversion of the pheasant to take wing when near its home, and have seen it, even when cantered directly up to, or charged on horseback, run across a considerable stretch of field to the preserve, rather than take wing. Attention has been called by some writers to the effect of thunder in prompting the pheasant to crow, and on this subject the following note appears in my journal:—"April 7, 1833. When walking along the banks of the Lagan today between four and five o'clock, there were a few peals of thunder, at the immediate commencement of each of which, the pheasants in Belvoir Park crowed, although their 'most sweet voices!' were not to be heard at any other time." Mr. Waterton does not believe in the capture of pheasants by means of the fumes of sulphur, but though never present at any such poaching office, I

* In Annals, vol. viii. p. 128, are further particulars.

† In the year 1589 it was noticed as common. See note on Quail.

have no doubt from what has been related to me that they are so taken, and that the vile practice is resorted to on the western, as well as the eastern side of the Irish Sea. An observant friend has often remarked that during the absence of the pheasant from its nest the eggs (sometimes thirteen in number) were covered with hay, which he believed to have been always placed there by the bird itself.

Upon looking to notes on the food observed in opening nine pheasants, killed at various times and places during five months—from December to April inclusive—I find that the stones of haws or fruit of the white-thorn were contained in seven of them; in addition to these were grain, small seeds, and peas: one exhibited a few roots of plants and twigs of trees: another was nearly filled with grass: one only contained any insects—all presented numerous fragments of stone. A pheasant which frequented our own garden daily for some time in summer was accused of feeding on black currants; the tops of turnips are sometimes eaten; and a fine cock bird was in the habit of visiting a stable-yard in the vicinity of Belfast very early in the morning for the purpose of feeding there.

The Bishop of Norwich, in his 'Familiar History of Birds,' mentions an ungallant and furious assault of a cock-pheasant upon a young lady when quietly walking on the highway, but who, nevertheless, seized her assailant and carried him home. Though, perhaps, not a rare instance in the case of the barn-door fowl, it may be worth noticing, that a fine cock of this species kept in our own yard, on more than one occasion assaulted an old cook who nowise meddled with him, though she did sometimes lay hold of some of the members of his seraglio. She was once indisposed for a few days after his attack, on which occasion he, according to her own version, had struck her "severely with his spurs between the ribs."

In April 1842 the following paragraph appeared in a Dublin newspaper:—"On Sunday se'nnight, a child named Martha Collins, living at Harold's-cross, was sent by her mother to a livery-stable yard in the neighbourhood, kept by a Mr. Smith. On entering the yard, a cock flew at the child and struck her three or four times in the face and other parts of the head, cutting her with each blow. A woman, also named Collins, resident in the yard, hearing the screams of the little sufferer, ran to her assistance and rescued her. On the Tuesday following, it was considered necessary to have medical aid, and the child was shown to Dr. Monks, who at once pronounced the case fatal. The child expired the next day. An inquest was held on the body, and a verdict according to the above-mentioned circumstance returned."

In the work last mentioned, a mousing hen is alluded to (vol. ii. p. 97. 3rd ed.), which reminds me that in my young days there was a hen of our own stock which took an especial delight in mouse-hunting, and often have I seen her carrying her victims about as if in triumph.

GOLD PHEASANT (*P. pictus*), SILVER PHEASANT (*P. nycthemeris*). As it is interesting to know the age which these birds will

attain in captivity, one or two notes on the subject may here be introduced. A fine male silver pheasant has been known to me to live twenty-one or twenty-two years. Such gold pheasants as I happened to learn the age of did not exceed half that period, though which species can really be termed the longer lived, I am unable to state. Such of the latter as came under my knowledge died almost instantaneously, and when in the highest condition as to flesh and plumage. Some years ago I saw at Glenarm Park a brood partly of the common, and partly of the silver pheasant, which had thriven very well together under the maternity of a "barn-door" hen—the young of both species made their first appearance on the same day.

It may here be mentioned that a pair of PEA-FOWL (*Pavo cristatus*) which we had for some time, paid due respect to the hall-door, as there they would eat only of bread or biscuit (moistened), although at the back door, or in the yard, they would feed freely on potatoes.

George Matthews, Esq. informs me that many years ago at Springvale, county of Down, where nearly fifty GUINEA-FOWL (*Numida Meleagris*) were kept, they flew about in company every evening before roosting, and then settled for the night on the highest trees about the place, which were ash. On a field of barley being reaped there, a nest of these birds was discovered, containing between two and three hundred eggs.

[To be continued.]

XLV.—*Anatomical Researches on the Nervous and Circulating Systems of the Triton aquaticus, or Aquatic Salamander.* By G. NICOLUCCI of Naples. Communicated by Dr. Grant, Professor of Comparative Anatomy and Zoology in University College, London.

THE object of the brief investigations which we now detail is merely a summary indication of the nervous and circulating systems of the Aquatic Salamander, in preparing a complete monograph of which we have been for some time engaged.

1. *Nervous System.*

The encephalic mass of the Salamander occupies a great part of the cavity of the cranium, and is formed by two oblong hemispheres, having a median furrow on their upper and under surface. The pineal gland, sufficiently developed, fills the space that the hemispheres present on the under side by diverging a little from each other, and closes the large calamus scriptorius between the two enlargements of the medulla oblongata, which, extended as far as the tail, presents a longitudinal median furrow. It is around the brain itself, and most especially externally along the furrow that separates the lobes of the medulla oblongata, that the chalky follicles of

Comparetti are visible, which appear to penetrate as far as the auditory organ, and which are again met with under the skin, of the use of which we are ignorant. Certainly they cannot be confounded with the dermal follicles which secrete the mucus with which the surface of the Salamander is covered, as they are considerably larger than these and quite different in colour.

The spinal marrow has not any enlargement corresponding with the nervous plexuses, which are directed to the anterior and posterior extremities; but the nervous filaments which spring from it have only a double root, which appears evidently in all the costal nerves, resembling what Delle Chiaje has observed in the Proteus. The brachial plexus is formed by three cervical nerves, which send off, before they unite, filaments both for the skin and the surrounding muscles, and, again united, divide into two branches, of which the shorter radial does not go so far as the fore-arm, dividing itself into infinite ramusculi; and the cubital, having furnished branches to the muscles of the arm, parts into four digital branches, each directed to its own finger. The plexus ischiaticus also consists of three lumbar nerves, of which the median sends branches to the genital organs and to the kidneys, the posterior sends small filaments to the neighbouring muscles, and the superior join to form two trunks, the anterior and posterior sciatic; the first the shorter, which does not reach so far as the thigh; the second, which extends to the foot, parting into two branches, one which supplies the two digital nerves to the first two fingers, and the other those of the remaining three.

The great sympathetic nerve appears to have its origin from the third cervical nerve, from which a filament is seen to be given off, which, passing across the other cervical nerves that form the brachial plexus, gives origin to the exceedingly minute ganglions on the spinal nerves precisely where their double roots join, and terminates in the first of the lumbar nerves, which unites with the others in forming the plexus ischiaticus.

The cerebral nerves of the Salamander are reduced to the first, second, fifth, eighth and ninth pairs. The first of these or the olfactory, springing from the anterior part of the cerebral hemispheres, immediately distributes itself in the nasal cavity; the second or the optic, springing from the rudimental optic thalami? (lobes), turns towards the eye, the bulb of which it penetrates entire; and the fifth or the trigeminus, taking its rise immediately in the upper part of the medulla oblongata, trifurcates after having given origin to a ganglion, the first

branch directing itself in a great measure to the skin of the muzzle and to the internal parts of the eye, the second to the maxillary angle, and the third partly to the skin of the head and partly to the inside of the mouth. The eighth pair or the acoustic, rising immediately from the brain, and in contact with the calcareous granules, enters into the auditory cavity; and the ninth or the pneumo-gastric, having a common origin with the fifth, at first enlarges into a ganglion, then resolves itself into three branches; the outer directed to the skin, the inner to the heart and the aorta, and the median further parts into two branches, one for the stomach and the other for the lungs.

2. *Circulating System.*

A. *Arterial System.*—From the conical ventricle of the heart, placed above a single (? double) auricle, rises the *bulb of the aorta*, which sends out three great trunks from both sides: the upper of which may take the name of *carotid*, since it entirely distributes itself in the head, and at first sends a superficial branch into the interior of the mouth, then another which soon divides into two; the internal, which supplies a branch to the eye and enters the cranium, passing over the brain and anastomosing with the opposite branch; and the external, wholly directed to the ear. The last most conspicuous branch is the maxillary, which supplies also a small branch to the muscles of the neck. The third or lower trunk, having anastomosed, by means of a transverse branch, with the median, is directed entirely to the lungs, where it forms a very delicate network joined by its extremities with the ramifications of the pulmonary vein. The median trunk is that which makes a curve and then descends to form the aorta; but before it bends, a little after its quitting the bulb, it sends out a branch which turns directly towards the nasal fossæ, supplying besides a ramuscule to the eyeball. The aorta, which runs through the whole body to the extremity of the tail, furnishes from its commencement in opposite directions the subclavian arteries, which branch off in their turn into the brachial, ulnar and radial, terminating in the four digitals for the upper limbs, before they enter which they furnish a large branch (*arteria mammaria*) anastomosing with the ischiatic arteries, and from which separate so many ramusculi for the abdominal muscles and skin. Thence from the aorta there rises lower down the cœliac artery, from which originate all the arterial vessels of the abdominal cavity. Because there arises from this the *cysto-hepatic* artery directed towards the gall-bladder and to the liver, where it is dispersed in a multiplicity of branches; the

pancreo-duodeno-gastro-splenic divided into the *pancreo-duodenal* and the gastric, which previous to its being divided upon the stomach sends two pretty large branches to the spleen. Two other small trunks which spring from the cœliac are all directed to the small intestine (*arteriæ mesentericæ superiores*); whilst another branch (*a. mesenterica inferior*) goes off direct from the aorta to disperse itself on the large intestine. Betwixt the cœliac and the last-described artery, the aorta always sends off branches to the testicles and the vasa deferentia in the males, to the ovaries and oviducts in the females; to the adipose bodies; to the kidneys in 10—12 ramusculi. Along the course of the aorta there pass off from it at right angles and in opposite directions the intercostal arteries, and from the last the vesical and the ischiadic, which, having given a superficial branch to the surrounding muscles, and anastomosing with the mammary, turn towards the hinder legs, soon divided into the femoral, tibial and fibular, extending to the fingers, divided into the five digitals. The aorta being prolonged into the tail, first gives small branches to the cloaca, and moreover lateral branches as far as to the extremity of the tail.

B. Venous System.—From the union of the digital veins arise the femoral and tibial of the hinder limbs, which are united, in the interior of the pelvis, to the caudal vein, from which then arise the *renal afferent* vein, which receives the vesical and is dispersed through the whole kidney by the aid of considerable lateral branching trunks; the *umbilical*, which runs isolated along the ventral side of the body so as to reach the liver and there lose itself; the *vena portæ*, which ascending successively collects many intestinal branches, the *splenic* vein, the *pancreatic*, the *gastric*, and divides thus enlarged in the liver; whilst the *renal efferent* vein, arising by the side of the kidneys from the many trunks which seem to be anastomosed with the renal efferent veins in the same manner as the pulmonary artery and veins are upon the respiratory sac, turns to the *vena portæ**.

* Jacobson was really the first person who made mention of this peculiar circuit of the blood in the kidneys which occurs in fishes and reptiles, but not in birds, as Nicolai has demonstrated (Oken's 'Isis,' 1806, p. 404); but the description given of it by Jacobson was altogether doubtful and confused, so that many anatomists either paid little regard to it, or considered it as a thing not at all demonstrated (Duvernoy in 'Cuvier, Leçons d'Anat. Comp.' 2nd edit., Paris, 1839, tom. vi. pp. 254, 255). Meyer (Analekten für vergleich. Anat., Bonn, 1835) pointed out traces of it, in the *Rana pipa*, somewhat more distinctly than the Danish anatomist; and Wagner in like manner made it the subject of his investigation (Lehrbuch der vergl. Anat.,

The vena cava posterior collects the branches of the dorsal skin, the spinal branches of the ovary and the oviducts in the females, of the testicles and deferential canals in the males, and of the adipose bodies, and running by side of the liver receives there the hepatic vein; thence discharges itself into the single auricle of the heart. The cava superior is formed of the jugular veins which carry back all the blood of the head, from the subclavian which bring back the nutritive liquid from the upper limbs, and from the pulmonary veins.

Leipsig, 1834, pp. 172, 178). But none of these has unfolded this question with so much accuracy as Delle Chiaje.

We shall not now repeat what the above-mentioned anatomists have said upon the venous system of Jacobson,—a discussion on which we shall enter in our Monograph,—but shall state that the observations of Delle Chiaje have already been recorded in his 'Notomia Comparata' (Naples, 1836, ii. 104—114. pl. 53. f. 1. Q q K B, in the *Rana esculenta*, 3 H 45 v 8 for the *Coluber natrix*), in the 'Ricerche anatomico-fisiologiche sul Proteo serpentino' (Naples, 1840, inserted in the 'Antologia di Sc. Nat. di Piria e Scacchi' for March 1841), and more particularly in the 'Monografia del Sistema circolatorio sanguigno degli animali rettili,' presented with 16 plates imperial 4to to the R. Acad. of Sciences, and mentioned in the Annual Discourse, 1838, of the Secretary Cav. Monticelli, and in our translation of Tiedemann's 'General and Comparative Anatomy' (Nap. 1840, p. 142). We ought lastly to notice that Delle Chiaje two years ago undertook for us the injection of the entire Jacobsonian system (which he appropriately denominates the uro-entero-hepatic) in an eft, and that the description of it traced by us in the salamander was taken from an injection, which at our request he was so good as to make for us, thus enabling ourselves to repeat it, as we often have done, with every kind of facility.

With regard to the office of the kidneys in reptiles and fishes, the opinions of Jacobson appear probable enough that they assist in the function of the hæmaturia, although Bojanus (Oken's 'Isis,' 1 bd. 7 hft. p. 873) and Carus (Lehrb. d. vergleich. Zoost. ii. Leipsig, 1834, p. 700) maintain that all the blood must be carried directly into the liver. This function of the kidneys was expressed by Jacobson (*De peculiari systemate venoso, &c. Hafniæ, 1821*) in the following terms: "This venous system is charged with carrying into the kidneys, or into the kidneys and liver, the venous blood coming from the hinder and middle part of the body, making it subserve the functions of the secretions of those organs." And this for a double reason, both because the lungs, or at least the branchiæ, in reptiles and fishes, do not present to the air so ample a surface as in the higher animals, to the vascular ramifications which carry the blood there into contact with the aerial fluid; and also because the venous blood, mixing in the heart with the arterial blood returned from the pulmonary veins, this is conveyed there in a state the most fitted for the wants of nutrition; and this clearly takes place partly in the kidneys and partly in the liver, and partly also, it may be said, in the skin, where the blood undergoes a modification in its proper elements, and from being venous and useless for nutrition becomes arterial and nutritive.

It appears, then, that subsequent to Delle Chiaje, who was the first to give its topographical description and delineation, nothing new has been added to the anatomical knowledge of the Jacobsonian system; nor, since Jacobson, any new idea respecting its physiological interpretation.

[The zootomical labours of Delle Chiaje have now been familiar to the anatomists of Europe for nearly a quarter of a century, and they reflect great honour on him and on his country. It must therefore be gratifying to all foreigners to observe the zeal and candour of his fellow-labourers at Naples, in thus reclaiming for their distinguished countryman the merit of originality to which he is so justly entitled.—R. E. G.]

BIBLIOGRAPHICAL NOTICES.

The Climate of the South of Devon and its influence upon Health; with short accounts of Exeter, Torquay, Babbacombe, Teignmouth, Dawlish, Exmouth, Budleigh-Salterton, Sidmouth, &c. By Thomas Shafter, M.D., Physician to the Exeter Dispensary, Lying-in-Charity, &c. Pp. 258. 12mo. Churchill: London, 1842.

IN this work, although chiefly embracing statistics and medical topography, there are many interesting observations relative to natural history, and on that account it may with propriety be noticed in this Journal.

The work was written "in accordance with the suggestion of Sir James Clark, that in order to determine the true character of the climate of the south-western part of England, observations should be made in some of its principal localities."

This has been already done in regard to Bristol and Clifton by Drs. Carrick and Symonds, and in regard to the Land's End by Dr. Forbes. Dr. Shafter's publication is a continuation of the subject.

The work is divided into two parts; the first treating of the climate and diseases of South Devon, and the second of its geology, natural productions, æconomical history and statistics.

The climate of Devon generally is warm and moist: this depends partly on its latitude and partly on its position as regards the ocean, nearly half of its circumference being sea-coast. The mean annual temp. of South Devon is $51^{\circ}29'$, or nearly 1° higher than that of London; one of its most striking characteristics is equability of temperature. The indications of the barometer, although not very dissimilar from those of London, yet show that the atmosphere of the district is both less dense and less liable to changes in its density than is the case in the metropolis. It is charged with moisture, and a slight depression of temperature causes deposition of dew or a fall of rain. In general language it may be stated, that from March to September the climate is dry, and during the remainder of the year humid. The mean annual fall of rain amounts very nearly to 32 inches, being about 7 inches more than fall in London. The average number of wet days (*i. e.* days in which a fall of rain, however slight, takes place) amounts to rather more than 162, while in London it amounts to 178.

Frost is not unfrequent during winter and spring, but is rarely of long continuance. Snow rarely falls in any great quantity, or re-

mains on the ground above two or three days, except on the high lands. Thunder and lightning are comparatively unfrequent, and very rarely indeed are the storms attended by serious or awful consequences. The prevailing winds are west and north-west. "During the winter season the south-west wind is often accompanied by a warm thick mist, which is peculiarly relaxing, and from its frequency not unaptly styled *Devonshire weather*."

"The chief characteristic then of the climate of this district is that of being warm, soft, mild, equably calm and free from storms: though subject to a large share of rain, yet it seldom occurs that a whole day is so unceasingly wet, as not to afford some hours, whether early or late, sufficiently fine for outdoor exercise." The general mildness of the climate is indicated by many tender and delicate exotics flourishing in the open air and not being destroyed during the winter. Among them we may notice *Erythrina laurifolia*, *Laurus Camphora*, *Camellia japonica*, *Thea viridis* and *Bohea*, *Magnolia fuscata*, *Arundo Donax*, *Agave americana*, *Passiflora brasiliensis*, *Hydrangea hortensis*, *Mimulus cardinalis*, *Myrtus communis*, *Punica Granatum*, *Citrus medica*, *Limonum*, and *aurantium*, *Olea europæa*, *Gladiolus cardinalis* and *psittacinus*, various species of *Alstræmeria*, *Callistemon salignum*, *Cheiranthus tristis*, *Salvia angustifolia*, *Ceanothus azureus*.

In illustrating the effects of climate upon the constitutions of the inhabitants, a description is given of the diseases incidental to the district. The results are deduced from the cases admitted to the Exeter Dispensary during ten years, and embrace 11,258 patients, of whom 4535 were males and 6723 females. September appears to be the healthiest month in the year. A diagram is given showing the relative number per cent. of sick persons in each month, and full tables are given illustrating the prevalence of particular diseases.

This being more immediately connected with medicine, we do not enter upon it. We would recommend to all medical men this part of the work, as well as the notice of those diseases in which the climate of Devonshire proves beneficial.

In treating of the geology of the district Dr. Shafter remarks, that the rocks which occur present a very extensive series, "ranging from the granite to the lower cretaceous group; the series however is by no means complete, many of the intervening rocks being wanting. Those which present themselves for investigation are granite, grauwacke slates, carbonaceous rocks, schists, limestone, new red sandstone (including Exeter conglomerate), greensand, granitic greenstone and trap rocks."

The indigenous Phanerogamous plants of Devonshire are said to amount to about 800, and the following is given as the number of species in the different natural Orders:—

MONOCOTYLEDONES.

Gramineæ	75	Aroideæ	8
Cyperaceæ	48	Asphodeleæ	5
Juncaceæ	16	And referable to eight other	
Orchidaceæ	13	natural Orders	13
Fluviales	10		

DICOTYLEDONES.

Compositæ	72	Chenopodææ	15
Cruciferæ	44	Boraginææ	13
Leguminosæ	39	Primulacææ and Lentibulariæ	13
Umbelliferæ	38	Geraniacææ and Oxalidææ..	14
Rosacææ and Pomacææ	36	Rubriacææ	11
Labiataæ	35	Hypericinææ	9
Scrophularinæ and Oroban-		Sempervivææ	9
cheæ	31	Solanææ	8
Caryophyllacææ and Lineææ..	31	Euphorbiacææ	8
Corylacææ and Salicinææ ..	28	Papaveracææ	7
Ranunculacææ	20	And referable to thirty-nine	
Polygoneæ	18	other Orders	113

The Grasses form nearly two-thirds of the Monocotyledons, and together with the *Compositæ* one-fourth of all the Phanerogamous plants; while *Cruciferæ*, *Leguminosæ*, *Umbelliferæ*, *Rosacææ* and *Labiataæ* form together one-fourth more. Amongst the plants peculiar to the county are noticed *Linosyris vulgaris* and *Lobelia ureus*; *Primula veris* and *Campanula rotundifolia*, of common occurrence in the adjoining counties, are but rarely met with. *Erica vagans* is chiefly restricted to the serpentine formation; *Iris fœtidissima* and the Elm are frequent in the red sand; the *Cistacææ*, *Clematis vitalba* and *Inula Conyza* on the limestone, and the Oak on the schist formation.

We trust that the example which has been set by Dr. Shafter will be followed by others, and that ultimately we may expect to have full accounts of the climate and natural productions of the various counties of England.

The tables of statistics of life and disease have been made with great care and are well worthy of attention.

Annales des Sciences Naturelles:—*Zoologie*, M. Milne Edwards. *Botanique*, MM. Ad. Brongniart et Guillemin. Paris: Fortin, Masson and Co.

Sept. 1842.—*Zoology*.—M. F. Dujardin on the Anatomy of *Gordius* and *Mermis*. The author gives the details of structure in the *Gordius aquaticus* and *Gordius tolosanus*. He confirms the account given by M. Siebold of the extraordinary structure of the animals of this genus. "They are," says M. Dujardin, "without mouth, without anus, without intestine, without veritable nerves or vessels. They have internally a fleshy muscular tube with thick walls. They have only a single aperture situated at the posterior extremity and serving doubtless the function of generation." Wanting all the organs necessary to the preservation of the individual, M. Dujardin is led to suppose that the *Gordius* may be the last stage of development of a worm, in which those organs have been atrophied in consequence of the excessive growth of the tegumentary system and of the organs destined for the continuation of the species. His genus *Mermis* differs from *Gordius* in the structure of its integument, in the presence of a minute terminal mouth, and in the mode of development of the ova.

There is something so anomalous in the structure of these worms, that we cannot admit the accounts of it to influence our generalizations until we have further observations, and above all a careful examination of animals of different ages. There is no difficulty in procuring material to work upon; will no British observer take up the subject?—M. E. Robert on the Habits of Ants.—M. Bouchard-Chantereaux on the genus *Productus*, in which he proves that the dorsal valves of these shells is not imperforate as is generally supposed, but the contrary, and attached by a ligament like its allies.—Comparative history of the Metamorphosis and Anatomy of *Cetonia aurata* and *Doreus parallelipedus*, by M. Leon Dufour: an elaborate paper beautifully illustrated.—A translation of Mr. H. Goodsir's important paper on the Development of the Eggs and Metamorphoses of *Caligus*, from the 'Edinburgh New Philosophical Journal' for July 1842.—M. Lucas on new Insects from Algeria.—M. H. Mitre on four new Shells, viz. 1. *Helix Minorciensis* (allied to *H. serpentina*) from Port Mahon; 2. *Helix Telonensis* (allied to *H. glabella*) from Toulon; 3. *Helix Nyeli* from Port Mahon, and 4. *Cardium aquilinum* from Toulon Roads. This paper wants figures.

Botany.—On the genera *Polysaccum* and *Geaster*, by MM. L. R. and C. Tulasne. Their observations on the first are at variance with those of M. Corda: figures excellent.—On the dry Gangrene of Potatoes, as observed for some years in Germany, by M. de Martius (from the 'Comptes Rendus'): a paper highly interesting to the vegetable pathologist, in which it is shown that the disease depends on the presence of a parasitic fungus.—On two plants new to the French Flora, by M. Delastre: these are *Cirsium spurium* and *Linaria prætermissa* (new; very near *L. minor*).—On the Nectaries of Plants, by M. L. Bravais.—On new Plants of Madagascar, &c., by M. Bojer.

Oct. 1842.—*Zoology*.—On the Embryo of *Syngnathus Ophidion*, Linn., by M. de Quatrefages: an elaborate memoir on the early history of these curious marsupial fish, illustrated by beautiful figures.—Researches on the composition of the Blood in some domestic animals, by MM. Andral, Gavarret and Delafond.—Researches on Digestion, by MM. Bouchardet and Sandras.—Memoir on Belemnites, by M. Alcide d'Orbigny. Commencement: an excellent paper.

Botany.—On the Distribution of the Arborescent Vegetables on the coast of Scandinavia, and on the north side of the Grimsel in Switzerland, by M. Ch. Martens. "If we except the oak and the beech, the succession of trees is the same on the Grimsel and in the North."—On the genus *Xiphophora*, and on the question whether we find in the *Fucaceæ* the two modes of propagation observed in the *Florideæ*? by Dr. Montagne.—On two genera confounded with plants of the family of *Myrsinaceæ*, by M. Alph. DeCandolle: these are, *Parastemon*, founded on the *Embelia urophylla* of Wallich, and *Kellana*, on the *Myrsine Kellan* of Hochstetter.—On the Flora of Southern Brazil, by MM. Aug. de St. Hilaire and Ch. Naudin. Third part. The plants enumerated belong to the family *Malvaceæ*.—M. Gay on the Flowers and Fruit of *Fumaria officinalis*.—M. C.

Dareste on a Monstrosity of *Delphinium Ajacis*.—M. Bunge on the genus *Braya*.—Count Jaubert and M. E. Spach, a Monograph of the genus *Cicer*: eight species enumerated.—Monograph of the genus *Halimodendron*, by the same botanists: three species described.—Third Century (5—8 decades) of new Exotic Cellular Plants, by Dr. Montagne.

Nov. 1842.—*Zoology*.—Continuation of M. d'Orbigny's memoir on the Belemnites; the author arranges them under five groups: 1st, the *Acuari*; 2nd, *Canaliculati*; 3rd, *Hastati*; 4th, *Clavati*; and 5th, *Dilatati*. These divisions not only present good zoological characters, but are respectively concentrated in different geological formations.—M. de Quatrefages on *Eleutheria dichotoma*, a new genus of Radiata allied to *Hydra*. Several highly original papers by this naturalist have lately appeared in the 'Annales,' founded on researches among the Invertebrata of the coasts of France. Most of the animals he has described may be looked for in our own seas. The new zoophyte here fully investigated is microscopic, and appears to us to be rather an ally of *Lucernaria* than of *Hydra*, very possibly the young state of some known species. The author has a tendency to see too much, and to put too great faith in the description of *Hydra* by M. Corda. His generic character, "Ocular points at the bases of the arms: no feet," is insufficient and unphilosophical.—M. S. Lovén on the Metamorphosis of an Annelide, see 'Annals Nat. Hist.' vol. xi. p. 43.—M. S. Lovén on *Myxostoma cirrhiferum*: an excellent paper on the curious parasite which infests the arms of *Comatula*.—M. Brullé on the Classification of Animals in parallel series, concluded.—M. Flourens on the Development of Bone.

Botany.—M. Montagne on Exotic *Cellulares*, continued.—Count Jaubert and M. Spach, Monograph of *Chesneya*.—Prof. Bernardi on the characters of *Tulipaceæ* and allied families (a translation from the 'Flora' for 1840).—M. Desvaux on a new Fig and some plants furnishing Milk.—M. Goepfert on the Anatomical Structure of some *Magnoliaceæ* (from the 'Linnæa'). The researches of the author lead him to deny the analogy asserted to exist between *Tasmannia* and *Drimys* on the one hand, and the *Coniferæ* on the other. The result is important, as removing an uncertainty from the study of fossil botany.

Dec. 1842.—*Zoology*.—Observations on the structure and functions of some Zoophyta, Mollusca and Crustacea of the coasts of France, by M. H. Milne Edwards. Every communication from the pen of M. Milne Edwards is of great value. In this paper he gives some most interesting notices: 1. On the Hermaphroditism of Pectens (in describing the testicle there is no mention of Spermatozoa). 2. On the Organization of *Carinaria Mediterranea*: the distinction of sexes in the animals of this species is first made out. In describing the respiratory system no mention is made of the presence or absence of cilia on the branchiæ, the structure of which is compared to that of the branchiæ of the *Pleurobranchus*. [We have sought for cilia on the branchiæ of *Firola* in vain, but with better glasses and under more favourable circumstances they may perhaps be detected.] The

nervous system is well made out. 3. On the existence of a Gastrovascular apparatus in the *Calliope* of Risso, a Mollusk of the family of *Eolidae*. [The phenomenon herein described may be well seen in the *Montagna viridis*, Forb. of our own seas.] 4. On the Spermatozoophores of the *Cephalopoda*. All these notices are illustrated by beautiful figures.—On the Neutral Nitrogenous Substances occurring in Organization, by MM. Dumas and Cahours.—Remarks relating to Insects found in the neighbourhood of Paris, by M. E. Robert.—Note on the existence of the Urea in the Normal Blood, by M. Simon (from Müller's 'Archiv').

Botany.—Observations on the structure of Dotted Vessels, by Prof. Mohl (from the 'Linnæa').—Observations on the Flower and Ovary of *Oenothera suaveolens*, by Dr. Duchartre: an elaborate paper with beautiful illustrations.—Note upon the Mineral Bases occurring in the Walls of Cells, by M. Payen.—Review of some observations on the Development of the Appendages of the Vegetable Axis, by M. Ch. Naudin.—Prof. Bernhardt on the *Sesameæ* (from the 'Linnæa').—Prof. Koch on the Strawberries of Germany and France (from the 'Flora').—M. Meyer on the species of *Agrimonia* (notes on sixteen species, results of examination of nine), from the Bulletin of the Imperial Academy of Petersburg.—Fischer, Meyer and Schrenk on *Schrenkia* and *Cryptodiscus*, new genera of *Umbelliferae*: extracted from a Russian work on the plants of Longaria.

The London Journal of Botany. By Sir W. J. Hooker, K.H. &c. &c. No. 11, Nov. 1842, to No. 15, March 1843.

Contents:—Botanical Excursions in South Africa; by C. J. F. Bunbury, Esq. (Nos. 11, 13.).—On a new species of *Thuja*, and on *Podocarpus Totarra* of New Zealand; by Sir W. J. Hooker (No. 11. t. 18, 19.).—Memoir to determine the use of Pollen in Natural Classification; by Dr. Aldridge (No. 11. t. 20.).—On the Hair-collectors of *Campanula*; by W. Wilson, Esq. (No. 11. t. 20.).—Figures and descriptions of three species of *Podocarpus*; by Sir W. J. Hooker (No. 12. t. 21, 22, 23.).—Genera of Ferns; by J. Smith, A.L.S. (No. 12.).—On the Vegetation of the Feejee Islands, Tauna, New Ireland and New Guinea; by R. B. Hinds, Esq. (No. 12.).—Notes of a Botanical Tour in the Azores; by H. C. Watson, Esq. (No. 13, 15.).—Descriptions of four new genera of Plants from the Organ Mountains [*Boromania*, *Leucopholis*, in *Compositæ*; *Hockinia*, in *Gentianeæ*; *Napeanthus*, in *Cyrtandaceæ*.] (No. 13.).—Contributions towards a Flora of South America: Mr. Schomburgk's Plants from Guiana; by G. Bentham, Esq. (No. 13.).—Contributions towards a Flora of South Africa; by Dr. Meisner (No. 13, 14.).—Biographical Sketch of F. Bauer; by Dr. Lhotsky (No. 14.).—Notes on a Botanical Excursion in South Carolina; by Dr. A. Gray (No. 15.).—Notes on the Distribution of Plants in Aberdeenshire; by Dr. Dickie (No. 15.).—Some data towards the Botanical Geography of New Holland; by Dr. Lhotsky (No. 15.).—Brief descriptions of *Juniperus Bermudiana* and *Dacrydium elatum*; by Sir W. J. Hooker

(No. 15. t. 1, 2.).—Botanical Information : Botanical Letters from Dr. Hortmann in Surinam (No. 11.); also from Mr. Drummond in New Holland (No. 12.), and extracts from M. Boissier's Spanish Botany (No. 12.); Notice of Le Conte Jaubert and M. Spach's *Illustrationes Plantarum Orientalium*; Mr. H. C. Watson's geographical distribution of British Plants, *third edition*; and of the Rev. J. E. Leefe's '*Salictum Britannicum Exsiccatum*' (No. 15.).—Botanical Collections noticed: China, South Africa, Caucasus, Swan River (No. 15.).

Salictum Britannicum Exsiccatum. Fasc. I.

By the Rev. J. E. Leefe, M.A.

In a former number of the 'Annals' we announced that a work under the above title was in preparation, and we have now the pleasure of informing our readers that the first fasciculus has reached us. We beg to recommend the collection most strongly; the specimens are ample, in good preservation, and very complete; and the notes appended to them are usually of considerable value. Great additional interest is given to these specimens by their having been inspected, and the nomenclature authenticated, by Mr. Borrer, whose acquaintance with willows generally, and particularly those of Britain, is probably unequalled. We hear that the great labour and amount of time which the preparation of this fasciculus has required causes Mr. Leefe to have considerable doubt of being able to continue the publication, but we earnestly hope and expect that this part will be so well received by botanists as to cause him to come to a different determination. Owing to some accident the author has not appended his name to the collection, nor named any publisher, we therefore think it right to add his name and address, viz. "Rev. J. E. Leefe, Sigston, North Allerton, Yorkshire." We believe that the collection may be procured from Messrs. Whittaker and Co., London, and recommend an early application, as very few copies were prepared. The price is extremely moderate.

PREPARING FOR PUBLICATION.

Mr. Hassall informs us that he has long been collecting materials for a History of the British Freshwater Algæ. Mr. Hassall states, that should any botanists be desirous of investigating those species which occur in their own neighbourhoods, he will have much pleasure in assisting them in the determination of those species, which plan he hopes may conduce much to the completeness of the work.

The simplest mode of transmission, he states, is to place a fragment of each species in a piece of moistened linen, and to enclose a number of such packages in an envelope of tin-foil.

Illustrations of Indian Ornithology; a series of fifty coloured Lithographic Drawings of Indian Birds, accompanied by descriptive Letterpress. By T. C. Jerdon, Assistant-Surgeon, Madras Medical Establishment.

The original drawings have been executed by *native artists*, from pencil sketches by the author, and under his immediate superintend-

ence. Several of them were exhibited at a meeting of the Literary Society of Madras some time ago, and were much admired for their beauty and accuracy.

The subjects for the present publication will be selected so as to present an agreeable variety, and most of them will be figured here for the first time.

The drawings will be lithographed both on quarto and royal octavo paper. The colouring will be finished under the author's own superintendence.

The letter-press will contain a full description of the species figured.

The work is proposed to be published by subscription. Subscribers' names received by Mr. Lizars, Engraver, Edinburgh.

We have, at the same time, received a specimen of one of the illustrations, which is well executed and carefully coloured.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Feb. 22, 1842.—William Horton Lloyd, Esq., in the Chair.

The following "Monograph of *Crassatella*, a genus of Acephalous Mollusks (Family *Maत्रaceae*)," by Mr. Lovell Reeve, was read.

The genus *Crassatella* was instituted by Lamarck for the purpose of associating certain bivalve mollusks that had been hitherto distributed amongst the *Maत्रæ* and the *Veneres*. Their shells exhibit an interesting peculiarity of character, differing from the former in being thick and solid, and for the most part covered with a strong brown epidermis; and from the latter in the position of the ligament. The genus, however, as introduced by Lamarck, was yet imperfect; it included five species that could not easily be distinguished from his *Amphidesmata*, and was therefore susceptible of farther division. With the view of uniting the intermediate species of these genera, a new genus was proposed by Deshayes, under the title of *Mesodesma*, and I have found great convenience in adopting it in my 'Systematic Conchology.' Thus out of eleven species described by Lamarck as *Crassatellæ*, six only can be allowed to remain. Since his time, however, several new and important species have been discovered; two have been described by Sowerby in the 'Proceedings' of this Society, one by the same author in his 'Appendix to the Tankerville Catalogue,' and I have now the pleasure of exhibiting *ten* more, which I believe to be entirely new to science.

To make this a complete monograph, I mention all the species, distinguishing the new ones by the addition of the specific characters.

1. *CRASSATELLA CASTANEA*. *Crass. testâ ovato-trigond, gibbosâ, umbonibus planè erosis, epidermide castaneâ, quasi politâ nitente, indutâ; intùs subfuscâ; latere antico rotundato; postico angulifero, abrupto.* Reeve, Conch. Icon.* *Crassatella*, pl. 1. f. 3.

* Having made accurate drawings of the *Crassatellæ*, with a view to publication at some future period, I venture to refer to a pictorial and descriptive repertory of species now in course of preparation, to be entitled "CONCHOLOGIA ICONICA."

Long. $3\frac{1}{2}$; alt. 3 poll. Mus. Stainforth, Saul, Walton.

Hab. ad oras Novæ Hollandiæ.

The *Crassatella castanea* is the largest and perhaps the best defined species of the genus; its shell is covered with a shining horny epidermis, and both valves are singularly eroded at the umbones. I know of three specimens of this fine shell, and each of them fully exhibit this last-mentioned peculiarity.

2. *CRASSATELLA KINGICOLA*. Lamarck, Anim. sans vert., vol. v. p. 481; Reeve, Conch. Icon. *Crassatella*, pl. 1. f. 5.

Hab. ad oras Novæ Hollandiæ. Mus. Stainforth.

A specimen of this species, in the possession of the Rev. Mr. Stainforth, is the only one that I have seen.

3. *CRASSATELLA DECIPIENS*. *Crass. testâ ovatâ, subgibbâ, epidermide fuscâ indutâ, vividè radiatâ, radiis ab umbonibus ad margines sæpè extensis; latere antico subangulato, striis brevibus ornato; postico subquadrato, parùm productiore.* Reeve, Conch. Icon. *Crassatella*, pl. 1. f. 4.

Long. $2\frac{1}{2}$; alt. $2\frac{1}{3}$ poll.

Hab. ad oras Novæ Hollandiæ.

Crassatella Kingicola, Nobis (falsò), Conch. Syst., vol. i. pl. 44. f. 3.

This species, which has lately arrived from New Holland in great abundance, has been received by most collectors as the *Crassatella Kingicola* of Lamarck; I moreover regret that it has been erroneously figured under that title in my 'Conchologia Systematica.' This error was kindly pointed out to me by Mr. Sowerby, and I am now satisfied that the shell of Lamarck's *Crassatella Kingicola*, which is accurately figured in the 'Genera of Recent and Fossil Shells,' is one of extreme rarity. Mr. Cuming possesses a gibbous variety of the *C. decipiens*, but it is not sufficiently distinct to demand especial notice. Mr. Owen is we believe engaged upon the anatomy of this species.

4. *CRASSATELLA PULCHRA*. *Crass. testâ ovato-trigondâ, depressâ, obsoletè radiatâ, epidermide crassâ, fibrosâ, molliusculâ, indutâ; transversim sulcatâ, sulcis profundis, regularibus; latere antico rotundato; postico subangulato.* Reeve, Conch. Icon. *Crassatella*, pl. 3. f. 16.

Long. $2\frac{7}{8}$; alt. 2 poll. Mus. Cuming, Stainforth.

Hab. ad oras Novæ Hollandiæ.

De Blainville appears to have figured this shell in his 'Manuel de Malacologie' as the *Crassatella sulcata* of Lamarck; but it is of a totally different form, nor does it agree with the *Maetra sulcata* of Bruguière, to which he refers in the 'Encyclopédie Méthodique'; I therefore now propose to distinguish it by the above new title. The shell of the *Crassatella sulcata* approaches rather in form to that of the *Crassatella rostrata*, the anterior side of which is specially characterized as being *productiore*; the grooves too in that species run irregularly across the valves, and are not parallel with the lines that mark the increase of growth. The shell of the *Crassatella pulchra*, on the contrary, is of a plain triangular form; the posterior

side is but slightly produced, the grooves are very deep, and they run parallel with the lines of growth.

5. *CRASSATELLA LAPIDEA*. *Crass. testá ovato-orbiculatá, epidermide fibrosá indutá, umbonibus parvis, striatis; intùs subfusca; latere antico rotundato, abrupto, striis nonnullis brevibus ornato; postico subangulato.* Reeve, Conch. Icon. Crassatella, pl. 2. f. 7.

Long. $1\frac{3}{4}$; alt. $1\frac{1}{4}$ poll. Mus. Cuming.

Hab. ad insulam Negros, Philippinarum.

Mr. Cuming met with one true pair only and a few odd valves of this species at the Island of Negros in coarse sand in seven fathoms water. The shell somewhat resembles that of the *Crassatella donacina*, but may however be readily distinguished.

6. *CRASSATELLA DONACINA*. Lamarck, Anim. sans vert., vol. v. p. 481. Reeve, Conch. Icon. Crassatella, pl. 3. f. 19.

This shell, figured in Delessert's 'Recueil de Coquilles,' pl. 4. f. 1, *a, b*, is extremely rare. The only specimens I have seen are in the collections of Miss Saul and the Rev. Mr. Stainforth.

7. *CRASSATELLA UNDULATA*. Sowerby, Proc. Zool. Soc., 1832, p. 56; Reeve, Conch. Icon. Crassatella, pl. 1. f. 2. *a.* and *b.*

8. *CRASSATELLA ANTILLARUM*. *Crass. testá trigono-ovatá, vix gibbosá, crassá, epidermide fibrosá indutá; intùs brunnea, propè ad marginem albicante; umbonibus subdepressis, leviter undulatis; latere antico rotundato, postico subangulato.* Reeve, Conch. Icon. Crassatella, pl. 2. f. 8.

Long. $3\frac{1}{2}$; alt. $2\frac{1}{4}$ poll. Mus. Cuming.

Hab. ad insulam Margaritta, Antillarum.

Mr. Cuming informs me that this beautiful species was dredged up in the pearl-fisheries at the island of Margaritta in the West Indies. It is erroneously figured in Delessert's 'Recueil de Coquilles' as the *Crassatella rostrata* of Lamarck. The rich chocolate colour of the interior of this shell is very remarkable, approaching somewhat in that respect to that of the preceding species.

9. *CRASSATELLA JUBAR*. *Crass. testá subovatá, valdè inæquilaterali, gibbosá, extùs vividè radiatá, radiis ferruginosis, ab umbonibus, jubarum similitudine, divergentibus; ad utrumque latus irregulariter multistriatá; epidermide fusca, subquassá, sparsim indutá; intùs albá, ad extremitatem posticam brunnea; umbonibus plicatis, compressis; latere antico inclinato, rotundato, postico arcuato, elongato, acuminato.* Reeve, Conch. Icon. Crassatella, pl. 2. f. 11.

Long. $2\frac{1}{2}$; alt. $1\frac{3}{8}$ poll. Mus. Cuming.

Hab. ad oras occidentales Novæ Hollandiæ.

A single specimen of this fine shell was procured by Mr. Cuming in Hamburg; it had been received from that prolific portion of the globe above noted, and has made a valuable addition to the genus. It has the general form of the *C. gibbosa*; the sides are profusely striated, and the entire surface is richly illumined with brownish rays, diverging like solar beams from the umbones to the margin.

10. *CRASSATELLA SULCATA*. Lamarck, Anim. sans vert., vol. v. p. 481; Reeve, Conch. Icon. Crassatella, pl. 2. f. 6. *a.* and *b.*

Hab. ad oras Novæ Hollandiæ.

This is another very rare species; I know of two or three odd valves, but only one true pair, which is in Mr. Cuming's collection.

11. *CRASSATELLA ROSTRATA*. Lamarck, Anim. sans vert., vol. v. p. 481; Reeve, Conch. Icon. Crassatella, pl. 2. f. 10.

Hab. ad insulam Ceylon.

The figures which have been just published by M. Chenu in Delessert's 'Recueil de Coquilles' as the *Crassatella rostrata* of Lamarck, are certainly not that species, nor do they at all correspond with his description of it, particularly in that part which says *intus margine crenulato*; I have moreover every reason to believe that they are drawn from specimens of the new species from the island of Margaritta, which we have called *Crassatella Antillarum*. The *Crassatella rostrata* is a well-known species from Ceylon, and the only large one of the genus that is distinctly crenulated at the margin.

12. *CRASSATELLA GIBBOSA*. Sowerby, Proc. Zool. Soc., 1832, p. 56; Reeve, Conch. Syst., pl. 44. fig. 2; and Conch. Icon. Crassatella, pl. 1. f. 1. *a.* and *b.*

13. *CRASSATELLA CORBULOIDES*. *Crass. testâ suborbiculatâ, valdè gibbosâ, umbones versùs profundè sulcatâ, epidermide fusca indutâ; latere antico rotundato, postico producto, subitò rostrato.*

Reeve, Conch. Icon. Crassatella, pl. 2. f. 9.

Long. $1\frac{3}{4}$; alt. 1 poll. Mus. Stainforth.

Hab. — ?

The title of *corbuloides* is selected for this new and very characteristic species, on account of its short gibbous form; the anterior side is suddenly beaked, like some of the *Corbula*, and cannot well be confounded with the *Crassatella gibbosa*, to which it is nearly allied.

14. *CRASSATELLA RADIATA*. Sowerby, App. Tank. Cat.; Reeve, Conch. Syst., pl. 44. fig. 1; and Conch. Icon. Crassatella, pl. 3. f. 12.

Hab. ad insulam Singapore.

This species, originally described by Sowerby from a specimen belonging to the late Earl of Tankerville, was found by Mr. Cuming at the island of Singapore, in coarse sand at seven fathoms' water.

15. *CRASSATELLA SUBRADIATA*. Lamarck, Anim. sans vert., vol. v. p. 482; Reeve, Conch. Icon. Crassatella, pl. 3. f. 15. *a.* and *b.*

I have little doubt but that the shell now before me, from the collection of the Rev. Mr. Stainforth, is the *Crassatella subradiata* of Lamarck. Unfortunately there does not exist any drawing of it, nor does it appear in Delessert's 'Recueil de Coquilles,' in which M. Chenu professes to illustrate all the species described by Lamarck that have not yet been figured.

16. *CRASSATELLA CONTRARIA*. Lamarck, Anim. sans vert., vol. v. p. 481; Reeve, Conch. Icon. Crassatella, pl. 3. f. 18. Mus. Stainforth, Saul.

Venus contraria, Gmelin.

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X

Venus divaricata, Chemnitz.

Crassatella divaricata, D'Orbigny.

Hab. ad insulam Lancerotte, Canariarum.

I have only seen three specimens of this very interesting shell. The above locality is quoted from D'Orbigny's 'Mollusques des Iles Canaries;' it is the only species of *Crassatella* he found in that district.

17. *CRASSATELLA ZICZAC.* *Crass. testá subtrigóná, depressá, luteolá, epidermide tenui indutá; radiis binis interruptis ab umbonibus ad margines divergentibus, lineis roseis, flexuosis, ubique pictá; intùs subrosaced; latere antico breviculo, rotundato; postico subangulato; lunulá utrinque radiis roseis vividè virgatá.* Reeve, Conch. Icon. *Crassatella*, pl. 3. f. 13.

Long. $1\frac{1}{2}$; alt. 1 poll. Mus. Cuming.

Hab. ad insulam Corrigidor, Philippinarum.

This species was found by Mr. Cuming at the island of Corrigidor, in coarse sand at six fathoms water; he possesses it in several stages of growth, all of which are covered with fine rose-coloured zigzag lines.

18. *CRASSATELLA TRIQUETRA.* *Crass. testá trigóná, solidá, rosaced, epidermide tenui indutá, transversim striatá; maculis roseis irregularibus vividè pictá; intùs rosaced, versùs marginem albicante; margine tenuiter crenulato; lateribus subrectis, vix rotundatis; lunulá utrinque magná, radiis roseis vividè virgatá.* Reeve, Conch. Icon. *Crassatella*, pl. 3. f. 14.

Long. $\frac{7}{8}$; alt. $\frac{6}{8}$ poll. Mus. Stainforth, Cuming, &c.

Hab. —?

I am unfortunately ignorant of the locality of this pretty little species; it is of a warm rose-colour, radiately spotted with deep pink, and is of a solid triangular form.

19. *CRASSATELLA ORNATA.* *Crass. testá trigóná, subdepressá, pallidá, lineis spadiceis brevibus, longitudinalibus, variè pictá, transversim striatá; intùs albaque brunneá, margine tenuiter crenulato, latere antico rotundato, postico flexuoso, angulato.* Reeve, Conch. Icon. *Crassatella*, pl. 3. f. 17.

Mesodesma ornata? Gray.

Long. $1\frac{1}{8}$; alt. $\frac{7}{8}$ poll. Mus. Stainforth.

Hab. —?

A specimen of this shell, in the collection of Miss Saul, is the only one we have seen at present. The above title has been decided upon because there is an inaccurate figure of it in Griffith's 'Cuvier's Animal Kingdom' with the name of *Mesodesma ornata*; it is not accompanied with any description, but we believe it to be intended for this shell.

March 8.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Waterhouse called the attention of the Members to two new species of Marsupial animals from South Australia, and forming part of a collection presented to the Society by J. B. Harvey, Esq.; one

belonging to the genus *Phascogale*; and the other, of which only an imperfect skin had been procured, Mr. Waterhouse observed, was evidently a new species of *Perameles*, nearly allied to the *P. Lagotis* of Mr. Reid, but differed from that animal in having much smaller ears, a less hairy tail, and in being of a brown colour above, pencilled with white. The fur is dense and very soft; on the upper part of the body it is of a slate-grey colour next the skin; each hair of the ordinary fur is brownish white towards the apex, and shaded into deep brown at the point. The longer and less soft hairs are very broadly annulated with white near the point, and black at the point. The fur on the under parts of the body is white—rather impure; and next the skin it is tinted with palish grey. On the side of the body and head a yellowish hue is observable. The ears are of moderate size, rather broad, and well clothed with hairs; on the inner side these are of a dirty white colour, slightly tinted with yellowish, and so are those on the outer side, excepting towards the margin, where they are of a brownish black hue. The tail is imperfect; it must have been, however, longer than in any known *Perameles* (excepting the *P. Lagotis*), the part attached to the skin measuring eight and a half inches. It is well clothed with hairs, which completely hide the skin, though they are rather short: on the upper part they are of a rich brown colour, excepting towards the apex, where they are longer and entirely white; on the under side they are dirty white. The feet are unfortunately wanting. The length of the head and body is about sixteen inches, and the ear measures about one inch in length.

Mr. Waterhouse gave to this animal the name of its discoverer, a Corresponding Member of the Society, and one to whom the Society is indebted for very many valuable collections. Its principal characters may be thus expressed:—

PERAMELES HARVEYI. *Per. pilis mollibus; corpore suprâ fusco alboque irrorato, infrâ albo; caudâ longâ, suprâ fuscâ, infrâ et ad apicem sordidè albâ.*

Hab. Port Adelaide.

The *Phascogale* presents the following characters:—

PHASCOGALE ALBIPES. *Phasc. pilis brevibus et permollibus; corpore suprâ nigro et flavescenti-irrorato, infrâ albo; pedibus albis; caudâ longâ suprâ fuscâ, infrâ fusco-albd.*

	unc. lin.
Longitudo ab apice rostri ad caudæ basin, . . .	3 9
————— ad basin auris	0 10½
————— <i>auris</i>	0 7
————— <i>caudæ</i>	3 2
————— <i>tarsi digitorumque</i>	0 8¼

Hab. Port Adelaide.

The fur in this little animal is shorter than in other species of *Phascogale* hitherto described, and extremely soft; it is of a deep slate-grey colour next the skin, but externally, on the upper parts of the body, the colour is brownish, a tint produced by the admixture of black and yellow, the hairs being annulated with the latter colour

near the point, and black at the point. The under parts of the body are greyish white, each hair being deep grey and tipped with white. The feet are white. The tail is furnished throughout with very minute hairs. It approaches most nearly to the *P. murina*, but differs in being rather larger, in general colouring, and especially in having the tail of a dark colour, and not white, as in that species.

March 22.—William Horton Lloyd, Esq., in the Chair.

The following paper, by Mr. Lovell Reeve, entitled "Descriptions of new species of Shells, principally from the collection of Hugh Cuming, Esq.," was read.

BULIMUS SMARAGDINUS. *Bul. testá oblongo-ovatá, nitidá, viridí, apicem versus subpurpureá; fasciá alba per anfractuum suturas decurrente; aperturá rotundato-ovali, peristomate albo, reflexo.*

Reeve, Conch. Syst., vol. ii. pl. 173. fig. 6.

Hab. ad insulam Mindanao, Philippinarum.

Long. $2\frac{3}{8}$; lat. $1\frac{3}{8}$ poll.

The whorls of this shell exhibit a pleasing gradation of colour; commencing at the apex in deep purple, it passes through pale yellow to a bright sea-green.

HELIX VALTONI. *Hel. testá ovatá, depressá, anfractibus ventricosiusculis, ultimo supernè productiore; rubido-fuscá, radiis longitudinalibus obsolete pictá; epidermide tenui, peculiariter maculosa, indutá; aperturá subquadrato-ovali, marginibus nigerrimis, disjunctis; labro acutissimè reflexo.* Reeve, Conch. Syst., vol. ii. pl. 166. fig. 23.

Hab. ad insulam Ceylon.

Long. $2\frac{1}{4}$; lat. $1\frac{5}{8}$ poll.

I name this remarkable shell in honour of my friend William Walton, Esq., a zealous and assiduous collector; it is of a dark ruddy brown colour, and has a very black polished lip; it is, however, especially characterized by its curiously speckled epidermis.

SIPHONARIA CHARACTERISTICA. *Siph. testá orbiculari, conicá, extùs longitudinaliter costatá, costis irregularibus, interstitiis nigricantibus, apicem versus valdè decorticatis; intùs nigerrimo-fuscá, impressione musculari scabrá, profundè notatá; impressione siphonali characteristicè imbutá.* Reeve, Conch. Syst., vol. ii. pl. 138. fig. 3.

Hab. In sinu Panamensi.

Long. $2\frac{1}{4}$; lat. $1\frac{7}{8}$; alt. $1\frac{1}{4}$ poll.

This shell approaches very closely to the *Siphonaria gigas* of Sow-erby; we venture, however, after a close comparison between specimens of each in different stages of growth, to pronounce it a distinct species. It is of a more irregular form, and the separate impressions of the muscle and the siphon are remarkably distinct.

PARMOPHORUS CORRUGATUS. *Parm. testá elongato-quadratá, tenui, depressá, extùs leviter corrugatá; vertice obtuso, propè ad partem posticam inclinato.* Reeve, Conch. Syst., vol. ii. pl. 139. fig. 1.

Hab. ad insulam Madagascar.

Long. $1\frac{1}{2}$; lat. $\frac{3}{4}$ poll.

Principally distinguished by the position of the vertex, which is more posterior than in any other species; the wrinkled sculpturing upon the outer surface is also a well-defined peculiarity.

PARMOPHORUS INTERMEDIUS. *Parm. testá ovatá, elevatiusculá, anticè attenuatá; extùs radiis asperrimis, quasi serratis, ornatá; vertice prominulo, incurvo; margine crenulato.* Reeve, Conch. Syst., vol. ii. pl. 139. fig. 5 and 6.

Hab. ad insulam Bohol, Philippinarum.

Long. $\frac{3}{4}$; lat. $\frac{3}{8}$ poll.

This beautiful little shell, which may be considered as intermediate in its generic characters between the *Parmophori* and the *Emarginula*, is most elegantly radiated on the outer surface, and the only species of this genus at present known that is serrated at the margin.

EMARGINULA CONOIDEA. *Emarg. testá conoideá, albicante, extùs striis numerosis creberrimè radiatá; vertice centrali, acuto; margine valdè crenato, sinu marginali profunde inciso.* Reeve, Conch. Syst., vol. ii. pl. 140. fig. 7.

Hab. — ?

Long. $\frac{7}{8}$; lat. $\frac{5}{8}$; alt. $\frac{1}{2}$ poll.

A very characteristic shell, in the collection of William Walton, Esq.

CALYPTRÆA CINEREA. *Cal. testá suborbiculari, extùs a vertice radiatá, radiis spinis parvis numerosis irregulariter ornatis; intùs cinereo nitente, cyatho magno, albo, subpellucido, lateraliter flexuoso.* Reeve, Conch. Syst., vol. ii. pl. 144. fig. 4.

Hab. Cape Horn.

Diam. $1\frac{3}{4}$; alt. 1 poll.

An immense number of these shells, just brought to England, were found attached to a single log of wood floating off Cape Horn. The interior is lined with a very dark, ashy, highly polished enamel, but the cup is of a pure transparent white, offering a remarkably rich contrast of colour. The exterior of the shell is irregularly covered with numerous small spines, becoming, as in most of the *Calyptræa*, obsolete with age.

April 26.—William Horton Lloyd, Esq., in the Chair.

The following "Description of a new Dorsibranchiate Gasteropod, discovered at Madeira," by the Rev. R. T. Lowe, was read.

Class MOLLUSCA.

Ord. GASTEROPODA.

Fam. NUDIBRANCHIÆ (*Les Tritoniens*, Lam.).

Gen. PEPLIDIA.

Char. Gen.—*Corpus* limaciforme, repens, oblongum; posticè compresso-triquetrum, dorso abruptè (ut in *Scyllæd*) cristatum s. alato-carinatum; apice attenuato, acuto. *Caput* anticè (ut in *Thethye*, L.) veliferum; velo semicirculari, margine fimbriato-lacero, ciliolato: ore inter labia buccalia subtùs, simplici. *Tentacula* (ut in *Doride*) duo. *Orificium* generationis ad colli dextrum. *Branchiæ* diplo-

morphæ: s. in medio dorsi (ut in *Doride*) circa anum stellatim ramosæ, arbusculiformes, ramis pectinato-ciliatis; et per latera utrinque (ut in *Tritonia Thethyve*) longitudinaliter biseriata, conico-papilliformes; papillis apice subdivisis, ciliatis.

Obs. Corpus totum glabrum, læve, subpellucidum. *Oculi* nulli.

Spec. *Peplidia Madera*, nob.

Hab. in mari Maderensi-atlantico, inter rupes littorales in aquis æstu relictis; rariss.

A single example of this beautiful and extremely interesting mollusk was discovered on the 24th of April, 1841, by Dr. Lister, in a pool left by the tide amongst a reef of rocks called the Gorgulho, situate a little to the west of Funchal. It presents a combination of generic characters, by which, if it approximates in each apart by turns to *Doris*, *Thethys*, *Tritonia*, and *Scyllæa*, it differs notably from all. The large dorsal star-like tuft of branchiæ, and the tentacles, resemble those of *Doris*; but it differs totally in other characters: the veil before the head, though smaller and differently fringed, together with the rows of branchiferous papillæ down the back or sides, bringing it somewhat nearer *Thethys*, from which it is essentially distinguished, as it is also from *Tritonia* and *Scyllæa*, by its Doridian character of the ano-dorsal five-branched rose or star of branchiæ. And if agreeing with the last of these two genera in the carinate or crested tail, it is at once distinguished by the presence of the frontal veil.

The whole upper surface of the animal, which is from one inch and a half to two inches and a half long, about one-third of an inch broad and half an inch high, is of a pale dull red, mottled or freckled with brighter orange-red and yellow, and thickly speckled all over with dark chestnut-brown spots and dots, which are larger and sub-confluent in two sublateral darker lines or rows, meeting behind the branchial star upon the back, and smaller on the sides and veil. The tentacles above, and the foot alone beneath are immaculate, the latter being pale pellucid flesh-colour, with the extreme edges yellow.

The edges of the veil, and the tips of the dorsal or sublateral branchiferous papillæ are fimbriato-ciliate. Of the latter, there are two rows on each side: the lower consisting each of six small and inconspicuous or obsolete papillæ; the upper, each of three much larger and more elongate or subcylindric bodies, placed at equal distances from one another, two in advance, and the third a little behind the ano-dorsal rose. The head or apex of each of this third or last pair forks into two parts, one of which is subdivided or ciliferous, like the other pairs; the other branch of the fork is simple and clavate, ending abruptly in a dark red sort of knob or button. The orifice of generation is on the right side of the neck, beneath the first of the upper row of branchiferous papillæ. During the animal's life it appeared simple, but on contraction after death it was found to be composed of two apertures close together; the male organ being exerted from the anterior.

The ano-dorsal branchial tuft or star is very large, and placed at

the top of a strong hump or protuberance; the vent being in its centre, as in *Doris*. It appears, in general, equally five-rayed; but assumes occasionally, as it also does sometimes in *Doris*, the appearance of being composed of two bifurcated lateral, and a simple anterior branch or ray. Its divisions are regularly and beautifully pectinate. The caudal fin-like crest begins a little behind it; and its edge is crisped or irregularly notched and plicate, and even obsoletely ciliate here and there, or fimbriate. In swimming, this crest is stiffly expanded into a broad fin, ending abruptly behind, as in Cuvier's fig. 4. of *Scyllæa pelagica* (Mém. des Moll.), but with the edge even or entire.

In a glass of sea-water, in which this animal lived more than six weeks, it had the usual habits of a *Doris*, but these with more activity: swimming about violently when disturbed or when provided with a fresh supply of water, in which operation the hind part of the body, with the crested fin-like tail, is lashed from side to side with a strong and regular sculling motion; the fore-part, with the head or veil expanded also to its full dimensions, being at the same time beat with equal force and regularity in a contrary direction, or obliquely upwards and downwards, stroke for stroke; these parts (the veil and crest) performing thus alike the office of true fins. At night, especially when thus in motion, it appeared most brilliantly phosphorescent; the light flashing progressively but very rapidly along the body, especially from all the branchial tufts and the edges of the veil and crest. At other times it remained quiescently adhering to the sides of the glass, or moving slowly up and down as if in search of food; seeming to use the veil as a feeler, but with the tentacles reflexed. Sometimes it crawled in the usual inverted posture along the surface of the water. It is by no means a shy or timid animal.

After five or six days, it deposited in the night-time a pale orange-coloured long and narrow riband of eggs, resembling a tape-worm, and loosely coiled up spirally on the side of the glass, to which it was partially attached by one edge. This egg-band was about three inches and a half long and two lines broad, narrowing a little towards one end. On two subsequent occasions, at intervals of ten days or a fortnight, it again deposited two similar but smaller bands; after which, though apparently remaining in full vigour, it retained not more than two-thirds of its former bulk.

Its mode of swimming perfectly resembles that of the larva of the gnat so common in our English cisterns of rain-water.

The next paper read was from W. J. Broderip, Esq. In this paper the author proceeds with his descriptions of Shells brought to this country by H. Cuming, Esq.

In the second volume of the 'Zoological Journal' will be found my notice of the *Voluta aulica* of Solander, a shell which formed one of the principal ornaments of the Portland Museum, of that of M. de Calonne (in the catalogues of which it is noted as unique), of the Tankerville collection (in the catalogue of which Mr. Sowerby speaks of it as "an extremely scarce and fine shell; the only speci-

men we have seen"), and of my own cabinet, which is now in the British Museum.

Mr. Cuming has laid before me some Volutes which he brought from the Philippine Islands, and which, after a careful examination, I think must be referred to this scarce species. Not one of them, however, is identical with the variety in the British Museum (var. *a.*), which is still, as far as I know, unique.

Voluta aulica.

Var. *a.* Without nodules or bands, spotted with large red flakes : Mus. Brit. Figured in the Tankerville catalogue (G. B. Sowerby).

Var. *b.* Flesh-colour, subnodulous, girt with two broad rich red bands mottled with white ; spire mottled with red and white, apex coral-red. Length nearly 4 inches, breadth $1\frac{5}{8}$.

Var. *c.* Flesh-colour, nodulous, lineated longitudinally with close-set, red, somewhat undulated lines, mottled here and there with white, girt by two interrupted rich red bands ; spire mottled with red and white, apex coral-red. Length $4\frac{1}{2}$, breadth $2\frac{1}{8}$ inches.

Var. *d.* Nodulous, whitish, lineated with very close-set, delicate, pale yellowish undulated lines ; body whorl girt with two broad yellowish red bands mottled finely with the ground-colour. The upper band is bordered above with a row of rich dark brown spots approaching closely to black, each spot being placed upon a nodule : the lower edge of this band is serrated as it were, and each of the teeth is marked with a spot immediately under the upper spots, but more dashed and somewhat less intense. The upper edge of the lower band is marked in a similar manner, but the spots are less defined. Above the shoulder of the body whorl is a band of similar colour, with its lower edge dashed with markings of the same colour as those which ornament the other bands, and at similar intervals. Two similarly coloured spots appear below the third and fourth nodule of the spire just above the suture of the body whorl, which suture almost hides one below the second of those nodules, counting from the edge of the lip. Upper part of the spiral whorls coloured after the same pattern, and brought out by the pale ground-colour of the lower part. Apex yellowish red. Length $3\frac{1}{2}$ inches, breadth $1\frac{1}{2}$.

This description will convey a very faint notion of one of the most beautiful shells I ever saw.

Var. *e.* Sharply nodulous. Dull red, blotched with flesh-colour ; a faint band, palest in the middle at intervals, girds the body whorl below the middle. The tips of the nodules are of the same colour as the blotches. Length $4\frac{1}{4}$ inches, breadth $2\frac{1}{8}$.

Var. *f.* Very sharply nodulous, the muricated nodules becoming high ridges extending almost half-way down the body whorl. Dull coral-red, with here and there a dash of whitish between the nodules. A very faint band may be traced below the middle of the body whorl, and on its darker upper and lower borders a few white spots appear at intervals as they approach the lip. Length $4\frac{2}{8}$ ths, breadth $2\frac{1}{8}$ th inches.

Var. *g.* Bluntly but highly nodulous on the back, the nodules on

the lower side rather sharper. Whitish, lineated longitudinally with close-set undulated livid lines blotched with clouds and dashes of livid red. A broad pale band girds the body whorl below the middle. Apex reddish white. Length $5\frac{1}{8}$; breadth 3 inches.

All these varieties, with the exception of var. *a*, are in the museum of Mr. Cuming.

CONUS VICTOR. *Con. testâ subcylindraceo-conicâ, flavâ, maculis albis inspersâ, fasciis 2 moniliformibus latis, nigro-brunneis vel brunneo-castaneis, latis concinnè ornatâ; spiræ mediocris, pyramidalis, anfractibus excavatis longitudinaliter striatis, subcancel-latis, apice subacuto.*

Long. $1\frac{2}{8}$; lat. $\frac{2}{8}$ poll.

Mus. Cuming, Harford.

Hab. ?

This brilliant Cone strikes the eye at once. The bright star-like spots with which the dark necklace-bands are interrupted and relieved, and the yellow ground-colour which takes the form of three alternating bands, render it attractive, and the more minutely it is examined the more it gains on the attention. The necklaces forming the moniliform bands, when looked at with a lens, present the appearance of some of the flattened platted chains executed in gold and silver, and the shell altogether is a choice piece of workmanship.

The species to which *Conus Victor* bears most resemblance are *Coni nobilis* and *Ammiralis*; but it comes much nearer to the last in shape and general character, differing, however, from it in the deeper excavation and sculpture of the spire, to say nothing of the discrepancy in the arrangement of the colouring, which in the only two specimens that I have seen is identical. Of these, the richest in colour is in the fine collection of Mr. Cuming, and the younger, but very perfect specimen, in the choice cabinet of the Rev. A. Harford.

A paper by Mr. Lovell Reeve, entitled "Descriptions of four new species of *Achatina*, a genus of Pulmobranchiate mollusks of the family *Colimacea*," was then read.

ACHATINA LACTEA. *Ach. testâ oblongo-ovata, solidâ, intus extusque quasi fossili, lactea, epidermide levidensi sparsim induta; spirâ regulari, anfractibus longitudinaliter striatis, lineisque minutis circumdati; aperturâ suboblongâ, labro solidiusculo.*

Reeve, *Conch. Syst.* vol. ii. pl. 177. fig. 6.

Long. $4\frac{1}{10}$; lat. $2\frac{1}{10}$ poll. Mus. Cuming, Stainforth.

Hab. Zanzibar.

This beautiful shell, which is in a perfectly live state, and covered with a slight scattered epidermis, is of a rich uniform cream-colour, without the least indication of any pattern; the whorls are very fully striated longitudinally, the striæ rather irregularly following the growth of the shell; and they are again characterized by having a number of fine lines running around the upper half of them in an opposite direction. The columella, the aperture, indeed the entire shell, both inside and out, is of rich cream-colour, and by this alone it cannot fail to be recognised.

ACHATINA TINCTA. *Ach. testâ oblongo-ovatâ, tenuiculâ, albicante, maculis grandibus longitudinalibus vividè tinctâ, epidermide flavidâ indutâ; spirâ parùm elatâ, apice obtuso, rosaceo; aperturâ oblongâ, albâ.*

Reeve, Conch. Syst. vol. ii. pl. 179. fig. 18.

Long. $3\frac{5}{10}$; lat. $1\frac{1}{2}$ poll. Mus. Cuming, Stainforth.

Hab. —? probably some part of Africa.

The *Achatina tincta* has a white shell covered with a yellowish epidermis, and it is singularly stained in a longitudinal direction with a deep morone colour. The stains take almost the form of bands in some places, but exhibit no degree of regularity.

ACHATINA KRAFSII. *Ach. testâ ovatâ, vix ventricosâ, rufocastaneâ, epidermide durâ, nitente, indutâ; anfractibus, ultimo excipiente, longitudinaliter strigatis, strigis albis, nunc rectis, nunc sinuosis, distantibus, de suturis, longitudine variabili, porrectis; spirâ breviusculâ, apice obtuso; aperturâ ovatâ, albâ.*

Reeve, Conch. Syst. vol. ii. pl. 179. fig. 19.

Long. $2\frac{3}{4}$; lat. $1\frac{1}{2}$ poll. Mus. Cuming.

Hab. Cape Natal, coast of Africa.

I have named this species, at the request of Mr. Cuming, in honour of Dr. Krafs, who presented it to him on his arrival from Cape Natal, where he had formed a very interesting collection of shells. It is of a dark chestnut colour, and the last and penultimate whorls are marked with small zigzag stripes running from the sutures about half-way down them; they are distant and somewhat irregular.

ACHATINA PICTA. *Ach. testâ ovato-conicâ, lævi, luteâ, maculis, quasi fasciis, viridibus, conspersim ornatâ; anfractibus planiusculis, suturis maculis castaneis, transversis, vividè pictis; spirâ subelatâ, apice minuto, rosaceo; aperturâ orbiculari, flavidâ.*

Reeve, Conch. Syst. vol. ii. pl. 178. fig. 10.

Long. $1\frac{1}{2}$; lat. $\frac{3}{4}$ poll. Mus. Stainforth.

Hab. ad insulam Cuba, Indiarum Occidentalium.

This elegantly painted shell is allied to the *Achatina fasciata* in form, though it is certainly of lighter texture. The ground-colour is a bright yellow; there are a few bright green bands crossing the whorls at intervals; and the sutures of the whorls are ornamented throughout with a banded row of stained chestnut-coloured spots, for the most part touching each other. I only know of one specimen, and it exhibits as distinct an assemblage of characters as can well be imagined.

ENTOMOLOGICAL SOCIETY.

May 2nd, 1842.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Frederick Parry, Esq., exhibited two cases of splendid *Lepidoptera* from Assam and Jamaica, including specimens of *Papilio Agestor*, Gray, and *P. Cloanthus*, Westw.

Mr. A. White exhibited the remarkable cocoon of the North American *Bombyx crepuscularis*, Abb. and Sm., one end of which is closed with a valve.

Mr. Ingpen exhibited a specimen of the common white butterfly which had died in the act of passing from the larva to the chrysalis state.

Mr. Westwood exhibited specimens of the pupæ of a small species of *Cicada*, from the body of each of which one or several elongated appendages (*clavariæ*) had been produced. Likewise a numerous collection of the portable cases formed by various insects, chiefly *Lepidoptera* allied to *Oiketicus*, Guild., as well as numerous drawings of other kinds of cases, observing that in all the instances which had fallen under his notice the larva closes the mouth of the case by fixing the edges of the aperture where the front of the body has formerly protruded to the stems or leaves of trees, whereas in a drawing by Abbott in the British Museum, copied by Mr. Doubleday in the 'Entomologist,' pl. 1. fig. 15, the case of a species allied to *Oiketicus* is affixed by a stalk at the open end to the twig. Mr. Edward Doubleday, who was present, however, affirmed the correctness of the drawing in this respect.

Mr. Shuckard mentioned that he had found specimens in the indigenous collection of the British Museum of *Anthocopa Papaveris*, and of the genus *Ammobates*, Latr., both hitherto unrecorded as natives of this country. He also exhibited some fine hymenopterous insects from New Holland, including a gigantic species of *Megalyra*, Westw.

A paper was read by Mr. Westwood, containing descriptions of some new exotic *Lamellicorn* Beetles:—

Silphodes Indica, W. *S. castaneo-fusca, lateribus rufescentibus; elytris striato-punctatis, mediocriter setoso-marginatis; tibiis anticis extùs (et inter dentes) serratis; tarsis anticis simplicibus.* Long. corp. lin. $5\frac{1}{3}$.—Hab. East Ind. Mus. Melly.

Silphodes Madagascariensis, W. *S. piceo-castanea, lateribus pedibusque magis rufescentibus; capite anticè latiori; elytris minus ovatis, punctatis punctis majoribus, striisque tribus lævibus, punctis utrinque marginatis; lateribus longe setosis.* Long. corp. lin. $5\frac{1}{4}$.—Hab. Madagascar. Mus. Melly.

Silphodes dubia, W. *S. nigricans, lateribus vix setosis; prothorace lævi; elytris sub lente irregulariter punctatis, lineis tribus lævibus in singulo, punctis utrinque marginatis; tibiis anticis externè (et inter dentes) serratis.*—Long. corp. lin. $4\frac{1}{2}$.—Hab.——? Mus. Hope.

June 6, 1842.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Mr. Bond brought for distribution amongst the members, specimens of *Blethisa multipunctata* and *Callidium violaceum*, and Mr. Evans specimens of *Cleonis nebulosa* and a rare species of *Chryso-mela*.

Mr. S. Stevens exhibited a box of *Coleoptera* captured near Charlton, Kent, comprising several rare species.

Mr. Ingpen exhibited some branches of the spindle trees growing in Lincoln's-Inn-Fields, covered with multitudes of a species of *Coccus*.

Mr. F. Bond exhibited specimens of *Schizocerus pallipes* ♂ and *Cladius difformis* ♂, from Stanmore, Middlesex; also a beautiful variety of *Pacilophasia marginata*. He also presented a number of cocoons of the small Honey-Moth.

Mr. Stephens exhibited larvæ of *Nyssia zonaria* bred from eggs received from Mr. Gregson.

Mr. Westwood exhibited a specimen of a species of *Typhlopone*, together with a female of a large species of Ant which had lost its wings, brought from Algiers by M. Lucas, to the former of which was attached the following note:—"Fourmie trouvée dans une fourmière qui par sa présence fait fuire les vrais habitans de la fourmière;" the wingless ant being one of the latter. This fact was of interest as determining the real nature of the genus *Typhlopone*, which Mr. Shuckard has regarded as composed of female *Dorylidæ*, but which Mr. Westwood considered to be true *Formicidæ*. He also exhibited specimens of a new species of *Cetoniidæ* from Madagascar, remarkable for the thick coating of coloured hairs on the hind tarsi [since figured in the 'Arcana Entomologica,' under the name of *Chromoptilia diversipes*, W.]. He also exhibited the pupa of a species of *Eumenia*, a genus of butterflies, presented to him by M. Boisduval, which was attached by the tail as well as girt round the middle of the body, thus proving this anomalous genus to consist of gigantic *Polyommataidæ*. Also a singular larva of some unknown *Coleopterous* insect [*Passalus*?] which possesses only four feet, the third or posterior pair being reduced to a very minute size.

The following memoirs were read:—

Description of a new British *Iulus*. By George Newport, Esq.

Iulus pilosus, Newp. Very like *Iulus terrestris*, but smaller and more elegantly formed. Black, shining, segments fifty-six, deeply striated longitudinally, with the margin of each, more especially of all the posterior segments, set with fine white hairs; anal spine compressed and elongated.

The chief characteristics of this species are the fringe of delicate hairs at the posterior margin of the segments, and the number of the latter, which amounts to fifty-six; while in *Iulus terrestris*, with which this species may readily be confounded, there are never more than fifty-one, and usually but fifty. It occurs in the neighbourhood of London at the end of May, but is not common.

Description of *Depressaria Gossypiella*, a small moth which is very destructive to the cotton plant in India. By W. W. Saunders, Esq., President.

The insect in question, which was communicated to the author by Dr. Royle, has committed great ravages in the cotton plantations at Broach in Western India, whence it was sent by Dr. Barn, superintendent of the government cotton plantations. In a commercial point of view, therefore, the means to be employed for its destruction are of importance. The eggs are deposited in the germen at the time of flowering, and the larva feeds on the cotton seed until the pod is ready to burst, a little previous to which it opens a round hole in the

side of the pod through which it descends to the ground, into which it burrows about an inch, where it assumes the pupa state.

Depressaria Gossypiella. *Dark fuscous brown, the head and thorax somewhat lighter in colour; fore wings with an undefined round blackish spot on the disk a little above the centre of a fascia of the same colour, crossing the wings a little above the apex, which itself is black; under wings silvery gray, darker towards the hinder margin.* Length $\frac{3}{10}$ ths of an inch.

Descriptions of new Australian *Chrysomelidæ* allied to *Cryptocephalus*. By W. W. Saunders, Esq., President.

The name *Anodonta* having been previously employed in zoology, the author proposes the name of *Idiocephala* in its stead, and describes the following new species:—

Sp. 7. *Idiocephala similis*, S. *Black; head, thorax and elytra deeply punctured, the latter with the surface undulating, somewhat fuscous at the apex; body beneath with the sides of the mesosternal region and of the abdominal segments silvery pilose; legs with a purplish iridescence.* Length $\frac{1\frac{1}{4}}{100}$ th of an inch. Cabinet Ent. Club. Inhabits New Holland.

Sp. 8. *Idiocephala Tasmanica*, S. *Head rufous brown, with three round yellow facial spots; antennæ brown, darker at the tip, basal joint yellow; thorax rich rufous brown, margins yellow, and with two yellow longitudinal lines on the disk behind; elytra rufous brown, with the apex and margin round the scutellum yellow, each with four longitudinal carinæ; legs rufous brown.* Length $\frac{1\frac{2}{10}}{100}$ th of an inch. Cabinet Ent. Soc. Lond. Inhabits Van Diemen's Land. C. Darwin, Esq.

Sp. 9. *Idiocephala Darwinii*, S. *Head black, with a large triangular patch in front; antennæ dusky brown, basal joints rusty brown beneath; thorax rufous brown, pitchy in front; elytra punctate-striate, dark metallic green, the apex luteous; legs horn-coloured; tarsi dusky.* Length $\frac{9}{100}$ th of an inch. Cabinet Ent. Soc. Lond. Taken near Sydney, N. S. Wales. C. Darwin, Esq.

Sp. 10. *Idiocephala semibrunnea*, S. *Head shining black; face rufous brown; antennæ black, basal joints rufous brown; thorax rufous brown; scutellum shining black; elytra brown, punctate-striate, margined with black, which ascends half-way along the suture; legs horny brown; tarsi pitchy.* Length $\frac{9}{100}$ th of an inch. Cabinet Ent. Soc. London. Taken near Sydney by Mr. Darwin.

Monograph of the genus *Nyctelia*. By G. R. Waterhouse, Esq., who exhibited the extensive collection of that group belonging to the Marquis de Breme, who was present at the meeting.

[This memoir has subsequently been published in the Proceedings of the Zoological Society.]

Descriptions of new species of insects collected at Adelaide in South-Western Australia by Mr. Fortnum. By the Rev. F. W. Hope.

Fam. BUPRESTIDÆ.

Sp. 1. *Stigmodera Fortnumi*. *Violacea, capite viridi, thorace*

- punctulato lateribus flavo-marginatis, medio purpurascenti; elytris ternisque latis fasciis flavis insignitis. Long. lin. 18, lat. lin. 8.*
- Sp. 2. *Stigmodera Parryi. Nigra, capite anticè argenteo; thorace nigro-punctato; elytris miniatis ad basin maculis ternis atris insignitis, binis externè humeralibus et elongatis, tertioque infra scutellum posito. Long. lin. 3½, lat. lin. 1.*
- Sp. 3. *Stigmodera Guerinii. Violacea, thorace nigro marginibus auratis; elytris anticè et posticè nigro-violaceis, in medio fascià latà flavà insignitis. Long. lin. 3, lat. lin. 1¼.*
- Sp. 4. *Conognatha Bremeri. Nigra, capite æneo, medio fortiter impresso; thorace bronzeo, disco punctatissimo lineà longitudinali, in medio vix impressà, foveà utrinque fortiter insculptà; elytris nigris, binis fasciis rubris. Long. lin. 9, lat. lin. 3½.*
- Sp. 5. *Conognatha coccinata, Hope. Coccinea, capite viridi antennisque concoloribus; thorace latè miniato maculis ternis viridibus insignito; elytris coccineis, tribus fasciis latè viridibus ornatis, primà basali duobus aliis ferè apicalibus. Long. lin. 5¼, lat. lin. 2.*

Fam. CANTHARIDÆ.

Tmesidera, Westwood in Guérin, Mag. Zool.

- Sp. 6. *Tmesidera violacea, Hope. Violacea, capite nigro; thorace nigro anticè capite latiori, angulis anticis rotundatis, posticis ferè rectis; elytris varioloso-rugosis; corpore infrà rubro. Long. lin. 5¼, lat. lin. 1¾.*
- Sp. 7. *Tmesidera assimilis. Nigra, antennis pedibusque concoloribus et nitidis; elytris rubro-testaceis lineis parùm elevatis. Long. lin. 4½, lat. lin. 1¼.*
- Sp. 8. *Tmesidera rubricollis. Nigra, thorace rubro, elytris atris subrugosis pedibusque concoloribus; corpore infrà nigro. Long. lin. 3, lat. lin. 1.*

Fam. CARABIDÆ.

- Sp. 9. *Calosoma Curtisii. Viride, thorace ferè glabro posticè fortiter impresso; elytris striato-punctatis et rugosis, punctisque impressis, in triplici serie ordinatis; infrà piceum; pedibus antennisque piceis. Long. lin. 10, lat. lin. 4.*
- Sp. 10. *Calosoma Australe. Nigro-æneum, thorace subcordato punctulato, posticè utrinque fortiter impresso; elytris nigro-æneis, confertim punctato-striatis, punctis subæneis in triplici serie ordinatis. Long. lin. 10, lat. lin. 3½.*

Fam. HETEROMORPHIDÆ, Hope.

Silphomorpha, Westwood.

- Sp. 11. *Sil. Orectocheiloides, Hope. Corpore suprà nigro-piceo lateribus thoracis marginibusque elytrorum pallidioribus, infrà brunneo-picea, antennis pedibusque concoloribus. Long. lin. 6¼, lat. lin. 2¼.*
- Sp. 12. *Adelotopus Fortnumi, Hope. Niger, marginibus lateralibus thoracis piceis, palpis ferrugineis; corpus infrà atro-piceum, segmentis abdominis posticè brunneo-piceis, pedibus concoloribus. Long. lin. 3½, lat. lin. 1½.*

Fam. HARPALIDÆ.

Acinopus, Ziegler.

- Sp. 13. *Ac. Australis*, Hope. *Niger, thorace magno, transversè subrugoso, marginibus externis thoracis posticè latè cupreis; elytris ferè glabris, marginibus subaneis et punctatis.* Long. lin. 9, lat. lin. $2\frac{1}{2}$.

Fam. BYRRHIDÆ.

- Sp. 14. *Anthrenus Australis.* *Niger, capite atro, thorace medio concolori marginibus externis albis; elytris tribus fasciis undatis albis; corpore infrà nigro.* Long. lin. $1\frac{1}{4}$, lat. lin. $\frac{1}{2}$.

Fam. MELYRIDÆ.

- Sp. 15. *Dasytes nigricans*, Hope. *Ater pubescens, thorace longioribus capillis obsito; elytris atro-brunneis marginibus externis pallidioribus.* Long. lin. $1\frac{3}{4}$, lat. lin. $\frac{3}{4}$.

- Sp. 16. *Dasytes fuscipennis.* *Ater, antennis rubris; thorace pubescente, nigro; elytris fusco-testaceis punctatis, pedibus concoloribus.* Long. lin. $1\frac{3}{4}$, lat. lin. $\frac{5}{8}$.

Fam. PSELAPHIDÆ.

Articerus, Dalman.

- Sp. 17. *Articerus Fortnumi.* *Sanguineus, capite elongato-ovato fronte rotundato; thorace ferè quadrato, angulis anticis rotundatis, medio impresso; elytris thorace latioribus marginibus posticis nigricantibus; abdomine posticè rotundato utrinque macula nigra insignito.* Long. lin. $\frac{1}{2}$, lat. lin. $\frac{1}{4}$.

Mr. Evans communicated a notice relative to an exotic species of caterpillar of large size and black colour with red spots, the hairs of which are so rigid that they penetrate into the flesh when incautiously handled, causing much pain and inflammation.

Mr. Westwood stated that he had recently acquired the greater part of Latreille's original collection of bees from the Abbé Blondeau, by whom it had been purchased at the sale of the collection of Baron Déjean.

Mr. Edward Doubleday (in allusion to Mr. Saunders's paper) stated that in North America he had observed that the cotton plants are not attacked by any of the *Tineidæ*, but that they suffer greatly from the attacks of several species of *Noctuidæ*.

BOTANICAL SOCIETY OF EDINBURGH.

February 9, 1843.—Professor Graham in the Chair.

Professor Graham then read a highly interesting account of his botanical excursion in Ross-shire, during August 1842, with a party of friends:—

The party left Edinburgh on the 21st of August, and met at Dingwall—thence they walked by Garve, Auchnalt, &c. for Kinlochewe. On the low hills near Garve they found a sprinkling of alpine vegetation, and *Nymphæa alba*, beautifully in flower, in a pool near the top of

one of them, at a higher elevation than had been previously observed. The season having been remarkably dry, all the lakes were far below their usual level, and in consequence such plants as *Lobelia Dortmanna*, *Subularia aquatica*, &c. were seen, wondering at each other, in flower and fruit, on dry ground. Things, however, were now changed, for the party had scarcely a dry day during the whole of their excursion, and few such as admitted of the vegetation being carefully examined. Several days were spent among the mountains about Loch Maree, which are chiefly composed of red sandstone, with quartz tops, and by no means prolific in interesting vegetation. *Cornus suecica*, *Saussurea alpina*, *Hieracium alpinum*, *Rubus Chamamorus*, *Arbutus alpina*, *Azalea procumbens*, *Cherleria sedoides*, *Sibbaldia procumbens*, &c. were among the rarest plants observed; and rather unusually, all the six *Lycopodiæ* were picked nearly in one spot. *Tofieldia palustris*, *Thalictrum alpinum* and *Malaxis paludosa* occurred at the bottom of the cliffs, and *Salix herbacea* was found sparingly on the red sandstone below the summit cliffs of Ben Tarshan. Opposite Applecross, in a bog which the tide could seldom reach, were picked specimens of *Blysmus rufus* two feet high. Here there is an extent of limestone country, easily recognised at the distance of several miles by a marked improvement in the pasturage. On it the party met with *Schænus nigricans*, *Gentiana amarella*, *Listera ovata* and *Epipactis latifolia*, with pale flowers, but searched in vain for *Dryas octopetala*, which occurs profusely in similar soils in Sutherland. In an old deserted garden between Sheildag and Janetown they observed *Althæa officinalis*, *Aconitum Napellus* and other introduced plants. They also saw near Janetown *Ulex europæus* (a rare plant in the west of Ross-shire) growing freely, and producing abundance of seed, and the elder seemed to thrive peculiarly well. The mountains at the head of Loch Duich seemed to the party the finest they had seen, more magnificent even than those at the head of Loch Torridon, which again were more imposing than the much-extolled, and certainly very superb, groups bordering Loch Maree; but differences in the weather might have had some influence on the effect produced.

Proceeding southward, the party enjoyed one fine day at Clunie, and examined with considerable attention some very promising mountains to the south-west of the inn. These are crumbling and micaceous, but want elevation to produce alpine plants, and the mildness of the western climate renders that all the more necessary. The only interesting vegetable feature was an immense profusion of *Saussurea alpina*; though in spring, before vegetation gets rank, it is not unlikely that these cliffs might be found more productive. A patch of snow observed on the south side of Maamsool, a mountain about twenty miles north of Clunie, made the party desirous of visiting it; but here again the weather baffled their intentions. The party took Ben Nevis on their route, but the same cause rendered them unable to examine as they wished its magnificent cliffs. They, however, picked some interesting plants, and among the rest *Carex saxatilis*, but only in one spot.

In concluding his remarks, Dr. Graham observes:—"The scenery

we passed in the west of Ross-shire was magnificent; and in fine weather, if ever such shall occur in that district, it may occasion less disappointment, botanically, than we experienced. The disappearance of the forests from this and a great part of the Highlands of Scotland is a phenomenon which I cannot account for. Certainly it is not a change of climate, for in many districts the forests have perpetuated themselves by their own seedlings; and even where they have not, solitary seedlings of Scotch fir, birch and poplar occasionally spring up and thrive. It could not have been that the trees were cut for the purposes of the population, for the population is, and always must have been, from want of food, very limited. Fir is the only natural agent I can think of which was capable of effecting such destruction, but the remains of the trees have no appearance of having been burnt; and I doubt whether any of my companions, after our experience in a season which has parched up all of Scotland except the district we were in, will believe they ever could have been long enough dry to burn.

A letter to Professor Graham from Mr. N. B. Ward, F.L.S., on the introduction of the *Musa Cavendishii* into the Navigator Islands, was read:—

“When Mr. Williams was about to leave England in 1839 for the Navigators, he was anxious to take with him some useful plants, and particularly the *Musa*. He inquired of me whether I thought that it would travel safely in one of the glazed cases, and having received an answer in the affirmative, he applied to his Grace the Duke of Devonshire, who kindly gave him a healthy young plant. Mr. Williams left England on the 11th of April 1839, and arrived at Upolu, one of the Navigator Islands, at the end of the following November. The *Musa* bore this long voyage well, and was transplanted into a favourable situation soon after its arrival. In May 1840 it bore a fine cluster of fruit, exceeding 300 in number, and weighing nearly a hundred-weight. The parent plant then died, leaving behind more than thirty young ones. These were distributed to various parts of the island, and in the following May (1841) when Mrs. Williams left the island, all of these were in a fructiferous state, and producing numerous off-sets. Supposing the plants to continue to increase in the same ratio, there will be in the ensuing May (of 1843) more than 800,000 of them, and as the son of Mr. Williams is established as a merchant at Upolu, is owner of two vessels constantly employed in trading between the various islands in the South Pacific, and is moreover actuated by the same benevolent disposition which was a striking characteristic of his late father, there cannot be a doubt, but that, in a very short time, they will be common in all the islands. To estimate the importance of the introduction of this plant, we must bear in mind the great quantity of nutritious food furnished by the Banana. Humboldt has told us that he was never wearied with astonishment at the smallness of the portion of soil, which, in Mexico and the adjoining provinces, would yield sustenance to a family for a year, and that the same extent of ground, which in wheat would maintain only two persons, would yield sustenance under the Banana to fifty, al-

though in that favoured region the return of wheat is never under seventy, and sometimes as much as a hundred-fold. The return, on an average, in Great Britain, is not more than nine for one."

Mr. Ralf's paper on the *Diatomaceæ*, No. 3, was then read, containing descriptions of the genera *Striatella Tessella* and *Tetra cyclas*.

"On the Development of Leaves;" by Dr. Dickie, Lecturer on Botany, King's College, Aberdeen. The author concluded by stating, "that it cannot be said that the forms of leaves in flowering plants have any dependence whatever on their venation, since young leaves are lobed, &c. previous to the appearance of the veins. The truth appears to be, that the quantity of cellular tissue in a leaf determines the development and positions of the veins, and not the opposite."

GEOLOGICAL SOCIETY.

June 29, 1842.—A paper "On the Fossil Foot-prints of Birds and Impressions of Rain-drops in the Valley of the Connecticut." By Charles Lyell, Esq., V.P.G.S.

The deposit in which these impressions, long known on account of the researches of Prof. Hitchcock, occur, is situated in a trough of hypogene rocks, about five miles broad, the strata, which consist of sandstone, shale and conglomerate, dipping uniformly to the east at angles that vary from 5° to 30° . Mr. Lyell first examined the red sandstone at Rocky Hill, three miles south of Hartford, in Connecticut, where it is associated with red shale and capped by twenty feet of greenstone. Many of the beds are rippled, and cracks in the shale are filled by the materials of the superincumbent sandy layer, showing, the author observes, a drying and shrinking of the mud while the accumulation of the strata was in progress. The next quarries he examined were at Newark in New Jersey, about ten miles west from New York city. The excavations are extensive, and the strata dip, as is usual in New Jersey, to the north-west, or in an opposite direction to the inclination in the valley of Connecticut, a ridge of hypogene rocks intervening. The angle is about 35° near Newark. The beds exhibited ripple-marks and casts of cracks, also impressions of rain-drops on the upper surface of the fine red shales. Mr. Lyell states, that he felt some hesitation respecting the impressions first assigned to the action of rain by Mr. Cunningham of Liverpool, but he is now convinced of the justness of the inference, having observed similar markings produced on very soft mud by rain at Brooklyn in Long Island (New York). On the same mud were the foot-prints of fowls, some of which had been made before the rain and some after it.

Mr. Lyell next visited the red and green shales of Cabotville, north of Springfield in Massachusetts, where some of the best Ornithichnites have been procured, chiefly in the green shale. The dip of the beds is 20° to the east, a higher inclination, the author says, than could have belonged to a sea-beach. He observed in the same quarries ripple-marks as well as casts of cracks, and he was informed that the impressions of rain-drops have likewise been found.

In company with Prof. Hitchcock, Mr. Lyell afterwards examined a natural section near Smith's Ferry, on the right bank of the Con-

necticut, about eleven miles north of Springfield. The rock consists of thin-bedded sandstone with red-coloured shale. Some of the flags are distinctly ripple-marked, and the dip of the layers on which the *Ornithichnites* are imprinted, in great abundance, varies from eleven to fifteen degrees. Many superimposed beds must have been successively trodden upon, as different sets of tracks are traced through a thickness of sandstone exceeding ten feet; and Prof. Hitchcock pointed out to the author that some of the beds exposed several yards farther down the river, and containing *Ornithichnites*, would, if prolonged, pass under those of the principal locality, and make the entire thickness throughout which the impressions prevail, at intervals, perhaps twenty or thirty feet. Mr. Lyell, therefore, conceives that a continued subsidence of the ground took place during the deposition of the layers on which the birds walked.

It has been suggested, but the opinion has not been adopted by Prof. Hitchcock, that the eastward slope of the beds represents that of the original beach. With a view to this question, Mr. Lyell examined the direction of the ripple-marks, and found that it agreed with the dip, or was at right angles to the supposed line of beach; but he adds, though this agreement presents a formidable objection to the suggestion above alluded to, if the ripples were produced by waves, yet it does not disprove the opinion, as the ripples do not exceed in dimensions those which are produced by sand blown over a muddy beach, and often distributed at right angles to the coast-line. Instances of this effect of the wind Mr. Lyell has remarked along the shores of Massachusetts. Nevertheless he is of opinion that the rippled layer of sandstone in question contains too much clay to have resulted from blown sand, and he is disposed to think that in most of these localities the strata have been tilted, instances of such disturbance having been pointed out to him by Prof. Hitchcock in the state of Massachusetts, and by Mr. Percival near Newhaven in Connecticut. In reference to this subject, he says, that a few miles from Smith's Ferry a conglomerate, several hundred feet thick, containing angular and rounded fragments of trap and red sandstone, the base being sometimes a vesicular trap and trap tuff, passes upwards into the very flags on which *Ornithichnites* occur; and from this he infers, that there were eruptions of trap, accompanied by upheaval and partial denudation, during the deposition of the red sandstone.

With respect to the impressions having been made by birds, Mr. Lyell states, that until he examined the whole of the evidence he entertained some scepticism, notwithstanding the luminous account given by Prof. Hitchcock. In proof of their being the foot-prints of some creature walking on mud or sand, he mentions, 1st, the fact of Prof. Hitchcock's having seen 2000 impressions, all, like those he had himself examined, indented in the upper surface of the layer, the casts in relief being always on the lower surface; and 2ndly, that where there is a single line of impressions the marks are uniform in size, and nearly uniform in distance from each other, the toes in the successive steps turning alternately right and left. Such single lines, Mr. Lyell says, indicate that the animal was a biped, and the trifid marks resemble those which a bird leaves, there being generally a

deviation from a straight line in any three successive prints; and his attention having been called to indications of joints in the different toes, he afterwards clearly recognised similar markings in the recent steps of coots and other birds on the sands of the shores of Massachusetts. Prof. Hitchcock has shown, that the same impression extends through several laminæ, decreasing in distinctness in proportion as the layer recedes from that in which it is most strongly marked, or in proportion as the sediment filled up the hollows and restored the surface to a level; and Mr. Lyell states, that he has observed a great number of instances of this fact.

He also says, that he can scarcely doubt that some of the impressions on the red sandstone of Connecticut are not referable to birds, but he believes that the gigantic ones described by Prof. Hitchcock are Ornithichnites. At Smith's Ferry they are so numerous that a bed of shale many yards square is trodden into a most irregular and jagged surface, so that there is not a trace of a distinct footprint; but on withdrawing from this area to spots where the same tracts are fewer, the observer, Mr. Lyell says, is forced to admit that the effect in each case has been produced by this cause.

On examining the shores on some small islands about fifteen miles south-east from Savannah, the author was struck with the number as well as the clearness of the tracks of raccoons and opossums imprinted in the mud during the four preceding hours, or after the tide had begun to ebb. At one spot, where the raccoons had been attracted by the oysters, the impressions were as confused as when a flock of sheep has passed over a muddy road; and in consequence of a gentle breeze blowing parallel to the line of cliffs composed of quartzose sand, the tracks had in many places already become half-filled with blown sand, and in others were entirely obliterated; so that if the coast should subside, the consolidation of this sand would afford casts analogous to those of Storeton Hill in Cheshire, yet the impressions had been made and filled in a few hours.

When considering the broad question whether the fossil foot-prints were made by creatures walking on mud or sand after the ebbing of the tide, Mr. Lyell reminds his readers of the fact that in the United States, as in Saxony and Cheshire, the tracks in sandstone and shale are accompanied by littoral appearances, as ripple-marks, the casts of cracks in the clay, and often by the marks of rain.

In regard to the age of the red sandstone of the valley of the Connecticut and New Jersey, the author states he has nothing to add to what had been previously advanced, by which its position had been shown to be between the carboniferous and cretaceous series. In the neighbourhood of Durham, Connecticut, he had collected in the sandstone, fishes of the genera *Palæoniscus* and *Catopterus*, but no other organic remains, except fossil wood.

In conclusion, Mr. Lyell remarks, 1st, that the Ornithichnites of Connecticut should teach extreme caution in inferring the non-existence of land animals from the absence of their remains in contemporaneous marine strata; 2ndly, that when this red sandstone of Connecticut was deposited, there was land in the immediate vicinity of the places where the Ornithichnites occur; and that but for

them it might naturally be inferred that the nearest land was several miles distant, namely, that of the hypogene rocks which bound the basin of the Connecticut. Now, the land that caused the sea-beach, Mr. Lyell says, must have been formed of the same sandstone which was then in the act of accumulating, in the same manner as where deltas are advancing upon the sea.

In a postscript, Mr. Lyell states, that subsequently to writing the paper he had read the luminous report of Mr. Vanuxem on the *Ornithichnites* described by Prof. Hitchcock, and though it agrees in substance with his own account in some particulars, yet that he has left his notice as it stood.

MISCELLANEOUS.

ON THE PEARL OYSTER OF CEYLON.

“It may interest some of your conchological acquaintances to know that *Avicula radiata* of Leach is the far-famed Pearl Oyster of Ceylon. I have got plenty of all ages destined for the Belfast Museum. I send you a sketch* of the fry which roves about near the surface of the sea; it in scarcely any respect resembles the full-grown shell.”
Vide Nat. Misc., vol. i. pl. 43.—*Extract from R. Templeton's, Esq., R.A., letter from Colombo in Ceylon, May 19, 1842.*

FOSSIL REMAINS IN ESSEX.

To the Editors of the Annals of Natural History.

GENTLEMEN,—Fossil remains of Mammalia have been met with so often in the county of Essex that their occurrence now almost ceases to excite surprise, but a large portion of a fossil tusk of the elephant has very recently been found at Grays Thurrock, of dimensions so large as to favour the impression, that the animal to which it formerly belonged must have arrived at the maximum size of those giants of the animal kingdom.

This fine fossil in its present state is two feet eleven inches in length; it is broken off at both ends, and appears to have formed the middle third part of the tusk in length. At its larger extremity it is $19\frac{1}{2}$ inches in circumference, and when it is considered that no part of the cavity forming the alveolus can be seen, that portion being broken off and with it more of the larger end of the tusk probably;—bearing this in mind, we may fairly infer that the tusk was quite as long as our conclusions warrant in drawing from the facts before us.

At its smaller end it is broken off at that part which gives us fifteen inches circumference, and as to its length, by following the two outer curvatures of this fragment to a point, these lines meet at a distance of about three feet from the smaller circumference; and if we allow little more than two feet from its larger end for the alveolus and other missing portions, we then have a length of between eight and nine feet when this tusk was whole.

* The figure will be given in one of the Plates of our present volume.—ED.

This fossil was discovered about a month ago in a bed of detritus, thirty feet from the surface, in a brick-field, at the locality before mentioned in this county; a locality rich in mammalian and other fossil remains, vide pages 262 and 263, vol. ix. of this work; and it is now in the collection of Mrs. Mills of Lexden Park, near Colchester, to whose kindness I am indebted for the measurements of this relic of days long gone by; another fact illustrating the alteration in the fauna of our planet.

I am, Gentlemen, yours very truly,

Stanway, Feb. 4, 1843. JOHN BROWN.

NOTICE OF THE DISCOVERY OF AN ELECTRICAL FISH ON THE AMERICAN COAST. BY D. HUMPHREYS STORER, M.D.

A species of Ray possessing electrical powers has been known to the fishermen of Cape Cod and New York for many years, and called by them the *cramp-fish* or *numb-fish*. Mitchell, in his paper on the "Fishes of New York," contained in the first volume of the Transactions of the Literary and Philosophical Society of New York, refers to this species; he had never seen it, but, from the facts he was enabled to collect respecting it, he supposed it to be identical with the European species "*Raia torpedo*," and as such introduces it into his memoir. In my Report on the Fishes of Massachusetts, I merely observed that a *Torpedo* was found on the coast of Cape Cod, but being unable to procure a specimen, I could not identify it. I have had the good fortune to procure a fine specimen within the last month, which was captured at Wellfleet; it was 4 feet 2 inches in length, and proves to be a *Torpedo nobiliana*, Bonaparte. It agrees perfectly with Mr. Thompson's description, in the fifth volume of the 'Annals of Natural History,' of a specimen taken on the Irish coast in 1838.

As some time may elapse before I can publish a contemplated paper on our fishes, I would avail myself of your valuable Journal to make the above-mentioned fact known to ichthyologists.—*Silliman's Journal*, Jan. 1843.

ON A PECULIAR SENSATION CAUSED BY SOME MOLLUSCA. BY FRANCIS M. JENNINGS.

On the 2nd of May, 1842, I brought before the Cork Cuvierian Society a short notice of a curious fact I had observed in some fresh-water mollusca, viz. a power of causing a peculiar sensation when placed on the tongue; this may be experienced by putting the *Limneus periger*, a small univalve shell which abounds in most ponds and lakes in this country, into the mouth, and allowing the foot of the animal to remain for a few minutes on the tongue, when the sensation will be felt, varying in intensity according to the size of the animal and the length of time it is allowed to remain.

The sensation, though not decidedly painful, is yet rather disagreeable whilst it continues, frequently lasting from one to two hours, being exerted with greater energy during warm than cold weather. I tried a few experiments to ascertain whether the power

arose from an acid secretion, capable of being emitted at pleasure by the animal, but so far without success.

I hope these few observations will be the means of directing the attention of naturalists to this subject, which has hitherto, I believe, escaped their notice.

Brown Street, Cork, March 4, 1843.

FRANCIS M. JENNINGS.

Mr. Jennings having sent the foregoing to me to forward for publication, I beg to add, that I repeated his experiment with a similar result to that he describes. I understand that Mr. Armstrong of this city, having, in collecting *Ancyli*, put some of them into his mouth, experienced the same painful action from the contact of these animals with his tongue. As I am not aware that the subject is rightly understood, I think it worth bringing under notice.

Dublin, March 13, 1843.

ROBERT BALL.

METEOROLOGICAL OBSERVATIONS FOR FEB. 1843.

Chiswick.—Feb. 1. Very fine : cloudy. 2. Heavy rain : overcast. 3. Stormy showers : boisterous. 4. Stormy : very boisterous. 5. Clear and frosty. 6. Cloudy. 7. Hazy : sleet. 8. Dense fog : hazy and cold. 9. Cold easterly haze. 10. Densely clouded. 11. Uniformly overcast. 12. Slight drizzle. 13. Frosty : hazy : sharp frost at night. 14. Frosty : cloudy : severe frost. 15. Sharp frost : snow flakes : frosty. 16. Dry air and frosty : overcast. 17. Clear and frosty : very fine : stormy at night. 18. Stormy, with drifting snow. 19. Overcast : heavy rain. 20. Rain : foggy. 21. Foggy : fine : foggy. 22. Slight rain : cloudy. 23. Very fine. 24. Foggy : cold easterly haze. 25. Slight drizzle : stormy. 26. Sleet : drizzly. 27. Stormy and wet : barometer very low. 28. Cloudy.—Mean temperature of the month $5^{\circ}\cdot 8$ below the average.

Boston.—Feb. 1. Fine. 2. Rain : stormy, with rain P.M. 3. Fine : stormy, with snow P.M. : stormy night. 4. Stormy : hail and snow P.M. 5. Fine. 6. Fine : rain and snow P.M. 7. Cloudy : rain P.M. 8. Cloudy. 9. Fine. 10. Fine : rain P.M. 11. Rain : rain early A.M. : rain P.M. 12. Cloudy. 13. Fine. 14—16. Cloudy. 17. Fine. 18. Cloudy : snow A.M. 19. Cloudy : rain P.M. 20. Cloudy : rain early A.M. : rain P.M. 21. Cloudy. 22. Rain : rain early A.M. : rain A.M. 23. Fine. 24. Cloudy. 25. Cloudy : rain and snow P.M. 26—28. Cloudy.

Sandwich Manse, Orkney.—Feb. 1. Showers. 2. At $1\frac{1}{2}$ P.M. wind N.W. : stormy, with drift. 3. Snow-drift : at 12 at night a storm began. 4. Cloudy : thaw : frost. 5. Cloudy : frost. 6. Bright : frost : thaw : aurora. 7. Clear : frost : thaw. 8. Bright : thaw : damp. 9, 10. Cloudy : frost. 11. Drizzly showers : clear hoar-frost. 12. Clear frost : clear hoar-frost. 13. Showers : snow-showers. 14. Snow-drift. 15. Clear : snowing. 16, 17. Snow-showers : clear. 18. Clear : cloudy. 19. Bright : cloudy. 20. Bright : thaw. 21. Cloudy : thaw. 22. Snow-showers : cloudy : frost. 23. Clear and frosty. 24. Bright : cloudy : thaw. 25. Cloudy : frost. 26. Cloudy : snow-showers. 27. Snow-showers : clear and frosty. 28. Clear and frosty : snow-showers.

Applegarth Manse, Dumfries-shire.—Feb. 1. Heavy showers P.M. 2. Snow-showers. 3. Snow : frost P.M. 4. Frost and snow. 5. Fine, but frosty. 6. Frost A.M. : rain P.M. 7. Thaw : high wind P.M. 8. Mild and fair. 9. Fair, but chilly. 10. Sprinkling of snow : frost. 11, 12. Fair : no frost. 13. Frost : fine. 14. Frost. 15. Frost : shower of snow. 16—18. Frost. 19. Slight frost. 20. Snow and sleet. 21. Slight rain. 22. Fair. 23, 24. Showery. 25. Fine and fair. 26. Fair, but cloudy. 27. Fair. 28. Frost A.M. : slight snow.

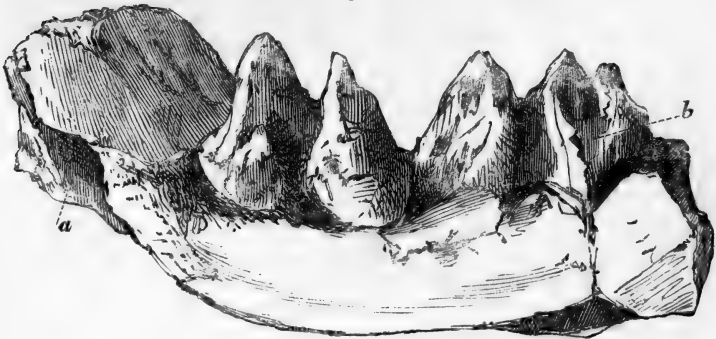
THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

No. 71. MAY 1843.

XLVI.—*Additional Evidence proving the Australian Pachyderm described in a former Number of the 'Annals' to be a DINOTHERIUM, with remarks on the Nature and Affinities of that genus.* By Prof. OWEN, F.R.S.

IN the January Number of the 'Annals of Natural History' (p. 7) I described some fossils transmitted from Australia by Sir Thos. L. Mitchell, and referred them to the Proboscidian family of Pachyderms, pointing out the close resemblance of the broken tooth (figs. 2 and 3, p. 9) to the molars of the Dinotherium and Mastodon, but more especially to those of the Dinotherium, on account of the size and shape of the transverse ridges; although, as their number in the entire tooth

Fig. 1.



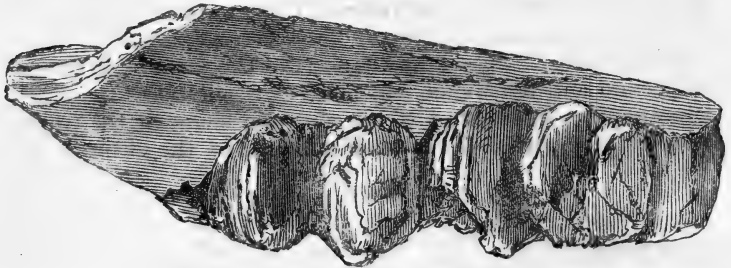
Dinotherium Australe: one-third nat. size.

could not be ascertained from the fossil, it could not with certainty be referred to that genus.

I have this morning been favoured by Sir Thos. Mitchell with a letter containing two figures of the portion of the jawbone referred to in his former letter, but which he has not been able to procure for transmission, and these figures prove the Australian Pachyderm to be a Dinotherium, not a Mastodon.

In the genus *Mastodon* the antero-posterior diameter of the molars and the number of the transverse eminences or pairs of tubercles on their grinding surface increase, as the teeth are placed further back in the jaw: thus, in the *M. giganteus*, whose teeth bear most resemblance to the Dinotherian type, the first and second molars have two transverse ridges, the third and fourth have three ridges, and the last molar has four or five ridges. In the portion of jaw from the Darling Downs, figured by Sir Thomas Mitchell, which contains the third and fourth molars, the former (fig. 1, *b*) has three transverse ridges, and is of greater antero-posterior extent than the fourth molar, which has only two transverse ridges. In the shape as well as proportions of the teeth, the Australian fossil agrees with the different species of *Dinotherium* that have been discovered in the Miocene of Europe. The Australian species is somewhat less than the *Dinotherium medium* of Kaup. The

Fig. 2.



Grinding surface of third and fourth molars.
Dinotherium Australe: one-third nat. size.

degree of correspondence, in both size and shape, of the teeth in the jaw figured by Sir Thos. Mitchell with the portion of the molar represented at p. 9, figs. 2 and 3, would indicate the latter to be part of an anterior molar of the same species of *Dinotherium*, if not of the same individual. The traces in the femur of the unobliterated junction of the condyloid epiphysis with the shaft of the bone indicated it to have belonged to a young though nearly full-grown animal, and it would seem that the last molar of the lower jaw had not come into place, for in the figure of the portion of the jaw, the cavity which contained it appears to be indicated at *a*, fig. 1. The summits of the ridges of the fourth molar are represented sharp and unworn, like those of a tooth that had been recently acquired.

We may thus assume, with a high degree of probability, that the portions of jaw, femur and teeth associated together,

on the Darling Downs, belonged to the same animal; and on this assumption proceed to apply the anatomical facts so attained to a resolution of the mooted question of the nature and affinities of the genus *Dinotherium*.

The only bone of the extremities referable to any of the European species of Dinothere which has hitherto been discovered is a scapula, described by Prof. Kaup in his 'Ossements Fossiles de Darmstadt,' 4to, 1832, p. 13. If the phalanx of the gigantic Pangolin, figured in the same work, pl. 2. *ad.* figs. 4—7, had belonged, as the discoverer of the *Dinotherium* supposed, to his most extraordinary genus, it would have indicated an affinity to the Edentata, which would have rendered the Dinothere with its huge incisive tusks a still stranger and more anomalous creature than its cranial and dental organization prove it to be.

The opinions of Prof. Kaup have been opposed by MM. de Blainville and Isidore Geoffroy St. Hilaire upon the evidence afforded by the entire cranium and dental system, which was exhibited in Paris in 1837*. This evidence was deemed conclusive in proof that the *Dinotherium* belonged to the family of the Herbivorous Cetacea†, or, to use the words of M. de Blainville, that it was a gigantic Dugong with inferior incisors developed into tusks‡. The Professor then adverts to the question, whether the Dinothere had four or two locomotive members, and, in reply, states it to be more probable that it had but two anterior pinniform extremities or 'en nageoires.' M. Isid. Geoffroy St. Hilaire recognises, with M. de Blainville, in the *Dinotherium* numerous analogies with the Dugong, and especially with the Manatee, "et c'est dans le groupe si remarquable, et jusqu'à présent si peu nombreux, auquel appartiennent ces deux genres, que le *Dinotherium* lui paraît devoir trouver sa place naturelle."—*Ibid.* p. 429.

The anatomy of the Dugong and Manatee—their *membrana nictitans*, their *vesiculæ seminales* and double *corpus cavernosum*, their renal system, larynx and dentition, their pectoral mammæ, &c. §, all combine to prove the close affinities of the

* "Quoique nous soyons bien éloignés de penser qu'un seul os, une seule facette d'un os, soient suffisants pour reconstruire la charpente osseuse ou le squelette d'un mammifère, ici nous croyons que la tête entière et le système dentaire complet, sont tout-à-fait suffisants pour mettre notre thèse hors de doute."—*M. de Blainville, Compte Rendu de l'Acad. des Sciences*, March 20, 1837 (p. 422).

† "Le *Dinotherium* a constitué un genre de mammifères de la famille des Dugongs et des Lamantins."—*Ibid.* p. 422.

‡ "En un mot, c'était, suivant nous, un Dugong avec les incisives en défense inférieures."—*Ibid.*

§ See Proceedings of the Zoological Society, March 27, 1838.

Herbivorous Cetacea of Cuvier with the Pachyderms, and especially with the group containing the Dinotherium. But the close relation manifested by this extinct genus to the Mastodon, in its molar teeth and inferior tusks, strongly argued it to belong to the proboscidian rather than to the aquatic or cetaceous family of Pachyderms. The femur associated with the jaw and teeth of the Dinotherium from Darling Downs gives the required evidence of its having been, like the Mastodon and Elephant, a heavy terrestrial quadruped, and the differences which I have pointed out (*ante* p. 8) between the femur of the Australian Pachyderm and that of the *Mastodon giganteus* may be regarded as indicating the distinctive characters of the femur in the genus *Dinotherium*.

Although this much-desired evidence has thus unexpectedly reached us from Australia, it cannot be doubted that it will be ultimately corroborated by the discovery, in the rich depositaries at Epplesheim and at Anch, of bones of the extremities associated with the characteristic teeth of the Dinotheres.

It is well known that the double transverse-ridged grinding surface, which characterizes the teeth of the Tapir, and is exhibited on a gigantic scale in those of the Dinothere (Cuvier's Gigantic Tapir), and by the *Mastodon giganteus* in its anterior molars, is likewise present in the molars of the Manatee and Kangaroo: and the similarity is sufficiently close to have warranted perhaps the supposition, if we had had only the remains of the jaw and teeth to reason from, that some still more gigantic form of *Macropus* than the *Gigas* and *Titan* of the Wellington bone-caves had formerly existed in Australia: but it might, on the other hand, have been contended that a gigantic form of Herbivorous Cetacean had formerly browsed on the shores of Australia; and, indeed, without other evidence, the advocates of M. de Blainville's hypothesis might have held this conclusion to be quite compatible with the admission of the generic relationship of the fossil of the Darling Downs with the Dinotherium of Europe. The happy discovery of the femur, while it shows that the mammal in question was neither Kangaroo nor Manatee, proves that the genus to which it truly appertains was a quadrupedal and terrestrial Pachyderm with thick and stout extremities adapted to the support and progression of the massive frame which characterizes the known Proboscidian Pachyderms.

I propose to designate the Australian Pachyderm by the name of *Dinotherium Australe*.

London, March 13, 1843.

XLVII.—*Remarks on a Collection of Australian Drawings of Birds, the Property of the Earl of Derby.* By H. E. STRICKLAND, Esq., M.A.

IN the March Number of the 'Annals of Nat. Hist.' Mr. G. R. Gray has given a list of certain Australian birds long since described by Latham, but which, from the brevity and incompleteness of that author's descriptions, have remained till now in much obscurity. By the aid of the original drawings, from which alone Latham compiled his descriptions, Mr. Gray has been enabled to refer the greater part of these hitherto doubtful species to their true place in the modern system, and by applying the "law of priority" to their specific names has done an act of justice to the father of British ornithologists.

Having had the pleasure of co-operating with Mr. Gray in comparing these drawings with specimens in the British Museum, and having then acquiesced in most of the conclusions to which he arrived, I should not have now referred to them, were it not that the Earl of Derby has kindly permitted me to take these drawings to my own residence, and by a careful comparison of them with specimens in my collection, I have obtained a few additional results.

Mr. Gould has also examined these drawings with much attention, and has communicated his remarks upon them, which, with his permission, I have inserted in the present notice, distinguishing them by the initials J. G.

These water-colour drawings, comprised in three folio volumes, are 225 in number, the first being a landscape in Norfolk Island, the next ten are mammalia, and the rest birds. There is no title-page, date or artist's name, but the backs are lettered "New South Wales Drawings," and there is every reason to believe that the whole of them were made in the Australian regions. It has been supposed that the artist was John White, author of the 'Voyage to New South Wales,' 4to, London, 1790, soon after which date they came into possession of Mr. A. B. Lambert. Mr. Gould however remarks, "this is probably a mistake; they were perhaps made by some convict. Mr. Lambert told Mr. Prince, upon showing him the drawings some time before his death, that they were made by an artist in the colony for one of the governors, by whom they were presented to Mr. Lambert. I am strengthened in this opinion by observing among them many of the denizens of the penal settlement of Norfolk Island, a part never I believe visited by White."

In 1800 they were borrowed by Dr. Latham, as appears from an autograph letter from him to Mr. Lambert, inserted

into the first volume. It was this circumstance which conferred on these drawings a far greater value than they would intrinsically have possessed. Dr. Latham not only wrote on each drawing with his own hand the name which he intended the species to retain, but drew up from these designs a great number of original specific descriptions, which he published for the first time in the second Supplement of his 'Synopsis,' 4to, London, 1802, and which are repeated in his 'General History of Birds,' and in the works of Shaw, Vieillot and other compilers. But inasmuch as many of the drawings are but rude and unscientific copies of nature, and the descriptions are often very vague copies of the drawings, these nominal species have hitherto lain in great obscurity, which will now be in great measure removed by the fortunate discovery, at Mr. Lambert's death, of the original designs.

The plates 121, 122, 126, 127, 129, 131, 134, 136 and 139 of Latham's second Supplement are copies, more or less exact, of some of these drawings; and it further appears that a M. Francillon, a French artist, copied others of them early in the present century, as some of the plates in Vieillot's 'Oiseaux Dorées,' said to be from M. Francillon's designs, are manifest copies from this collection. From that time till very recently the "New South Wales Drawings" remained in oblivion, to the no small inconvenience of the science, for had Messrs. Vigors and Horsfield and other writers on Australian ornithology had an opportunity of consulting them, it would have saved us many superfluous synonyms and cleared up many difficulties.

These remarks, it is hoped, will prove the great value of original drawings when they have been used as the basis of specific descriptions. How much useless lumber was removed from zoology by the valuable memoir of Lichtenstein on the original designs for Marcgrave's 'History of Brazil,' now preserved at Berlin! (See Oken's 'Isis,' 1820.) And Mr. Gray would confer an equal boon if he would give us a *catalogue raisonnée* of the yet unpublished drawings made by Forster during Capt. Cook's voyage, and preserved in the British Museum. There are also numerous unascertained species described by Latham from drawings once belonging to Lady Impey, Gen. Davies, and other persons, which, if they could be now discovered, would prove of the *utmost value* to modern science. Let me hope that these observations may aid in bringing some of these lost documents to light, and in submitting them to the criticisms of zoologists.

I now proceed to make some specific remarks by way of a commentary and supplement to Mr. Gray's paper, premising

that the determination of many of these species is rendered difficult by the rudeness of the designs, and by the changes which some of the colours have undergone, especially the *whites*, which being metallic colours have become oxydized, and are now changed to black. Another difficulty arises from some of the birds being drawn of the natural size and others reduced, without any indication when this is the case, so that the dimensions given by Latham from the drawings are often faulty. Hence, after all the pains bestowed by Mr. G. R. Gray, Mr. Gould, and myself, some few of the drawings still fail to be identified with any known species. These may either represent true species unknown to modern science, or they may possibly be, as Mr. Gould conjectures, mere inventions of the artist.

Page 189 of the present vol. After "*FALCO nisus*, Lath.," insert var. δ . (This bird is the *Accipiter torquatus*, not *Astur approximans*, J. G.) Also note that the larger species, *Astur approximans* of Vigors and Gould, is unquestionably a true *Accipiter* and not an *Astur*. (The true *Falco radiatus* of Latham is also not an *Astur* but an *Accipiter*, J. G.)

(*FALCO lunulatus*, Lath., is perhaps a young *Ieracidea*, J. G.*)

(*LANIUS robustus*, Lath., represents one of the numerous varieties of plumage of *Graucalus mentalis*. It must now I suppose be called *Graucalus robustus*, J. G.)

LANIUS erectus, Lath., judging from the figure, is more like a *Maturus* than a *Falcunculus*, but I am unacquainted with any species like it.

P. 190. *CORVUS versicolor*, Lath., is a true species of *Strepera*, of a gray colour, allied in form and size to *Strepera graculina*. I possess a specimen, and Mr. Gould has shot it in New South Wales. The name *versicolor* being decidedly erroneous, Mr. Gould proposes to call it *Strepera cinerea*.

CORVUS cyanoleucus, Lath. As this bird was also very accurately described by Latham in his second Supplement under the name of *Gracula picata*, and as the name *picata* is more correctly descriptive than *cyanoleuca*, I should prefer making the permanent designation of the bird *Grallina picata* (Lath.) rather than *Grallina cyanoleuca* (Lath.).

For *CUCULUS phasianus*, Lath., read *CUCULUS phasianinus*, Lath., and it should therefore now stand as *Centropus phasianinus*.

P. 191. (*CERTHIA melanops*, Lath. Syn. Sup. ii. p. 165. description 1, is perhaps the same as *Glycyphila fulvifrons*, J. G.)

(*CERTHIA melanops*, var. Lath. l. c. description 2, is certainly *Glycyphila fulvifrons*, J. G.)

* Mr. Gould and I have compared the drawing of *Falco lunulatus*, Lath., with specimens of *Ieracidea berigora* and *Falco frontatus*, Gould. Though differing from both, it most resembles the *Ieracidea*. The name *Falco frontatus* may therefore be allowed to stand.

(*CERTHIA leucophæa*, Lath., is not *Glycyphila subocularis* as Mr. Gray makes it, but is the *Climacteris picumnus*, Tem., J. G.) This is sufficiently evident on comparing the drawing of *C. leucophæa* with Mr. Gould's figure of the female *Climacteris picumnus*. This bird should therefore be designated as *Climacteris leucophæa* (Lath.).

The *Certhia atricapilla* of Lath. is figured and described with a white chin, which distinguishes it from the *Meliphaga atricapilla* of Sir W. Jardine's 'Illustrations of Ornithology,' ser. 1. pl. 134. f. 1. Mr. Gray unites it to *Melithreptus lunulatus* (Shaw), but that differs in having a white band at the back of the head. The *Certhia atricapilla*, Lath., is therefore either a distinct species from both the above, or it may possibly be the young of Jardine's *M. atricapilla*.

Certhia sanguinolenta is probably the female of *Myzomela dibapha*. To the synonyms of *CERTHIA dibapha*, Lath., add *Meliphaga cardinalis*, V. and H. (nec *Certhia cardinalis*, Lath.) and *Certhia australasie*, Leach.

(*CERTHIA canescens*, Lath., is perhaps the *Colluriocinclla cinerea*, V. and H., J. G.)

CERTHIA cærulescens, Lath., is the *Zosterops dorsalis*, Vig., not the *Z. tenuirostris*, Gould. It is also the *Sylvia lateralis* of Latham, and the latter specific name seems preferable to *cærulescens*. Add *Certhia diluta*, Shaw, and *Philedon cæruleus*, Cuv., to the synonyms of *Zosterops lateralis*.

Add *Certhia xanthotis*, Shaw, to the synonyms of *Certhia chrysolis*, Lath.

P. 192. Mr. Gray makes the *Meliphaga auricomis* of Vigors, Swainson and Gould, to be distinct from *Muscicapæ auricomis*, Lath., but I do not see on what grounds. This bird is figured no less than four times over in the "New S. Wales Drawings"—once as *Turdus melanops*, and again under Latham's MS. names of *Muscicapæ australis*, *Sylvia mystacea*, and *Muscicapæ novæ hollandiæ*. These three last references Latham seems to have afterwards incorporated into one species, described in his second Supplement under the name of *Muscicapæ auricomis*. The species should therefore retain the appropriate name of *Ptilotis auricomis*.

TURDUS harmonicus, Lath., is, I have no doubt, a synonym of *Colluriocinclla cinerea*, Vig., which should therefore stand as *Colluriocinclla harmonica*.

TURDUS prasinus, Lath., seems to be the young of *Pachycephala rufiventris* (Lath.).

(*TURDUS tenebrosus*, Lath., is perhaps the young of *Artamus sordidus*, J. G.)

To the synonyms of *TURDUS lunulatus*, Lath., add *Turdus varius*, V. and H., and perhaps also *T. varius* of Horsfield's 'Java.'

(*TURDUS fuliginosus*, Lath., is *Merula nestor*, Gould, J. G.), and will now stand as *Merula fuliginosa*.

(*TURDUS maxillaris*, Lath., is perhaps the *Sphæcotheres australis*, Sw., J. G.)

(*TURDUS mellinus*, Lath., is the young male of *Sericulus chrysocephalus*, J. G.)

LOXIA bella, Lath., and *Loxia nitida*, Lath., constitute a well-known species of *Estrilda*, which may stand as *Estrilda bella*, Lath.

(*LOXIA fascians*, Lath., is my *Micræa macroptera*, *Myiagra macroptera*, Vig. I presume it must now be termed *Micræa fascians*, J. G.)

P. 193. To the synonyms of *Muscicapa pectoralis*, Lath., add *Turdus lunularis*, Steph., and *Lanius albicollis*, Vieill.

I feel quite satisfied that *Muscicapa cucullata*, Lath., is the same as *Petroica bicolor*, Swains., which should therefore stand as *Petroica cucullata* (Lath.). *Grallina bicolor*, V. and H., is another synonym of it.

MUSCICAPA rhodogastra, Lath., is synonymous with *Saxicola rhodogastra*, Drap., and *Muscicapa lathamii*, Vig. It therefore stands as *Petroica rhodogastra* (Lath.).

MOTACILLA atricapilla, Lath., is possibly the young male of *Sericulus chrysocephalus*, as it bears some resemblance to the drawing of *Turdus mellinus*, Lath.

(Mr. Gould considers that the *SYLVIA sagittata*, Lath. (which is certainly the *Anthus minimus*, Vig.) will probably rank as the type of a new genus; but for the present we may follow Mr. Gray in calling it *Acanthiza sagittata*.)

(*SYLVIA leucophæa*, Lath., is *Micræa fascians* (Lath.), J. G.)

(*SYLVIA versicolor*, Lath., is *Chrysococcyx lucidus*, J. G.) This seems to be the *Chrysococcyx plagosus* of Mr. Gray, who I believe regards the true *C. lucidus* of New Zealand as a distinct species. The toes, having been erroneously drawn, induced Latham to make it a *Sylvia*.

P. 194. The following synonyms refer to *HIRUNDO caudacuta*, Lath.: *Chætura australis*, Steph.; *Hirundo fusca*, Steph., and *Chætura macroptera*, Sw.

(*HIRUNDO pacifica*, Lath., is *Cypselus australis*, Gould, J. G.) It should therefore be designated *Cypselus pacificus*.

To the synonyms of *CAPRIMULGUS vittatus*, Lath., add *Caprimulgus cristatus*, White, and *Egotheles australis*, Sw.

CAPRIMULGUS megacephalus, Lath., appears to be the same as *Podargus stanleyanus*, V. and H., and perhaps also *Caprimulgus gracilis*, Lath.

COLUMBA melanoleuca, Lath., is the same as *Columba picata*, Lath., *Columba armillaris*, Tem., and *Columba jamiesoni*, Quoy. It will stand as *Phaps picata* (Lath.), Selby.

A comparison of the original drawing of *Charadrius magnirostris*, Lath., with a specimen in my collection has convinced me that this bird is no other than *Ædicnemus grallarius* (Lath.). We have here an instructive example of the mode in which errors arise and are propagated in natural history. The artist who drew the bird which Latham named *Charadrius magnirostris* has represented with considerable exactness the plumage of *Ædicnemus grallarius*, but by throwing too strong a shade into the nasal groove, he led Latham to describe the beak as "very broad, resembling the *Tody* genus." Next came Illiger, who in his 'Prodromus Systematis Mammalium

et Avium,' published in 1811, had the rashness to found a genus, *Burhinus*, on Latham's imperfect description of a rude drawing, and the consequence has been that for the last thirty years our systems of ornithology have been haunted by a "*Burhinus magnirostris*"—a *vox et præterea nihil*, unknown both to nature and to science. The original drawing which led to all this confusion has now assisted in dispelling it.

CHARADRIUS griseus, Lath., is I conceive the *Charadrius virginianus*, Borkh. (*C. marmoratus*, Wagl., *C. pectoralis*, Less., *C. affinis*, Boié).

The following remarks refer to some additional species of Latham not in Mr. Gray's list:—

FALCO ponticerianus, var. Lath., is the *Haliastur leucosternus* (Gould).

CORVUS melanops, Lath., is the *Graucalus melanops*.

GALLINULA porphyrio, var. B. Lath., is *Porphyrio melanonotus*, Tem.

FALCO melanops, Lath., is the *Accipiter torquatus*, Tem. (*Nisus australis*, Less.) As the black round the eye which suggested the specific name of *melanops* seems to be an invention of the artist, I would reject that name on the ground of its serious incorrectness, and retain the later one of *torquatus*.

FALCO albicilla, var. Lath., is the *Ichthyaëtus leucogaster* (Lath.), young (*Haliaëtus sphenurus*, Gould).

FALCO clarus, Lath., is perhaps the young of *Astur nova hollandia* (Lath.).

FALCO pacificus, Lath., is perhaps a peculiar state of *Milvus isurus*, Gould, with the head pure white.

MUSCICAPA erythrogastra, var. 2. Lath. Syn. Sup. ii. p. 216, is perhaps a new species of *Petroica*, differing from *P. multicolor* by having a white eyebrow.

(*CUCULUS flabelliformis*, Lath., may perhaps be the *Cuculus cineraceus*, Vig., J. G.)

ARDEA antigone, var. Lath., is *Grus antigone* (Lin.) (*Grus orientalis*, Frankl.).

LANIUS curvirostris, Lath., is *Cracticus torquatus* (Lath.) (*Vanga destructor*, Tem.).

ARDEA maculata, Lath., is *Nycticorax caledonica*, young.

Besides the above there are several other species which Latham originally described from these drawings, but which, having been long since identified and made known to naturalists, it is unnecessary to enumerate.

XLVIII.—Notes on the Botany of Sicily. By JOHN BALL, B.A., M.R.I.A.

HAVING observed in a recent number of this Magazine a paper upon the Botany of Sicily, containing a list of species observed or recorded as belonging to that island, I have been induced to refer to some notes made during a very hasty

tour, which I did not at the time conceive to be worthy of publication. On looking over the catalogue of species given by Mr. Hogg I was struck with the extreme meagreness of its contents, extending to scarce half the number of species already known as natives of Sicily, though probably a far more complete one would come far short of adequately representing the exuberant richness of its gorgeous flora. It is indeed extraordinary that an island so easily accessible to travellers, which presents to them probably less of difficulties and inconveniences than any part of the South of Europe, and which offers so many objects of surpassing interest, both those already known, the theme of the historian and the poet, and those yet in store to reward the investigations of the antiquarian or the naturalist, should be so little visited and so imperfectly known. To be told that the temple of Segesta stands in solitary grandeur amongst mountains rarely tracked by the foot of a traveller, that the guide can scarcely determine the uncertain course amidst the pathless sands where arise the colossal ruins of Selinuntium, that there are yet unexplored tracts where hundreds of new and beautiful species would doubtless reward the botanist, whilst the geology offers many most interesting problems to the future historian of the earth, seems a sort of reproach on the activity and energy of the numerous travellers who yearly quit England, seeking throughout Europe for new objects of inquiry. I find that even amongst the limited number of species which it was possible for me to collect during a hurried ride round the island under an almost vertical sun, there is a great portion not contained in the catalogue furnished by Mr. Hogg; and I think it may tend to show what the real extent of the Sicilian flora must be, and at the same time be interesting to botanists who may visit the South of Europe, to give a list of the known species of the single family of Grasses, to which I have paid some attention, with some remarks, attracting their notice to various points which may be studied on the spot by any one having sufficient time to spare for the purpose. I have added a few notes of my tour, pointing out localities for some of the more remarkable plants, those interesting either for their rarity, beauty, or scientific importance. The authorities for most of the species in the following list, not seen by myself, are extracted from the first volume of Bertoloni's 'Flora Italica,' a work well known to many of your readers as indispensable to the student of Italian, indeed of European botany; as unsurpassed, and scarcely equalled, for the accuracy of its descriptions, the soundness of its criticism, or the extent of research which has been bestowed upon it.

The traveller landing in Sicily from Naples is at once sur-

prised by the almost total change in the vegetation. The least curious eye must be struck by the strange forms of the distorted *Opuntia*, the dark glossy foliage of the *Carubia*, or the stiff motionless aloe (*Agave americana*), which within a short period has become universally diffused; but to the botanist few of the new objects which meet him in every direction will be more attractive than the beautiful and varied species of *Gramineæ*.

The neighbourhood of Messina, particularly the sandy tract extending to the now undreaded Charybdis and the Pelorian promontory, is peculiarly rich in plants of this class; here will be found the beautiful *Panicum teneriffæ**, R. Br. (*Saccharum teneriffæ*, Fl. Gr.), the *Lamarckia aurea*, Moench., *Stipa tortilis*, Dsf.; many species of *Festuca* of the *Vulpia* group, including *F. alopecurus*, Pers., and *F. ligustica*, Bert. (whether the latter be distinct from *F. geniculata*, W., is I should think doubtful); the *Avena condensata*, Link, which occurs here and elsewhere on the east coast (it may be doubted whether this should not be united with *A. neglecta*, W.), and *Ægilops triaristata*, W. The genus *Ægilops* requires further study and illustration; though favoured by specimens from the Botanic Garden at Pisa, I can find no permanent character by which to distinguish *Æ. neglecta*, Savi, from *Æ. ovata*, nor do the remarks of Bertoloni enable me to separate *Æ. triaristata*, W., from *Æ. triuncialis*, L. Amongst the species of other orders, the botanist will notice several maritime *Umbelliferae*, including *Thapsia Garganica*, Fl. Gr., and *Cachrys Sicula*, L., and among the less conspicuous plants the *Gnaphalium tenuifolium*, Psl.†, which seems to have some claims to the rank of a distinct species.

The rocks near St. Alessio are covered with beautiful species, including *Scabiosa cretica*, L., *Matthiola rupestris*, R. Br. (which seems too near to *M. sinuata*), *Dianthus velutinus*, Guss., *Silene fruticosa*, L., *Euphorbia ceratocarpa*, and *E. biglandulosa*, Dsf., *Lythrum Græfferi*, Ten., *Artemisia arborescens*, L., *Centaurea sicula*, L., and *C. cineraria*, L.; also *Cineraria bicolor*, W. (it is to be wished that some botanist would clear up the confusion that exists as to several species of this group). The neighbouring sands abound in rare plants; the *Matthiola tricuspida*, R. Br., is conspicuous; amongst the *Gramineæ*, the scarce *Bromus fasciculatus*, Presl, *Festuca (Vulpia) ciliata*, DeC., a beautiful and distinct species, *F. maritima*, Kunth

* I have not observed the reddish tint given to the figure in the 'Flora Græca.'

† *Filago Gallica*, β. DC. Prod.

(*Triticum maritimum*, L., Bertol. Fl. It.); it seems quite impossible to separate this from the group forming the genus *Sclerochloa* of Link. I here found a variety of *Bromus sterilis*, L., with the panicle dense and pendulous, and the membranous margin of the calycine valves broader and whiter than usual, giving the plant a beautiful silvery appearance; it is very possibly a distinct species. A few miles to the southward of St. Alessio is Taormina (the ancient Taurominium): as the traveller stands above the vast area of its theatre, his eye is distracted from the glorious prospect which extends from the southern point of Calabria on the one hand, across the Ionian Sea, to the rocks of the Cyclops and up to the snowy peak of Etna, by the gorgeous vegetation which mantles over this mighty monument of ancient art. The *Acanthus mollis*, *Phlomis fruticosa*, and *Solanum sodomæum* are conspicuous, and here the botanist first notices the beautiful little *Sedum cæruleum* abundant on the walls and rocks. I should think that no spot in Sicily would better reward the naturalist or antiquary for a halt of some days: the small town of Taormina contains many beautiful remnants of Norman architecture, and the numerous half-ruined towns and villages that are perched on the summit of lofty and seemingly scarce accessible rocks must abound in objects of interest; while the little inn at Giardini, though not very inviting, is one of the most tolerable in the country. No one visiting the supposed site of the scenes described in the Odyssey—the island of Polyphemus, will fail to remark the singular geological phænomena there presented; where beds of a very recent tertiary limestone are interposed between the more ancient columnar lava and an upper stream, which is not to be distinguished from that which advances into the sea from the neighbouring shore; inducing the suspicion that the whole may have undergone material changes even since the date of the Homeric record. Indeed it is still to be determined whether the shells contained in a large portion of the Sicilian tertiary strata be not identical with existing species*, thus referring the period of elevation to a more recent epoch than has hitherto been suspected. The marshy ground south of Catania contains many interesting plants, such as *Enanthe globulosa*, *Bupleurum Odontites*, L. (nec Sm.), &c.; one group of the genus *Phalaris* may be well studied here, as within a confined range may be found *P. paradoxa*, L., *P. nodosa*, Spr., *P. aquatica*, L. (*P. cærulescens*, Auct.), and *P. minor*, W.; it may be worth inquiry whether the characters

* I have been informed that several supposed extinct species have been dredged up by Mr. Forbes in the Levant.

of the last species be not subject to variation. Of the vegetation of Etna much has been written, yet I am satisfied that a more lengthened examination than has yet been given, especially to its western slopes, would amply reward the botanist who would undertake it. Upon the Monte Rosso, the lowest of the long line of craters which have been opened by the successive eruptions, many of the species of the lower region will be found, amongst them *Sedum amplexicaule*, DeC. (*Sempervivum tenuifolium*, Fl. Gr.). The extent of snow at the period of my ascent prevented my examination of the upper region; the last plants which I saw in flower were *Viola Æt-nensis*, Psl. (which is doubtless, as DeCandolle has placed it, a variety of *V. calcarata*), and *Erophila præcox*, DeC., scarcely an inch in height; this most of the foreign botanists consider distinct: I presume that the *E. verna*, β . of Hooker's 'British Flora' is this species. The limestone tract round Lentini is covered with beautiful plants, such as *Ononis ramosissima*, Dsf., *Phlomis Herba-venti*, L., *Lonicera implexa*, Bert., *Eryngium triquetrum*, Vahl., and *E. pusillum*, L.

In wandering over the barren rocks where once stood Syracuse, the mind is so prepossessed by the thousand confused memories of former days as to forget its accustomed occupations, and at first even the most hardened botanist will hesitate lest in pursuing his vocation he sacrilegiously disturb the ashes of some of that illustrious race who once made this spot celebrated; he will however speedily overcome his scruples on noticing several scarce species, such as *Origanum heracleoticum*, *Marrubium hispanicum* and *Pteris cretica*; these grow in different parts of the Latomie, the enormous quarries which alone attest the extent of the ancient city; in the same place I found the *Melica minuta* of Bertoloni, 'Fl. It.' Kunth seems not to have well understood this group, as the *M. ramosa*, Vill. of Bertoloni seems certainly distinct from its allies; it is a scarce plant; I have seen it only in the Roman stations mentioned in the 'Fl. It.' The *Melia Azedarach*, a quite tropical tree, has become naturalized about Syracuse. As the guides conduct all travellers up the stream of the Anapus, where the Papyrus grows in great luxuriance to a height of eight or ten feet, no one can avoid remarking this, the king of the Cypereaceous tribe; as it grows in several other similar situations, I see no reason to doubt Gussone's correctness in supposing it a native of Sicily. At or near the mouth of the Anapus I noticed *Rottboëllia cylindrica* and *fasciculata*?; a large *Glyceria* near to *G. fluitans* in character, but approaching *G. aquatica* in habit, probably a new species of the genus; two spe-

cies of *Frankenia*, (*F. laevis* and another doubtful one,) together with several litoral species.

The limestone hills which lie to the westward of Syracuse contain many interesting species, but have been scarcely at all examined; I noticed *Salvia triloba*, L., *Convolvulus tricolor*, L., a doubtful *Pyrus*, *Ophrys tenthredinifera*, W., and *Orchis lactea*, Poir. It is only on arriving on the southern shores of Sicily that the traveller discovers the semi-tropical character of its vegetation; here the ground is covered with the dwarf palm, *Chamærops humilis*, L., and many species of *Helianthemum*, and waving in the breeze will be seen those singular shrubs *Ephedra distachya*, and *E. fragilis*, Dsf.* On the sea-banks grow *Momordica Elaterium*, and *Mesembryanthemum crystallinum*, and here and there tufts of the beautiful and anomalous grass *Lygeum spartum*. Amongst many scarce *Umbelliferae* I gathered on the sands near Terranova *Orlaya maritima*, Koch, *Kruberia leptophylla*, Hoffm., *Kundmannia (Sium) sicula*, DeC., &c.; also *Bromus lanceolatus*, *B. scoparius*, *B. maximus*, several varieties, *Ammophila arundinacea*, &c. It would be impossible within the limits of a brief sketch to give any notion of the great variety of the vegetation of this coast, I have no doubt but that many interesting species would reward any examination that may be given to it: Girgenti, from the surpassing interest attaching to its architectural remains, would naturally be chosen as head quarters; in the same neighbourhood a large number of fossils of the tertiary strata might be collected with little trouble: amongst the rare plants already known in the neighbourhood, I may mention *Ornithogalum arabicum*, L., *O. narbonense*, L., *Scabiosa dichotoma*, *Lavatera Agrigentina*, and *L. cretica*; the first four I observed near to the so-called temple of Juno. I suspect that the numerous species of the tribe of *Cynareae* have not yet been sufficiently examined; I found a species of *Carduncellus*, probably undescribed; the *Cirsium Italicum*, DeC. Pr., though scarce in Italy, is here frequent: there are also many Sicilian species of *Euphorbia* omitted in Mr. Hogg's list; besides those already noticed there are, *E. trinervis*, Bert., *E. melapetala*, Gaspar., *E. cuneifolia*, Guss., *E. orientalis*, L., *E. spinosa*, L., *E. pterococca*, Spr., *E. Cupani*, Guss., and probably many more.

In the beautiful district lying between Trapani and Palermo, the naturalist who will explore the pathless mountain ranges, such as that which runs to the westward from Alcamo, will

* Any botanist carrying a microscope or a powerful lens should carefully examine the structure of the inflorescence and fructification of these plants, as in the dried state this becomes impossible; at present very little seems to be known on the subject.

be sure of being amply rewarded for his labour; it would probably be easy to obtain such letters as would ensure resting-places within a reasonable distance from the scene of his operations; but the less adventurous or more hurried traveller may well content himself with the vicinity of Palermo, which does not disappoint the expectations excited by the magnificence of the first view which he obtains from the heights above Monreale. Within the amphitheatre which he overlooks, there are three different regions for the botanist to examine, the sea-coast, the plain, and the hills around: in the first, amongst other rarities, will be found *Medicago olivæformis*, *M. tribuloides*, *M. Helix*, &c.; two tropical grasses, *Pennisetum distylum* and *Dactyloctenium aegyptiacum*, &c. In the plain round the town grow *Narcissus serotinus*, *Crocus longiflorus*, *Zizyphus Lotus*, *Saccharum aegyptiacum*, and the beautiful *Lobelia tenella*, Biv., which is frequent upon damp walls. On the hills near San Martino I gathered *Matthiola tristis*, *Lychnis Cæli-Rosa* and *L. Coronaria*, *Andropogon pubescens*, Vis., and a new species of *Dactylis*, to which I propose to give the name *disticha*, from its peculiar habit; amongst other species from the hilly district, Professor Parlatore, a young Sicilian botanist of great promise, has discovered *Lepidium bonannianum*, *Chamæpeuce stellata*, DeC., and a new *Agropyrum*, which he has named *A. panormitanum*. That this, which is considered the well-known district of Sicily, should present some new object to every inquirer, may give some idea of how much remains to be done by naturalists in this country; it is not too much to suppose that the following list of Grasses, which contains about 240 species*, may be nearly a hundred short of the real number hereafter to be ascertained; I can only hope that the foregoing brief sketch may have the effect of stimulating the zeal of future travellers, more especially of those who may be able to devote a longer period to their visit than I was myself able to do. In the following list I have given localities for most of the rarer species, and where the plant rests on my own authority; and have affixed a note of interrogation where I do not actually possess specimens from the locality mentioned, even where I do not feel any doubt on the subject.

Note.—I may remark, in respect to Mr. Hogg's observations on the temperature of Palermo, that in July 1841 the thermometer rose on three successive days to 37° R. or 115°·2 F. in the shade; and I have understood that this is not much above the usual heat during the prevalence of the sirocco.

* Mr. Hogg's two lists have somewhat less than one hundred.

CATALOGUE OF SICILIAN GRASSES.

Anthoxanthum odoratum, L.

————— *gracile*, R. and S.

Saccharum Ravennæ, Spr.

————— *Ægyptiacum*, W. banks of the Oreto, Palermo, Gussone.

————— *cylindricum*, Lam. Sea-coast.

Phalaris Canariensis, L. Certainly indigenous on the sandy coast, north of Messina, &c., J. B. sp.

————— *nitida*, Psl. Palermo, Gussone.

————— *nodosa*, Spr. Vizzini, Noto, Gussone.

————— *aquatica*, L. Near Catania, &c., J. B. sp.

————— *minor*, W. Near Catania, J. B. sp.; Terranova, Gussone.

————— *paradoxa*, L. Not unfrequent, J. B.

————— *arundinacea*, L.

Phleum pratense, L.

—————, β . *nodosum*, J. B. sp. This can scarcely be separated even as a variety.

————— *echinatum*, R. and S. Madonie, Gussone. *P. felinum*, Fl. Gr., is this plant.

————— *asperum*, Pers.

————— *Bæhmeri*, W., J. B.

————— *Michelii*, All. Madonie, Gussone; lower region of Etna, J. B.?

————— *arenarium*, L., J. B.?

————— *tenuë*, Schr. Near Messina, J. B.

Crypsis aculeata, Ait.

————— *schænoides*, Lam. Near Palermo, Gussone.

————— *alopecuroides*, Schr.

————— *nigricans*, Guss. Several places along the south coast. I suspect it will prove to be only a stunted variety of the last species.

Alopecurus pratensis, L.

————— *agrestis*, L.

————— *bulbosus*, L., J. B. ? This is perhaps a var. of the last.

————— *geniculatus*, L. I do not know whether *A. fulvus*, Sm., has been observed in Sicily; I cannot agree with Bertoloni in considering it a form of the last; the rounded anthers and different character of the herbage seem to me constant characters.

————— *utriculatus*, Pers. Catania, J. B. ?

Polypogon monspeliensis, R. and S. This beautiful grass is common in salt marshes, growing sometimes, as at the mouth of the Anapus, to a height of three feet. Gussone has described a remarkable variety with the arista only equalling the calycine valves, not three times as long.

————— *maritimus*, R. and S. Sea-coast, Gussone. This species, though like the last, is quite distinct.

Milium effusum, L. Madonie, Gussone.

————— *scabrum*, R. and S. Madonie, Gussone. This, the *M. vernale*, M. B., is I think certainly a good sp. It always has a much simpler panicle and the stem scabrous.

————— *carulescens*, Pers. Near Syracuse, Gussone.

- Gastridium lendigerum*, R. and S., J. B. sp. I cannot agree in the reunion of this genus with *Milium*. In an extensive natural order it is surely necessary to allow great weight to habit in establishing generic distinctions.
- *muticum*, Spr. In several places. Observation may perhaps show that the differences are not permanent which separate this from the preceding very variable species.
- Agrostis pallida*, DeC. Castelvetro, &c.
- *canina*, L.
- *nitens*, Guss. Trapani, from the salt-marshes, Gussone.
- *Sicula*, Kunth (*A. glaucescens*, Spr.). I am not acquainted with this species, nor does it appear that Bertoloni is so either.
- *alba*, L. Very common and variable: amongst other forms there are *A. vulgaris*, E. B.; *A. stolonifera*, L.; *A. pumila*, L.; and I should say the following:—
- *verticillata*, Vill. Syracuse, J. B. I cannot find satisfactory characters, though assisted by Bertoloni's observations.
- *pungens*, Schreb. Palermo.
- Cynodon Dactylon*, Pers. Very common.
- Digitaria Sanguinalis*, W. A very variable species.
- Panicum verticillatum*, L. Fields about Palermo, Gussone.
- *viride*, L. Common.
- *glaucum*, L. Common. Bertoloni has well distinguished these plants.
- *Crus-Galli*, L. Common.
- *zonale*, Guss. Fields near Palermo and Boccadifalco, Guss.
- *Teneriffæ*, R. Br. Not unfrequent, J. B.
- *repens*, L.
- *compressum*, Biv. Neighbourhood of Palermo, J. B. sp.
- Aira cristata*, L.
- *grandiflora*, Bert. This is I think frequent on rocky ground.
- *aquatica*, L.
- *agrostidea*, Spr. Madonie, Herb. nost.; meadows at Bucheri, Gussone.
- *cæspitosa*, L. Nebrodes, Gussone.
- *pubescens*, Vahl. Frequent on the sea-coast, J. B. sp.
- *flexuosa*, L. Mountainous parts, J. B.
- *articulata*, Pers. South coast, Gussone; lower region of Etna, J. B. sp. The Etna plant has a slightly different appearance, but is scarcely distinguishable as a variety: it is the *Aira Ætnensis*, Psl.
- *caryophyllea*, Madonie, Herb. nost.; Terranova, Jan.
- *Tenorii*, Guss., *A. pulchella*, W. Sicily, Gussone. This should be placed next to the last species, to which it is nearly allied, though certainly distinct.
- *capillaris*, Spr. Palermo, Gussone.
- , γ . Bert., *A. intermedia*, Guss. Palermo, Gussone; Madonie, Herb. nost.
- Pollinia distachya*, Spr. Palermo, Taormina, and elsewhere on the east coast, J. B. sp.
- Andropogon hirtum*, L. Frequent, J. B. sp.
- *angustifolium*, Fl. Gr. Frequent, J. B. Should Bertoloni

be correct in distinguishing this from the *A. Ischamum*, L., the common French species, it will be necessary to rename the *A. angustifolium*, H. and K., a Mexican species, which ought then to recover the name *A. stenophyllus*, R. and S. Syst. Nat.

Andropogon pubescens, Vis. I found this species, which is nearly allied to *A. hirtum*, L., on dry rocky ground near the monastery of San Martino, seven miles from Palermo. It is widely spread along the coast of Barbary, and has been found in Abyssinia and Nubia by Schimper and Kotschy.

Sorghum halepense, Pers. Palermo, Biv.

Holcus lanatus, L., J. B. ?

——— *mollis*, L., J. B.

Arrhenatherum avenaceum, P. de B.

Melica ciliata, L. South coast, J. B. sp.

——— *Cupani*, Guss. Madonie, Gussone.

——— *Bauhini*, W., J. B. ? These three species are very nearly allied; with the assistance of Bertoloni's remarks, both groups may be well studied in Sicily. If great difference of habit suffices to constitute a genus, these might well be separated.

——— *uniflora*, W. Etna, J. B.

——— *pyramidalis*, Bert. Not rare, J. B.

——— *minuta*, L. Latomie, Syracuse, J. B. sp.

Molinia cærulea, Mœnch. Etna ? J. B.

——— *serotina*, M. and K.

Sesleria cærulea, Scop.

——— ———, β . *tenuifolia*, Schrad.

——— ———, γ . *cylindrica*, R. and S.

——— ———, ϵ . *nitida*, R. and S. I fully concur in the propriety of uniting all these supposed species, as well as the *S. elongata*, W., into one. The above forms, with many intermediate ones, will be found in Sicily. The var. ϵ . has been found in the mountains of Madonie and Cammarata by Gussone.

Echinaria capitata, Dsf. Frequent in the south of Sicily, J. B. sp.

Poa aquatica, L.

——— *fluitans*, L.

——— *annua*, L.

——— *bulbosa*, Sm. Frequent, J. B.

——— ———, β . *vivipara*. Lower crater of Etna (Monte Rosso), J. B. sp.

——— *trivialis*, L.

——— *fertilis*, Kunth, J. B.

——— *pratensis*, L.

——— *nemoralis*, L. Etna ? J. B.

——— *compressa*, L. Madonie, Herb. nost.

——— *pilosa*, L. Sicily, J. B.

——— *Eragrostis*, L. Frequent, J. B.

——— *tritica*, Psl. A doubtful species.

Briza minor, L., J. B. ?

——— *media*, L. Not common.

——— *maxima*, L. Very common.

Dactylis glomerata, L.

—————, β . *glaucescens*, W.

—————, γ . *hispanica*, W. These supposed species are certainly mere forms of a common type; they are all found in Sicily.

————— *disticha*, nobis*. Near Palermo, J. B.

————— *litoralis*, W. Marshes near Catania, Gussone.

————— *repens*, Dsf. Salt marshes at Spaccaforno and Cape Passaro, Gussone.

Dactyloctenium Ægyptiacum, W. Near Palermo, sp. in Herb. nost.

Cynosus cristatus, L.

————— *echinatus*, L. Very common.

————— *elegans*, Dsf. Madonie, Castrogiovanni, Gussone.

Lamarckia aurea, Mœnch. This beautiful species is not uncommon.

Pennisetum distylum, Gussone. Lower part of the Monte Pellegrino, Palermo, Gussone.

Festuca expansa, Kunth (*Poa divaricata*, W., Bert.). Salt marshes of Trapani.

————— *divaricata*, Dsf. (*Triticum divaricatum*, Bert.). Sea-coast in various places, J. B. sp.

————— *maritima*, DeC. Gall. (*Triticum maritimum*, L., Bert.). St. Alessio, J. B. sp.; coast at Capaci, Gussone.

————— *rigida*, Kunth. Common, J. B.

————— *distans*, Kunth (*Poa distans*, L., Bert.). Palagonia, Gussone.

—————, β . (*F. thalassica* and *F. Hostii*, Kunth, *Poa maritima*, Huds.). The above species form a very natural group which can scarcely be well separated into different genera. I agree with Bertoloni in believing that there are intermediate forms connecting *Poa distans*, L., and *P. maritima*, Huds., though the opposite opinion is held by high authority.

————— *unioloides*, Kunth (*Triticum unioloides*, Vahl, Bert.). Near Palermo and Termini, Gussone.

————— *Poa*, Kunth (*Triticum tenellum*, L., Bert.). Sicily, J. B.?

————— *rottboëllioides*, Kunth (*Triticum loliaceum*, Sm., Bert.). Near Messina, J. B. sp.

————— *tenuicula*, Link (*Triticum festucoides*, Bert. i. 808). On volcanic sand in the lower region of Etna, J. B. sp. This is I suppose the *T. hispanicum* of Mr. Hogg. The whole group still requires some careful study and the examination of living specimens, as both the natural limits of the species and the synonymy are in great confusion.

————— *Sicula*, PsL. Hills of Floresta and Val di Mazzara, Gussone.

————— *Michelii*, Kunth (*Kæleria macilentata*, DeC., sec. Bertoloni). Sands of Vittoria, Gussone.

————— *ligustica*, Bert. Frequent, J. B. sp.

————— *geniculata*, W. Sea-coast, Jan.

————— *uniglumis*, Sol. Messina, &c., J. B. sp.

————— *myurus*, L.

—————, β . (*F. bromoides*, L.). Both are common.

————— *ciliata*, DeC. St. Alessio, J. B. sp.

* It may turn out that this is the *Wangenheimia disticha* of Mœnch (*Cynosurus Lima*, L.). I have not seen specimens of a good description.

- Festuca alopecurus*, Pers. I have specimens from near Messina agreeing with the plant so named by Tenore.
- *incrassata*, Salz. Sea-shore at Girgenti and Alicata, Gussone.
- *poæformis*, Spr. Sands of Etna, Gussone; Madonie, Jan.
- *ovina*, L. I am quite of the opinion of Bertoloni, 'Flora Italica,' i. 601, in uniting this with *F. duriuscula*, L., and the various supposed species there mentioned, but am inclined to consider the following as distinct.
- *rubra*, L. I am quite sure that I observed the large sea-side form of this plant on the east coast of Sicily, J. B.
- *heterophylla*, L. Woody region of Etna, Gussone. The characters of this species remain very constant in cultivation.
- *exaltata*, Psl.
- *calamaria*, Sm. Woods of Etna, J. B. ?
- *pratensis*, Huds. Sicily, Gussone.
- ———, β . (*F. elatior*, L.). Coast near Syracuse, J. B. sp. I am unable to find any permanent characters by which to separate these extreme forms, which are connected by many intermediate varieties.
- *serotina*, L.
- *cærulescens*, Dsf. Mountains near Palermo, Val Damone, Gussone.
- *cristata*, L. (*Kæleria phleoides*, Pers.). Frequent, J. B. sp.
- *hispida*, Savi. Castelvetro, Bronte, Gussone.
- *Etnensis*, Psl. Lower region of Etna. This plant should be sought for, as it seems little known; Bertoloni believes it to be nearly allied to or identical with *Poa cenisia*, All.
- *gracilis*, Moench. (*Brachypodium sylvaticum*, R. and S.). On Etna, J. B. ?
- *pinnata*, Huds. (*Brachypodium pinnatum*, R. and S.). Frequent, J. B. sp.
- *phenicoides*, L., Mant. Frequent, J. B. sp. Extremely near the last species.
- Bromus secalinus*, L.
- ———, β . (*B. velutinus*, Schr.). Polizzi, Gussone.
- *squarrosus*, L.
- *mollis*, L. It occurs both in the pubescent and glabrous form.
- *racemosus*, L. (*B. arvensis*, Sm.). Bertoloni is probably correct in referring the *B. arvensis*, E. B., to *B. racemosus*, L.; but I believe that the plant named *B. racemosus* by Smith and most English botanists is the glabrous form of *B. mollis* before mentioned. *B. commutatus*, Schrad., should probably be referred to the present species. The *B. arvensis* of the Italian botanists, and perhaps of Linnaeus, is certainly different from the English species.
- *intermedius*, Guss. Boccadifalco, &c., Gussone. This is not unlikely to prove a variety of *B. mollis*.
- *lanceolatus*, Roth. Not unfrequent, J. B. sp., and certainly distinct.
- *scoparius*, L. Terranova, J. B. sp.; Palermo, Val di Mazara, Gussone. This species has been much confused; it is nearly allied to the last.

- Bromus giganteus*, L. Woody region of Etna, J. B. ?
- *asper*, L. I suspect that this and the preceding species, and possibly the following one also, will ultimately be placed in the same group with *Triticum ciliatum*, DeC.
- *erectus*, Huds. The extreme forms of this species are at least as distinct as *Festuca pinnata*, Huds., and *F. phænicoides*, L.
- *sterilis*, L.
- ———, β . *argentea*. Coast near St. Alessio, J. B. sp. I know not on what authority Bertoloni has united the *B. jubatus*, Ten., with this species.
- *scaberrimus*, Ten.
- *maximus*, Psl.
- ———, β . (*B. madritensis*, Guss.). This latter is considered distinct by Professor Parlato, who has well illustrated the Sicilian species of this genus. A great variety of forms exist in the island, but I can only separate my specimens into two specific groups, and even of these the limits are not very well defined. The synonymy is in inextricable confusion.
- *tectorum*, L. Frequent.
- *rubens*, L. Val di Mazzara and hills about Palermo, Guss.
- *fasciculatus*, Psl. Near St. Alessio and Selinonte, J. B. sp.; Val di Mazzara, Gussone: a very distinct species. Had I not been desirous of avoiding unnecessary change in a mere catalogue, I should have followed Prof. Parlato in separating the *Bromi secalini* as a distinct genus, to which he has given the name *Serrafalcus*, in the small monograph already referred to.
- Stipa pennata*, L. Hills of Termini and Altavilla, Gussone.
- *capillata*, L. Terranova, Castelvetro, Gussone.
- *tortilis*, Dsf. Frequent, J. B. sp.
- Aristella bromoides*, Bertoloni (*Stipa Aristella*, L.). Not unfrequent, J. B.
- Avena sterilis*, L.
- *fatua*, L.
- *fallax*, Ten. Hills about Palermo and Caltavoturo, Gussone.
- *pubescens*, L. Sicily, J. B. ?
- *pratensis*, L. Frequent, J. B.
- *condensata*, Link. In many places on the coast, J. B. sp.
- *neglecta*, Savi. Terranova, Gussone. It is admitted that most of the characters which separate this and the preceding are variable.
- *parviflora*, Dsf.
- *flavescens*, L. (To this Bertoloni refers *Trisetum splendens*, Psl.)
- *fragilis*, L. (*Gaudinia fragilis*, R and S.). Common, J. B.
- Danthonia provincialis*, DeC. Lower region of Etna, J. B. ?
- Lagurus ovatus*, L. Very common.
- Arundo Donax*, L.
- *pliniana*, Turr. Chiefly about Palermo. This is the *A. mauritanica*, Dsf., of Mr. Hogg.
- *Ampelodesmos*, Cyr. Common.
- *Phragmites*, L.
- *epigejos*, L.
- *montana*, R. and S. Etna, J. B. ?

- Ammophila arundinacea*, Host. Sea-shore at Terranova, J. B. sp.
Lolium perenne, L.
 ———, β . (*L. strictum*, Psl.). Sands near Messina, J. B. sp.
 ——— *temulentum*, L.
 ——— *temulentum*, β . (*L. speciosum*, Guss.). Frequent, J. B.
Rottboëllia incurvata, L. fil. In many places, J. B. sp.
 ——— *filiformis*, Roth. Less frequent than the preceding, J. B.
 Nothing but a careful study of the living plants will settle the still doubtful question as to the identity of these two species.
 ——— *cylindrica*, W. Mouth of the Anapus near Syracuse, J. B. sp.; Mondello, Gussone.
 ——— *fasciculata*, Dsf. South coast, J. B.
Psilurus nardoides, Trin. Frequent in the lower region of Etna, J. B. sp.
Elymus europæus, L. In woods. I believe I have seen Sicilian specimens of *E. crinitus*, Schreb.
Hordeum bulbosum, L. Mistretta, Gussone.
 ——— *murinum*, L. Not common: near Syracuse, J. B. sp.
 ——— *pratense*, Huds. Mountainous parts.
 ——— *maritimum*, With. Frequent, J. B. sp.
Ægilops ovata, L. Common.
 ——— *neglecta*, Req., Savi. J. B. sp.?
 ——— *triaristata*, Req.? J. B. sp.
 ——— *triuncialis*, L. J. B. sp.? As I before remarked, I am unable to distinguish the species of this genus; I believe that I have found the above four forms, and probably the *Æ. triticoides*, Req., and *Æ. cylindrica*, Host, are also to be found; the genus calls for careful examination.
Secale Montanum, Guss. Frequent, J. B.
Triticum æstivum, sylvestre. Frequent in various situations, and to all appearance spontaneous, J. B. See Bert. Fl. It. i. 796.
 ——— *villosum*, Psl. Frequent, J. B. sp.
 ——— *junceum*, L. Sandy sea-shores, J. B.
 ——— *scirpeum*, Guss. Salt marshes at Sferracavallo, Serra di Falco and Termini, Gussone.
 ——— *repens*, L.
 ———, β . W.
 ———, γ . Bert. (*T. litorale*, Host). Coast near S^{ta} Agata, Gussone.
 ——— *panormitanum* (*Agropyrum panormitanum* of Parlatore). I have not yet seen specimens of this plant. It is to be feared that many of the described species of this section are merely variable forms of two or three types. Bertoloni unites *T. glaucum* of Host with *T. repens*, L.
 ——— *caninum*, Huds. May not even this be an extreme form of *T. repens*?
Lappago racemosa, W. This is scarce in Sicily.
Nardus stricta, L.
Lygeum spartum, L. This singular and beautiful plant is almost confined to the south coast between Terranova and Sciacca.

XLIX.—*Contributions to the Ichthyology of Australia.* By JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

[Continued from p. 182.]

BATRACHUS DIEMENSIS (*Le Sueur?*), Tasmanian Frog-fish.

No. 34. Mr. Gilbert's list.

MR. GILBERT says that "this fish is an inhabitant of the mud at the head of the harbour of Port Essington, where it may be frequently seen creeping over the surface when the tide has left. It is very difficult to capture, for on the slightest appearance of danger it plunges down instantaneously."

Not having at hand the journal of the Academy of Science of Philadelphia, in which M. Le Sueur describes the *Batrachus diemensis*, I am unable to affirm the correctness of the designation which I have given to Mr. Gilbert's specimen. The *diemensis* is quoted in the 'Histoire des Poissons' as a synonym of the *quadriscopinis* of that work, and with this the Port Essington fish agrees in having two spines on the suboperculum similar to the opercular ones; but *quadriscopinis* has three spines in the first dorsal, its markings are described as merely crowded dots on a pale ground, and nothing is said of the finely streaked and reticulated arrangement of the pale tint on the upper surface of the body, and in the axilla of the pectoral, which exists in Mr. Gilbert's fish. The figure of *Lophius dubius* in White's 'Voyage to Botany Bay,' which is referred by Cuvier to *Batrachus dussumieri*, is so bad, that the only mode of discovering what it was intended for is a careful comparison of all the species which frequent Port Jackson.

Teeth all very short, appearing conical and acute under the microscope, but to the naked eye forming villiform bands. The band is broadest at the symphysis of the lower jaw, but laterally and on the intermaxillaries it is reduced to a single, or at most a double row of teeth. On the vomer and palatine bones the dental stripe is three or four rows deep, and it widens posteriorly. The lower lip is fringed with short, thick filaments; there are a few on the maxillary; one small one projects from the membrane on each side of the snout over the limb of the intermaxillary, and about five somewhat larger ones mark out the edge of the preoperculum. The upper edge of the orbit is furnished with a short palmated filament, and there is a smaller simple one further back. One row of pores with tumid lips runs above the orbit, and another below it: they meet behind, pass on in a single line to the nape, and thence with a slight arching to the end of the soft dorsal. A second row commencing before the ventrals, runs under the pectoral to the end of the anal; a third one, not so crowded and less complete, may be detected on the middle of the side; and a few pores are scattered over the body. When

the skin is moistened it wrinkles, particularly behind the pectorals and on the upper part of the sides, forming many soft, forking and anastomosing ridges which enclose innumerable little pits, each of which is marked by a black spot, while the ridges have a pale yellowish brown colour. In drying the skin becomes quite even, and the site of the wrinkles on the top and sides of the body and head is occupied by a fine meshwork of yellowish lines. Towards the belly there appear merely dark specks scattered over the yellowish ground. There are also five or six large irregular dark blotches on the sides and back. The skin is scaleless.

RAYS:—B. 6; D. 2—18; A. 16; P. 20; C. 13; V. 1|2.

The pectorals are oval. The first dorsal is represented by two warty points scarcely projecting above the skin: there is no vestige of a third spine. The soft dorsal, commencing a short way behind these points, has the free compressed tips of its rays covered with thick skin; its last ray is short, and may be merely a division of the one which precedes it. The same may be said of the last ray of the anal. The opercular spines are rather flat and obtuse, and, as in *quadrispinis*, the upper one is twice the length of the under one. The suboperculum is armed with two similar spines, and also by a third shorter one or rather angular point beneath them.

DIMENSIONS.		inches.	lines.
Length from upper lip to end of caudal fin		7	5
———— base of ditto		6	0
———— anus		4	7
———— gill-opening		2	3
Height at pectorals		1	8
Thickness at ditto		1	8
Length of pectorals		1	1
———— ventrals		1	5

LABRUS GOULDII (Nob.), Gould's Wrasse.

Sp. British Museum, No. 40, 12, 9, 62.

The 'Histoire des Poissons' contains descriptions of only four *Labri* of the Southern seas, viz. *L. pæcilopleura* of New Zealand, *L. ephippium* and *macrodontus* of Java, and *L. gayi* of Juan Fernandez. The British Museum possesses a fish brought from Western Australia by Mr. Gould, which appears to be nearly allied to *L. macrodontus*, but to differ in the number of the fin-rays as well as in some other particulars. The specimen consists of the dried skin of one side of the fish, and the bones of the head have been much cut away, so that the proper form of the profile cannot be exactly ascertained. No traces of the original colour remain, but Mr. Gould reports that it was an uniform olive in the recent fish. In the dentition this species approaches to the genus *Cossyphus*, but the fins are not so extensively scaly, there are no crenatures on the preoperculum, and the general aspect is dissimilar. It differs

in various characters from any of the *Cossyphi* described in the 'Histoire des Poissons.'

Head short and obtuse. Two long obtuse nearly cylindrical teeth stand near the symphysis of each jaw (in all four above and four below), followed by a series of nine short conical ones. The edges of the jaws are naked and crenated, with some small granular teeth bursting through. [Part of the upper jaw is concealed by the dried incurved lip. The vomer and palate bone are cut away.] There is no canine tooth at the angle of the mouth. The snout, under-jaw, sub-orbital and top of the head to the occiput, are naked. The cheek is covered by small, vertical-oval, remote, impressed scales, which form seven rows before the curve of the preoperculum, but diminish to two towards the temples, the scales at the same time increasing in size. The hinder edge of the preoperculum is free and quite smooth. The anterior border of the operculum is also smooth and is vertically striated; the rest of the bone is entirely scaly, so as to conceal its junction with the suboperculum: the scales form five rows, and increase in size towards the gill-opening. A row of still larger scales protects the suboperculum, and five rows of smaller ones, though not so small as those on the cheek, cover the interoperculum, the lower edge of this bone being smooth. The free edge of the gill-cover is rounded, its tip being formed by the rounded, scaleless, membranous lobe. The situation of the suprascapular bone is denoted by the peculiar form of the scales, and there is a patch of smaller scales on the temple, which does not reach to the top of the head. The scales of the body are large, there being forty in a longitudinal row, including two rows of smaller ones on the base of the caudal*. The lateral line is very slightly arched, and becomes quite straight under the end of the dorsal. It is formed by a raised tube on each scale, ending in a bushy cluster, the branches of which are not very distinct.

RAYS:—D. 11|10; A. 3|10; C. 14 $\frac{3}{5}$; P. 17; V. 1|5.

The spinous part of the dorsal is slightly arched and is lower than the articulated portion, which ends in a point formed by the penultimate and two preceding rays, the eighth soft ray being the longest. The spines are much compressed with thin edges and a round tip, except the three last, which are more cylindrical and acute. The membrane is notched behind each spine. The soft part of the anal resembles the corresponding portion of the dorsal: the spines are much wider and more thin and rounded at the ends than the dorsal ones; the membrane forms a broad edging to each spine. The caudal is moderately rounded. The pectoral is also rounded off. The ventral is pointed; its greatly compressed spine is shorter than the fifth soft ray, and has only half the length of the second and third rays, which are the longest.

* There are twenty or twenty-one scales in a vertical row, of which seven are above the lateral line. A few small scales exist on the base of the articulated portions of the dorsal and anal, but none on the spinous parts. The edges of the scales are rounded, thin and membranous.

	DIMENSIONS.	inches.	lines.
Length from end of snout to	end of caudal	38	6
_____	base of caudal	35	6
_____	anal fin	22	0
_____	anus	20	6
_____	ventral	13	0
_____	dorsal	12	6
_____	pectoral	10	3
_____	edge of gill-cover	10	3
_____	centre of eye	5	6
Height of first dorsal spine.....		1	6
_____ fourth and fifth		2	2
_____ ninth		1	6
_____ eleventh		1	9
_____ longest soft ray of dorsal		5	6
_____ first anal spine		2	0
_____ second ditto		2	3
_____ third ditto		2	6
_____ longest soft ray of anal		5	6
_____ body about.....		12 or 13	0

LABRUS CYANODUS (Nob.), Azure-toothed Wrasse.

No. 16. Mr. Gilbert's list.

This wrasse bears the name of "ngurmin" among the Aborigines of Port Essington, and is very abundant in that harbour, where it inhabits deep water with a rocky bottom. The specimen was captured at Black Point. It seems to have the closest affinity with the *Labrus macrodontus* of Lacepède and *japonicus* of the 'Histoire des Poissons,' differing from them only in the arrangement of the shades of colour, in the want of a canine tooth at the angle of the mouth, and in the minor development of the bony edges of the upper and lower jaws.

The profile rises in a straight line from the upper lip, at an angle of 45° with the axis of the fish, and then curves abruptly to join the very slightly arched dorsal line. The curve of the belly is similar to that of the back, and the body, which is highest in the pectoral region, tapers from thence to the trunk of the tail, whose height is about one-third of that of the body. The length of the head measured to the tip of the gill-flap equals the height at the breast, and somewhat exceeds one-third of the length of the fish, excluding the caudal fin. The canine teeth, strong, curved, and of an azure blue colour, stand in a pair on each side of the symphysis of each jaw. In the upper jaw the outer or posterior tooth of each pair is comparatively short and small; in the lower jaw the corresponding tooth is as tall and strong as the one next the symphysis, from which it diverges by a lateral curve. The naked bony edges of the upper and lower jaws are thin, of a blue colour, and are armed with minute granular teeth; the upper ones, with the exception of one within the base of the canines, scarcely perceptible to the naked eye; the lower ones resembling crenatures of the bone, and amounting to about sixteen in number, the four next the angle of the mouth being

slightly larger than the rest. The eye is small, placed high up, and equidistant from the edge of the upper lip and tip of the gill-flap, but more remote from the under edge of the interoperculum. The anterior nasal orifice is incapable of admitting more than the point of a fine needle; the posterior one is larger and of an oval shape. There are seven rows of small roundish depressed scales on the cheek, not touching each other; they increase a little in size as they approach the temple, and the rows there are reduced to two. Five irregularly tiled vertical rows of larger scales cover the bony operculum and suboperculum, increasing in size as they recede from the preoperculum. The gill-cover ends in a projecting rounded thin membranous lobe, beneath which there is a conspicuous curved notch, formed by a narrowing of the suboperculum and the expansion of the very thin edge of the wide interoperculum. A single row of six small scales runs along the upper part of this bone, immediately beneath the edge of the preoperculum. The angle of the suboperculum is widely rounded, its edge slightly detached and very entire, and its surface somewhat uneven and porous. The suprascapular region is marked out by a patch of scales of smaller size than those of the body. The lateral line is traced on the fourth row of scales, taking into the reckoning the row of smaller scales which forms the wall of the groove in which the dorsal stands. It runs parallel to the curve of the back until near the end of the dorsal, when it gradually assumes a straight course through the tail. Thirty scales enter into its composition, and the arbuscle on the disc of each consists anteriorly of six branches, mostly inclining upwards and seldom divided; posteriorly the branches are fewer, and near the caudal fin the line is formed by a straight tube almost continuous from scale to scale, and having a few very short and slender branchlets diverging from it upwards and downwards at right angles. This composition of the lateral line is much like that of *Cossyphus schenleinii* of Agassiz (C. and V. xiii. p. 143), which further nearly agrees with our fish as well as with *Labrus macrodontus* and *L. japonicus* in the numbers of the fin-rays. Short crowded streaks are faintly visible with a lens on the edges of the scales, and similar striæ are more plainly seen towards the bases of the uncovered discs of the paler scales on the lower parts of the body.

RAYS:—B. 6; D. 13|7; A. 3|10; C. 12 $\frac{2}{3}$; P. 15; V. 1|5.

Though the normal number of gill-rays of the *Labri* be only five, the specimen here described, which consists of the right side of the fish, has six that can be reckoned without risk of mistake. In the recent fish the gill-membrane must be greatly concealed by the dilated interoperculum. The spinous rays of the dorsal, anal and ventral fins are all moderately strong and pungent. The dorsal ones are overtopped by small membranous processes; the height of the fin augments gradually up to the penultimate branched ray, which is the tallest, and forms an acute though not slender point, the last ray being deeply divided and rounding it off behind: the first spine has one-third of the length of the tallest jointed ray. The form of the anal resembles that of the dorsal: its third spine is the strongest of

the three, and is twice the height of its first one. The ventral spine is more slender, and is one-third shorter than the soft acute point of the fin, which reaches nearly to the vent. The caudal fin forms one-sixth of the total length of the fish, and is moderately and somewhat irregularly rounded; its upper corner being acute and rather longer than the under one.

The original colours of the specimen have disappeared, but the distribution of some of the darker tints may still be made out. The top and sides of the head have a dark brownish hue, which is separated from the inferior orange or reddish yellow parts by an even line running from the corner of the mouth beneath the angle of the preoperculum and pectoral fin. There is a purplish brown patch on the chin. The light tints of the under surface rise in the axilla of the pectoral to the middle of the side, and are continued at that height to the caudal. The upper parts have in the dried fish a not very uniform leaden hue. Three broad dark bars descend from the spinous part of the dorsal to the lateral line; there is a fourth before the fin, and a fifth more obscurely seen at the end of the soft part. The intermediate paler spaces are narrower than the bars. All the fins have a yellowish tint, except the three upper pectoral rays, which have the dark hue of the dorsal bands. There are no markings on the dorsal, though the colour of the spinous part is somewhat deeper than that of the soft part. Two diaphanous lines traverse the middle of the anal, and five similar ones cross the caudal, followed by dots on the end of the fin.

	DIMENSIONS.	
	inches.	lines.
Length from front teeth to tip of the caudal fin	10	0
———— base of ditto	8	8
———— vent.....	4	11
———— ventrals	3	3
———— dorsal	3	2½
———— pectoral	3	0
———— tip of gill-cover	2	11
———— edge of orbit	1	5
Diameter of orbit	0	6½
Length of pectorals	2	4
———— ventrals	1	6
Height of body	3	0
———— trunk of tail	1	0

LABRUS ? IRIS (*Solander*), Rainbow Labroid.

Labrus ? iris *, Solander, Pisc. Nov. Holl.

This fish was obtained on Cook's first voyage to the coast of New Holland, off Bustard Bay, in the 24th parallel of south latitude and 208½° meridian. Solander has not furnished us with the means of ascertaining its proper genus, and we quote his description chiefly to excite the attention of collectors who

* *Labrus iris* of Lacepède is a *Centrarchus*, and is identical with his *Labrus macropterus*.

may visit that part of Australia. Judging from the splendour of its dress, we may suspect it to be a *Julis*. It will be readily recognised by the extreme length of its upper caudal ray.

“*Labrus iris*, Maij 24, 1770. Dorsum pallide olivaceum, infra medium e cærulescenti albidum. Vitta in medio quadruplex, α . superne lutescens, β . pallide cyanea, γ . lutescens, δ . griseo-cærulescens. Supra os fasciæ tres splendidæ, α . intense cærulea, β . flava, γ . —. Capitis latera pallide cærulescentia ad pinnas pectorales ducta. Vittæ cæruleæ per iridem continuantur. Obs. Vitta lateralis postice cyanea, ad basin pinnæ caudalis arcuata et inferne reflexa. Pinna caudalis rubescens, subpellucida; dorsalis lutescens; pinnæ pectorales e corneo albidæ, pellucidæ; ventrales et pinna ani albedo-pellucidæ. Obs. Radius supremus pinnæ caudalis elongatus, ut cauda triplo longior.” (Solander.)

TAUTOGA MELAPTERUS (Cuv. et Val.), The Ardilga.

Tautoga melapterus, Cuv. et Val. xiii. p. 311.

Labrus melampterus, Bl. 285. Schn. 247.

No. 19. Mr. Gilbert's list.

The ‘Ardilga’ of the natives of Port Essington inhabits deep water among sunken rocks, and readily takes a baited hook. Mr. Gilbert's specimen was captured at the Tamar rock. It agrees so closely with the account of the large-lipped *Tautoga* from the sea of Java, in the ‘*Histoire des Poissons*,’ that I have no hesitation in considering it to be the same species. A few particulars which are more readily observed in the dried skin than in a specimen preserved in spirits are mentioned in the following notice.

The plaits of the large upper lips and the lobes of the lower one preserve their form when dried. The cranium above the posterior angle of the orbit and the suborbitars show many undulating and anastomosing lines, producing an irregular rustic-work; the upper limb of the preoperculum is more faintly marked in the same way; and the operculum is sculptured in fine straight lines, radiating from its upper corner. There are two rows of scales on the cheek deeply imbedded in the skin, and a single vertical row containing five on the temple. The lateral line is composed of twenty-seven scales, each having on its disc a tapering tube with the point inclined upwards. The exposed discs of all the scales on the body are impressed by upwards of twenty faint fan-like streaks, which are continued over the thin membranous edges.

RAYS:—B. 5; D. 9|10; A. 2|10; C. 13 $\frac{3}{4}$; P. 13; V. 1|5.

The pectorals are rounded; the dorsal and anal fins end in acute points. The dorsal contains an articulated ray fewer than the specimen belonging to the Leyden Museum, which is the one described in the ‘*Histoire des Poissons*.’ The posterior rays of the fin are one-fifth longer than the first soft ray, and twice as high as the first spine. The other spines increase gradually in height, the ninth being just perceptibly shorter than the jointed ray which succeeds

it. The anal contains only two spines, unless the anterior short one has been removed in preparing the specimen. The pointed ventral reaches to the anus. The margin of the caudal is slightly concave, the angles rather acute, and the upper one projecting a very little.

The colours of the specimen are tolerably well preserved, and agree generally with the tints mentioned in the 'Histoire des Poissons.'

The scales of the back and sides are dark and show greenish tints, and each is sharply bordered by a dark purplish margin producing a regular meshwork: there are faint traces of a paler crescent on each scale within the marginal one. The under surface of the body, bounded by a line running from the axilla of the pectoral to the anal, is pale, each scale having also a pale margin, though of a different tint from the disc. There is a large circular violet-purple blotch behind the eye, a dark patch on the preorbital, and some spots of campanula-purple on the preoperculum, suboperculum and interoperculum. The cheeks and operculum have a dull yellowish hue. The colours of the pectorals and ventrals are effaced, except that a dark mark remains on the base of the former. The dorsal and anal fins are imperial purple, which is bounded by a line of deep pansy-purple, the extreme border being pale. Many dots of pansy-purple are spread over both fins, being roundish on the anal and oblong on the soft dorsal; a few larger drops extend to the pale border of the anal, and the scales on the base of the fins are edged with emerald-green. The caudal is purplish without spots, its edge being pale.

DIMENSIONS.		inches.	lines.
Length from upper teeth to	end of caudal	13	6
	base of caudal	11	3
	anus	6	9
	dorsal	4	9½
	ventrals.....	4	6
	pectorals	4	2
	end of lobe of gill-cover	4	3
	orbit	2	3
Diameter of eye		0	7
Height of body		3	6

[To be continued.]

L.—*Observations on the Growth, Reproduction, and Species of the Branched Freshwater Confervæ*. By ARTHUR HILL HASSALL, Esq.

In a paper read before the Natural History Society of Dublin, a portion of which was inserted in the 'Annals,' vol. ix. p. 431. allusion was made to the principal mode of growth of the freshwater *Confervæ*, viz. by the continued growth and bisection of all the cells entering into the formation of the filaments. I come now to notice a second mode of development,

scarcely less interesting and important as regards the classification of Confervæ than the former.

In many species of Confervæ, more especially amongst the branched kinds, there is not only a longitudinal development of the cells, but there is likewise a lateral growth of them, so that if we examine any species in which this law is known to exist, we shall observe, first, that the filaments differ considerably in diameter in the same specimen; secondly, that the largest filaments are near the centre of the specimen; and thirdly, that the diameter of all the filaments, whether these be near the centre or circumference, gradually decreases from base to apex; the observation of these three things proving the existence of the law of lateral development of the cells, and also showing it to be in proportion to their age. The proportions of a specimen of branched Conferva are therefore, in miniature, those of a tree or shrub.

I have observed this law of growth to exist in the following Confervæ: in the Vesiculasperms, many *Diatomaceæ*, and in *Conferva zonata*, the filaments of all of which are simple; in the Batrachiosperms, the genera *Draparnaldia* and *Chætophora*, in *Conferva glomerata*, *C. crispata*, *C. flavescens*, and in *C. ægagropila*, in all of which the filaments are branched. It has no existence in the Conjugating Confervæ, in many *Oscillatoria*, in some of the species of the genus *Desmidiium*, and in the genus *Bulbochæte*, all of which, save the last, have simple filaments, whose diameter does not vary with age, but is the same in the immature and mature condition of the species.

These laws of the lateral development of cells prevail doubtless likewise amongst the majority of the marine ramose Confervæ, and it is important that it should be kept in view in the framing of genera.

The reproduction of the branched Confervæ, whether marine or freshwater (for I believe it to be the same in both) is still shrouded in much obscurity, but certainly differs essentially, if we except the genus *Bulbochæte*, from that of the Confervæ with simple unbranched filaments, the Synspores of M. Decaisne, and the Vesiculasperms; for in them there is no intermingling or union of the contents of the adjacent cells, either in the same or different filaments, and no formation of a true spore; but there is, as in the Vesiculasperms, an inflation of the reproductive cells, which inflation is produced by an increase in the size of the small sporular granules, some twenty, thirty or more of which are contained within each cell. The determining cause whereby this increase of the granules is produced is at present a mystery, the solution of which is much to be desired. The inflation of the reproductive cells of

the branched Confervæ does not appear to have been noticed, so far as I am aware, by any other observer save Vaucher, and by him only in the Batrachiosperms, and yet it is of frequent occurrence, and affords a character whereby often species may be distinguished from each other, although at the same time it changes the ordinary appearance of species so much as to lead sometimes to the description of specimens so altered as distinct species; and this has doubtless been the case with *Conferva fracta* of the 'Flora Danica,' which I take to be nothing more than *C. crispata* in a state of reproduction.

It is then by means of the small granules to which reference has been made, which, although they have undergone a considerable increase in size, are not one-twentieth part so large as the true spores of the *Conjugatæ* and of the *Vesiculasperms*, that the branched Confervæ are perpetuated; and hence we see the necessity and wisdom of the law of lateral growth to these Confervæ, which otherwise would be placed amongst the most minute objects of creation.

And it is, therefore, amongst the branched freshwater Confervæ that we are principally to look for members of the once apparently important class of Zoospores. If there be such things, and it can scarcely be doubted but there are, it is here that they will chiefly be found. I have myself tried to detect motion of the reproductive granules, (which motion, by the way, is no conclusive proof of animality,) and once only in *Conferva glomerata* did I observe any motion of bodies within the cells; and these might possibly have been small animalculæ which had effected an entrance through the aperture said to be provided for the escape of the zoospores, which aperture I have observed only in *Conferva glomerata*, in which it invariably occupies a determinate situation at one side of the upper extremity of each cell; a fact in itself so strong, as in my opinion at once to throw discredit upon the explanation of Agardh as to the manner of the formation of the aperture, viz. by the reiterated pulsations or knocking of the confined zoospores against the sides of the walls of the cells.

The freshwater species of the branched Confervæ appear to me to resolve themselves into the following genera, the whole of which, including the genus *Bulbochæte*, appear to form an exceedingly natural group, which I propose to designate Microsperms. First, into the genus *Bulbochæte*, which may be thus defined:—

Genus BULBOCHÆTE.

Filaments attached, of equal diameter, branched; cells truncate, setigerous, the setæ being rigid, elongated and bulbous

at their bases ; reproductive bodies situated either in inflated cells, when they are formed by the union of the contents of true contiguous cells, or in the bulbous portion of the setæ, which becomes much enlarged for their accommodation.

The reproduction of this remarkable genus has until very recently been wholly unknown. M. Decaisne, in his memoir on the Classification of the Algæ, contained in the numbers of the 'Ann. des Sciences Nat.,' for May and June 1842, alludes to the mode of formation of the reproductive bodies by the union of the matter of true cells in the same filament, but does not appear to have noticed the second way in which they are formed, viz. within the bulbous portion of the tube. The observations of M. Decaisne and my own remarks appear to have been made nearly at the same period.

In the above account of the reproduction of the genus *Bulbochæte* I have avoided using the term spore to designate the condensed endochrome in the inflated cells which presents so much the appearance of a true spore, for I conceive that it is most probable that this separates, as in the other branched species of *Confervæ*, into numerous small reproductive granules.

The genus *Bulbochæte* may be regarded as forming the connecting link between the simple and branched freshwater *Confervæ* ; it agreeing with the *Conjugatæ* in the equality of its filaments, with the *Vesiculasperms* in the union of the contents of two distinct cells, and probably with the branched species in the separation of the condensed endochrome in the inflated cells into numerous reproductive vesicles.

But one species of this genus is described by British authors. There are however, I suspect, not less than three or four distinct species, which I would characterize as follows, refraining for the present from naming them, in the hope of having further opportunities of examining them.

1st sp. *Bulbochæte setigera*. Cells usually five times as long as broad.

This I regard as the most common species of the genus, and I have met with it in very great abundance in ponds on Hertford Heath, High Beach, Cheshunt Common, as well as other places.

2nd sp. Cells usually three or three and a half times as long as broad ; reproductive bodies formed by the union of the contents of two adjacent cells, in one of which they are contained.

3rd sp. Cells usually once and a half as long as broad; reproductive bodies placed within the bulbs of the setæ, which become much enlarged for their accommodation.

4th sp. Filaments very minute; cells usually four or five times as long as broad.

The filaments in this are not one-third so large as those of the preceding species.

Secondly, into the three well-known and intimately allied genera *Batrachiospermum*, *Draparnaldia* and *Chaetophora*, which resemble in their mode of growth as well as in their reproduction the branched Confervæ of the following genus.

Thirdly, into the genus *Microspora*.

Nov. gen. MICROSPORA.

CHAR. Frond attached, branched, filaments tapering and of various diameter according to their age; reproduction consisting of minute vesicles, several of which are placed in each inflated cell.

This important genus contains the following species, *Conferva glomerata*, *C. crispata*, *C. flavescens*, *C. agægropila*, *C. Brownii*, and most probably the majority of the marine branched Confervæ usually associated with the genus *Conferva*, as well as many of the unbranched marine species.

I have omitted enumerating *Conferva fracta* and *C. nigricans* as belonging to this genus, for I regard the first, as already stated, to be *Conferva crispata* in a state of reproduction; and the latter I strongly suspect to be some aquatic production, probably a *Chara* in a state of decay, of which I found a considerable quantity on a recent visit to Wimbledon Common, the locality from which Mr. Dixon [Dickson?] obtained his specimens, presenting much the appearance of a *Conferva*.

Fourthly and fifthly, into two genera characterized as below, but which I shall leave for the present unnamed.

1st genus. Filaments very sparingly branched, slightly contracted at the joints; endochrome rarely filling the cells.

There is but one species which I am at present able to refer to this genus, the *Conferva ericetorum* of Roth, a plant which, in common with some other observers, I was long inclined to regard as a *Conjugata* and a member of the genus *Mougeotia*; however, the occasional presence of short branchlets seems inconsistent with this opinion.

2nd gen. Filaments nearly equal, dichotomously branched; endochrome contained in a small tube which passes through the cells in a waved manner.

Species. Filaments slender, attached, tufted, about three-fourths of an inch in height; cells usually about seven times as long as broad, slightly contracted at the joints; endochrome black, contained in a small tube which passes through the cells in a waved manner.

It is not at all easy to make out the structure of this production, unless it be immersed in a solution of iodine, owing to the extreme transparency of the filaments, the dark colouring matter being situated only in the narrow thread which passes up the filaments. To the unassisted sight the filaments are of a blackish-gray colour.

Acton Green, Middlesex: several specimens.

LI.—On some new Insects from Western Africa. By the
Rev. F. W. HOPE, F.R.S., F.L.S.

[Continued from vol. x. p. 95.]

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

GENTLEMEN,

FROM illness I have not until now been able to continue the description of the new insects received from Western Africa. Those described at present are remarkable for beauty and richness of colouring, and exhibit all the splendour so peculiar to tropical regions. From the Rev. Mr. Savage I have lately received some additional observations respecting the Goliath Beetles, which it is my intention to transmit to you on a future occasion. In haste,

I remain, yours very sincerely,

February 22, 1843.

F. W. HOPE.

Sp. 35. *Hydaticus discoidalis*, Hope. Long. lin. $5\frac{1}{2}$; lat. lin. 3. Affinis *Hydat. dorsigero*, Dupont, at minor. Oblongo-ovalis, thorace obscure testaceo, suturali parte elytrorum nigra lateribus testaceis, punctis minutisque per discum aspersis, corpore infra ferrugineo, pedibus concoloribus.

Sp. 36. *Hydrous rufofemoratus*. Long. lin. 11; lat. lin. 5. Niger, palpis rufo-testaceis, thorace glabro, elytris quibusdam lineis punctato-striatis, punctis parum distinctis. Corpus infra atrum, femoribus rubris, tibiis nigricantibus nitidis.

Hab. Circa Palmas.

Sp. 37. *Hydrous distinctus*. Long. lin. 9; lat. lin. 4. Niger, forma ovali elongata, palpis rufo-testaceis. Elytra glabra punctis haud sub lente distinguendis. Corpus infra obscure atrum et subtomentosum, femoribus tibiisque nigris et nitidis.

Hab. in Sierra Leona.

There are two other species undescribed in the same collection

from Africa, but they are omitted, being in too bad a state to describe.

Sp. 38. *Ampedus Savagei*, Hope. Long. lin. 9; lat. lin. $2\frac{1}{4}$. Cyaneus, capite thorace pectore femoribusque miniatis, elytris læte cyaneis et striato-punctatis, abdomine nigro et nitido.

Hab. circa Sierram Leonam.

This magnificent insect is named in honour of the Rev. Mr. Savage. The tibiæ and tarsi are unfortunately wanting.

Sp. 39. *Ampedus cyanocephalus*. Long. lin. 6; lat. lin. $1\frac{1}{2}$. Cyaneus, capite concolori antennisque atris. Thorax miniatus et punctatus. Elytra læte cyanea et subtilissime striato-punctata. Corpus infra subcyaneum, abdomine parum rubescente, lateribus thoracis miniatis pedibusque testaceis.

Hab. Cape Palmas.

Sp. 40. *Ampedus auripennis*, Hope. Long. lin. 9; lat. lin. 3. Viridis, antennis atris, thorace convexo, virescenti-punctulato, elytris auratis nitidis, sub lente minutissime punctatis. Corpus infra viride punctulatum, pedibus concoloribus, tarsis spongiosis.

Hab. Circa Palmas.

Sp. 41. *Ampedus Iris*, Hope. Long. lin. 8; lat. lin. 2. Viridis, antennis atris, thorace punctulato versicolori flavoque tomentoso. Elytra concoloria, striato-punctata. Corpus infra rubrum, pedibus pallidioribus.

Hab. Circa Palmas.

Sp. 42. *Ampedus cyanicollis*. Long. lin. 6; lat. lin. $1\frac{1}{2}$. Violaceus, antennis nigris, thorace cyaneo, elytris ad basem auratis nitidis, posticeque cyaneis. Corpus infra pectore viridi, annulis abdominis rufescentibus, pedibus flavis.

Hab. Circa Palmas.

Sp. 43. *Ampedus auricollis*, Hope. Long. lin. 7; lat. lin. $1\frac{3}{4}$. Æneus, antennis atris, thorace læte aureo, elytris striato-punctatis et viridi-æneis. Corpus infra concolor flavoque tomento obsitum, pedibus flavis.

Sp. 44. *Alaus*? *interruptus*, Hope. Long. lin. 8; lat. lin. $2\frac{3}{4}$. Affinis *Al. Reicheo*, at minor. Fusco-brunneus, antennis atris, thorace maculis minutis flavis asperso, elytris postice abrupte truncatis flavoque irroratis cruceque flava interrupta notatis. Corpus infra pectore flavo-ochraceo colore insignitum, abdomine griseo, pedibusque concoloribus.

Hab. Circa Palmas.

The genus *Alaus* requires subdividing, those from Africa differing considerably from the Asiatic species. The type of the genus belongs to the New World.

Sp. 45. *Agrypnus Tropicus*, Hope. Long. lin. 13; lat. lin. $3\frac{1}{2}$. Affinis *tomentoso* Fab., at minor. Brunneus, thorace nigricanti, elytris striato-punctatis tomento ferrugineo vestitis. Corpus infra brunneum.

Hab. Circa Palmas.

Sp. 46. *Agrypnus laticollis*, Hope. Long. lin. 16 ; lat. lin. 6. Niger, antennis pedibusque fusco-ferrugineis, thorace lato punctulato elytris que fortissime sulcatis, interstitiis crebre punctatis. Corpus subtus atrum, femoribus tibiisque piceis tarsisque auricomatis.

Hab. Circa Palmas.

The above species in Africa seems to represent what *Al. fuscipes*, Fab. does in Asia, and is the largest species yet described.

LONGICORNES.

Sp. 47. *Mallodon Downesii*, Hope. Long. lin. 24 ; lat. lin. 9. Piceus, mandibulis porrectis intusque hirsutis, apicibus 3-dentatis. Thorax fere transverso-quadratus lateribus depressis et serratis, disco in medio elevato, punctisque variis sparsim dispositis. Elytra picea ad suturam mucronata. Corpus infra piceum, annulis abdominis postice rufescentibus, pectore aurato tomento obsito.

The above insect was taken at Fernando Po by my gallant friend Captain Downes ; I have also received it from Cape Palmas. *Mallodon picipennis* and *Raddoni* are also taken at Sierra Leone.

Sp. 48. *Acanthophorus Palinii*, Hope. Long. lin. 17 ; lat. lin. 6. Piceo-brunneus, antennis piceis, thorace marginato 3-dentato, anticis spinis majoribus et recurvis, posticis minutis. Thorax flavo-tomentosus, elytris piceis, maculis plurimis villosis obsitis. Corpus infra flavo-tomentosum, tarsis infra rubro-spongiosis.

The above insect was sent to me by Mr. Palin, who fell a victim to the unhealthy climate of Sierra Leone.

Sp. 49. *Acanthophorus longipennis*. Long. lin. 33 ; lat. lin. 11. Piceus, thorace marginato 3-dentato, dentibus fere æqualibus, disco in medio tuberculato. Elytra valde elongata, picea, ad humeros parum scabra, maculisque irrorata, lineis longitudinalibus vix distinctis. Corpus infra rubro-piceum, pedibus concoloribus.

Hab. Sierra Leone.

*Phyllarthrius**, novum genus.

Antennæ articulo 1^{mo} crasso, 2^{do} minore, 3^{tio} minimo, 6 sequentibus gradatim increscentibus et foliaceo-ramosis, externo articulo fere ovali, apice subacuto.

Thorax fere orbicularis lateribus haud spinosis.

Elytra ad apicem gradatim increscentia, rotundata.

Pedes femoribus quatuor anticis incrassatis, posticis longioribus et parum dilatatis.

The above characters will at once sufficiently distinguish it from *Amphidesmus*, Esch., to which it approaches in form : its true locality in the system is doubtful.

Sp. 50. *Phyllarthrius Africanus*. Long. lin. $6\frac{1}{2}$; lat. lin. $1\frac{3}{4}$. Flavus, antennis atris, sex ultimis articulis foliaceis, thorace fere rotundato, elytris postice sensim increscentibus flavis, apicibus autem nigris, totum corpus infra nigrum tarsis solummodo auricomatis.

* From $\varphi\acute{\upsilon}\lambda\lambda\omicron\nu$ and $\acute{\alpha}\rho\theta\epsilon\rho\nu$, leaf-jointed *Cerambyx*.

The above insect was received from Sierra Leone and was collected by Mr. Palin.

Sp. 51. *Phyllarthrus unicolor*. Long. lin. 5; lat. lin. $1\frac{1}{4}$. Rubropiceus, thorace orbiculari, antennis binis primis articulis nigricantibus, reliquis flavo-piceis. Elytra concoloria. Corpus infra testaceo-rubrum, femoribus incrassatis.

The above insect was received from Ashantee.

Sp. 52. *Hamaticherus signaticollis*, Hope. Long. lin. 10; lat. lin. $2\frac{1}{2}$. Niger, antennis corpore longioribus, thorace 4-maculato, maculis flavo-sericeis. Elytra ad apicem abrupte truncata linea aurato-sericea longitudinali conspicua, reliqua parte disci atra. Corpus infra nigrum, segmentis abdominis argenteo-sericeis, pedibus nigricantibus, tarsis infra flavo-spongiosis.

Hab. Circa Palmas.

The above species will at some future time be regarded as the type of a subgenus allied to *Hamaticherus*.

Sp. 53. *Hamaticherus viridipennis*. Long. lin. 12; lat. lin. 4. Viridinitens, thorace nigro rugisque transversis obsito, elytris viridibus, ad apicem abrupte truncatis et sub lente subtilissime punctulatis. Corpus infra atro-piceum, antennis pedibusque rubris.

Hab. Circa Sierram Leonam.

Sp. 54. *Hamaticherus pilosicollis*. Long. lin. 10; lat. lin. 3. Viridis, capite thoraceque flavis capillis obsitis, disco supra linea longitudinali, maculaque utrinque nigra nitida insignito. Elytra viridia nitida ad apicem rotundata, sub lente vix punctulata. Corpus infra nigrum flavisque capillis obsitum, pedibus concoloribus.

Hab. Circa Palmas.

Sp. 55. *Hamaticherus glabricollis*. Long. lin. $8\frac{1}{2}$; lat. lin. $2\frac{1}{2}$. Viridis, antennis rubro-piceis, thorace nigro lateribus rugosis. Elytra ad apicem truncata subbispinosa viridia nitida sub lente vix punctata. Corpus infra nigrum, pedibus segmentisque abdominis postice rubro-piceis.

Hab. Circa Palmas.

The above three species are all metallic, and appear to belong to a peculiar section. I am also acquainted with others from the same locality.

Sp. 56. *Ionthodes amabilis*. Long. lin. 11; lat. lin. 3. Affinis *formosæ*, Serville, at major. Caput atrum, antennis pedibusque rubris. Thorax niger, maculis argenteis insignitus, binis flavis in medio disci positus, binisque aliis albidis utrinque ad latera conspicuis. Elytra læte purpurascencia in quibusdam locis obscura. Corpus infra nigro-sericeum.

This lovely insect inhabits Sierra Leone.

Sp. 57. *Callichroma assimile*. Long. lin. 10; lat. lin. $2\frac{1}{2}$. Affine *Call. Afro*, Fab. et *Cer. nitenti*, Olivier. Viridinitens, antennis pedibusque ferrugineo-flavis, thorace rotundato subspinoso, transverse rugoso viridique aurato. Scutellum læte aureum, elytris vi-

ridibus suturaque interne aureo-vittata. Corpus infra aureum et punctatum.

Hab. Circa Sierram Leonam.

Sp. 58. *Callichroma lætum*, Hope. Long. lin. 15; lat. lin. $4\frac{1}{2}$. Cyaneum aut læte viride, antennis nigris, thorace utrinque fortiter spinoso, dorso subtuberculato. Scutellum rugis transversis impressum et auratum. Elytra læte purpurea aut viridia punctulata, corpore infra concolori. Tarsi supra argentei infraque flavo-spongiosi.

Hab. Circa Palmas.

This splendid insect varies considerably in its colouring, being sometimes purple, blue and green; it is closely allied to the *C. albotalarsis* of Fabricius.

Sp. 59. *Callichroma atripenne*, Hope. Long. lin. $12\frac{1}{2}$; lat. lin. 4. Atrum, antennis pedibusque rubris, thorace utrinque subspinoso, rugisque transversis impresso. Corpore infra aurato tomentoso.

The above insect I have received from Cape Palmas and also from Sierra Leone.

Sp. 60. *Callichroma igneicolle*. Long. lin. $12\frac{1}{2}$; lat. lin. $2\frac{1}{2}$. Viola-ceum, antennis nigricantibus. Caput læte auratum. Thorax utrinque spinosus, igne auroque æstuans. Elytra elongata interne viridia lateribus violaceis. Corpus infra auratum, pedibus violaceis.

The above insect seems to unite in itself the Asiatic and African *Callichromidæ*; it was received lately from Ashantee, and is one of the most beautiful insects found in Africa.

Sp. 61. *Promeces carbonarius*. Long. lin. $9\frac{3}{4}$; lat. lin. 2. Niger, antennis atro-violaceis, thorace fere rotundato utrinque subtuberculato, corpore infra concolori, pedibus rubris, femoribus quatuor anticis incrassatis, reliquis elongatis.

It inhabits the vicinity of Sierra Leone.

Sp. 62. *Euporus amabilis*. Long. lin. 6; lat. lin. $\frac{3}{4}$. Cyaneus, antennis purpurascens, capite læte viridi, thorace cyaneo, dorso varioloso-punctato. Scutellum aureum, elytra ad humeros violacea, interne viridia et ad latera atro-cyanea. Corpus infra viride, femoribus cyaneis, tibiis posticis binis in medio rubris.

Hab. Circa Palmas.

Sp. 63. *Euporus chryscollis*. Long. lin. 7; lat. lin. 1. Viridis, capite antice concolori posticeque cyaneo. Antennæ violacæ. Thorax aureus, fortissime punctatus. Elytra in medio obscure viridia, sutura aureo-virescente lateribus externe violaceis. Corpus infra auratum nitidum et punctatum, pedibus cyaneis.

This species was given me by Captain Downes, and taken by him at Fernando Po; it is closely allied to the insect above described under the name of *amabilis*.

Sp. 64. *Sternodonta Palinii*. Long. lin. 9; lat. lin. $2\frac{3}{4}$. Viridis, antennis atris, articulo 1^{mo} cæruleo. Capite fronte viridi posticeque atro. Thorax ater, antice et postice linea transversa virescenti

notatus, aliaque media aurantia. Elytra nigra fascia humerali aurantia, secunda fere media, duabus maculis concoloribus fere ad apicem positis. Intra humeralem fasciam et apicem totum discum maculis minutis viridibus aspersum. Corpus infra viride, pectore utrinque aurantio colore imbuto.

The above elegant insect is named after Mr. Palin, an assiduous collector of insects at Sierra Leone.

Sp. 65. *Sternodonta Princeps*. Long. lin. 13; lat. lin. 6. Atroviridis, antennis pallidioribus, thorace 4 lineis transversis albidis notato, elytris disco nigro binis fasciis obliquis variisque maculis albido beryllinis insignitis. Corpus infra nigrum, segmentis abdominis beryllino-viridibus.

Received from Ashantee in 1833.

Sp. 66. *Sternodonta amabilis*. Long. lin. 12; lat. lin. 5. Affinis *Stern. Imperiali*, at major. Viridis, corpore pulvere fulvo aurato, fere omnino tecto. Thorax medio aurantius, antice posticeque viridis. Elytra læte beryllino-viridia, ad basem nigra fascia notata, maculisque variis aurantiis conspicua. Corpus infra læte viride, pedibus concoloribus.

The above insect is one of the most beautiful received from Africa. It was obtained from the country of the Ashantees.

LII.—*Some remarks on the Soft-billed Duck of Latham.*

By GEORGE ROBERT GRAY, Esq.

AMONG the ducks described by Latham in his 'Synopsis' is one that he denominated the Soft-billed Duck. It was first noticed however by Cook and Forster in their Voyages, and to them Dr. Latham was indebted for the information which supplied the material for his description. A representation of this curious and rare species of duck is given by G. Forster among his drawings, tab. 74. Gmelin was the first to give a scientific name, which he did by translating Latham's, as *Anas malacorhynchus*. The specimens which have again brought it into notice have recently been presented to the National Collection by the New Zealand Company; they are two in number, and were brought from New Zealand by Dr. Dieffenbach; it is thus that the writer has had it in his power to examine it and to compare it with the Australian soft-billed duck. He soon discovered that Wagler was in error in considering it as belonging to the same division. From the form of the hind toe, the Australian species is a true duck near the Shovellers; while the present bird is more properly placed with the lobed hind-toed ducks, such as the Pochards, and partaking in some measure of the form of the Goosanders. It should therefore be placed in the subfamily *Fuliginæ* between *Camptolaimus*

and *Branta*; the former of which is the only one of that sub-family that has the apical margins of the bill soft and somewhat flexible. The Australian soft-billed duck is the type of the genus *Malacorhynchus* as established by Mr. Swainson in 1831. In 1832 Wagler used the same generic name, being unacquainted with the fact that it had been previously employed: he seems to consider the New Zealand bird as the type, but mentioned the Australian one as the second species. This leaves us to conclude that Mr. Swainson's genus *Malacorhynchus* must, by the law of priority, be retained for the Australian *Anas membranacea*, while a new generic name should be proposed for the New Zealand *Anas malacorhynchus*.

Capt. Cook in his 'Voyage' mentions this bird as a "blue-gray duck, or whistling-duck as some called them, from the whistling noise they make;" and Forster in his 'Voyage' states, that "its bill had a remarkable membranaceous substance at the extremity on both sides, probably because the bird is intended to live by sucking the worms, &c. in the mud, when the tide retires from the beach." On the drawing is written (as if called so by the natives) the word *heweego*; where is also represented (and of which he speaks in his 'Voyage') a narrow white band across each wing that is not found in the specimen before me.

HYMENOLAIMUS. Bill as long as the head, equally compressed, elevated at the base, with the culmen for three-fourths of its length straight, and then slightly curved to the tip; the sides from the culmen shelving to the lateral margins, of which the basal half is firm and furnished with lengthened slender laminæ; the apical half of the margin composed of a soft flexible skin that hangs over the lower mandible, widening towards the tip, where it is somewhat truncate and the nail not very prominent; nostrils situated near the middle of the bill and oval. Wings short, slender, with the first, second and third quills equal and longest, and the shoulder armed with a short blunt spur. Tail lengthened and composed of broad feathers with the ends rather rounded. Tarsi nearly as long as the middle toe exclusive of claw, fore-toes strong and fully webbed, and the hind toe moderate and strongly lobed.

H. malacorhynchus (Gm.), n. Brownish blue; the feathers more or less margined with glossy green, especially on the head and back; the breast varied with large spots of light chestnut; the secondaries (some tipped with white) with their outer edges margined narrowly with velvety black. Bill white, with the nail and the soft part black. Legs brown and web black.

Length 20 inches; bill $2\frac{1}{4}$ inches; wings $8\frac{3}{4}$ inches; tail $5\frac{1}{2}$ inches; tarsi $1\frac{3}{4}$ inch.

Anas malacorhynchus, *Gmel. Syst. Nat.* i. 526; *Lath. Ind. Orn.* ii. 862.

Malacorhynchus Forsterorum, *Wagl. Isis*, 1832.

As an appendix, I subjoin the descriptions of five species of birds which are considered to be new to science.

Falco subniger. Deep brown, margins of feathers lighter; abdomen, greater wing-coverts, quills and tail blackish brown; bill and legs plumbeous.

Length 23 inches; bill 1 inch and 1 line; wings $16\frac{1}{4}$ inches; tarsi $2\frac{1}{4}$ inches.

This bird has the form of the peregrine falcon, but is larger in all its proportions; judging from the plumage, it appears to be an immature specimen of a species not hitherto described. Its locality is unknown, but is supposed to be an Australian species.

Falco guttatus. Black, the feathers of the back margined with blue, and the inner webs of the quills and tail-feathers spotted with rufous; throat and a semicollar on the neck white, slightly tinged with rufous; breast and beneath deep rufous, spotted with black. Bill black, cere and legs yellow.

Length $12\frac{1}{2}$ inches; bill $\frac{3}{4}$ of an inch; wings $9\frac{1}{2}$ inches; tail $5\frac{1}{2}$ inches; tarsi $1\frac{1}{2}$ inch.

Approaches mostly to the *Falco frontatus* of Gould in size and colour, but the lower parts are deep rufous and distinctly spotted with black. It is from the Philippine Islands.

Astur cristatus. Glossy brown, top and back of the head, where the feathers form a crest, black; ear-coverts plumbeous; throat white, with a very narrow streak of black down the centre; breast rufous, varying with white; abdomen broadly banded with white and rufous; thigh white, with narrow bands of rufous brown; tail ashy, with four dark brown bands. Bill black and legs yellow.

Length $16\frac{1}{4}$ inches; bill 1 inch; wings $8\frac{1}{4}$ inches; tail $7\frac{1}{4}$ inches; tarsi $2\frac{3}{4}$ inches.

This bird might at first sight be taken for a species of *Baza*, as far as regards the position of its colours, but the festooned bill and lengthened tarsi at once distinguish it from that genus. It is an inhabitant of the Philippine Islands.

Tchitrea rufa. Rufous, with the base of the feathers paler, the inner webs of the quills dusky.

Length $8\frac{1}{2}$ inches; bill 1 inch; wings 3 inches 8 lines; tail $4\frac{3}{4}$ inches; tarsi 9 lines.

This fine species is from the Philippine Islands.

Caccabis Bonhami. Grayish isabella-colour, numerously banded and vermiculated with dusky; lower part of the back and tail-coverts slightly speckled with black; front and line above the eyes black, another line through the eyes white; the throat and sides of the neck pale blue, with some of the feathers of the latter variegated with white; breast plain isabella-colour; feathers of the sides varied with blotches of rufous isabella and white margined with black; abdomen nearly white; tail pale cinnamon, with the ends paler and vermiculated with black. Bill and legs yellow.

Length $8\frac{1}{2}$ inches.

Female paler, entirely banded and vermiculated with dusky; sides and abdomen varied with white, which colour predominates on the throat. It is from the mountains of Persia, and has much the appearance of the *P. Heyii*, Temm., to which it also approaches in size.

LIII.—*Remarks on the species of Desmidiium*. By JOHN RALFS, Esq., M.R.C.S., Penzance.

[With a Plate.]

DESMIDIUM, Ag.

FILAMENTS fragile, jointed, angular, with the angles of each joint bicrenate, or cylindrical with a circular groove which produces a crenate appearance, finally separating into single joints or frustules.

This natural genus is not well defined either in Agardh's 'Conspetus criticus Diatomacearum' or in any of our British works. Its best distinctive character appears to consist in the crenated appearance of the filaments, which is least evident in *D. mucosum**

The filaments are of a pale green colour, simple, fragile, short,

* Since this paper was written I have had an opportunity of seeing Kützing's 'Synopsis Diatomearum,' and as his character is the best I have met with I subjoin it:—

"*Desmidiium*. Corpuscula geminata in longam seriem conjuncta, itaque filum articulatum constituenta, tubulo communi filiformi mucoso inclusa."—In Linnæa, 1833, p. 613.

Ehrenberg's *Desmidiium* differs widely from that of botanists. *D. Swartzii* is the only species common to both, in consequence of his having made triangular frustules one of the characters of his genus. His *Desmidiium*, besides *D. Swartzii*, contains five species, *orbiculare*, *hexaceros*, *bifidum*, *aculeatum* and *apiculosum*, all found in England. But these, not being united into a filament, are distinguished from the genus as above described, just as *Frustulia*, Ag., is from *Fragilaria*.

Ehrenberg defines his genus in the following terms:—

"*Desmidiium* animal liberum, lorica simplici, univalvi, triquetra inclusum, sæpe cateniforme."—Die Infus. p. 140.

straight, and are scattered in loose bundles in the water, or form a thin gelatinous fleece at the bottom of the pool. They are generally twisted in a regular manner; this is shown by the waved darker line in *D. Swartzii*, and in *D. cylindricum* and *D. Borreri* by the *apparent* variableness in the diameter of the filament, and by the different position of the angles, which causes the crenatures either to become less distinct or entirely to disappear at certain intervals.

Whether *D. mucosum* is also twisted, I am unable to determine, the crenated appearance of the joints being caused by a shallow groove running all round the joint: all the joints seem to be similar, and if twisted would not present any perceptible difference.

As the angles of the joints in all the species are, in a greater or less degree, really or apparently bicrenate, this character is rather a generic than a specific one.

Most commonly each joint in the species of this genus has its endochrome divided into two portions separated by a paler line, which runs across between the crenatures, and in *D. mucosum* corresponds with the groove passing round the joint. A transverse view shows the endochrome disposed in a stellate manner.

The species are found during great part of the year in clear shallow pools or in old peat-pits; those at present known are few in number, and possess well-marked characters.

* *Filaments with a mucous sheath.*

1. *D. cylindricum*, Grev. Filaments slightly compressed, with two angles; crenatures strongly marked; joints rather broader than long*. Plate VIII. fig. 1. *Grev. Scot. Crypt. Fl.* t. 293; *Desmaz.* n. 1110.

In old peat-pits about Dolgelly, N. Wales; sparingly near Penzance.

D. cylindricum, *Swartzii*, *Borreri* and *mucosum*, growing together in a watercourse on Chiltington common near Pulborough, Sussex: *Mr. Jenner*; Cheshunt, *Mr. Hassall*.

The filaments are as thick as those of *D. Swartzii*, which species it much resembles in the water. The joints, inclusive of the angles, which are colourless, are rather broader than long, and of an oval form, with a small sharp notch in each angle. Those joints in which the angles are not visible are about as long as broad. The joints seem to be connected by a thickened border. The mucous sheath is not noticed by Dr. Greville or Agardh, whose description in the 'Conspectus criticus Diatomacearum' is taken from Greville. The description in the 'Scot. Crypt. Flora' was probably drawn up from dried specimens, in which the sheath is less evident.

* Length and breadth have here their usual meaning when applied to the joints of the filament of a Conferva.

The mucous sheath is narrower than that of *D. mucosum*, and in both a portion of it seems to belong to each joint; in both also it is elastic, which may be the cause why the joints separate so easily. The elasticity is shown by its becoming longer than the joints after their separation.

I learn from Mr. Berkeley, who kindly sent me a portion from Desmazières' specimen, that Desmazières figures the joints as slightly compressed, with a rounded angle both of the filament and sheath on each side, and thus agrees exactly with my own observations.

Desmazières, however, represents the endochrome in two parcels, each consisting of five granules. In the specimens I have examined the endochrome has sometimes four and sometimes five rays.

The filaments are twisted, and consequently at about every tenth joint the angles are very perceptible, whilst in the two central joints they are almost invisible; on altering slightly the position of the filament the angles in the latter become visible, and in the former disappear.

On account of the oval form of the joints the angles of each are separated, and thus the filament acquires a pinnatifid appearance; the notch is sharply defined, as if a triangular bit had been snipped out.

2. *D. mucosum*, Breb. Filaments cylindrical, appearing very slightly crenate; joints generally half as long as broad. Pl. VIII. fig. 2. *Conf. dissiliens*, Eng. Bot. t. 2464. (crenatures in the figure too deep):

Cwm Bychan, *W. Borrer, Esq.*; Tunbridge Wells, *Mr. Jenner*; near Bedgelert and about Dolgelley, N. Wales; Swansea, S. Wales; plentiful near Penzance, Cornwall; High Beach, Essex; Hertford Heath and Wormley West end, Herts, *Mr. Hassall*.

Filaments slenderer than those either of *D. Swartzii* or *D. cylindricum*, mucous, adhering firmly to paper, with a broad mucous sheath, cylindrical, *without any angles*, in which respect it differs from the other three species. Each joint has a shallow groove passing round it (thus resembling a small pulley-wheel) which gives the crenate appearance to the filaments; the crenatures are generally very shallow, sometimes nearly obsolete, but I have occasionally seen them deeper, and thus more like the figure in 'Eng. Bot.' There is scarcely any depression between the joints; in this circumstance it differs greatly from *D. cylindricum*.

If kept in water for a few days it separates into single joints, each joint having a perfect mucous covering; both the filament and sheath are cylindrical.

The endochrome generally is disposed in a stellate manner (when seen transversely), having a small central ring and six or seven rays.

Foreign specimens given me by Mr. Berkeley exactly agree with the above description.

** *Filaments without a mucous sheath.*

3. *D. Swartzii*, Ag. Filaments triangular; joints shorter than broad. Pl. VIII. fig. 3. *Grev. Crypt. Fl.* t. 292; *Ehren. Die Infus.* p. 140. t. 10. fig. 8; *Pritch. Infus.* p. 183.

Tunbridge Wells, Mr. Borrer; Swansea, S. Wales; Caernarvon and Dolgellay, N. Wales; Penzance.

Agardh seems not to have understood this species. In the 'Conspectus criticus Diatomacearum' he says, "filis planis triangularisve," and afterwards, "Fila mihi plana visa, secundum Carmichael revera triangula sunt; secundum Lyngbye articuli soluti cito figuram triangulam induunt. Iterum itaque hoc respectu observanda."

Dr. Greville's description is very correct: the filaments are no doubt triangular, as a little care in using the microscope may easily determine. Under the lens two angles always appear at the two margins of the filament. The third angle is marked by the dark line caused by the greater thickness in that part. As the filaments are twisted, the dark line regularly passes, as seen in the sketch, from one margin to the other. By examining the filament where the angle (shown by the dark line) touches the margin and bringing the lens a little nearer, and then withdrawing it again, both angles may be distinctly seen.

Transverse view triangular, the angles blunt, the sides slightly concave; endochrome in three portions placed in the angles, and connected in the centre by three processes resembling stalks. But this is only seen when the joints separate spontaneously.

When a joint is separated under the microscope, a cloud of extremely minute granules is poured out, which for an instant obscures the view.

It adheres but slightly to paper, is very fragile, but separates spontaneously into single joints with less readiness than *D. mucosum* and *D. cylindricum*.

Mr. Borrer has kindly presented me with a portion of a specimen given him by Mr. D. Turner as the *Conferva dissiliens* of Dillwyn, but which is undoubtedly the plant now described.

4. *D. Borreri*. Filaments cylindrical, inflated, with two angles; joints about twice as long as broad. Pl. VIII. fig. 4.

I have great pleasure in dedicating this species to Mr. Borrer, who directed my attention to it in a boggy ditch at Cwm Bychan in July last, when I accompanied him in a very agreeable excursion among the Welsh mountains.

We afterwards found it above Twll Dû in a small pool near

Llyn y Cwn; I have also gathered it in old peat-pits near the outlet of the Llanberris Lakes, and near Dolgelley, N. Wales.

It is a very distinct species, and in the great length of its joints remarkably differs from the other species of this genus.

Filaments pale green, very slender, and without a mucous sheath. The joints are cylindrical when viewed transversely, and have two minute angles. The endochrome, stellate, as in the other species, has five or six rays.

That the crenatures are situated in the angles and not in a groove as in *D. mucosum*, is shown by their prominence and disappearance at regular distances as in *D. cylindricum*, which results from the twisting of the filament.

The notch seems less like an interruption of the outline than in the other species, but rather as if the angles were attached to the sides of the joint.

The joints are somewhat inflated. When the angles are not visible they resemble small barrels placed end to end. Where the angles are fully displayed, the appearance may be compared to the juxtaposition of two flower-pots by their mouths, the rims and interval between which will represent the crenated angles.

On account of the great length of the joints, the division of the endochrome into two portions is very strongly marked.

LIV.—*Note on the Saw-Fly (Lyda inanita) the subject of M. Huber's paper in the preceding Number.* By J. O. WESTWOOD, Esq., F.L.S. E.S., &c.

To Richard Taylor, Esq.

DEAR SIR,

YOUR readers will be interested to learn that the curious insect whose proceedings are detailed in the last number of the 'Annals' is a native of this country. For ten years past I have observed it on the rose-trees in my garden at Hammersmith, where I have watched its proceedings in detail, and had prepared a history of it with a view to publication. A short abstract of my observations on it was published in my 'Introduction to the Modern Classification of Insects,' vol. ii. p. 107, accompanied by a figure of the case as well as of the perfect insect (with which M. Huber was unacquainted), and which is the *Lyda inanita*, which appears in the imago state in the last week of May, flying about the bushes in the garden with great velocity and settling on the leaves in the sunshine, its splendidly golden-coloured wings rendering it a very beautiful object.

I am, dear Sir, yours very truly,
JOHN O. WESTWOOD.

LV.—*On the Blood and Fibre.* By JOHN WILLIAM GRIFFITH,
M.D., F.L.S.

To the Editors of the Annals of Natural History.

GENTLEMEN,

As Dr. Barry has noticed in the last Number of your valuable Journal some observations I made in a former Number* on the Blood and Fibre, I shall feel obliged by your inserting the following remarks, extracted from my paper in the Medical Gazette in reply to Dr. Barry:—

“I leave the reader to judge whether the *description* of the fibre in the blood-corpuscles, given by *me*, is sufficient to authorize any one to give an opinion as to whether I have seen it or not. I believe that the consideration of the abstract appearances presented by objects under the microscope, serves very often rather to call forth the powers of the imagination as to what might cause such appearances, than as the means of making out the real structure of bodies; and, in examining different structures, we ought to avail ourselves of the assistance of all the means of investigation in our power—as dissection, chemical agents, heat, maceration, &c. Were these made use of in all cases, I feel convinced we should arrive at more satisfactory and less discrepant results. Now the effect of maceration in the case of muscular fibre convinces me that no such arrangement as that of a double spiral can exist; otherwise why do we have the separation into discs? This has been accurately figured and described by Mr. Bowman, and every microscopist must have seen it. As regards the formation of the tissues of the body from the blood-corpuscles, there seem to me insuperable difficulties in these views. In addition to the majority of the appearances which have been observed in the blood having occurred *after the blood has left its vessels*, in many cases *they have been seen taking place*, under the microscope, in the blood removed from the body. Can these appearances be called vital? Have we any right to believe that they take place in the living body? Moreover, where do these *forming* or *perfected* fibres, &c. pass through the capillaries? And how is it we do not find in certain cases fibres, epithelium-cells, &c. existing in the arteries, veins, or capillaries?

“I must say, however, that no views have been yet advanced which will explain some of the appearances presented by muscular fibre. Some of those which have been figured by Dr. Barry certainly cannot be explained on the views advanced by Mr. Bowman; although I believe the appearance figured by him in the ‘New Cyclopædia of Physiology’ to be the real structure of the muscle in its ordinary form.

* Annals and Mag. of Nat. Hist. No. 68. Feb. 1843.

“Dr. Barry cannot, I feel convinced, imagine that I am exceeding the bounds of propriety in publicly noticing what he was kind enough to show me in private. Feeling assured that his object is no other than the advancement of science, I can only say that I have no other motive; but advance these objections to his views with the idea that it is the duty of every one who has the opportunity to throw his mite into the common heap; and that the opposition of any theory will either bring forward evidence explaining the difficulties, and thus fixing truth on an immoveable basis; or bring up some new views, by means of which the old difficulty will be solved, and the same truth irresistibly founded.”

9 St. John's Square, April 1843.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

December 8, 1842.—The following papers were read, viz. :—

“Observations on the Blood-corpuscles, particularly with reference to opinions expressed and conclusions drawn in papers ‘On the Corpuscles of the Blood,’ and ‘On Fibre,’ recently published in the Philosophical Transactions.” By T. Wharton Jones, Esq., F.R.S.

The author points out what he considers to be important errors in the series of papers by Dr. Martin Barry, which have lately appeared in the Philosophical Transactions, and are entitled, “*On the Corpuscles of the Blood,*” and “*On Fibre.*” He alleges that Dr. Barry has generally confounded the colourless corpuscles contained in the blood with the red corpuscles of the same fluid; each of which latter kind consists of a vesicle or cell, with thick walls, but in a collapsed and flattened state, and having therefore a biconcave form, and in consequence of its thick wall being doubled on itself, presenting under the microscope a broad circumferential ring, which is illuminated or shaded differently from the depressed central portion, according to the focal adjustment of the instrument: while the colourless corpuscles, on the other hand, are of a globular shape, strongly refractive of light, and granulated on their surface, and are of less specific gravity and of somewhat larger size than the red corpuscles. The author quotes various passages from Dr. Barry's papers in proof of his assertions, and refers particularly to fig. 23 of his second paper on the corpuscles of the blood. He farther states, that Dr. Barry's description of the appearances of what he terms the red corpuscles, in paragraphs 53, 68, and 76 of his second paper, can, in fact, apply only to the colourless corpuscles: and he observes, that even when Dr. Barry does, at last, in his “Additional Observations,” advert to the distinction between the red and the colourless globules, he considers the latter as being merely “the discs” contained in the red globules appearing under an altered state.

The author regards as wholly erroneous the notion which Dr. Barry entertains that a fibre exists in the interior of the blood-corpuscle; and that these fibres, after their escape from thence, constitute the fibres which are formed by the consolidation of the fibrin of the *liquor sanguinis*. The beaded aspect presented by the double contour of the thick wall of the red corpuscle when it has been acted upon either by mechanical causes or by chemical reagents, of which the effect is to corrugate the edge, and to bend it alternately in opposite directions, has, in the opinion of the author, given rise to the illusive appearance of an internal, annular fibre. The appearance of flask-like vesicles presented by some of the red corpuscles, with the alleged fibre protruding from their neck, the author ascribes altogether to the effects of decomposition, which has altered the mechanical properties of the corpuscle, and allowed it to be drawn out, like any other viscid matter, into a thread.

In conclusion, he remarks, that if these statements of Dr. Barry should be recognised as fundamental errors in his premises, the whole of the reasonings built upon them must fall to the ground.

“Spermatozoa observed within the Mammiferous Ovum.” By Martin Barry, M.D., F.R.S. L. and Ed.

In examining some ova of a rabbit, of twenty-four hours, the author observed a number of spermatozoa in their interior.

Dec. 15.—A paper was read, entitled “Experimental Inquiry into the cause of the Ascent and Continued Motion of the Sap; with a new method of preparing plants for physiological investigations.” By George Rainey, Esq., M.R.C.S. Communicated by P. M. Roget, M.D., F.R.S.

The ascent of the sap in vegetables has been generally ascribed to a vital contraction either of the vessels or of the cells of the plant: the circumstances of that ascent taking place chiefly at certain seasons of the year, and of the quantity of fluid, and the velocity of its motion being proportional to the development of those parts whose functions are obviously vital, as the leaves and flowers, have been regarded as conclusive against the truth of all theories which professed to explain the phenomenon on purely mechanical principles. The aim of the author, in the present paper, is to show that these objections are not valid, and to prove, by a series of experiments, that the motion of the sap is totally independent of any vital contractions of the passages which transmit it; that it is wholly a mechanical process, resulting entirely from the operation of endosmose; and that it takes place even through those parts of a plant which have been totally deprived of their vitality.

The lower extremity of a branch of *Valeriana rubra* was placed, soon after being gathered, into a solution of bichloride of mercury. In a few hours a considerable quantity of this solution was absorbed, and the whole plant, which had been previously somewhat shrunk from the evaporation of its moisture, recovered its healthy appearance. On the next day, although the lower portion of the branch had lost its vitality, the leaves and all the parts of the plant into which no bichloride had entered, but only the water of the solution, were

perfectly healthy and filled with sap. On each of the following days additional portions of the stem became affected in succession; but the unaffected parts still preserved their healthy appearance, and the flowers and leaves developed themselves as if the plant had vegetated in pure water and the whole stem had been in its natural healthy state. On a minute examination it was found that calomel, in the form of a white substance, had been deposited on the internal surface of the cuticle; but no bichloride of mercury could be detected in those parts which had retained their vitality; thus showing that the solution of the bichloride had been decomposed into chlorine, calomel, and water, and had destroyed the vitality of the parts where this action had taken place; after which, fresh portions of the solution had passed through the substance of the poisoned parts, as if they had been inorganic canals. Various experiments of a similar kind were made on other plants, and the same conclusions were deduced from them.

As the addition of a solution of iodide of potassium converts the bichloride of mercury into an insoluble biniodide, the author was enabled, by the application of this test to thin sections of the stems of plants into which the bichloride had been received by absorption, to ascertain, with the aid of the microscope, the particular portion of the structure into which the latter had penetrated. The result of his observations was, that the biniodide is found only in the intercellular and intervascular spaces, none appearing to be contained within the cavities of either cells or vessels.

As the fluids contained in the vessels and in the cells hold in solution various vegetable compounds, their density is greater than the ascending sap, which is external to them, and from which they are separated by an intervening organized membrane. Such being the conditions requisite for the operation of the principle of endosmose, the author infers that such a principle is constantly in action in living plants; and that it is the cause of the continual transmission of fluids from the intervascular and intercellular spaces into the interior of the vessels and cells, and also of the ascent of the sap.

Jan. 19, 1843.—“On the minute structure of the Skeletons or hard parts of Invertebrata,” by W. B. Carpenter, M.D.

The present memoir is the first of a series which the author intends to communicate to the Society, and relates only to the Mollusca; and he proposes, hereafter, to extend his inquiries to the skeletons of the Echinodermata, and the various classes of articulated animals. After adverting to the classifications of shells proposed by Mr. Hatchett and Mr. Gray, from the propriety of which he finds reason to dissent, he proceeds to state the results of his microscopic examination of the texture of shells under the several following heads. First, shells having a prismatic cellular structure, as the Pinna, and which are composed of a multitude of flattened hexagonal calcareous prisms, originally deposited in continuous layers of hexagonal cells, and thus constituting a calcified epithelium, analogous with the enamel of the teeth. Secondly, those con-

sisting of membranous shell-substance, the basis of which, after the removal of its calcareous portion, presents nothing but a membranous film, of greater or less consistence, composed of several layers, but without the appearance of any cellular tissue: this membrane the author regards as being derived from the mantle, of which it was originally a constituent part, by the development of nucleolated cells; and the various corrugations and foldings of which it is susceptible in different species, introducing many diversities into the structure of the shells of this class. Thirdly, shells having a nacreous structure, and exhibiting the phenomena of iridescence; a property which the author ascribes to the plicated form of the membrane of the shell, combined with a secondary series of transverse corrugations. Fourthly, shells exhibiting a tubular structure, formed by cylindrical perforations occurring among the several layers, and varying in diameter from about the 20,000th to the 3500th part of an inch; but measuring on an average about the 6000th part of an inch, and presenting a striking analogy with the dentine or ivory of the teeth. The last sections of the paper relate to the epidermis and the colouring matter of shells.

References are made, in many parts of the paper, to illustrative drawings; which, however, the author has not yet supplied.

Feb. 9.—“On the Structure and Mode of Action of the Iris:” by C. R. Hall, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

After reciting the various discordant opinions entertained at different periods by anatomists and physiologists, relative to the structure and actions of the iris, the author proceeds to give an account of his microscopical examination of the texture of this part of the eye, in different animals. He considers the radiated plicæ, which are seen on the uvea in Mammalia, as not being muscular; but he agrees with Dr. Jacob in regarding them as being analogous in structure to the ciliary processes. The white lines and elevations apparent on the anterior surface of the human iris, he supposes to be formed by the ciliary nerves which interlace with one another in the form of a plexus. The iris, he states, is composed of two portions; the first, consisting of a highly vascular tissue, connected by vessels with the choroid, ciliary processes, sclerotica and cornea, and abundantly supplied with nerves, which, in the human iris, appear, in a front view, as thread-like striæ; and which are invested, on both surfaces, by the membrane of the aqueous humour. They are more or less thickly covered with pigment, which, by its varying colour, imparts to the iris on the anterior surface its characteristic hue; and, by its darkness on the posterior surface, renders an otherwise semi-transparent structure perfectly opaque. The second component portion of the iris consists of a layer of concentric muscular fibres, which fibres, in Man and Mammalia generally, are situated on the posterior surface of the pupillary portion of the iris; but which in Birds extend much nearer to the ciliary margin, and consequently form a much broader layer. In Fishes and in some Reptiles they do not exist at all.

The author then proceeds to inquire into the bearings which

these conclusions may have on the physiology of the iris. He thinks that the phenomena of its motions can receive no satisfactory explanation on the hypothesis of erectility alone, or on that of the antagonism of two sets of muscular fibres; the one for dilating, the other for contracting the pupil. He is convinced that the contraction of the pupil is the effect of muscular action; but does not consider the knowledge we at present possess is sufficient to enable us to determine the nature of the agent by which its dilatation is effected. He, however, throws it out as a conjecture, that this latter action may be the result of an unusual degree of vital contractility, residing either in the cellular tissue, or in the minute blood-vessels of the iris. It is from elasticity, he believes, that the iris derives its power of accommodation to changes of size, and its tendency to return to its natural state from extremes, either of dilatation or of contraction; but beyond this, elasticity is not concerned in its movements.

Feb. 16.—“On Fissiparous Generation:” by Martin Barry, M.D., F.R.S. L. and Ed.

The author observes that the blood-corpusele and the germinal vesicle resemble one another* in the circumstance of an orifice existing in the centre of the parietal nucleus of both. He pursues the analogy still farther, conceiving that as a substance of some sort is introduced into the ovum through its orifice, which the author terms *the point of fecundation*, so the corpuscles of the blood may undergo a sort of fecundation through their corresponding orifice; and also that the blood-corpusele, like the germinal vesicle, is propagated by self-division of its nucleus; a mode of propagation which he believes to be common to cells in general. The nucleus of the germinal vesicle, or original parent cell of the ovum, gives origin, by self-division, to two young persistent cells, endowed with qualities resulting from the fecundation of the parent cell; these two cells being formed by assimilation, out of a great number of minuter cells which had been previously formed. This account of the process, which takes place in the reproduction of the entire organism, explains, according to Dr. Barry, the mysterious reappearance of the qualities of both parents in the offspring.

Certain nuclei, which the author has delineated in former papers as being contained within and among the fibres of the tissues, he conceives to be, in like manner, centres of assimilation, from observing that they present the same sort of orifice, that they are reproduced by self-division, and that they are derived from the original cells of development; that is, from the nuclei of the corpuscles of the blood. He considers that assimilation of the substance introduced into the parietal nucleus of the cell is part of the process which propagates the cell; that the mode of reproduction of cells is essentially fissiparous, and that the process of assimilation prepares them for being cleft.

A pellucid point is described by the author as being “contained in a certain part of the cell-wall, and as representing the situation

* Dr. Barry requests us to add, that the words “in certain states” are wanted here.—EDIT.

of a highly pellucid substance, originally having little if any colour." This substance, which he considers as being primogenital and formative, he denominates *hyaline*, and ascribes to it the following properties. It appropriates to itself new matter, thus becoming enlarged; then divides and subdivides into globules, each of which passes through changes of the same kind. Under certain circumstances, it exhibits a contractile power, and performs the motions called *molecular*. It is the seat of fecundation, and it is by its successive divisions that properties descend from cell to cell, new properties being continually acquired as new influences are applied; but the original constitution of the hyaline not being lost. The main purpose for which cells are formed is to reproduce the hyaline; and this they do by effecting the assimilation which prepares it to divide; such division being thus the essential part of fissiparous generation.

The remaining part of the paper is occupied with a detailed account of these processes as they occur in the development of the ovum, and also in the changes exhibited by the corpuscles of the blood, in which fissiparous reproduction also takes place, and the red blood-discs are converted into fibrin, and thus give origin to the various tissues of the organs. The same theory of fissiparous reproduction he also applies to the formation of the muscular fibre, in connexion with his belief that it is composed of a double spiral filament. Contractile cilia, he supposes, are also formed by the elongation of nuclei, the filaments proceeding from them in opposite directions. The author considers, lastly, the subject of the fissiparous reproduction of the Infusoria, and particularly of the *Volvox globator*, the *Chlamido-monas*, *Baccillaria*, *Gonium*, and the *Monadina* in general; and applies the same theory to gemmiparous reproduction, and to the so-called spontaneous generation of infusoria and parasitic entozoa.

March 16.—“Further Observations on the descending fluids of Plants, and more especially the Cambium.” By George Rainey, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

The author relates an experiment in proof of the sap descending from the upper to the lower part of an exogenous tree, through vessels which are continuous from the leaves to the roots; the course of these vessels being shown by the addition of a solution of iodide of potassium after they had taken up by absorption a quantity of a solution of acetate of lead. The fluids in these vessels are, he conceives, separated from the sap, which is ascending from the roots, only by the membrane of which they are composed. When the leaf-buds of a tree are vegetating, large separations are observable between the cells of the bark, and also between the bark and the wood; while no such separations are apparent when the leaf-buds are entirely inactive. These separations are various in size, and irregular in form; their parietes consist of rows of cells, piled up one above another, like the bricks of a wall: and their cavities all communicate with one another. From these and other anatomical facts, which are given in detail by the author, he concludes that the

propulsion of the sap along the vessels, resulting from the operation of endosmose, will explain the descent of the cambium, which, being the nutritious portion of the vegetable fluids, corresponds in its nature to the chyle in animals.

ROYAL SOCIETY OF EDINBURGH.

March 27, 1843.—“On the Growth and Migration of the Sea Trout of the Solway (*Salmo trutta*).” By Mr. John Shaw, Drumlanrig. Communicated by James Wilson, Esq., F.R.S.E.

The author has here pursued the same course of experimental inquiry regarding the Sea Trout as that formerly followed in relation to the salmon. Having obtained impregnated ova from a pair of spawning fish, he conveyed these ova to his experimental ponds. This was on the 1st of Nov. 1839, and the young were excluded from the egg in seventy-five days. They resembled salmon of the same age, but were somewhat smaller and paler. They took two years to grow about 7 inches, and the majority were then converted into smolts, but about one-fourth did not assume the silvery lustre, and this peculiarity, Mr. Shaw thinks, distinguishes a like proportion even in the rivers. He then experimented on the smolts in the natural streams, and found that after descending to the sea they returned as herlings (*Salmo albus* of Dr. Fleming) in July and August, with an addition to their weight of 7 or 8 ounces. These herlings spawn towards the end of the season of their first ascent, and after revisiting the sea they ascend the rivers again in the ensuing months of May and June, with an average weight of $2\frac{1}{2}$ lbs. This increase takes place almost entirely in the sea. After spawning for the second time, they descend for the third time to the sea, and make their appearance again in fresh water in the course of the ensuing summer, weighing 4 lbs. They are now in their fifth year, including the two seasons they had passed as fry, anterior to the assumption of the migratory dress and instinct. Descending seawards for the fourth time, they weigh about 6 lbs. when next seen in the rivers in the course of their sixth summer. These at least were the progressive changes and rates of increase observed by Mr. Shaw in specimens distinctly marked, and carefully noted when retaken successively from year to year. The peculiar marks imposed each season are detailed in his paper, and the whole subject is illustrated by an extensive series of specimens from the day of hatching to the middle of the sixth year. These specimens are now in the Society's museum.

April 17.—Professor Connell read a paper on the Presence of Organic Matter in the purest Water from Terrestrial Sources.

Sir John MacNeill then read a Biographical Sketch of the late Sir Charles Bell, K.H.

Dr. Douglass Maclagan read a notice regarding the Bebeeru Tree of British Guiana. Of this last paper we present a brief sketch. The plant bearing the above Indian name, and also called Siperi by the Dutch colonists, furnishes the hard and heavy timber known by the name of Greenheart. The object of the present paper was to

state the result of experiments made by the author on the bark and seeds of the tree, which had been found by Mr. Rodie, late surgeon R.N., to contain a vegetable alkali possessed of the power of checking intermittent fevers. Dr. Maclagan stated that the tree was unknown to botanists. Sir William Hooker and Dr. Lindley had seen the fruit and declared it to be lauraceous, but the author had been unable to find in Nees v. Esenbeck's 'Systema Laurinarum' any genus or even suborder of lauraceous plants to which he could refer it. With regard to its chemical qualities, Dr. Maclagan stated that he had obtained both from the bark and seeds two distinct alkalies, both uncrystallizable; to one of which he applied Mr. Rodie's name Bebeerine; to the other he gave the name of Sipeerine. They could be separated by anhydrous æther, the bebeerine being soluble in that menstruum, whilst the sipeerine was not. Dr. Maclagan had likewise obtained, especially from the seeds, a peculiar crystallizable and deliquescent acid, which he called bebeeric acid, and which seemed to be distinct from every vegetable acid hitherto described.

The author stated that he had instituted experiments with a view to ascertain if a soluble salt of the alkalies could be procured which might be used as a substitute for sulphate of quinine when dear. He stated as the results of his trials that the produce did not amount to more than one and a half of sulphate per cent. from the bark; but he still calculated that if the bark could be got at a moderate price, the salt of the alkalies might be prepared at a cost inferior to that of sulphate of quinine. Dr. Maclagan stated that the bark appeared to be better suited for the purposes of manufacture than the seeds. The author mentioned that sulphate prepared under his directions had been sent out to Demerara, and had been tried there with marked success in intermittent fever by Dr. Watt. He had likewise used it with success in a few cases of ague in Edinburgh, and also in periodic headache, so that he had no doubt of its possessing considerable power as an antiperiodic remedy. Lastly, he mentioned that a secret preparation, sold under the name of Warburg's Fever Drops, reputed a good antiperiodic, appeared to him to be a tincture of bebeeru seeds.

ZOOLOGICAL SOCIETY.

May 10, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Gould exhibited and pointed out the characters of two new species of Kangaroo. The first of these belongs to the section to which Mr. Gray gave the name *Petrogale*, as was described under the name

PETROGALE CONCINNA. *Pet. corpore suprâ rufescente fusco alboque irrorato, ad latera flavescente, subtùs albo; caudâ dimidio apicali pilis longis vestitâ, his flavescenti-albis ad apicem nigris; pedibus pallidè fuscis, pilis sordidè albis crebrè interspersis; auribus mediocribus ad apicem paulo attenuatis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin.	14	0
———— caudæ	8	0

	unc. lin.
<i>Longitudo tarsi digitorumque</i>	3 9
———— <i>auribus</i>	1 4
———— ab apice rostri ad basin auris	2 11

Hab. North-west coast of Australia.

This species of *Petrogale* is remarkable for its small size, the general pale colouring and the bright rusty tint of the upper parts of the body; these parts are freely pencilled with whitish and with brown; the sides of the neck and body are of a delicate yellowish hue, or might be described as very pale rust, and this is the prevailing hue of the head, which is nearly of a uniform tint; but is white, or nearly so, on the sides of the muzzle at the tip, and there is a trace of the usual white mark on the cheeks; above the eye is a spot of a pale rust-colour, and an indistinct brownish mark running towards the nostrils from the front of the eye; the ears are clothed within with white hair; externally they are of the same palish rusty yellowish hue as the upper surface of the head; the chin, throat and whole under parts are white, with a faint yellowish rusty tint; the outer side of the hinder legs is of a brighter tint than the sides of the body, but less red than the back; the feet are of a very pale brownish colour, freely pencilled with dirty white; a small space at the base of the tail is covered with fur of the same texture and colour as that of the body; beyond this the hairs of the tail are harsh, at first about half an inch or rather more in length, but becoming gradually longer towards the apex, where they are more than an inch long; these hairs are of a yellowish white colour, but the apical third of each hair is black. This species was brought to England by Lieut. Emery, of H.M.S. Beagle, and is now in the British Museum.

The second species belongs to the section or genus *Halmaturus*, and received from Mr. Gould the specific name *Binoë*, in honour of Benjamin Bynoe, Esq., to whom science is indebted for the discovery of many new and interesting objects in zoology. It is nearly allied to *Halm. agilis*, but in size is about equal to *Halm. Thetis*. The fur is harsh and adpressed, and for the most part of a very pale brownish yellow tint; the back, however, is freely pencilled with black, the longer hairs having the exposed portion of this colour; a slight brownish grey hue is observable next the skin in the hairs of the back, but they are nearly uniform throughout their length, if we except a small black point to the shorter hairs, and the exposed black portion of the longer hairs; the sides of the body and the limbs are of a paler hue, and are not pencilled with black; the abdomen may be described as of a dirty yellowish white colour; the tail is very nearly uniform in tint with the body, but a small portion at the apex is covered with brownish black hairs; the upper surface of the head is slightly tinted with brownish, and a mark of this colour runs from the eye to the tip of the snout on either side; adjoining this mark below is a pale mark; the ears have yellowish white hairs on the inner side, and rusty yellow hairs on the outer side; but along the anterior margin, and at the tip externally, the ears are black. The principal characters may be thus expressed:—

HALMATURUS BINOË. *Halm. corpore pallidè fuscescenti-flavo, suprâ nigro penicillato, subtùs dilutiore; caudâ ad apicem fuscescenti-nigrâ; auribus externè ad apicem, margineque anticè, nigris.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin.	21	0
————— ad basin auris	4	6
————— <i>caudæ</i>	20	0
————— <i>tarsi digitorumque</i>	7	9
————— <i>auribus</i>	2	3

Hab. Port Essington.

The following paper, by Mr. Lovell Reeve, entitled "Monograph of the genus *Tornatella*, a small group of Pectinibranchiate Mollusks of the family *Plicacea*, including descriptions of seven new species, from the collection of H. Cuming, Esq.," was then read.

TORNATELLA, Lamarck.

Testa ovalis, cylindracea, plerumque transversim striata, rarò lævis-sima, spirâ brevi, apice acuto; aperturâ longitudinali, supernè angustatâ, infernè integrâ, rotundatâ; columellâ incrassatâ, valdè plicatâ; labro simplici, solido, acuto. Molluscum marinum, pectinibranchiatum, operculo corneo, minuto, instructum.

The very wide range of characters which were selected by Linnæus for the determination of genera induced many inaccuracies in his method of classification which might certainly have been avoided, if, instead of generalizing upon the external variations of the shell, he had pursued a more searching inquiry, like his contemporaries Adanson and Forskael, into the nature of its animal inhabitant. His genus *Voluta*, for example, founded upon the character of the columella being obliquely plaited, included both phytophagous and zoophagous mollusks, animals both with and without proboscis, and respiratory siphon. The presence or absence of these organs, distinguishing the plant-eating from the flesh-eating mollusks, is however still indicated to a certain extent in the shell, by the basal formation of the aperture; and Bruguière, the conchologist of the 'Encyclopédie Méthodique,' appears to have sagaciously detected the difference between the shells of the true *Volutæ* and those which were subsequently selected by Lamarck for the formation of this genus; the base of the aperture being sinuated or canaliculated in the one, and entire in the other. But the alteration proposed by Bruguière was little or no improvement upon the arrangement of Linnæus; for in removing the *Tornatellæ* to his genus *Bulimus*, they became associated with a miscellaneous assemblage of mollusks, differing most essentially both in their organization and habits. They were then distinguished by Lamarck by the above generic title; whilst De Blainville included them, together with some air-breathing mollusks, in a new genus under the name of *Pedipes*. The arrangement followed by the learned author of the 'Manuel de Malacologie' was thus scarcely better than that of his predecessor Bruguière; he, however, cautiously abandoned it, when the propriety of Lamarck's distribution of the *Tornatellæ* was subsequently confirmed by Gray in the discovery of their being operculated.

Of the following thirteen species referred to this genus, seven are entirely new; five were collected by H. Cuming, Esq. in the Philippine Islands, one by Dr. Rüppell on the shores of the Red Sea, and one by Dr. Siebald on the coast of Japan.

1. *TORNATELLA FLAMMEA*. Lamarck, Anim. sans vert., vol. vi. part 2. p. 219; Lister, Synop. Conch., pl. 814. f. 24; Sowerby, Genera of Shells, No. 24. f. 1; Kiener, Iconographie des Coquilles, pl. 1. f. 1. Reeve, Conch. Syst., vol. ii. pl. 206. f. 4.

Auricula flammis lateritiis, Martini.

Voluta flammea, Gmelin.

Bulimus variegatus, Bruguière.

Hab. ad insulam Java.

This shell, which is distinctly figured both by Lister and Martini, is marked with a number of flesh-coloured stripes, running in a longitudinal direction from the spire.

Var. *a.* *Strigis rubris in maculis semilunaribus apertè divisis*.

Reeve, Conch. Syst., vol. ii. pl. 206. f. 6.

Hab. ad insulam Ticao, Philippinarum.

A beautiful variety, in which the longitudinal flesh-coloured stripes are divided into distinct patches, of the form of a crescent. Found by Mr. Cuming at the island of Ticao, in sandy mud at seven fathoms' depth.

Var. *β.* *Testá minore, maculis semilunaribus frequentioribus, indistinctis*.

Reeve, Conch. Syst., vol. ii. pl. 206. f. 1.

Hab. ad insulam Corrigidor, Philippinarum.

This variety is constantly smaller and of deeper colour; the crescent-shaped spots are thicker, and run so indistinctly the one into the other as often to be completely clouded over.

2. *TORNATELLA SOLIDULA*. Lamarck, Anim. sans vert., vol. vi. part 2. p. 220; Chemnitz, Conch., vol. x. pl. 149. f. 1405; Kiener, Iconographie des Coquilles, pl. 1. f. 2. Reeve, Conch. Syst., vol. ii. pl. 206. f. 7.

Voluta solidula, Linnæus.

Bulimus solidulus, Bruguière.

Hab. ad insulas Philippinarum, &c.

Several varieties of this shell, varying in colour from a bluish grey to a reddish brown, were found by Mr. Cuming amongst the Philippine Islands, in sandy mud at different depths, from 7 to 25 fathoms; they are, however, by no means confined to this locality.

3. *TORNATELLA COCCINATA*. *Torn. testá cylindraceo-ovatá, transversim striatá, albá, maculis coccineis minutis profusè ornatá; epidermide luted, leviter indutá; spirá depresso-conicá, suturis profundis, apice præcipuè exserto, acutissimo; columellá buplicatá, plicá maximá bilobá.*

Reeve, Conch. Syst., vol. ii. pl. 206. f. 10.

Hab. ad insulam Mindanao, Philippinarum.

This beautiful shell is very distinct from any variety of the preceding; the spire, which is remarkably sharp-pointed at the apex, is somewhat depressed and rounded; and the shell altogether is covered

with a number of small bright scarlet spots. It was found by Mr. Cuming at the island of Mindanao in sandy mud at the depth of twenty-five fathoms.

4. *TORNATELLA GLABRA*. *Torn. testá ovatá, transversim striatá, albá, nitidiusculá, maculis leucophæis variè denigratá; spirá subelátá, apice acuto; columellá buplicatá, plicá maximá víx bilobá.*

Reeve, Conch. Syst., vol. ii. pl. 206. f. 12.

Hab. ad insulam Negros, Philippinarum.

Mr. Cuming collected several of this species at the island of Negros. The shell is by no means a new one, but it has been hitherto confounded with the *Tornatella solidula*, probably in consequence of its resemblance in colour. It differs in form, and besides being more highly polished, is stamped with a certain peculiarity of character by which it cannot fail to be recognised.

5. *TORNATELLA TESSELLATA*. *Torn. testá oblongo-ovatá, albá, transversim striatá, striis plus minusve approximatis, interstitiis maculis helvinis tessellatis; spirá elatá, apice præcipuè acuto; columellá buplicatá, plicá maximá parùm bilobá.*

Reeve, Conch. Syst., vol. ii. pl. 206. f. 3.

Hab. In sinum Persicum.

This elegant little shell was found by Dr. Rüppell at the Red Sea, on the sands at low water. It is finely striated in a transverse direction, and the interstices are neatly tessellated with numerous pale flesh-coloured square spots.

6. *TORNATELLA FASCIATA*. Lamarck, Anim. sans vert., vol. vi. part 2. p. 220; Martini, Conch., vol. ii. pl. 43. f. 442 and 443; Encyclopédie Méthodique, pl. 452. f. 3. *a, b*; Kiener, Iconographie des Coquilles, pl. 1. f. 3; Reeve, Conch. Syst., vol. ii. pl. 206. f. 11.

Voluta tornatilis, Linnæus.

Auricula bifasciata, Martini.

Bulimus tornatilis, Bruguière.

Hab. ad oras Devonix, Insulæ Britannicæ.

Several of this well-known species have been recently dredged up from sandy mud at the depth of five fathoms, off the coast of Devonshire.

7. *TORNATELLA SIEBALDII*. *Torn. testá ovato-conicá, transversim striatá, rubicundulá, irregulariter dibaphá, spirá elatá, suturis albis, apice acuto; columellá uniplicatá, aperturá ovatá, labro tenui, acuto.*

Hab. ad oras Japonix.

This shell, which was brought by Dr. Siebald from Japan, is irregularly stained with a ruddy brown, exhibiting the appearance of having been dyed in two distinct colours; the sutures of the spire are perfectly white, and so is also the columella.

8. *TORNATELLA BULLATA*. Kiener, Iconographie des Coquilles, pl. 1. f. 4; Lister, Synops. Conch., pl. 714.

Hab. Indian Seas.

A small cylindrical bulla-shaped shell, which we have not included in this monograph without considerable hesitation.

9. *TORNATELLA NITIDULA*. Lamarck, Anim. sans vert., vol. vi. part 2. p. 221; Encyclopédie Méthodique, pl. 452. f. 2. *a, b*; Sowerby, Genera of Shells, No. 24. f. 2; Kiener, Iconographie des Coquilles, pl. 1. f. 5; Reeve, Conch. Syst., vol. ii. pl. 206. f. 5.

Hab. ad insulam Bohol, Philippinarum, &c.

Some specimens of this shell, found by Mr. Cuming at the island of Bohol, in sandy mud at eleven fathoms' depth, are smaller and more cylindrical than those hitherto known.

10. *TORNATELLA VIRGATA*. *Torn. testá rotundato-ovatá, subcylindraceá, albá, transversim bellè striatá, longitudinaliter strigis latis, nigerrimis, sinuosis, subdistantibus, vivide ornatá; spirá brevi, suturis distinctis, apice subobtusó; columellá uniplicatá.*

Reeve, Conch. Syst., vol. ii. pl. 206. f. 8 and 9.

Hab. ad insulam Masbate, Philippinarum.

This is a beautiful shell, and very distinct from any other species; it is of a pure transparent white, ornamented with a regular series of broad dark black stripes running down from the spire. Found by Mr. Cuming at the island of Masbate, in sandy mud at the depth of seven fathoms.

11. *TORNATELLA VENUSTA*. D'Orbigny, Voyage dans l'Amérique Méridionale, Mollusques, p. 399. pl. 56. f. 4 to 6.

Hab. ad Peruviam, propè ad Paytam.

A small fusiform shell, highly deserving of the title by which D'Orbigny has distinguished it.

12. *TORNATELLA INSCULPTA*. *Torn. testá parvâ, ovatâ, sulcis parallelis numerosis transversè insculptâ; spirá indistinctâ, apice acuto; maculis subaquilis ubiquè pictâ; columellâ biplicatâ, plicâ maximâ præcipuè bilobâ.*

Reeve, Conch. Syst., vol. ii. pl. 206. f. 2.

Hab. ad insulam Masbate, Philippinarum.

It is to be regretted that Mr. Cuming did not succeed in obtaining live specimens of this very characteristic shell, of which he found two only, lying dead upon the sands at the island of Masbate. The spire is rather prominent, but still so indistinct as scarcely to exhibit the volution of the whorls; the shell is then neatly sculptured from the apex to the base with transverse lines running exactly parallel with each other, and the whole surface is painted with light brown spots.

13. *TORNATELLA ORYZA*. *Torn. testá minutâ, oblongo-ovatâ, eburned, nitidâ, transversim sulcatâ, sulcis plus minusve approximatis; spirâ regulari, apice subacuto; columellâ uniplicatâ; aperturâ ovatâ, supernè attenuatâ; labro simplici, solido, acuto.*

Hab. ad insulam Cabbalonga, Philippinarum.

A small species, unlike any hitherto described; it is perfectly white (a fine ivory white), and deeply sulcated from top to bottom.

In concluding this monograph, it may be as well to state that the *Tornatellæ auricula* and *pedipes* of Lamarck should be referred to the genus *Auricula*. The *Tornatellæ* are strictly marine, dwelling in several fathoms' water; whilst the species just alluded to are inland, and amphibious, inhabiting swamps and marshy places.

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

The following paper, by George Gulliver, Esq., F.R.S., entitled "Observations on the Muscular Fibres of the Œsophagus and Heart in some of the Vertebrate Animals," was read.

The present communication is a continuation of the observations on the muscular fibres of the œsophagus and heart published in the 'Annals Nat. Hist.' vol. v. p. 349.

The author applies the term voluntary to the striated muscular fascicles—extending along the entire length of the gullet, and even on the commencement of the cardiac extremity of the stomach in several animals, along more or less only of the tube in man and some other mammals, and wholly absent from it in many of the lower Vertebrata—because this fibre has all the anatomical characters of the muscular fibre of animal life, which no completely involuntary muscle has hitherto been found to possess. "If we are to judge of the office of the fibre in question from its structure, it must be concluded that in many Vertebrata the whole length of the gullet is capable of voluntary motion, in some the lower or posterior portion is not obedient to the will, while in others the motions of the entire gullet must be quite involuntary.

"That the muscular coat of the gullet should differ in animals of different orders will not appear surprising; but it was hardly to be supposed that a difference in the œsophageal sheath would be found in some genera of the same order. Yet such is the fact in the Feræ; and it is probable that further research into the anatomy of this order will disclose more differences in their minute structure, especially as my observations on the blood have shown that there is a remarkable diversity in the size of the blood-corpuscles or red particles of some of the subdivisions of the Carnivora*.

"Perhaps the extent of the muscular coat of the gullet may vary in the same subject at different periods of life. In young and middle-aged mares and geldings some of the muscular fibre of animal life may be generally traced on the gullet four or five inches from the stomach; but in a gelding twenty-five years old this fibre could not be found on the last ten inches of the gullet; and in an aged rabbit I found the striated muscular fascicles but sparingly on the last inch of the gullet, although in this animal generally they are most abundant in this situation.

"A summary of my inquiry concerning the extent of the voluntary muscular fibre on the gullet is subjoined. Some of the results may be modified by more facts, which are yet required to furnish a satisfactory view of the subject. I have had no opportunity of becoming acquainted with the researches of M. Ficinus and M. Valentin, referred to by Dr. Baly in his translation of Professor Müller's 'Physiology,' vol. ii. p. 851.

QUADRUMANA.

In this order, as in the human subject, the muscular fibre of animal life does not invest the lowest portion of the gullet.

* See Ann. Nat. Hist. vol. vii. p. 577; vol. viii. p. 533; and Appendix to Gerber's General Anatomy, p. 6-7.

CHEIROPTERA.

In the pipistrelle, the sheath of the gullet, excepting 1-16th of an inch at the stomachic end, was formed of the muscular fibre of animal life.

FERÆ.

Insectivora.—In the three British genera the muscular fibre of animal life covers the whole length of the gullet.

Canidæ.—The muscular fibre of animal life extends to the stomachic end of the gullet. In the silvery fox none of this fibre could indeed be detected on the terminal third of an inch of the gullet, which should be examined again in another individual.

Viverridæ.—In the African civet cat the striated muscular fascicles do not cover the last portion of the gullet.

Felidæ.—The stomachic end of the gullet is not clothed with the muscular fibre of animal life; but in the caracal a few irregular fibres were observed on the cardiac end of the gullet, perhaps belonging to the muscular fibre of animal life, although they were quite destitute either of transverse or longitudinal streaks.

Mustelidæ.—In the otter the muscular fibre of animal life covers the gullet, excepting about half an inch of its stomachic extremity; in three species of *Mustela* this fibre invests the whole gullet.

Phocidæ.—In the seal no muscular fibre of animal life was found on the gullet within an inch of the stomach.

Ursidæ.—In the genus *Nasua*, and in the sloth-bear and American bear, the gullet is throughout clothed with the muscular fibre of animal life, which in the latter animals is very thick and red on the last portion of the gullet, and extends on the cardiac extremity of the stomach.

CETACEA.

In a porpoise no muscular fibre of animal life could be found on four inches of the stomachic end of the gullet, although this fibre was abundant on the rest of the thoracic portion of the gullet.

RUMINANTIA.

The voluntary muscular fibre runs along the entire length of the gullet, and sometimes to a short distance on the cardiac extremity of the stomach. The striated muscular fibre on the last portion of the gullet is often mixed with a much greater proportion of the muscular fibre of organic life.

RODENTIA.

The whole length of the gullet is clothed with the muscular fibre of animal life.

MARSUPIALIA.

In the kangaroo and the squirrel-flying opossum no muscular fibre of animal life was found on the stomachic end of the gullet.

BIRDS, REPTILES, AND FISHES.

I have carefully searched for the striated muscular fascicles in the gullet of the birds and reptiles mentioned in the table, but in vain. In Birds the fibre of the superficial coat of the gullet is often

disposed transversely, in which respect it may be seen with the naked eye to differ from the œsophageal muscular sheath of mammals. In a few fishes the striated muscular fascicles invested the entire length of the gullet, and extended some distance on the stomach in others, as in the pike and bull-head. In the barbel some of these fascicles were found on the gullet or termination of the pharynx opposite to the posterior border of the gill-cover. In Fishes the striated muscular fasciculi of the gullet appear, from the measurements now given, to be much smaller than the fasciculi of the muscles of the body; and a like difference, though to a much smaller degree, often exists in mammals.

“ In the heart of the smaller species of the lower Vertebrata distinct muscular fibres are often not to be found, the structure being less distinct than in the heart of many mammals; generally composed of bands or fillets not easily separable from each other, and commonly about $\frac{1}{3000}$ th of an inch broad. These fillets are seldom clearly streaked transversely; they are irregularly and most minutely granulated, without the longitudinal arrangement of the granules so plainly visible in the beaded primitive fibrils of the heart of Mammalia. In short, the known points of resemblance between the muscular fibre of the heart of mammals and that of voluntary muscle are generally wanting in the structure of the heart of the smaller species of the lower Vertebrata, for the latter is more nearly allied to the muscular tissue of organic life as it exists in other parts.

“ In some of the voluntary muscles of many of the smaller Mammalia and Birds, as the common mouse and *Fringillidæ*, the existence of a sheath around the fibres appears to be questionable; and in the heart of such animals the fibres are remarkably indistinct. In the common water-vole I noticed a very clear appearance of primitive fibrils, yet these seemed to be nowhere collected into fascicles. In the great pectoral muscle of various small birds, as the common swift, the transverse streaks are very indistinct, and often difficult to be seen, although they are very plain in the muscles of the leg; yet in this bird the former muscle is highly developed, and almost constantly in action, while the latter are but small and little used. It will be recollected that the above remarks apply only to particular muscles, and are not to be considered as at all invalidating the admirable demonstration of the sarcolemma in many muscles by Prof. Schwann and Mr. Bowman, and the parallel observations of Dr. Jones Quain and Mr. W. J. E. Wilson*. As before observed, the fibres of the heart of Mammalia seem to have no intervening cellular (filamentous) tissue; this tissue, however, is easily observed in the heart of many lower vertebrate animals; and I have very recently seen minute wavy filaments, having all the characters of cellular tissue, in the heart of the bear, and of some other mammals which had died in confinement.”

The term fibre, as used in this paper, corresponds to the primitive fasciculus of Fontana, Müller, and Bowman†. As in the heart there

* See Phil. Trans. part ii. 1810, p. 475.

† *Loc. cit.* p. 458.

is often a tolerably clear appearance of fascicles, and as frequently only of the fillet-like bands, both are set down in the table annexed to the author's paper as fibres: the larger size of the fascicles at once distinguishes them from the bands, the primitive fibrils of the muscular tissue being out of the question. In the snake and newt the bands composed the tissue of the auricles, while a collection of these bands into fascicles appeared and was measured in the ventricles; the measurements show many parallel instances, and one in which the fascicles appeared in the auricle and the bands in the ventricle.

Mr. Gould exhibited to the Meeting an extensive collection of Australian *Halcyonidæ*, and characterized two new species belonging to this family as follows:—

HALCYON PLATYROSTRIS. *Halc. capite, dorsoque ex æruginè viridibus; alis caudâque virescenti-cæruleis; guld pallidè luteolâ, hoc colore gradatim apud nucham et partes corporis inferiores in ceruinum, vel arenaceo-luteolum transeunte.*

Spot before the eye buff; head and back verditer green; wings and tail greenish blue; throat very pale buff, gradually passing into the rich sandy buff of the back of the neck and the whole of the under surface; bill black; the base of the under surface of the lower mandible flesh-white.

Total length, $7\frac{1}{4}$ inches; bill, $1\frac{3}{4}$; wing, $3\frac{1}{4}$; tail, $2\frac{1}{2}$; tarsi, $\frac{1}{2}$.

Hab. Navigators' Islands.

For the knowledge of this new species Mr. Gould is indebted to the kindness of Mr. Cunningham, who collected it, and to Mr. Bennett, at Sydney, at whose suggestion Mr. Cunningham presented it, with some other interesting birds, to Mr. Gould, for the advancement of zoological science.

HALCYON SORDIDUS. *Halc. capite, dorso, plumis scapularibus tetricibusque alarum fusciscenti-virescentibus, alis virescenti-cæruleis, tertiariis ad apicem viridi-tinctis; caudâ virescenti-cæruleâ; torque collari, corporeque inferiore pallidè luteolis.*

Hab. North coast of Australia.

Head, back, scapularies and wing-coverts brownish oil-green; wings greenish blue, gradually changing into green on the tips of the tertiaries; collar surrounding the back of the neck and all the under surface buffy white; tail greenish blue; upper mandible and tip of the lower one black; base of the latter flesh-white.

Total length, 9 inches; bill, $2\frac{1}{4}$; wing, $4\frac{1}{4}$; tail, 3; tarsi, $\frac{5}{8}$.

From the collection of Benjamin Bynoe, Esq.

June 28.—William Yarrell, Esq., Vice-President, in the Chair.

A Monograph on the Coleopterous family *Phyllophoridae*, by the Rev. F. W. Hope, was read. Following are the characters of the new species and genera contained in this paper.

Family PHYLLOPHORIDÆ, Hope.

Genus *Phyllophorus*, Hope.

Fœmina antennis filiformibus 11-articulatis, articulo 1^{mo} magno, ex-

ternè crassiore, duobus proximis brevibus, 7 sequentibus gradatim increscentibus et ferè trigonis, ultimo autem ovale, apice parum minori. *Palpi* haud securiformes. *Caput* impressum, maxillis obtusis unidentatis. *Thorax* lateribus carinatis, angulis posticis subspinosus, anticis subrotundatis. *Elytra* thorace quintuplo longiora, sulcata et rugosa, lateribus elevatis.

Phyllophorus gigas. *Elater gigas*, Fab., Syst. Eleut.

Genus *Tetralobus*, Serville.

Tetralobus flabellicornis. *Elater flabellicornis*, Fab.

Tetralobus cinereus, Gory, Ann. de la Soc. Ent. de France, tom. i. p. 220. pl. 4. fig. 1.

TETRALOBUS GORYI. *Tetr. Mas, fusco-cinereus, capite ferè quadrato, anticè subexcavato, angulis anterioribus rotundatis. Thorax marginatus, valdè convexus, ad scutellum elevatus, utrinque depressus, angulis posticis obliquè acutis. Elytra thorace triplo longiora, posticè rotundata, lineis elevatis parum distinctis, tomentosa. Corpus infrà piceo-cinereum, pectore pubescenti. Pedes tomentosi, femoribus compressis, tibiis subarcuatis, tarsisque flavo-membranaceis. Annuli abdominis utrinque foveolati. Long. corp. $18\frac{1}{2}$ lin.; lat. $5\frac{1}{2}$ lin.*

Hab. forsitan in Africâ.

Fœmina differt, long. 21 lin., lat. 6 lin.; antennis serratis, articulo ultimo tribus antecedentibus æquali, subacuto, abdomine multo convexiore.

A small variety of the above species exists in the rich cabinet of M. Dupont at Paris, and has been named by him *T. Sennarius*. It measures twenty lines in length, and differs also in the colour of its pubescence.

TETRALOBUS DUPONTI. *Tetr. nigro-cinereus, capite ferè quadrato, anticè excavato, tomentoso, angulis anticis rotundatis. Thorax convexus, subtilissime punctulatus haud foveis binis in medio impressus. Elytra thorace triplo longiora, ad suturam subacuminata, lineis vix distinctis. Corpus infrà piceum, tomentosum, binis ultimis annulis foveis, utrinque fortiter impressis. Pedes, femoribus, tibiisque compressis. Long. corp. 28 lin.; lat. 9 lin.*

In Musæo Dom. Dupont.

It is probable that the above species is from Africa. It was received by M. Dupont (in whose honour it is named) from a foreign traveller, who is lately dead. No locality is mentioned. The antennæ are imperfect.

TETRALOBUS SAVAGEI. *Tetr. totum corpus suprâ fusco-brunneum, aurantiisque capillis obsitum. Caput ferè quadratum angulis anticis rotundatis, anticè excavatum. Thorax convexus, angulis posticis acutis. Elytra thorace duplo longiora, auratâque pubescentiâ tecta. Corpus infrâ abdomine piceo, pectore aurantiisque capillis longis obsito, femoribus tibiisque piceis tarsisque infrâ auricomatis. Long. corp. 13 lin.; lat. 4 lin.*

The above species I have much satisfaction in naming after an American clergyman, the Rev. T. S. Savage. His zeal in the col-

lecting of insects in Western Africa has tended to add greatly to our stock of information regarding the entomology of those countries. Respecting the Goliath Beetles, he has in store for us many important observations, having collected them in the bush: his remarks on them may shortly be expected to arrive in this country.

Tetralobus Australasiæ. Gory, Ann. de la Soc. Ent. de France.

TETRALOBUS FORTNUMI. *Tetr. totum corpus fuscum, auratâ pubescentid tectum, antennisque pedibus ferrugineis, elytris que suturâ acuminatis. Caput vix emarginatum punctatum, fronte foveâ anticè impressâ. Antennæ ferrugineæ. Fasciculus antennarum e lamellis novem rubro-ferrugineis. Thorax angulis anticis lateralibus, porrectis rotundatis; posticis acutis, disco varioloso-punctato, lined que longitudinali parum impressâ. Scutellum posticè rotundatum. Elytra striato-punctata, striis punctis fortiter impressis, internè acuminata, externè que rotundata. Corpus infrâ atro-piceum aureo tomentosum, capillis pectoris longioribus. Pedes ferruginei, tarsis subtis pallidioribus et excavatis.* Long. corp. 12 lin.; lat. 3 lin.

The above insect was lately sent to this country by Mr. Fortnum, from the new settlement of Adelaide, and although closely allied to *T. Australasiæ* of Gory, is yet distinct; it is the smallest species that has fallen under my notice, and has been named in honour of the above assiduous collector.

TETRALOBUS PARRYI. *Tetr. niger, capite ferè quadrato, antrorsum foveolato, angulis anticis parum rotundatis. Oculis flavis. Thorax latus punctulatus. Elytra thorace triplo longiora, depressa, striata, striis valdè distinctis. Corpus infrâ nigrum, segmentis abdominis utrinque foveolatis, pedibus piceis, antennis ferrugineis.* Long. corp. 18 lin.; lat. $6\frac{1}{4}$ lin.

Hab. in Nubiâ. In Musæo Dom. Parry.

Captain Frederick Parry lately received this species in a box with other Nubian insects. It is of a remarkably depressed form, approaching somewhat in this respect to *Tetralobus Goryi*, which latter insect, however, is certainly much more convex, and differs from it also in various other minor points.

TETRALOBUS MANGLESII. *Fæm. fusco-picea, antennis articulo primo concolore, reliquis ferrugineis. Caput ferè quadratum, punctatum, oculis rubris et nitidis. Thorax valdè convexus, angulis anticis rotundatis, posticis acutis, lined longitudinali mediâ, foveâ utrinque compressâ insignitus. Elytra vix acuminata, striato-punctata. Corpus infrâ rubro-piceum, antennis tarsisque ferrugineis.* Long. corp. 17 lin.; lat. $4\frac{1}{4}$ lin.

Hab. in Novâ Hollandiâ.

The above insect was sent to me by Capt. Mangles, the Egyptian traveller, in whose honour it is named. He received it from the vicinity of the Swan River.

Since the above was written, I have discovered the male in the collection of the Linnean Society, and the following is a concise description of it:—

Fusco-piceus, articulo primo nigricanti, reliquis ferrugineo flabellatis.

Caput ferè quadratum, vix emarginatum. *Thorax* convexus, marginibus lateralibus subcarinatus. *Scutellum* valdè depressum. *Elytra* acuminata, substriato-punctata et sparsim punctulata. *Corpus* infrà fusco-piceum, pectore auratà pubescentiâ tecto, pedibus ferrugineis et auricomatis.

TETRALOBUS AURICOMUS. *Tetr. aureo-tomentosus, antennis flabellatis nigris, thorace posticè producto, elytris thorace triplo longioribus, auricomatis, apicibus rotundatis. Corpus infrà aureo-tomentosum, pedibus concoloribus. Caput anticè rotundatum, fronte subfoveolatà. Antennæ articulo 1^{mo} inæquali elongato subsecuriformi, 2^{do} et 3^{tio} minutis, reliquis trigono-ramosis, ultimo sublongo compresso, apice emarginato. Thorax anticè rotundatus, convexus, in medio disci fovea utrinque impressà, angulisque posticis acutis. Elytra auricomata vix sublineata. Corpus infrà tomentosum, annulis abdominis utrinque subimpressis. Long. corp. 12 lin. ; lat. 3 $\frac{3}{4}$ lin.*

In Musæo Dom. Guerin.

Hab. in Africâ.

Since the above description was written a more exact locality has been given me.

Hab. "Le fort de Sedou, au bord de la rivière Casamance, découvert par M. le Capitaine Mion."

TETRALOBUS ROBUSTUS. *Fæm. flavo-fusca, antennis valdè compressis. Caput anticè excavatum, flavisque capillis obsitum. Thorax convexus, angulis anticis rotundatis, posticis acutis. Elytra striata, ad apicem dehiscentia, subacuta. Corpus infrà flavofuscum, pectore aurato tomento obsito pedibusque concoloribus.*

From the remarkable compressed antennæ I am inclined to consider this insect, which was received from the island of Madagascar, as the type of a distinct genus. The following characters may be deemed sufficient to mark its peculiarities, which are chiefly taken from the antennæ, and hence it has been named

*Piezophyllus**.

Caput rotundatum, *antennis* valdè compressis, undecim articulatis, articulo 1^{mo} crasso, 2^{do} brevi, octo sequentibus gradatim decrescentibus, ultimo apice acuto. *Thorax* angulis anticis rotundatis, posticis acutis. *Elytra* subacuminata e suturâ dehiscentia lateribus medio subsinuatis. *Pedes* robusti, *tibiis* subincurvis.

Other peculiarities might be mentioned ; but as it is well-figured, however, its other characters may easily be distinguished.

PIEZOPHYLLUS SHUCKHARDI. *Tetr. atro-piceus, capite ferè quadrato, anticè parum excavato, angulis anticis subobliquè truncatis antennisque ferrugineis. Antennæ articulo 1^{mo} ferè trigono, crasso, 2^{do} 3^{tio} brevibus, 7 sequentibus lamelligeris; antennis capite thoraceque æqualibus. Thorax valdè convexus, lateribus carinulâ insignitis, angulisque posticis subacutis. Elytra sulcata. Corpus infrà atro-piceum, pectore hirsuto, flavisque capillis longis obsito.*

* *Piezophyllus*, from $\pi\acute{\iota}\epsilon\zeta\omega$ *premo*, and $\phi\acute{\upsilon}\lambda\lambda\omicron\nu$ *folium*.

Pedes picei, auricomi, femoribus tibiisque subcompressis. Long. corp. 24 lin. ; lat. 7 lin. ♀ Long. corp. 21 lin. ; lat. 7 lin.

I am indebted to Mr. Shuckhard for the above insect, and the species is most probably the *Tetralobus Dumolinii* of Dupont's cabinet. The antennæ and tarsi of this specimen were in too imperfect a state to describe.

PIEZOPHYLLUS SPENCEI. *Tetr. niger, antennis fusco-piceis, articulo primo nigricante. Caput ferè quadratum, anticè excavatum. Thorax robustus, valdè convexus, lineâ longitudinali impressâ foveâque utrinque insignitus et creberrimè punctulatus, angulis posticis ferè rectis et acutis, carinulâ abruptè interruptâ. Elytra ad apicem dehiscentia, subacuta. Corpus infrâ atrum, pectore auricomato pedibusque concoloribus.* Long. corp. 16 lin.

Hab. in agro Senegalensi.

This singular insect is described from the rich cabinet of Monsieur Dupont in Paris, and it appears to belong to the same subgenus as *Tetr. Shuckhardi*. The same insect I have seen before, and as it was named after Mr. Spence, the celebrated entomologist, I have retained that name.

Oxynteris mucronatus. Elater mucronatus, Olivier.*

Olivier suspects that this insect is the female figured by Voet (vid. Coleop. tab. 45. fig. 34.) ; it was originally described from the cabinet of the Prince of Orange, and certainly differs from the *Flabellicornis* of Drury, which Olivier seems to doubt. The following short Latin characters separate it at once from *Tetralobus*.

Genus *Oxynteris*, Hope.

Caput anticè submarginatum, antennis ♂ apicibus flabellatis elytrisque in utroque sexu acuminatis. Thorax angulis anticis ferè rotundatis, posticis acutis. Elytra striata et mucronata, pedibus veluti in Tetralobo.

Each joint of all the tarsi is clothed beneath with a row of short golden-coloured plush, as in other species belonging to this genus.

OXYNTERIS AUDOUINI. *Oxyn., Mas, brunneo-cinereus, capite fortiter excavato, parum tomentoso. Thorax emarginatus, posticè subsinuatus, anticè aurantiis capillis obsitus, depressus. Scutellum rotundatum. Elytra brunneo-cinerea, parum tomentosa. Corpus infrâ nigro-cinereum. Pedes concolores, femoribus tibiisque compressis, tarsisque piceis.* Long. corp. 62 lin. ; lat. 23 lin.

The above species was described by me, during my late residence in Paris, from the collection at the Jardin des Plantes. It is named in remembrance of the late Professor Audouin, who succeeded to the entomological chair held by the celebrated Latreille. The locality was not stated ; I believe it, however, to be from the East Indies, although I cannot actually specify its real locality. It seems to differ considerably from *mucronatus* of Olivier.

OXYNTERIS CUMINGII. *Oxyn. fusco-flavus, antennis ferrugineis.*

* From *δξύων* acuo, and *πτερόν* penna.

Caput clypeo rotundato atro, medio disci subsulcato. Thorax fuscus, marginibus elevatis, angulis anticis parum productis, posticis acutis et extùs divergentibus. Scutellum posticè rotundatum atrum. Elytra acuminata fusco-flava, tribus lineis parùm elevatis insignita. Corpus infrà atro-piceum, femoribus concoloribus. Mesosternum fortiter excavatum, cornu aprosterni ad medios pedes porrecto. Long. corp. 36 lin. ; lat. 11 lin.

Fœmina magnitudine differt, thorace etiam paullo latiore antennisque compressis.

The light castaneous appearance of the elytra of the above insect must in a great measure be attributed to abrasion : when recently captured it was remarkable no doubt for a golden pubescence above and beneath, which is a characteristic of other allied species. The above magnificent species is named in honour of Mr. Cuming the conchologist, whose important discoveries at Manilla in various branches of zoology entitle him to the thanks of the naturalists of England. It may be mentioned with regard to the above insects, that the joints of all the tarsi are clothed with a row of short golden-coloured plush ; the head and thorax are covered also with very short gray pile, and in the male the elytra are fulvous red, whilst in the female they are saturated on the disc with brown ; the latter sex is also a quarter of an inch larger than the male. It is also worthy of notice that the joints of the antennæ to which the leaflets are attached gradually increase after the third joint, the extreme being the most marked.

OXYNOPTERUS LATIPENNIS. Nigro-fuscus, antennis concoloribus, elytris acuminatis et piceis. Caput ferè quadratum, anticè excavatum rugoso-punctatum. Thorax latus, angulis anticis vix productis, posticis acutis, lateribus marginibus elevatis. Elytra atro-picea tomentosa, apicibus acutis. Corpus infrà nigrum, pedibus ferrugineis. Long. corp. 24 lin. ; lat. 8 lin.

Hab. in Africâ.

The above species was received by me in a box of insects from the Cape of Good Hope : for some time I was induced to regard it as an Asiatic species, but since I have lately received a species nearly similar in form from Sierra Leone, it may be an African insect. It is remarkably broad for a male ; the disc of the thorax also is slightly convex. A label attached to it has 'Gold Coast' written on it.

In Musæo Dom. Hope.

Fœmina adhuc latet.

OXYNOPTERUS JAVANUS. Oxyn. fusco-flavus et aureo-tomentosus, antennis ferrugineis. Caput atrum, antennis thorace ferè duplo longioribus. Thorax anticè emarginatus, angulis utrinque productis, posticis acutis et divergentibus. Elytra acuminata fusco-picea aurato-tomentosa. Corpus infrà nigrum, pedibus nigricantibus tomento suprâ aspersis, tarsisque auricomatis. Long. corp. 23 lin. ; lat. 7 lin. ♀ Long. corp. 28 lin. ; lat. 8½ lin.

Fœmina differt antennis compresso-serratis et fuscis.

Hab. in insulâ Javæ.

The above insects, male and female, were brought to this country by Dr. Horsfield from the island of Java; at first I was inclined to consider the species as the *mucronatus* of Olivier, but the figure in Voet is quite different. I have no hesitation in recording it as another species, and it may be remarked here that the above insects are in a good state of preservation, and that all the species of flabellate Elaters with pubescence should be described immediately they are captured, as when dead they change considerably in colouring, often turning black and greasy, so that it is impossible accurately to describe them as in their original state.

LEPTOPHYLLUS STRACHANI. *Lept. (Mas) piceus, capite anticè excavato antennis, capite cum thorace ferè duplo longioribus, elytrisque acuminatis. Caput ferè quadratum, anticè excavatum rugosum, antennæ thorace duplo longiores, lamellis elongatis et ferrugineis. Thorax undique marginibus elevatis conspicuis, angulis anticis parùm productis, obtusis, posticis acutis et extùs divergentibus. Elytra valdè acuminata marginata picea et aurato-tomentosa. Corpus infrà concolor, femoribus tibiisque compressis. Fœmina adhuc latet. Long. corp. 26 lin. ; lat. 7 lin.*

The above species was brought to this country by Mr. Strachan, long time a resident at Sierra Leone. His zeal in urging his friends to collect insects in that climate has been the means of considerably enriching our metropolitan collections, and to him chiefly we are indebted for our acquaintance with the Goliath beetles. I have named the insect above described in honour of this gentleman, who has exhibited such a remarkable zeal in favour of zoology. When his health declined in consequence of the bad climate, he yet made arrangements with his friends for enriching our collections at home. He returned to England, after resigning his laborious situation, broken in health but unsubdued in spirits, and hence we may hope that his health will shortly be re-established. The following characters appear to me sufficient to form into a subgenus, allied to *Oxyopterus*, the above insect which I have denominated *Leptophyllus*, from the long leaflets which compose the antennæ.

*Leptophyllus**, Hope.

Caput ferè quadratum, anticè emarginatum. Antennæ 11-articulatæ, 1^{mo} magno, 2^{do} subtrigono, octo sequentibus ferè æqualibus et lamellatis, undecimo triplo majori. Thorax angulis anticis rotundatis, posticis acutis, lateribus marginatis et carinatis. Elytra posticè acuminata, pedibus unguibus ferè æqualibus.

The anatomical sections of this genus are so fully figured by Mr. Westwood that there is no necessity for more ample details, as they may be detected on reference to the plate.

Pectocera†, Hope.

Caput fortiter emarginatum. Antennæ valdè pectinatæ, novem ulti-

* From λεπτός *tenuis*, and φύλλον *folium*.

† πεκτός or πηκτός *combed*, and κίρας *horn*, in short, comb-horned antennæ.

mis articulis, dentibus gradatim increscentibus, ultimis longissimis. *Thorax* anticè rotundatus, angulis posticis acutis. *Elytra* acuminata, pedibus simplicibus.

The remaining characters may easily be seen in the accompanying plate. It appears to me that the above genus is mediate between *Tetralobus* and *Ludius* and *Ctenicera*.

PECTOCERA CANTORI. *Pect. fusco-castanea, antennis valdè pectinatis brunneis. Thorax niger tomentoque aureo aspersus. Elytra fusco-castanea, apicibus acuminatis. Corpus infra pilosum, cinereis flavisque capillis obsitum. Segmenta abdominis utrinque brunneo-maculata, maculis glabris.* Long. corp. 10 lin.; lat. $2\frac{1}{4}$ lin.

Hab. in agro Assamensi.

The above insect I received from Dr. Cantor before he quitted England, and I have since received it from the Khasyah Hills: it is named in honour of the above zealous naturalist.

PECTOCERA MELLII. *Flavo-fusca griseoque variegata, antennis pectinatis. Thorax angulis posticis acutis, subtomentosus. Elytra posticè valdè acuminata, pedibusque fusco-flavis et pubescentibus.* Long. corp. $12\frac{1}{4}$ lin.; lat. 3 lin.

Hab. circa Semlaa in agris Thibetianis. E Musæo Dom. Melly descriptus.

Mr. Gould exhibited a new species of Hawk, belonging to the genus *Elanus*, which he thus characterizes:—

ELANUS SCRIPTUS. *Elan. fronte et lined superoculari albis; capite et corpore subtùs saturatè cinereis, rufescenti-fusco lavatis; tectricibus alarum fulgidè nigerrimis; parte aë interiori notà latà nigrâ, per humerum et antibrachium eductâ, instar literæ V (aut potiùs VV, utriusque aë paginâ interiori in conspectu,) impressâ.*

Forehead and line over the eye white; head and all the upper surface dark grey, washed with reddish brown; wing-coverts deep glossy black; primaries greyish brown, becoming nearly white on their webs, all but the first two or three margined with white at the tip; secondaries brownish grey on the outer web, white on the inner and at the extremity; tertiaries brownish grey; two centre tail-feathers grey; the remaining tail-feathers pale brown on their outer webs and white on the inner; lores black; all the under surface and edge of the shoulder white; on the under surface of the wing following the line of the bones a broad mark of black assuming the form of the letter V, or if both wings are seen at once, of a W; bill black; cere and legs yellow; claws black; irides orange.

Total length, $15\frac{3}{4}$ inches; bill, $1\frac{1}{4}$; wing, $12\frac{1}{4}$; tail, $7\frac{1}{4}$; tarsi, $1\frac{1}{2}$.

Hab. South Australia.

Mr. Gould next called attention to a collection of Birds from India, recently presented to the Society by Walter Ewer, Esq.

BOTANICAL SOCIETY OF LONDON.

Dec. 16, 1842.—Dr. William Hughes Willshire in the Chair.

Dr. John Lhotsky read a paper “On the Limits of Vegetation.”

Jan. 6, 1843.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

The Rev. W. H. Coleman presented a specimen of *Carex Boenhausiana* (Weihe) found by him in Herts.

Dr. John Lhotsky read a paper “On the Sugar of *Eucalyptus*.”

Jan. 20.—Adam Gerard, Esq., in the Chair.

Mr. Robert Embleton presented a specimen of *Maianthemum bifolium* (DeC.), *Convallaria bifolia* (Linn.), found by him at Howick in Northumberland.

A paper was read from Mr. William Gardiner, jun., being “Localities for the rarer Alpine *Hypna*.” The paper was accompanied by specimens.

Feb. 17.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Mr. T. Clarke, jun. presented specimens of a large variety of *Lastræa Filix mas*, found by him at King’s Cliff Valley near Bridgewater.

Mr. G. H. K. Thwaites read a paper, being a notice of the discovery of *Grimmia orbicularis*, a moss new to Britain, which was found by him upon St. Vincent’s Rocks, Bristol. The foliage is not distinguishable from that of *Grimmia pulvinata*; the capsule however is abundantly distinct, being globose instead of ovate, and having a conical instead of a rostrate operculum. Both species grow upon St. Vincent’s Rocks, and are sometimes intermingled, but each retains its peculiar characteristics, so that *Grimmia orbicularis* cannot be considered a variety of *G. pulvinata*. Specimens of the former species accompanied the paper.

Read also a paper from Mr. T. Beesley, being “Additions to the List of Plants found in the neighbourhood of Banbury, Oxfordshire, in 1842.”

March 17.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Mr. David Moore of the Royal Botanic Garden, Dublin, presented a specimen of *Carex paradoxa* (Willd.) found by him in Ladiston Woods, Mullingar, Westmeath, Ireland, in July last.

Mr. Arthur Henfrey (Curator) read a paper “On the British species of *Statice*.”

BOTANICAL SOCIETY OF EDINBURGH.

This Society met on the 9th of March (Dr. Neill in the Chair) when the following papers were read:—

1. “Remarks on the Mode of Growth of the British Fruticose *Rubi*, &c.” By Mr. Edwin Lees, F.L.S.

2. “Continuation of Remarks on the *Diatomacea*.” By Mr. John Ralfs, M.R.C.S.L., Penzance.

3. "On *Fumaria micrantha* and *F. calycina*." By Mr. C. C. Babington, M.A., F.L.S. &c.*

4. "On two new species of *Jungermanniæ*, and another new to Britain." By Thomas Taylor, M.D.: communicated by Mr. William Gourlie, jun., Glasgow.

5. "Notice of the new fossil plant, *Lyginodendron Landsburgii*, Gourlie." By Mr. William Gourlie, jun.

Mr. James Macnab exhibited a magnificent cluster of the male catkins of a palm from one of the South Sea Islands, which Lady Harvey had obtained from the captain of a vessel, and kindly allowed to be shown to the Society. Its dimensions, when expanded, were about three feet by three and a half, and it somewhat resembled an ornamental grate-screen formed of shavings.

April 13th.—Professor Graham in the Chair.

The attention of the Society was chiefly directed to a donation by William Brown, Esq., R.N., consisting of a miscellaneous collection of plants and fruits from Canton river and Chusan, and from the Cape and Prince's Island, including a collection of forty species of *Ericææ* from Simond's Bay and Table Mountain.

The following papers were read:—

1. "Two Botanical Visits to the Reeky Linn and Den of Airly, in April and June 1842." By Mr. William Gardiner, Dundee.

2. "On the *Diatomææ*." No. VI. By Mr. Ralfs, Penzance.

MISCELLANEOUS.

Note on a Vermiferous kind of Blood of a Dog, caused by a great number of Hæmatozoa of the genus Filaria. Communicated by MM. Gruby and Delafond to the French Academy of Sciences.

PHYSIOLOGISTS and anatomists have long since detected the presence of certain entozoa in the nutritive fluid of cold-blooded animals, as, for instance, frogs and fish. In the mammiferæ, worms have sometimes been found in the blood; but these worms had probably only come there after having perforated the organs in which they had developed themselves. It is of very great importance to physiology, pathology, and natural history, to demonstrate, not merely the existence of entozoary worms in the blood, but moreover to prove their constant circulation in that fluid, in animals which come near to man. Now, since science is not as yet in possession of any example demonstrating conclusively the circulation of worms in the blood of mammiferous animals, we are most anxious to communicate to the Academy the discovery which we have made of Entozoa circulating in the blood of a dog of a vigorous constitution, and in a state of apparent good health.†

These worms are from 3 to 5 millièmes of a millimetre in diameter, and about 25 in length. The body is transparent and colourless. The anterior extremity is obtuse, and the posterior or caudal

* See last Number of Annals.—ED.

† Observations, however, of this kind will be found described at pp. 48 and 49 of the 10th vol. of this Journal.—ED.

extremity ends in a very fine thread. At the fore part a small short furrow 5 millièmes of a millimetre in length is observed, which may be considered as the mouth.

By all its characters, this species of hæmatozoa must rank in the genus *Filaria*.

The motion of these animals is very lively. Their life continues even ten days after the blood has been drawn from the vessels and deposited in a vessel placed in a temperature of 59° Fahr.

By examining a drop of blood under the lens of the microscope, we see these hæmatozoa swim with an undulatory movement between the globules of blood; they curl, uncurl, and twist about with great vivacity.

In order to be certain whether these worms existed in the whole circulatory current, we examined the blood of the coccygeal arteries, those of the external jugular veins, of the capillary, of the conjunctiva, and of the mucous membrane of the mouth, of the skin and of the muscles, and we were always able to detect entozoa.

For the last twenty days we have daily opened the capillaries of the different parts of the skin and of the mucous membrane of the mouth, and always find these animals present.

The urine and excremental matters do not contain them.

The diameter of the globules of the blood of the dog is from 7 to 8 millièmes of a millimetre; that of the *Filaria* is from 3 to 5. There is therefore not the least doubt but that this worm can circulate wherever the blood has to pass. We reckon, according to several investigations made in order to ascertain the quantity of blood existing in the vessels of dogs of moderate size, that the dog in question has 1^{kil}.500 of blood in circulation. Now a drop of this blood weighs 0^{kil}.067, and in this drop we are able to detect from four to five *Filaria*. This dog would therefore contain more than 100,000 of these worms in the whole of its blood.

The prodigious number of the animals is the more astonishing, as the dog seems to be in good health. We should however remark, that the entozoa of the digestive canal of dogs, the *Tænia*, even in very great numbers, very seldom disorder the vital functions.

During a year we have examined the blood of from seventy to eighty dogs without meeting with the *Filaria*, and dating from its discovery, we have sought for it, but in vain, in the blood of fifteen dogs.

We have now the honour of presenting to the Academy—

1. A drawing of the *Filaria* of the blood of the dog.
2. Some blood containing some of these worms alive.
3. The dog whose blood is verminiferous; and we can, if the Academy desire it, make an incision in the lip of the animal and show, with the microscope, the *Filaria* which circulate with the blood.—*Annales de Chimie et de Physique* for March.

On the Cotton called "Nurma," in Guzerat. By A. BURN, Esq.

The plant yielding what is called Nurma cotton in this part of the country, is the same as is described by Dr. J. F. Royle as *Gossy-*

pium arboreum. It is to be found growing wild, I believe, in different parts of India; and from some experiments I made when at Kaira, I have very little doubt that it will be found to be the original stock from whence the Barbadoes, Bourbon, Egyptian, and Sea Island varieties have originally sprung.

It grows in every kind of soil that is met with in Guzerat. But it obtains the greatest perfection in light sandy soils, to which a little old cow-dung manure has been added, and where it can have a *proper drainage*, in the black clayey soil known as "the cotton soil" of the indigenous *G. herbaceum*; it grows, but with diminished vigour, in proportion to the purity of that soil. In a state of nature, and when fully developed, the seeds are nearly as large as a grain of wheat, and are closely covered all round by a strongly-adhering bright pea-green coloured fur, and enveloped in a fine silky wool of considerable strength, and fully an inch in length.

Hedge-rows, gardens, groves of trees about the abodes of devotees and temples, are the places where this plant is found. I do not know of its being cultivated in any other way. In these places it is a perennial, lasting for four or five years or more, and being cut down to within 2 feet of the ground in the end of June, or a little before the setting in of the annual rains; this also is the best time for sowing the seed.

The natives appreciate this cotton, from its fine staple enabling them to spin finer thread than from any other kind with which they are acquainted. Muslins and long pugries for the head are made from it; but since the introduction to this country of European products of the loom, its use and its culture have been so reduced, as hardly at this day to afford sufficient evidence to save their being classified along with the fabulous stories of Hindoo history.

Of the quantity produced per acre I can give no estimate, but in the first year it could not be over 100 lbs. of clean cotton. In the second year, as the plant then comes into full bearing, it might be from 300 to 400 lbs. The great extra labour and expense over the common crops, of protecting the fields during the whole year, which the cultivation of this plant would entail, is, I believe, the main obstacle to any attempts being made to cultivate it. Here we have no hedge-rows, and nothing that is well calculated for such a purpose; all the agricultural produce being from annuals, the ryot protects them from cattle, thieves, &c., by living in his fields during the few months they are ripening, and which he could not do for a longer period. The price of this cotton in the bazaar is always double that of the common country article. However, there is never more than a few pounds procurable.

I have for several years back entertained great hopes in regard to this cotton, particularly that it may be improved, so as to become of value, by attending to modes of culture. That from it new varieties, suited to different soils and situations as regards climate, may be obtained, is more probable than from any of the cultivated kinds, and I have hoped that circumstances might some day admit of my

being able to attempt its culture as a perennial, in the same way as cotton is grown in Peru.

ON DIPHYA SAGITTARIA.

M. Hollard read before the Society some facts relative to *Diphya sagittaria*, a singular animal, and as yet but little known, which, living in the open sea, is blown upon the coast by stormy winds which mutilate it, as its structure is very fragile. He also presented some details on the anatomy of the *Velellidæ*, radiated animals, the order of which is not yet determined. M. Hollard submitted to the Society several curious anatomical objects, and particularly a Torpedo from the Mediterranean, in which the electric apparatus was laid bare.—*Bulletin des Sciences de la Société Vaudoise, as inserted in the Bibliothèque Universelle, Nov. 1842.*

EXPERIMENTS ON THE TORPEDO.

M. Matteucci communicated to the French Academy of Sciences, on the 20th of Feb. last, the results of some experiments on the torpedo, illustrative of the theory entertained by himself and M. de Blainville on the analogy between muscular contraction and electricity. He introduced a small quantity of the aqueous solution of opium into the stomach of the living torpedo; the tincture of nux vomica was likewise introduced into the stomach of another live torpedo. The two fishes, apparently dead, were soon afterwards removed from the water, and on their backs were placed two frogs (prepared in the way already described by the author) and the galvanometer. When the animal, or any part of it, was slightly touched, it contracted, and the torpedo furnished an electrical discharge, although before the experiment it required strong irritation to produce any effect.

The brain of a torpedo, much reduced in strength, was exposed, and an alkaline solution of potash applied on the fourth lobe. The torpedo died, giving forth very strong discharges.

The electrical organ was rapidly removed from a living torpedo, and prepared frogs were placed on the organ. On passing a knife into the organ, and dividing the smallest nervous filaments, the frogs leaped up, sometimes one, sometimes the other, according to the point of the electrical organ which was cut. I had never before (says the author) seen in so perfect a manner the localised action of nervous filaments, nor had I ever witnessed so clearly the curious action of the electrical lobe of the brain. I received six torpedos, which were brought to me in a state of apparent inanition; the most active irritants failed to produce a discharge, for the animals seemed to have been destroyed by the cold. I exposed the brain, and on irritating the fourth lobe I obtained very powerful discharges. I cut up the electrical organ of a live torpedo in all directions, and applied the galvanometer to different points; the direction of the electrical current was invariably from the points nearest the back, towards the lower part of the belly. It is impossible to admit any analogy between the organ, and piles, batteries, &c.

BIBLIOGRAPHICAL NOTICE.

To be published by subscription, the *Genera of Birds*; comprising their *Generic Characters*, a notice of the *Habits of each Genus*, and an *extensive List of Species*, referred to their several *Genera*. By George Robert Gray, Senior Assistant of the Zoological Department, British Museum, and author of the 'List of the Genera of Birds,' &c. Illustrated with Figures by David William Mitchell.

The Illustrations of this work, amounting to about 200 plates, will be from the pencil of the author's colleague, Mr. Mitchell; whose knowledge of the science, and zealous wish to facilitate its acquirement by others, will guarantee the faithful and spirited performance of his department of the work.

It is proposed to commence the publication as soon as 100 subscribers are obtained, in Monthly Parts, each Part to consist of Four imperial-quarto coloured plates, and accompanying letter-press; giving the generic characters, short remarks on the habits, and a list of species of each genus as complete as possible. Each plate will contain, as far as practicable, the characters of all the groups of an entire subfamily, illustrated by a complete figure of a species not hitherto figured; or, in the few cases where this is not to be obtained, of one that has only been given in some expensive work, accompanied with numerous details of heads, bills, wings and feet of the other genera, as the case may require, for pointing out their distinguishing characters.

METEOROLOGICAL OBSERVATIONS FOR MARCH 1843.

Chiswick.—March 1. Clear: some snow-flakes: frosty. 2, 3. Clear and frosty: fine. 4. Cloudy and fine: frosty at night. 5. Sharp frost: cloudy. 6. Cloudy: clear and frosty at night. 7. Frosty and foggy: cold with easterly haze. 8. Light clouds: fine: frosty. 9. Dry haze. 10. Hazy: overcast. 11. Slight haze. 12. Uniformly overcast. 13. Clear: cloudy and fine. 14. Fine. 15. Hazy: cloudy and fine. 16. Hazy and mild: clear and fine. 17, 18. Mornings foggy, clear and fine. 19. Foggy: fine. 20. Foggy: very fine: rain. 21, 22. Very fine. 23. Cloudy and mild. 24. Hazy: fine. 25. Dry and windy. 26. Cold and dry. 27, 28. Cloudy and cold. 29. Dry cold haze. 30, 31. Overcast and fine.

Boston.—March 1. Fine: snow early A.M.: rain P.M. 2, 3. Fine. 4. Cloudy. 5. Fine. 6. Cloudy. 7. Fine. 8—10. Cloudy. 11. Fine. 12. Cloudy. 13. Fine. 14. Cloudy: rain early A.M. 15. Fine: rain early A.M. 16. Cloudy. 17, 18. Fine. 19. Cloudy. 20. Fine. 21. Fine: rain early A.M. 22. Rain: rain early A.M. 23, 24. Cloudy: rain early A.M. 25. Windy. 26. Stormy. 27, 28. Windy. 29, 30. Fine. 31. Cloudy.

Sandwich Manse, Orkney.—March 1. Snow-showers: frost. 2—5. Cloudy: thaw. 6. Clear: aurora. 7, 8. Clear: hoar-frost: aurora. 9. Clear: cloudy. 10. Cloudy: damp. 11. Damp. 12. Showers. 13. Snow: showers. 14. Snowing: clear. 15. Snow: showers: clear. 16. Cloudy: snow: rain. 17. Rain: drizzle. 18. Showers: clear: aurora. 19. Cloudy. 20. Cloudy: damp. 21, 22. Damp. 23. Damp: showers: damp. 24. Damp. 25—29. Bright: clear. 30. Cloudy: rain. 31. Drizzle: rain.

Applegarth Manse, Dumfries-shire.—March 1—4. Frost: fair. 5. Slight frost: thaw P.M. 6. Thaw and drizzle. 7. Fair and fine: spring day. 8. Frost. 9. Frost: dull P.M. 10. Rain. 11. Very damp. 12. Wet A.M.: cleared up. 13. Fair and fine: drizzle. 14. Frost: threatening. 15. Frost: fine. 16. Drizzle. 17. Moist, but not rain. 18—20. Fair and fine. 21. Fair and fine: shower P.M. 22. Wet A.M.: cleared. 23, 24. Wet A.M. 25, 26. Fair. 27—29. Fair: slight frost. 30. Heavy rain: thunder. 31. Rain A.M.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 72. JUNE 1843.

LVI.—*Notes on the Salmon.* BY JOHN BLACKWALL, F.L.S.

To Mr. Shaw of Drumlanrig belongs the merit of having successfully developed the natural history of the small fish denominated Parr, whose œconomy, prior to the enunciation of his discoveries, was involved in obscurity, and was the occasion of much perplexity and hypothetical reasoning among British ichthyologists. By a series of well-conceived and skilfully conducted experiments he has not only proved that the parr is neither a hybrid nor a species *sui generis*, but has clearly established the interesting and important truth that it is the young of the salmon.

Residing in the immediate vicinity of the river Conway, for some years past my attention as a naturalist and a fly-fisher has been directed to the finny inhabitants of its waters, and to the salmon in particular. In the course of my researches several remarkable facts relative to the latter species in its earlier stages of growth have come under my observation; 1st, that young males, exhibiting all the characters of the parr, frequently have the lobes of milt fully matured, while females of the same size have the lobes of roe in so backward a state that it is necessary to employ a magnifier in order to distinguish the ova; 2nd, that these males shed their milt in the ensuing winter months; 3rd, that the males of salmon-smolts are found to have shed their milt before they descend to the sea, though the lobes of roe in the females are then of very small dimensions; and 4th, that smolts may be made to assume the barred appearance of parrs by carefully removing their silvery scales.

Perceiving that Mr. Shaw, in his "Experimental Observations on the Development and Growth of Salmon-fry," published in the fourteenth volume of the 'Transactions of the Royal Society of Edinburgh,' had noticed the phænomena enumerated above, which serve, however, in some measure, to corroborate the accuracy of his views, I put aside my notes in which they are recorded, and probably never might have recurred to them again had not an abstract of a paper "On the Growth of the Salmon," by Mr. John

Young, given in the 'Annals and Magazine of Natural History,' vol. xi. p. 157, induced me once more to turn to them, under the impression that they comprised evidence in favour of a conclusion opposed to that arrived at by the latter observer.

Concurring with Mr. Shaw as regards the history of the salmon from its rupturing the external capsule of the egg to the period when it acquires the migratory dress and descends to the sea, Mr. Young has endeavoured to determine, by observations made upon marked individuals, the growth of this species after its first arrival in the salt water.

In the months of April and May 1837, he marked a considerable number of descending smolts by making a peculiar perforation in the caudal fin by means of small nipping-irons; in the course of the ensuing months of June and July many of them were recaptured ascending the river as grilse, and weighing several pounds each, more or less, according to the difference in the length of their sojourn in the sea. Again, he marked a number of descending smolts in April and May 1842, by clipping off the adipose fin, and in June and July he caught some of them returning up the river, the adipose fin being absent. One of these specimens, marked in April and recaptured on the 25th of July, weighed seven pounds, and another, marked in May and recaptured on the 30th of July, weighed three pounds and a half.

Many small grilse, marked after they had spawned in winter and were about to redescend into the sea, in the course of the ensuing summer were recaptured as finely formed salmon, ranging from nine to fourteen pounds in weight, the difference still depending upon the length of their sojourn in the sea. A specimen marked as a grilse of four pounds in January 1842, was recaptured as a salmon of nine pounds in July.

A salmon which had spawned, weighing twelve pounds, was marked on the 4th of March, and was recaptured on its return from the sea on the 10th of July, weighing eighteen pounds.

Such are the experiments detailed in the report of Mr. Young's paper, and the inference deduced from them and others of a similar kind is that the growth of the salmon in its transition from a smolt to a grilse, from a grilse to the perfect state as to form and aspect, and also in the perfect state, is extraordinarily rapid during those portions of its existence which are passed in the sea, but Mr. Young entertains the opinion that salmon rather diminish than increase while they remain in fresh water.

Now, though it is an undoubted fact that great deterioration in the *condition* and, consequently, in the *weight* of salmon uniformly takes place while they are engaged in perpetuating their species, yet that the growth of young individuals which do not accompany their congeners to the sea is steadily progressive, ob-

ervation and experiment plainly show. Salmon-fry from seven to eight inches long, having all the characters of the parr, may be taken in the Conway and its tributary streams in small numbers in the month of June, after the smolts of the season have entirely quitted those rivers, and, occasionally, I have obtained specimens of still larger dimensions, weighing four ounces. The physical cause, whatever it may be, which prevents these fish from acquiring the migratory dress and instinct of their species, evidently does not prevent them from increasing in growth and improving in condition, even the males which have shed their milt presenting every appearance of renovated health and vigour.

Mr. Yarrell, in his 'History of British Fishes,' vol. ii. p. 21, states that a large landed proprietor in Scotland, in April 1831, put a dozen or two of small salmon-fry, three or four inches long, into a newly-formed pond between three and four acres in extent. No fishing was allowed in this pond till the summer of 1833, when several of these salmon were taken, weighing from two to three pounds, perfectly well-shaped, well-coloured, and well-flavoured. As these fish must have been in their second year when put into the pond, it follows that they attained to the weight of two or three pounds in rather more than three years.

In the Supplement to the second volume of Mr. Yarrell's work other examples of the growth of young salmon in fresh water are given (pp. 5, 6), from which it appears that in one instance there was an increase in weight of eleven or twelve ounces in sixteen months, and in another instance an increase of fourteen or fifteen ounces in twenty-seven months.

I shall now proceed to inquire into the growth of the salmon during its sojourn in the sea.

Early in the month of June, salmon in high condition, ranging from three to five pounds in weight, ascend the Conway in considerable numbers if the state of the water be favourable; but that they cannot be identical with the smolts of the same year is manifest, because the inversion of established physiological principles is involved in the opposite supposition; for as great numbers of grilse weighing from half a pound to a pound come up the same river in August, full two months later than the former, there is no escaping from the unphilosophical conclusion to which such a hypothesis leads; namely, that young salmon decrease in size as they increase in age. To avoid the awkwardness of this dilemma, it is only necessary to admit the identity of the small grilse which ascend the Conway in August with the smolts of the preceding spring; and this view of the subject, which, if correct, completely subverts the theory of the all but preternatural growth of the salmon in salt water, derives support from the gradual increase of

this species in size when restricted to fresh water, and from some circumstances attending the loss of its teeth from the vomer.

Adult salmon of average dimensions are known to have one or two teeth only at the anterior extremity of the vomer, though smolts have the same part amply provided with teeth extending along a great portion of its length. In the summer of 1840 I examined numerous specimens of salmon in various stages of growth, for the purpose of ascertaining the period at which the teeth begin to disappear from the vomer and the order in which they are shed. Specimens weighing from two to five pounds, taken in the months of June and July, had from three to seven teeth on the anterior part of the vomer, the number, allowing for the difference in condition, being almost always inversely as the weight; and individuals of a larger size, captured at the same time, usually retained one or two teeth only, situated quite at its anterior extremity. Other specimens weighing from half a pound to a pound, taken in the month of August, were found to have the vomer well supplied with teeth except at its posterior part, from which some had been lost invariably. The situation which the lost teeth have occupied is distinctly marked by dark spots in small grilse, but as they increase in size these spots become more obscure and, ultimately, are obliterated.

As the teeth disappear from the vomer gradually and nearly in regular succession, those at the posterior part being shed first, it follows that the youngest fish, generally speaking, will have lost the fewest; consequently, the small grilse which ascend the Conway in August may be safely regarded as identical with the smolts which descended the same river in the preceding spring.

Having attempted to show that the growth of the salmon during its first visit to the sea is not so rapid as has been supposed, I may state that I see no reason for believing that it is accelerated in an extraordinary degree at any subsequent period of its life. The salmon which come up the Conway annually exhibit every gradation in weight from half a pound, or under, to twenty-five and thirty pounds; this would hardly be the case were the belief in their extremely rapid growth well-founded, neither would individuals of large dimensions bear so very small a numerical proportion as they are known to do to those of a medium size.

In pursuing researches of this description it is desirable that measurement should be attended to as well as weight, for salmon of the same weight precisely often differ remarkably in their dimensions according to the *condition* they are in; and the neglect of this circumstance, I am inclined to think, has contributed greatly to encumber the question with difficulties.

I feel unwilling to offer any comments upon Mr. Young's ex-

periments, not being in possession of all the particulars given by the author in connexion with them; but I may be permitted to remark, that *condition*, considered with reference to weight, must have exercised no small share of influence in the case of the grilse marked by him after they had spawned in winter, and recaptured in the ensuing summer as finely-formed salmon weighing from nine to fourteen pounds; in the instance of the specimen marked as a grilse of four pounds in January 1842, and retaken as a salmon of nine pounds in July; and also in that of the salmon weighing twelve pounds, marked on the 4th of March, after it had spawned, and recaptured on the 10th of July, weighing eighteen pounds.

For the following table of the dimensions and weight of salmon differing in condition I am indebted to my brother, Mr. Thomas Blackwall.

Length in inches.	Girth in inches.	Weight in pounds.
23	13	5
26	12	5
28	—	5
26	13	7
29	14	7
29	15	8½
31	15	9
28	18	11½
33	15½	11½
35	17¼	15½
34	18	16
36	19½	18½
39	18½	18½
36	20	20
42	18	21
39	20½	23
34	13	—

The salmon which ascend the Conway are frequently infested externally by the *Caligus curtus* of Müller, and internally by *Entozoa*, three perfectly distinct species being sometimes found in the intestines of the same individual. These internal parasites abound in salmon newly arrived in the fresh water; but in various specimens which I have examined in March, when they had spawned and were about to return to the sea, scarcely any were to be seen. My observations, however, are too limited to warrant the deduction of any general conclusions in relation to this curious subject, which certainly merits further investigation.

P.S. I have ascertained by repeated dissections of the young of the Salmon Trout, *Salmo trutta*, that the males of that species shed their milt before they descend to the sea, but that the fe-

males do not spawn till they return from their first visit to the salt water, though some inequality in the development of the ova may frequently be perceived towards the end of April and the beginning of May in specimens measuring from six to seven inches in length which have assumed the migratory dress. Young salmon trouts weighing from half a pound to a pound are observed to ascend the Conway in considerable numbers every year in August, and adults of large dimensions are, at all times, very much scarcer than those of a medium size. From these facts I am led to infer that the salmon trout, in its œconomy and rate of growth, bears a close resemblance to the salmon.

Oakland, May 8th, 1843.

LVII.—*Short description of a Bottle-nose Whale stranded upon the coast of the co. Louth in the autumn of 1840.* Communicated to the Nat. Hist. Society of Dublin, by O. B. BELLINGHAM, M.D.*

A SPECIMEN of *Hyperoodon Butzkopf* became entangled on the evening of Oct. 6, 1840, upon a bed of rocks, which run some distance into the sea, and are partially uncovered at low water, off Salterstown near Dunany Point, co. Louth, and next morning was found nearly dead by some fishermen, by whom it was towed to Johnstown Beach.

It was a male, and measured 23 feet 7 inches in length; the greatest circumference behind the pectoral fins 13 feet 8 inches; snout measured 2 feet 7 inches, and the tail 6 feet across.

The skin was smooth, polished, and of an olive-black colour.

Eyes small, dark, and somewhat larger than those of the ox; immediately behind each eye was an opening about 5 inches in length and 2 broad.

There were 2 small teeth in the extremity of the lower jaw, buried at least 2 inches in the gum.

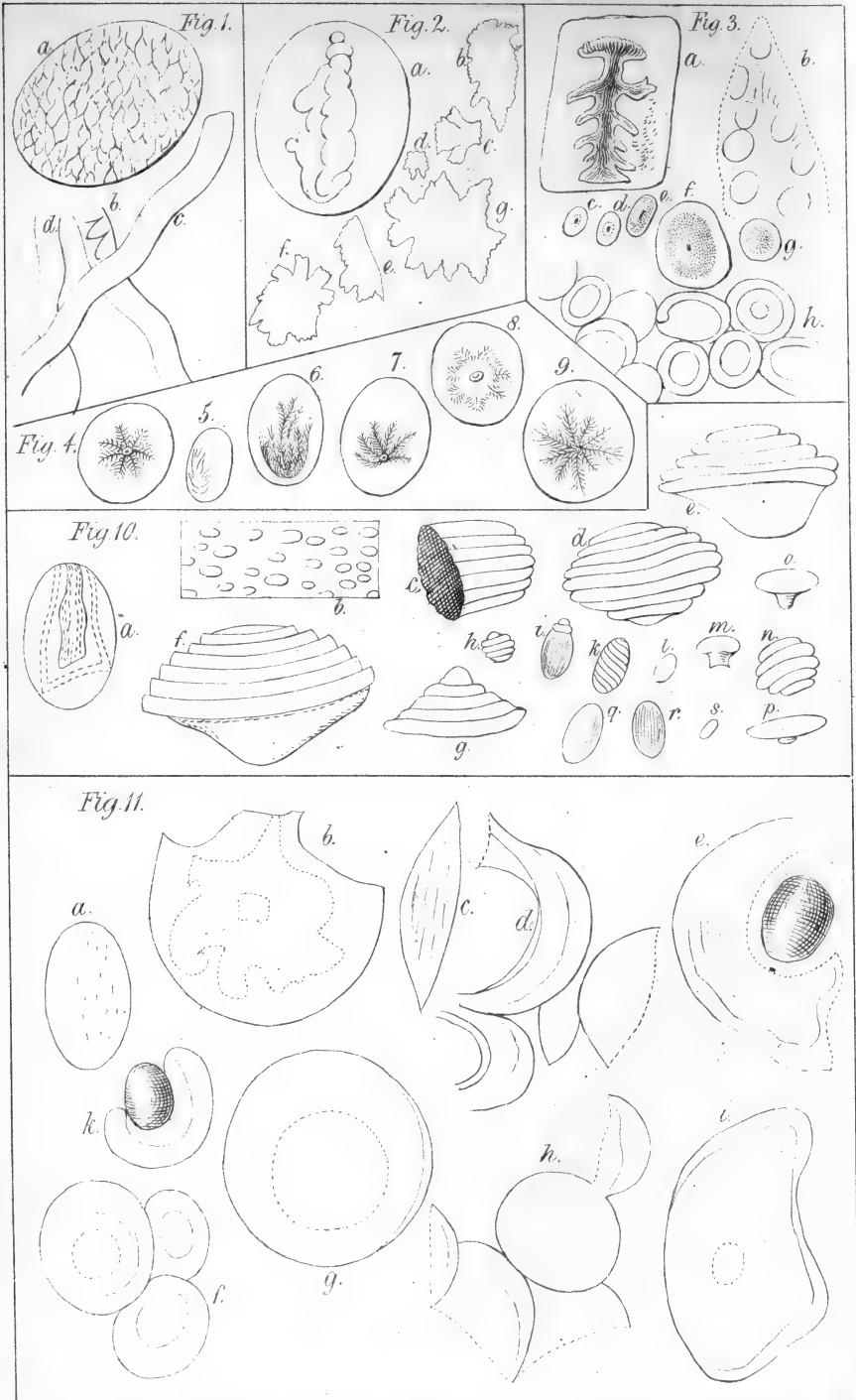
No remains of food were found on examination in the stomach or intestines.

The blubber yielded upwards of 120 gallons of oil.

Observations.—The *Hyperoodon Butzkopf* of Lacépède, *Hyperoodon bidens* of Fleming, *Ceto-diodon Hunteri* of Jacob, *Bottle-head* of Dale, and *Bottle-nose Whale with two teeth* of Hunter, is so little known to British naturalists that the most trifling particulars respecting it possess interest. This is the third specimen of this species which within the last four years has been stranded upon the same part of the coast of the co. Louth; two of these

* A drawing of the animal, made by Lieut. Raye, R.N., was exhibited to the meeting.





J. Baore, del.

Organic substances inclosed in Mocha-Stones.

have been noticed by my friend Mr. Thompson, President of the Belfast Natural History Society, in a communication to the 4th volume of the 'Annals of Natural History:' the head of one is in the museum of the Royal Dublin Society, that of the other is in the museum of the Natural History Society of Dublin; the skeleton of the third and largest (prepared by Lieut. Raye) has been presented by Sir Alan Bellingham to the Natural History Society. The drawing of a recent animal by Lieut. Raye adds considerably to the value of his communication.

Lieut. Raye's figure of this specimen resembles much more closely Dale's than Hunter's, particularly in the shape of the body and its proportional thickness, as well as in the manner in which the forehead rises from the snout: it differs from Dale's figure in the snout being much longer in proportion, in the lower jaw being longer and larger than the upper, and in the dorsal fin being placed nearer the posterior extremity of the body.

The teeth are conical, pointed, and evidently only rudimentary; and I could not learn that the palate was studded with any of those little horny eminences of tubercles which have been described, and are considered by Cuvier as rudimentary vestiges of whalebone.

LVIII.—On *Substances inclosed in Mochastones**. By KARL MUELLER, Physician at Detmold. Translated and communicated by the Rev. M. J. BERKELEY †.

[With a Plate.]

§ 1. *General Observations.*

SINCE in the present day the naturalist is busied with constantly increasing zeal in bringing to light the relics of an Antediluvian Flora, even the slightest contribution is welcome which adds a link to the great chain of those plants which are denominated fossil.

Moreover, although in many of these remains it is scarcely possible from fragments to determine in what part of the fossil flora they should take their place, such notices are at least a contribution to the history of those minerals in which they are found, and so far a mite towards the history of the original condition of the world.

On these grounds I venture to make some remarks on a subject which has at present, alas! received little attention.

* This word is evidently used with considerable latitude, and by no means confined to the bodies so named in this country.

† From the Regensburg Flora, May 21, 1842.

§ 2. *History.*

As far as I know, this matter was first noticed by Blumenbach in his 'Specimen archæologiæ telluris terrarumque impr. Han-nov. ser. Gœtting. 1813,' in which he pointed out the organic nature of the so-called Dendrites, and even recognised amongst them genera which exist at the present day.

At a later period the subject was considered worthy of especial notice by Macculloch, who however laboured only to prove again their organic nature (Transact. of the Geolog. Soc. of London, ii. 510; Leonh. Taschenb. f. Mineral. xiii. 595*).

In this state the matter rested, and we merely find it mentioned occasionally in introductions to geology under the head Chalcedony.

§ 3. *On their Organic Nature.*

This question springs in part from the scarcity of the substance which gives rise to it, which is found only here and there in collections of minerals, and then preserved merely as a curiosity; in part, from the prevailing doubt as to their vegetable origin.

People are easily induced to consider them as dendritic growths of metallic substances, as indeed has been done by many mineralogists and botanists; but I have never heard of an explanation how such growths take place.

I must indeed add, that amongst these inclosed bodies others are found whose organic origin cannot be denied, though I have never found the former with such a form or texture under the microscope, without whose help no judgement can be formed.

While some allow their organic nature, we hear others too frequently speak of them as belonging to the category of sports of nature. But, it may be asked, what is a sport of nature? The dendritic formations in marly slate are brought forward as proofs of the existence of fortuitous forms in nature. How far they are related to the bodies in question I cannot say, not having paid especial attention to them.

Even they however depend on fixed laws, under whose activity they are produced, since their forms so constantly recur.

But how is it possible in the remotest degree to speak here of sports of nature, when so many forms so frequently recur in these inclosed bodies?

To prove their vegetable nature without the help of the microscope, Macculloch advised treating them with sulphuric acid, which turned them black. This method should seem however to be less practical than it appears at first, for many inorganic inclosed sub-

* It is to be regretted that M. Müller had no opportunity of seeing Mr. Bowerbank's admirable memoir, who however appears to have observed nothing which he considered as referable to the vegetable kingdom.—M. J. B.

stances may also become black under its influence. One circumstance indeed goes far to prove their vegetable nature, namely, that those portions of the mineral, whether it be chalcedony or quartz, where the bodies are exposed, do not admit of being polished, but being stained by the polishing-oil always remain tarnished.

§ 4. *On the Inclosed Bodies themselves.*

The number will probably be found considerable, when they shall have been rescued from the curiosity-drawer and have been observed and described. Something complete can be expected only from the labours of many. It is to be wished, for instance, that the botanists about Oberstein would turn their attention to this subject, where of a certainty many a treasure is thrown away as useless amongst the chips which are made by the agate-grinders.

I was permitted to examine a large quantity of inclosed substances, and what I discovered amongst them will for the most part appear from what follows.

1. Intricate deposits of different colours, mostly black or red-brown. They are very frequent, and resemble, under the microscope, mould; that is, they are compressed, transparent, without distinct cellular structure adhering after the manner of vegetables, and plainly converted into coal.

Since other vegetable substances frequently accompany these, it is clear that they are really mould which was formed before the mineral had received its present physical form. Found at Oberstein.

2. A moss in fructification. It was surrounded by such a mass of mould that it was impossible to discover anything accurately as to its structure, or to come to the least decision as to its genus. The capsule had the form of that of a *Hypnum*. The peristome was not present.

The fact however is of importance as a weighty argument against the devotees of sports of nature. Found at Oberstein.

3. In a bright, clouded chalcedony, in which traces of water were still visible, fragments of a *Chara* occurred. They consisted of fine, much-branched, glaucous green stems entangled with one another, and among which some branches occurred which were incrustated as if with lime. I could not discover any whirled fragments. The occurrence of water in chalcedony was interesting, which was confirmed by the late Prof. Zenker. Found at Oberstein.

In another reddish chalcedony I found a great mass of erect stems disposed with exceeding regularity. They were almost all in the same position, quite simple, and strongly incrustated with lime (?). The upper surface of the stone, where they were exposed to view, was sprinkled with black dots, which is very na-

tural, as such places, as said above, become black from the oil used in polishing. Found at Oberstein.

4. Plate X. *fig. 1.*—A Conferva in a green jasper [Prase]. Threads simple, short, curved, containing spiral threads (?). *b—d.*

I am obliged to place a note of doubt here, since I am not quite sure whether what I saw was a spiral as in *Zygnema*: I have figured what I did see at *b.*

It is a very difficult task to examine objects like this. We can examine only that portion which lies close to the surface, and it is then always matter of chance whether one falls in with anything of interest. I was unable to prepare thin sections, as the specimens were not my own property.

I was besides obliged to make my observations mostly by means of concentrated lamp-light, in order to transmit more light through the whole stone, and may therefore have been subject to some optical deception.

I could not ascertain the exact place in the system of Algæ to which the Conferva belonged, being unable to ascertain its inner structure. The thickness of the threads, which are distinct though congregated, seems to place them in the series of true *Confervaceæ*, as *Conferva*, *Zygnema*, &c.

In conformity with the intention of these notes, I am content to draw attention to the fact, in the hope that later inquiries, should I be so fortunate as to meet again with similar objects, may throw more light upon the matter. Found in Scotland.

5. Plate X. *fig. 2, a.*—Mass lobed, glaucous green, compressed.

A remarkable formation, resembling altogether a compressed dried *Nostoc*, which it resembles also in colour. Indeed I know not with what else to compare it.

The vegetable has certainly once been a *frons plicata*, since we find the single folds lying one over the other. They are not of equal thickness; their colour is also here and there darker, where the layers of folds are darker. The outline is very delicate and distinct.

Under the microscope the whole appears like a compressed macerated mass. I could not perceive the moniliform sporidia which are peculiar to the genus *Nostoc*, probably in consequence of their having been separated from one another by enormous pressure.

The great distinctness of the frond seems to bespeak its affinity to *Nostoc*, as the lower Algæ, *Palmella*, *Coccochloris*, *Microloa*, &c., under such pressure would scarcely have preserved their outline, their mass being too gelatinous, while in most species of *Nostoc* it is of a firmer consistence. From want of globules it is impossible to name it.

Fig. 2, b—g.—In certain portions of the frond under small magnifying powers appear some darker specks. If these are followed

up gradually with higher powers they appear as represented at *b—g*; they are of the same colour as the frond and lie scattered upon it, as if pressed to it. They are tender, scale-like membranes (?) jagged at the border.

It is surprising to find structures like these, which are the last one should expect to find upon what, judging from habit, I have considered as a *Nostoc*.

Many no longer retain their original orbicular form; and more are frequently torn into many divisions as at (*e*).

If we inquire what this formation probably is, it is very pleasing to be able to give a certain answer: they are forms which belong to the great family *Desmidiaceæ* amongst Algæ, and indeed to the genus *Micrasterias*.

It has the greatest affinity with *Micrasterias lacerata*, Kützing, and I leave it for a while to the judgement of algologists.

Since hitherto *Micrasteriæ* are known only as hydrophytes, the *Nostoc* must also be a water Alga. Found at Idar in the principality of Birkenfeldt.

6. *Fig. 4—9.*—More or less round, pinnate, moss-like fronds, with a yellow-brown substratum, in the middle of which is generally a circle with a dot in its centre. Under the microscope the texture appears as in the foregoing, macerated, and we can therefore judge only from habit what the production may be.

If we examine first the circle in its centre, with its own central dot, it appears that this is the point to which the object was fastened, and from whence as a centre the other branches proceeded. It must have been gelatinous, more or less globose, as appears from the gradually fading colour and the very thin compressed membrane; it must have been conglobated, so as to receive its present orbicular form. The feather-like lines were branches, whose branchlets were also gelatinous and conglobated.

This again then belongs to the family of Algæ, being most nearly allied to *Chatophora* amongst the *Nostochineæ*, whose frond, as in *Chat. endiviaefolia*, exhibits a similar branched structure. Found in a clear chalcedony from Oberstein.

7. *Fig. 10.*—Red organic masses, appearing to the naked eye as small, more or less isolated dots, occurring in a clear chalcedony. The circumjacent parts are yellow. This yellow field is bordered by similar red dots, only larger and more distinct and tolerably isolated.

Under a weak magnifying power they appear like more or less oval balls, generally very regular, sometimes much torn and crushed, the one dark red, the other reddish yellow.

As in *fig. 2*, a higher magnifying power surprises the inquiring eye, when these dots, which still appear superficial and isolated, are found to exhibit the forms represented in the figures *c—s*.

c, d, f, g, h, i, k, l, n lie mostly at the side of the yellow field at (*a*); the remaining figures in the midst of the chalcedony, which they completely fill.

The first appear as large, globular and spiral, the latter as more or less oval; these again as reddish yellow, those as almost tile-red bodies. Both have the same peculiarity, that they assume the form of a mushroom: *e, f, m, o, p*. There occur also frequently thin, skinny, banded remains, as at *g*. Their size is very variable. At the first glance all these bodies have so much resemblance to the fruit of *Characeæ*, that one might feel satisfied in considering them as such in reality. The banded spiral divisions bespeak as much; yet it does not appear probable, as the bodies, so frequently confined to a small space, lie collected together in heaps. No single organic remain is found amongst them, and it is besides inconceivable that, supposing them to be the fruit of *Charæ*, not a single vestige of the stem should remain.

That amongst them clearly younger individuals and of a similar formation are perceptible, may afford an argument that they could be assigned to the animal kingdom. I have not observed extremities, feet, &c.

I cannot venture to say more on this matter, but perhaps the same bodies may be found by some other observer under other peculiar circumstances, whence we may fortunately be able to draw some conclusion. Found in Siberia.

8. *Figs. 3 & 11.*—*Fig. 11.* I have given in *fig. a—k* the magnified representations of the very isolated red dots at (*a*) in a chalcedony likewise from Siberia. They may be thought very confused, but they are true copies of what I saw. The single dots are of such a size that their outline can be distinguished by the naked eye. I have figured almost every dot which lying near the surface could be distinctly observed, and almost every one bore the marks of powerful destruction.

In spite of this inroad on these so remarkable and beautiful red bodies, it is not difficult to form a clear notion of the original form from the individual fragments.

The body was circular, as appears easily, and the figures *f, d, g* seem to give perfect assurance of the fact, since only a round body could be pressed so flat, as is the case in both these instances. Some other dots which I found showed the same form and structure, so that I considered it superfluous to figure them here for further confirmation. I give exactly what I found.

The circular body was moreover furnished with an epidermis, as is clear from *d, g, h*. This seems to have been dark red. It was filled with a loose marrow (*b—k*) inclining from orange to purple-red. Where this was extremely compressed the colour is of course lighter, in consequence of the mass being thinner. This is illustrated by *b—e*.

In the centre of the globular body was a conformable dark red nucleus *e—h, k*.

Finally the whole mass was gelatinous; as is indicated by the thick indistinct outlines of all the figures and by the body marked (*i*), from whose central opening the nucleus appears pressed, which betokens clearly a gelatinous nature.

The nucleus is found of various sizes, probably merely from difference of age. At (*k*) one is seen almost isolated.

Fig. 3.—These figures also belong here, and are remarkable and interesting enough. This chalcedony came from Oberstein, whereas the other came from Siberia. The globules marked in outline are here more aggregated than in fig. 11, but they exhibit the same structure and colour.

What these bodies are I dare scarcely conjecture. Here also there are no organic remains; and would we compare them with some vegetable organ, the most appropriate should seem to be some kind of berry. I must however repeat what was said under fig. 10: the collection of the bodies into a small space, and the absence of other organic remains, are against such a supposition.

Have we however before us some pristine inhabitant of the water belonging to the animal kingdom? If so, the black nucleus must represent some organ; possibly the stomach.

We must here also wait patiently for further researches, and content ourselves with the little which I am able with my feeble powers to offer. May they only lead to further inquiries; if so, I shall be satisfied.

§ 5. *In what state are the Inclosed Substances found?*

If the worthy Goeppert, in the introduction to his work on fossil plants, assumes three conditions (vid. Flor. 1840, p. 482), this section may be regarded as indicating a fourth. For here clearly the plants have undergone no chemical change. They were inclosed in the original soft mass of the chalcedony, and so, when this hardened, became impervious to atmospheric air and other chemical agents. As also amber and copal present their insects well-preserved, so here the mineral offers us its plants.

The whole alteration consists merely in the highly compressed state in which most of the objects are found. The substance of the plants is still precisely what it was at first.

In conclusion I have only to state, that all the objects examined are in the admirable mineralogical collection of M. Siegismund of Jever, a most excellent and obliging naturalist.

LIX.—*Contributions to the Ichthyology of Australia.* By JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of Hospitals, Haslar.

[Continued from p. 359.]

JULIS AURICULARIS (Cuv. et Val.), Ear-marked Julis.

No. 18. Lieut. Emery's drawings.

I AM inclined to consider the beautiful drawing here quoted as a representation of the *Julis auricularis* (Hist. des Poiss. xiii. p. 489) discovered in King George's Sound by MM. Quoy and Gaimard, the naturalists of the expedition commanded by Captain D'Urville. Lieutenant Emery's specimen was procured at Abrolhos on the same coast.

It measured fourteen inches in length, the head forming two-ninths of this measurement, and slightly exceeding the height of the body. The ventrals are acute, but not longer than the rounded pectorals, which equal the sixth part of the whole length. The dorsal and anal rise equably as they run backwards to the height of one-third of the body. The caudal is much rounded. Lips flesh-coloured; from thence on the upper part of the head to the dorsal fin, and down to the middle of the eye, duck-green. Cheeks and operculum scarlet, terminating by a horizontal line even with the angle of the mouth, beneath which the colour is pale reddish lilac. Tip of the gill-flap smalt-blue, with a red spot and a black posterior edging. The pectoral region from the gill-opening to the anus and up to the level of the point of the gill-cover is white, which ends squarely behind. The ground-colour of the remainder of the body is vermilion-red, which takes a lakish tint on the flanks. The whole side is regularly streaked by sixteen stripes, a little narrower than the intervening spaces, and of a pistachio-green colour, except the two upper ones, which are smalt-blue. A rectangular black mark crosses the middle of the first two dorsal rays; the border of the fin is marked longitudinally by six waving gallstone-yellow lines, and the part beneath is crossed obliquely by crowded lines of the same colour. The anal wants the black spot, but is otherwise coloured exactly like the dorsal. Four coarser undulating gallstone-yellow lines cross the extremity of the caudal, and there are five round spots of the same hue on the proximal half of the fin; its ground tint being pale blue; each of its rounded corners is occupied by a narrow pale lilac crescent. The bright gamboge-yellow pectoral has three black streaks along its upper edge, and the ventrals are striped with deep lilac and yellow. The iris is painted with blue and scarlet concentric rings. The specimen described by M. Valenciennes had lost its original colours, though some tracings of the markings remained, which do not correspond well with the drawing here described.

Figure 13 of Lieutenant Emery's drawings represents a fish which was also taken at Abrolhos. It resembles the above so closely in its form and in the general arrangement of its

markings, that I cannot venture, on the authority of the figures alone, to consider it as more than a variety or perhaps a sexual dress.

Its dorsal and anal fins are however lower, and scarcely increase in height posteriorly. The ground-colour of the whole beneath the lateral line is sulphur-yellow, and the longitudinal lines are buff-coloured, much fainter on the breast than elsewhere. A broad stripe of scarlet covers the snout, includes the eye, and, narrowing as it goes, runs backwards to the caudal fin. The back above it is brownish red, with two lines of a paler tint, occupying the place of the smalt-blue ones of the preceding variety. A bright king's-yellow tints the cheek and gill-cover, and fades to white on the throat. The gill-cover is tipped with black. The dorsal and anal are coloured like those of the preceding fish, except that there are only four longitudinal lines on their borders, and that the black mark on the dorsal is triangular. The pectoral is buff-coloured and unspotted, the ventral edged with buff, and the caudal crimson, crossed in the middle by three waving buff-coloured stripes, and having its angles pale lilac as in No. 18.

JULIS? RUBECULA.

Sparus rubecula, Solander, Pisc. Austr. p. 6; Parkinson, Bib. Banks. fig. 2. 36. no. 20.

Parkinson's drawing, quoted above, represents a fish which was taken on Cook's first voyage, in Totæranue or Ship Cove, one of the harbours of Queen Charlotte's Sound. The species is not noticed by the authors of the 'Histoire des Poissons,' but I think that its general aspect points it out to be a *Julis*, though the figure indicates a greater number (eleven) of spinous dorsal rays than any member of that genus is known to possess. Solander describes the colours of the recent fish, but does not mention the number of the rays, or the form of the pharyngeal teeth, so as to clear up the doubts occasioned by the unfinished state of the drawing.

The length of the sketch is eleven inches, and the height of the body or length of the head is exactly equal to a fifth part thereof. The caudal has a slightly concave margin, or rather its acute, falcate angles project a fifth part beyond the straight intermediate membrane. The dorsal rises slightly in its course backwards and ends acutely, but not in a slender point. The anal has a similar form, and the points of both fins reach the base of the caudal. Eleven spinous rays are indicated, occupying a third part less space than the soft part of the fin, and having the membrane behind their tips notched. The rounded pectoral just exceeds a sixth of the length of the fish. The ventrals are shorter, and terminate nearly their own length before the anus. The lateral line, traced continuously on the third row of the large scales which cover the body, follows the curve of the back till it passes beyond the dorsal, when it descends suddenly in a short oblique line, and then runs straight to the base of

the caudal. The profile of the head blends gradually with the curve of the back, the gill-cover appears to be much rounded off posteriorly, and the conical teeth are slightly curved and diminish rapidly in size as they recede from the symphysis. There is no canine tooth at the angle of the mouth, and no scales are depicted on the head. "*Sparus rubecula*. ('Kurakura' aboriginorum.) Habitat prope 'Cape Kidnappers.' Corpus vivide rubrum, subtus pallidum. Pinna dorsalis saturate rubra, superne punctis fusco-sanguineis adpersa. Pinnae pectorales rubicundæ, immaculatæ. Pinnae ventrales pallide incarnatæ, apice rubescentes. Pinna analis ex aurantiaco-rubra. Pinna caudalis saturissime aurantiaca, fascia lata, nigra ad basin." "*Varietas pallidior*. Totus piscis pallidior, pinna dorsali incarnata, punctis lineisque sanguineis adpersa, pinna caudali flavicante, alias simillimus." (Solander, *Pisc. Austr.* p. 5.) In the figure the tint of the head is dark lake-red, that of the body lighter, and of the caudal yellow, with a lilac edging and a well-defined even black bar across its base.

Several other members of the genus described in the 'Histoire des Poissons' have one or more black bars on the tail or caudal fin, but they differ materially from *rubecula* in other characters. Among these are *Julis cingulum* and *J. caudimacula*. Mr. Gilbert's collection contains a species obtained at the island of Timor, which approaches very near to *caudimacula* (C. & V. xiii. p. 465), and it may be only a variety of that fish, but it offers a different distribution of colours, though it has the same black bar across the tail. As it has not actually been detected on the Australian coasts, a description of it is foreign to the precise object of this paper. The *Crenilabrus chabrolii* of Lesson, which is the *Cossyphus maldat* of the 'Histoire des Poissons,' has also a black bar on the trunk of the tail, but farther removed from the caudal fin than in *rubecula*. The fish also differs from the latter in the presence of conspicuous scaly fillets at the base of the dorsal and caudal, in the elongation of the ventrals, in the rounded caudal, in the brilliant streaks on the head, the rows of spots on the body, and in its very different general aspect, which is peculiar to the genus *Cossyphus*, while the *rubecula* has more the character of a *Julis*. The *Labrus ephippium* is another of the family which has its tail encircled by a black or deep blue ring. It has nine spinous rays in the dorsal, is well characterized by a saddle-shaped black patch on the back, and is supposed to be a native of the Javan sea. As the distance between Timor and the islands leading to Java is not great from the north-west coast of Australia, and their parallels of latitude differ little, we may expect to find much similarity in their ichthyology.

JULIS ? RUBIGINOSUS.

Sparus rubiginosus, Parkinson, Banks, Bib. fig. 2. 38. no. 4; Solander, Pisc. Austr. p. 7.

This fish was discovered on the coast of New Zealand on Cook's first voyage. Parkinson's figure was done after a specimen taken at Mattaruhow, and Solander has given the following account of the colours of one obtained off Kidnapper's Cape :—

“*Sparus rubiginosus*. Corpus pallide rubiginosum, macula oblonga transversali in singula squama. Caput rubrum subtus pallidum. Iris rubro-argentea; pupilla nigra. Pinna dorsalis livido-rubicunda, maculis sub-ocellaribus e viridi lutescentibus. Pinnæ ventrales et pectorales rubicundæ, immaculatæ. Pinna analis similis pinnæ dorsali, sed prope basin serie jam unica ocellorum rubicundorum. Pinna caudalis basi et lateribus e nigricanti-violacea, in medio olivacea. Habitat oceano prope Kidnappers.”—(Pisc. Austr. p. 7.)

Solander mentions, without describing, a variety taken at the same place. Parkinson's figure exhibits a fish having the same profile of the head and body with the *Julis decussatus* (Cuv. et Val. xiii. p. 433) figured in Bennett's 'Fishes of Ceylon' (No. 14), except that the height of the body is a trifle less, being contained thrice and one-half in the total length, caudal included. The mouth is small with thickish lips, which are represented shut, so that the teeth are not seen. The caudal is lunate on the margin, with the points acute and projecting about a fifth part of the length of the fin beyond the central rays. The spinous part of the dorsal is nearly even, or rather higher anteriorly, and contains nine or ten rays, which occupy somewhat less space than the jointed rays, of which about eleven or twelve are indistinctly indicated. The membrane is notched between the spines, the dorsal and anal terminate rather acutely, and their tips reach the base of the caudal. The pectorals are rounded and longer than the ventrals, which do not reach to the anus. The scales are large, and their uncovered discs have the form of vertical rhombs. There are several rows of small ones on the base of the tail. The lateral line is continuous, and has a sudden descending flexure opposite to the end of the dorsal. Four rows of spots are shown on the fore half of the anal, and three on the spinous portion of the dorsal.

The colours of the New Zealand *Labrus pæcilopleura*, as described in the 'Histoire des Poissons,' are not very dissimilar to those ascribed by Solander to the *rubiginosus*; but the *pæcilopleura* is not so high a fish, its caudal fin is square, its dorsal low, and its pectorals rather large.

JULIS ? NOTATUS.

Sparus notatus, Parkinson, Bibl. Banks. fig. 37; Solander, Pisc. Austr.

This is also a New Zealand fish, taken on the same voyage. Parkinson's drawing in outline is from an example captured
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in Totæranue, a cove of Queen Charlotte's Sound. Solander's description of one taken off Tolaga, in lat. $38\frac{1}{2}^{\circ}$ S. long. $181\frac{1}{4}^{\circ}$, is as follows.

"*Sparus notatus*. Habitat Tolaga. Piscis interdum pedalis, virescens, inferne albus. Squamæ dorsi et laterum postice fuscæ. Macula magna nigricans utrinque paulo pone medium. Iris flavo-argentea: pupilla nigra. Pinna dorsalis sordide e cinereo-virescens, maculis fuscis et rubentibus. Obs. pone maculam lateralem fasciæ duæ obsoletissimæ, fuscæ, seu nebulosæ. Pinnæ pectorales pellucentes cum pauxillo flavèdinis et rubèdinis. Pinnæ ventrales luteæ, marginibus albis. Pinna analis lutea, basi albido-nebulosa, maculis duabus nigris. Pinna caudalis lutescens vel rubescens. Obs. in capite infra oculos interdum lineæ vel maculæ oblongæ cæruleo-virides. Juniores pinnam dorsalem habent altius coloratam." (Pisc. Austr. p. 16.)

Parkinson's figure shows that this species resembles the *Julis decussatus* still more exactly in the form of the body than the preceding one, but the snout is a little more obtuse. The oval black spot on the flank gives it some resemblance to a *Cossyphus*, but the position of the spot below the lateral line distinguishes it from the described species of that genus. The caudal ends squarely, or with a very slightly concave line, the angles neither projecting nor yet rounded off. The dorsal rises very gently from the first spine to the end of the soft part, which is moderately rounded, and does not quite reach the base of the caudal: it contains nine spinous rays. The anal is lower. The pectoral is obliquely rounded, its upper angle being acute. The ventrals do not reach the anus. The scales are rather large, and their exposed discs have a vertical acutely oval or hexagonal outline. The lateral line is continuous, and bends suddenly under the end of the dorsal as in the preceding species.

A *Sparus stellatus* and *Labroides asellinus* are mentioned in the 'Pisces Australiæ,' but as their colours only are noted, and nothing is said of their forms, we cannot say whether they ought to be ranked in the Wrasse family or not.

ODAX VITTATUS, Solander's Odax.

Coregonoides vittatus, Solander, Pisc. Austr. p. 1 and 39.

Callyodon coregonoides, Parkinson, pl. 44. no. 2.

This fish was discovered on Cook's first voyage at Mattaruhow, on the coast of New Zealand. Solander has the following notices of it in his 'Pisces Australiæ.'

"*Coregonus vittatus*. Totus piscis castaneo-umbratus, subtus multo pallidior, et uti alibique argentum mixtum esset. Vitta ex incarnata argentea, utrinque per medium piscem, sub basi mandibulæ inferioris incipiens, sub oculos ducta per basin pinnarum pectoralium in media latera, ad basin pinnæ analis extensa. Sæpe maculæ parvæ violacæ in serièbus longitudinalibus per dorsum et latera dispositæ. Iris e viride argentea. Pupilla majuscula, violacea, nigra. Caput

læve, subconicum. Dentes quatuor, duo in utraque maxilla, granulosi seu denticulis obtusis arcte imbricati. Pinnæ abdominales in antica parte abdominis, pone thoracem ut potius piscis abdominalis quam thoracicus, etsi dentibus convenit Callyodontibus. Pinnæ omnes e fusco-castaneæ: pectorales et caudalis extus sordide rubicundæ." (p. 1.)¹

"Pisces adulti sesquipedales, a junioribus valde variant et proportione et colore. Adulti crassi sicut cum capite parvo subtus (h. e. gula) gibbosiusculo, abdomine late rotundato. Color adultorum fusco-cinereus. Vitta laterali e maculis magnis sordide carnes interrupta, non continuata. Br. 5; D. 34; A. 14; C. 14; P. 14; V. 5. Pinna dorsalis postice altior; radius postremus subduplex. Pinna analis itidem postice altior: radiis primis minutis. Pinnæ pectorales oblongo-rotundatæ. Pinnæ ventrales in thorace sed pone pinnas pectorales sitæ. Obs. Figura nostra exhibet pisces crassiorem, præcipue gulam." (p. 39.)

The figure here referred to is eleven inches and a half long, and represents a fish with a fuller head and more obtuse snout than *Odax semifasciatus* or *pullus* of the 'Histoire des Poissons.' The eye is farther from the profile than in either of these, and the body is less slender, its height being just equal to the length of the head and to one-fifth of the total length, caudal included. The dorsal undulates in its height: its first four rays are equal to each other, after which the fin gradually lowers to the thirteenth or fourteenth spine and then rises again, so that the posterior quarter of the fin is higher than the four anterior rays. The caudal is slightly concave, with its angles scarcely rounded. Parkinson has added the following note respecting the colours:—"The stripe on the side silvery, the spots on the P. D. and P. A. transparent. The membranes of the tail transparent, the spots on the side purple-gray." The back is tinted dark liver-brown, fading on the belly, with roundish spots below the lateral line ranging from the pectoral to the caudal.

George Forster's sketch of *Odax pullus* (202. Banks. Libr.), discovered in Queen Charlotte's Sound, New Zealand, seems, from a query appended to it, "*an Callyodon coregonoides?*" to have been considered by some annotator to be a representation of Solander's fish. The general proportions of the fish and the numbers of the fin-rays correspond, but the figure does not indicate the characteristic lateral stripe of *vittatus*, nor does the dorsal exactly correspond in shape, being even for two-thirds of its length, and then rising agreeably with the phrase in J. R. Forster's notes as quoted by Schneider (*Scarus pullus*, p. 288), "*pinna dorsi longitudinalis, primum æqualis dein adscendens.*" No spots are expressed in Forster's pencil sketch, nor are any mentioned by Schneider. The caudal is described by the latter as sublunate, and also by M. Valenciennes, who adopts the species; but his plate (No. 408) in the 'Histoire des Poissons' exhibits an even dorsal, a

greatly rounded caudal, and a much more slender head than that of *vittatus*. This plate is probably a representation of a fish procured by MM. Quoy and Gaimard at Port Western in New Holland, and unless the artist has erred in the form of the dorsal and caudal, it can scarcely be the same with Forster's *pullus*, and is still more evidently distinct from Solander's *vittatus*.

[To be continued.]

LX.—*Descriptions of British Freshwater Confervæ, mostly new, with observations on some of the Genera.* By ARTHUR HILL HASSALL, Esq.

GENUS DRAPARNALDIA.

Draparnaldia repetita. Filaments branched, consisting of a repeated series of cells, each of which is composed of five or six cells or utricles which gradually decrease in size from the first or lower cell, which is rounded below, to the last or upper one; a tuft of minutely divided filaments, similar to those of other *Draparnaldiæ*, arises from the superior cell of the series usually only on one side, but sometimes on both; the different series are not placed in a straight line immediately above each other, but are arranged somewhat in a zigzag or waved manner.

I have only once met with the above species, and then but in small quantity; it is therefore no less rare than it is curious. Each series of cells is an epitome of the entire plant, which consists but of an aggregation of these series. A sketch of it was forwarded to Dr. Greville, who did not hesitate to agree with myself in the opinion of its distinctness.

Draparnaldia elongata. Filaments very slender, ciliated; cells fasciated, usually three times as long as broad.

I once met with a considerable quantity of the above species in a horse-trough near Cheshunt: it is however by no means common.

Draparnaldia sparsa. Filaments highly mucous, very slender, sparingly branched; branches acuminate, not usually ciliated; cells rather broader than long.

This is by no means an uncommon species during the spring and early part of the summer, being attached frequently to dead leaves and sticks. In the fineness of the filaments, in the shortness of the cells, as well as in the excessive mucosity of its filaments, it seems to evince some relation to the genus *Chætophora* (a bad name, as the species of the genera *Batrachiospermum* and *Draparnaldia* are likewise chætophorous).

Draparnaldia condensata. Filaments of considerable diameter, sparingly branched; branches furnished with cilia; cells two or three times broader than long, and usually entirely filled with endochrome, which renders the demarcation of the cells but little apparent.

This is one of the finest and most distinct species of the genus. The only locality at present known for it is in a large fish-pond, opposite Mr. Bosanquet's school for girls, in the parish of Wormley, Hertfordshire.

GENUS VAUCHERIA.

Vaucheria aversa. Vesicles sessile, germinate, sometimes ternate, in form resembling a bird's head, the beak or summit of each vesicle being turned in opposite directions, so that a distinct horn or anther is required for each; anther depressed; spores circular, not filling the entire cavity of the capsule.

I have only once met with the above species, but then in considerable quantity and in great perfection. It differs from *Vaucheria sessilis* in the form of the vesicles, and the beaks are turned from and not towards each other as they are in all other species.

Vicinity of Cheshunt.

Vaucheria polysperma. Filaments minute; vesicles subsessile, varying in number from one to five, but usually there are three; in form the vesicles resemble an old-fashioned bill-hook, their beaks are long and point in the same direction; spores circular, not filling the entire cavity of the vesicles.

This species, which is by no means uncommon, may be distinguished from all others known to me by the fineness of its filaments, which are not half so large as those of our other British species. I at first thought that it might be identical with the *Vaucheria ornithocephala* of Agardh, but in that species the vesicles are represented to be pedunculated, and are either two or four in number.

It is remarkable to observe that in this *Vaucheria* there are no distinct horns or anthera, the base of each vesicle before its complete formation appearing to discharge the office of an anther.

Vicinity of Cheshunt.

Vaucheria hamata (syn. *Ectosperma hamata*, Vaucher, Hist. des Conf. d'eau douce, p. 26. pl. 11. fig. 2.). Vesicles solitary, pedunculated, the peduncle being divided at its summit into two short pedicels, one of which bears the spore and its capsule, the other the curved horn.

“ It differs from all the other *Vaucheriæ* by the manner in which it carries its grains. The peduncles which sustain them are very much elongated; they bear at their extremities two little threads, the one curved, into which is inserted the anther; the other, shorter and straighter, carries the grain. This *Conferva* expands its grains at the commencement of spring. I have seen it germinate in such a manner as that I doubt not that these grains are really the seed.”—*Vaucher*.

This is an abundant British species: I have met with it repeatedly in the vicinity of Cheshunt and other places during the springs of the past and present years.

Vaucheria repens. Filaments terrestrial; capsules sessile, solitary and avicular, or in the form of a bird's head; anthers curved and placed in close approximation with the capsules.

I have as yet been able only to find but one specimen of this species, which is to be distinguished from *Vaucheria Dillwynii*, the only species near to which it approaches, by the form of the capsules, which in the latter species are spherical.

In a foot-path near Roydon, Essex, February 21st, 1843.

GENUS ZYGNEMA.

Obs. Having recently had the opportunity of re-examining two of the three species of non-conjugating *Zygnemata* described in a previous paper, viz. *Zygnema angulatum* and *Z. intermedium*, as well as many other species not yet described, I have been able not merely to confirm the general accuracy of the statement formerly made of the production in certain species of spores without conjugation of the filaments, but also have ascertained two other particulars in reference to these most interesting productions.

The first of these relates to the fact, that union of the filaments does in some rare cases occur even in those species, in which the rule is, that the spores should be formed without conjunction; and this is nothing more than from analogy might clearly have been expected, nor does it in any way affect the importance or truth of the fact of the formation of spores in separate filaments.

The second particular is one of much interest, and has reference to the circumstance, that in some few instances more than two apparently perfectly formed spores—three, four, or even five—are placed in adjacent cells, and consequently that no empty cells intervene between them, as we should expect to find in all cases, were it an essential, that every true spore should consist of the mingled contents of two cells. But this is only an apparent exception to the law of the formation of spores by

the intermingling of the matter of two cells, which is applicable not merely to the *Zygnemata* but also to true Confervæ (*Vesiculaspermæ*) and the genus *Bulbochæte*; for although the mixing of the endochrome of two cells be necessary, *it does not follow that the whole of this should go to constitute a single spore* IN ALL CASES, so that, consistently with the above law, we may arrive at a satisfactory explanation of the juxtaposition of more than two spores, by supposing, that in these comparatively rare instances, *each* spore does not consist of the full amount of the contents of two cells; that where three seeds are adjacent that these are made up of the matter of five cells, that on either side of the terminal spore being empty; that where there are four, of the matter of six cells; and where five, the greatest number I have ever noticed, that these are constituted by the mingling of seven cells.

The above explanation will apply not only to the non-conjugating *Zygnemata*, but also to the group of *Vesiculasperms*, where there are more than two adjacent spores, an occurrence not of greater frequency than amongst the non-conjugating *Zygnemata*.

In one species of *Zygnema* which I have recently met with, and which is described in this paper, yoked and unyoked filaments occur plentifully, the conjugated being however by far the most abundant: the two forms of species would appear to be especially related through this species.

* Spores produced both with and without union of the filaments, but most frequently in the latter way.

Zygnema varians. Filaments of less diameter than those of *Zygnema inflatum*, Vaucher; cells usually four, five or six times as long as broad; spores elongated, formed either with or without union of the filaments, but generally in the former way, and lodged in cells, which become considerably inflated for their reception; extremities of cells inverted.

This species comes very close to Vaucher's *Conjugata inflata*, a species recently found by Mr. Jenner, but differs from it in the size of its filaments, number of spires, form of the inflated cells, as well as in the greater frequency with which union of the filaments takes place.

This species was first noticed by me in the vicinity of Cheshunt, since which time I have seen it amongst Confervæ sent by Mr. Ralfs, and within the last few days a very perfect specimen was forwarded to me by Mr. Jenner.

** Spores produced by conjugation.

Zygnema maximum, Annals Nat. Hist. for 1842.

This plant appears to be subject to considerable variety.

In most species of *Conjugata*, at the period of reproduction, a number of contiguous cells of one filament unite with the opposed cells of another filament, but the arrangement is different in specimens of this species in its ordinary state; in these it is usually only every second or third pair of cells which conjugate, and as soon as this conjugation is about to take place a very curious phænomenon occurs: the spherical granules contained within the spiral coil of the pair of cells which have united increase in size and deepen in colour, while at the same time those contained in the intermediate cells which have not conjugated become much smaller than they were previous to the union. The filaments with the cells thus united appear to the unassisted eye to be striated or banded. The above account, as well as the description given in the 'Annals' for September, apply to the species in its ordinary condition. Two varieties of it however occur: in the first the filaments do not differ in any material respect from the ordinary ones, but all the cells of each filament unite to form spores, as in other *Zygnemata*; this they do also in the second variety, but in it there are fewer spiral coils, usually six or seven, and these are filled with much larger granules than those of either of the previously mentioned conditions. The filaments of this variety, which may possibly be a distinct species, from the small number of the spires and large size of the granules, resemble in all save diameter those of *Zygnema nitidum*. In all the varieties, the spores are slightly oval, and are less than the calibre of the cell which contains them, the cavity of which they therefore do not fill.

Zygnema interruptum. Filaments of considerable length, and intermediate in diameter between those of *Z. maximum* and *Z. nitidum*; cells at the period of conjugation rather longer than broad, previous to this however they are frequently not half so long as broad; spiral coils numerous; spore oval, equalling in breadth the diameter of the cell, but not producing any inflation of it.

This fine species comes next to *Z. maximum* in size. It is estranged from *Z. nitidum* by the larger diameter of the filaments and the greater number of its spiral coils, these being not less than eight or ten; while from *Z. belle*, to which it bears considerable resemblance, it may be distinguished by a comparison of the filaments, which are considerably the largest in *Z. interruptum*; the number of spiral tubes is also somewhat greater in this. As in *Z. maximum*, in its ordinary condition, it is only every second or third pair of cells which unite, the granules, as in it, become likewise largest in the cells which have conjugated.

Zygnema rivulare. A variety of this species, described in the 'Annals' for September 1842, is sometimes met with during the autumn in water-courses, which differs from the ordinary condition of the species in having cells varying in length from twice to four times their diameter, and in being of a deep green colour. The species in its ordinary state is generally found attached to stones, and in streams near the margin where the current is slow. In specimens procured from such places the filaments are of a yellowish green colour, and the cells much longer. There is no question of the specific identity of the variety with the species proper.

Zygnema æstivum. Filaments of less diameter than those of *Z. quininum*; cells usually about four times as long as broad, but sometimes much longer and occasionally shorter. A single spiral tube occupies the cells, passing from side to side in right lines.

This species is by no means uncommon, and was for a long time confounded by me with the *Z. quininum* of Ag., from which it differs in its smaller filaments, longer cells, and peculiar zigzag disposition of the single spiral tube.

Cheshunt.

GENUS MOUGEOTIA.

Mougeotia brevior. Filaments about equal in diameter to those of *Mougeotia genuflexa*; cells usually twice as long as broad, but sometimes nearly four times as long. Conjugation angular, without the intervention of tubes.

I do not think that there can be any question of this being specifically distinct from *M. genuflexa*, to which species its filaments however bear considerable resemblance, owing to the endochrome being of the same yellowish green colour.

Vicinity of Cheshunt.

Mougeotia dubia. Filaments about equal to those of *M. genuflexa* in diameter; cells usually either four or eight times as long as broad, but mostly only four times. Conjugation angular and without the intervention of transverse tubes.

This species may possibly be merely a variety of *M. genuflexa*, a doubt which I have indicated in the provisional name.

Vicinity of Cheshunt.

Mougeotia flava. Filaments about equal to those of *M. major*; cells varying in length from rather better than twice to nearly five times their diameter, but being generally three or three and a half times as long as broad. Conjugation angular, without the intervention of tubes.

The above appears to be one of several species which have all been confounded under the name of *M. genuflexa*.

Vicinity of Cheshunt.

Mougeotia quadrangulata. Filaments of less diameter than those of *M. cærulescens*; cells usually six times as long as broad; sporangium quadrangular.

This very interesting species I for a long time confounded with the *M. cærulescens* of Capt. Carmichael, an error which I was enabled to correct through the kindness of Mr. Ralfs, from whom I have received more than one fine specimen of that production.

The present species differs from *M. cærulescens* in having finer filaments as well as in the form of the sporangium. In *M. cærulescens* the sporangium is somewhat cruciform, while in *M. quadrangulata* it is quadrangular.

Found in the early part of the spring of the past year (1842), at High Beech, Epping Forest.

Mougeotia parvula. Filaments as slender as those of *V. bombycina*; cells usually six times as long as broad; endochrome imperfectly divided into two roundish masses; spores circular, lodged in the transverse tubes.

I at first regarded the above species as the *Zygnema ordinarium* of the Rev. M. J. Berkeley, but that gentleman informs me that the filaments of his species exceed in diameter those of *Z. elongatum*, a much more robust Conferva than mine.

Vicinity of Cheshunt.

Vesiculifera vernalis. Filaments more robust than those of *V. Mulleri*; cells usually six times as long as broad; spores circular, contained in inflated cells, which are somewhat narrower at one extremity than the other.

This species, which I have twice found since the commencement of the present year (March 4th, 1843), once at High Beech and again near Waltham Abbey, approaches very closely to *V. Mulleri*, from which it may be known, however, by its stouter filaments as well as the less regularly spherical form of the seed-bearing cells.

GENUS SPHÆROPLEA.

Since the publication of my papers on the Vesiculasperms, in which some remarks occurred relative to the reproduction of the genus *Sphæroplea*, I have received some very interesting observations respecting one of the species of that genus from Mr. Ralfs of Penzance, which I cannot do better than transcribe in the writer's own words.

“I believe you to be quite correct about the *Vesiculaspermæ*,

and the specimens I sent from Ilfracombe, *V. princeps*, were an example of its truth. Subsequently to calling your attention to the vegetating spores, I found these to elongate and divide into two joints, the rudiments of the filaments, but I cannot agree when you consider the *Sphæropleæ* to have spores similar to those of the *Vesiculaspermæ*. In the *Conjugatæ* and *Vesiculaspermæ*, the mass as it approaches to maturity becomes denser and appears of a more homogeneous texture. In *Sphæroplea*, on the contrary, the granules are larger and more distinct in its advanced state, and my experience distinctly proves these granules to separate and move about with a very rapid motion resembling that of animals. This motion I first had an opportunity of seeing in *Draparnaldia tenuis*, and found it to agree with Agardh's description in all respects, excepting that I did not see them rupture the cells to escape.

“ At Ilfracombe in June last, for the first time, I gathered *Sphæroplea crispa*, and examining the specimens within a few minutes after they were gathered, I perceived to my surprise some of the round masses, after escaping from the top of the filaments, separate into several largish granules, of which each of these masses was composed, and these then to dart about with rapid motion; and in order to have witnesses, I called up the people of the house where I was lodging and told them to look into the microscope and tell me what they saw, and they said that numerous minute insects were darting about amongst the filaments of the plant. On my mentioning the circumstance to Mr. Borrer, he informed me that many years ago he had observed the same thing to take place in the *Conferva bicolor*, and that Mr. Dillwyn, on his relating it to him, said that he supposed ‘the plant had taken physic for worms;’ and this tended to confirm me in the opinion of the identity of *Sphæroplea crispa* with the *Conferva bicolor* of ‘English Botany’.

“ Subsequently on gathering the plant at Dolgelly, I observed the granules, which are slightly angular, move, but only slowly, and a few days after, when I gathered some in order to show the motion of the granules to my friend the Rev. T. Salwey, I was unable to detect any motion at all.”

In a second communication Mr. Ralfs further observes, “ I omitted in my last to give Mr. Berkeley as another observer of the motion, &c. of the granules in *Sphæroplea crispa*. When I found it at Ilfracombe I immediately sent off a specimen to Mr. Berkeley, and it was not until the next day that I discovered the activity of the granules, of which I the same day informed Mr. Borrer on sending him a specimen. Some time afterwards I received an answer from Mr. Berkeley with

sketches of his and my plants, and against his sketch is written "the granules separate into most active Zoosperms." Thus (supposing the *Conferva bicolor* to be the same) we have three different observers noticing the motion in this plant, neither of us being aware at the time of its having been noticed by the others."

If there be no fallacy connected with the above highly interesting remarks, and it can scarcely be supposed that there is any, since the singular motion of the granules into which each of the larger masses found in *Sph. crispa* is said to separate, is not only attested by so many able observers in our own country, but was likewise especially witnessed in this same species by Agardh himself, for the *Conferva zonata*, one of the three species more particularly submitted by him to examination is assuredly none other than the *Conferva bicolor* of 'English Botany,' and this again, it is equally certain, is the *Sph. crispa* of the Rev. M. J. Berkeley as well as *Conferva lucens* of Mr. Dillwyn. It would appear that I have erred in regarding the large condensed masses of endochrome found in the cells of *C. zonata* as true spores, an opinion which I at no time entertained without a degree of misgiving. Nevertheless I still think that I am correct in ascribing the formation of these masses to the intermingling of the contents of adjacent cells in the same filament, whereby fecundation may be supposed to be effected, and which intermingling I have shown to occur so invariably in the *Vesiculaspermæ**.

The only undoubted species which can at present be referred to the genus *Sphæroplea* is the *Conferva zonata* of Weber, and this would appear to present a threefold relation with other freshwater Confervæ; first, with the *Conjugata* in the excessive mucosity of its filaments; secondly, with *Vesiculasperms* in its attenuated filaments and in the intermingling of the contents of two cells; and lastly, with the branched Confervæ in the other particulars of its reproduction, amongst the species of which group it should find its station.

The following species, if not to be regarded as a *Sphæroplea*, should be referred to the genus *Lyngbya*, and which differs but slightly, and perhaps not in any material respect, from *Sphæroplea*.

Sphæroplea? *vermicularis*. Filaments very mucous, floating, of a light green colour, in diameter but little exceeding those of *Vesiculifera bombycina*; cells usually not quite so long

* I am now able to add my own testimony to the correctness of the above remarks. In my specimens, however, the synspores did not escape at the top of the filament, but by apertures in the cells occasioned by their bursting.

as broad, but sometimes much longer and slightly inflated; endochrome at the period of reproduction becoming moulded into spherical masses similar to those of *Sphæroplea zonata*.

This species may generally be met with throughout the year in boggy pools at High Beech, Epping Forest.

GENUS MELOSEIRA.

The reproduction of this genus does not hitherto appear to have been at all understood; I believe, however, from the occurrence of vesicles on the filaments similar to those of the *Vesiculaspermæ*, that it will find its true position with these. In the tapering of the filaments, in the absence of gloss on them, and in the possession of strongly marked points, the *Meloseiræ* likewise resemble the *Vesiculaspermæ*, from which they differ principally in the excessive fragility of their filaments, by which they evince an affinity with diatomaceous productions.

The only species in which I have noticed these vesicles is in the *Meloseira varians* of Agardh; a production which I was led, from the presence of the vesicles, to describe as new in the paper upon the *Vesiculasperms* under the name of *V. composita*. Kützing however figures them with his *Meloseira orichalcea*, a species which I was so fortunate as to find in considerable quantity in the vicinity of Cheshunt in the autumn of the last year.

Since these descriptions were written I have had the pleasure of receiving some of the plants described from Mr. Ralfs and Mr. Jenner, the habitats for which I subjoin:—*Draparnaldia sparsa*, Penzance, Mr. Ralfs; *Mougeotia quadrangulata*, Penzance, Mr. Ralfs; Fisher's Castle, Tunbridge Wells, and Broadwater Forest, Mr. Jenner; *M. parvula*, Penzance, Mr. Ralfs; near Cross-in-hand, Waldron, Mr. Jenner; *Vesiculifera vernalis*, near Tunbridge Wells, Mr. Jenner; Penzance, Mr. Ralfs; *Sp. vermicularis*, Penzance, Mr. Ralfs.

The following species described in this paper were recorded on the wrapper of the 'Annals' for August 1842:—*Draparnaldia sparsa*, *D. elongata*, *D. repetita*, and *Sp. vermicularis*.

LXI.—*On the Sacculi of the Polygastrica*. By JOHN WILLIAM GRIFFITH, M.D., F.L.S. &c.

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

GENTLEMEN,

If you will find a place in your valuable Journal for these observations on the Polygastric Animalcules, I shall feel obliged by your inserting them.

Your obedient servant,

JOHN WILLIAM GRIFFITH, M.D.

9 St. John's Square, May 8th, 1843.

The real nature of the sacculi, vesicles, or stomachs which are seen in the bodies of the Polygastric division of Infusorial Animalcules is a point which has occupied considerable attention, and is at the present time by no means satisfactorily determined. The extreme minuteness of these bodies renders their examination a matter of very considerable difficulty, and what has hitherto been discovered concerning their digestive cavities has been principally, if not entirely, recognized by the introduction of foreign colouring matters into the sacs; which colouring and other matters being moulded by the compressing force or elasticity of the containing sac or substance forming the walls of the cell in which they are contained, assume its shape, and are readily distinguished from the transparent parts of the animalcules by their opacity or altered refractive properties of light. Great difficulty is also experienced in conducting the manipulations which are required for examining such minute atoms, and an unusual share of patience and care. The rapidity of their movements is also, without extreme caution, liable to mislead the microscopic observer.

It is well known that when the animalcules denominated Polygastrica are examined under the microscope, certain sac-like bodies are observed in different parts of their bodies; these are sometimes filled with various coloured particles, similar to those floating in the water in which they live, sometimes merely with fluid or semifluid matters. These bodies, called by Prof. Ehrenberg stomachs, are variable in number and situation, and in some cases entirely absent.

An opinion that these sacculi were ova was formerly entertained by Gleichen, but this has long since fallen into disrepute; and justly so, inasmuch as the different matters which constitute the food of these minute animals has been, and can readily be, traced into the vesicles, which is sufficient to indicate their connexion with the digestive and not the reproductive system. The *Vorticellæ*, among many others, are particularly well adapted for the examination of these sacculi, on account of their large size, fixed position, or nearly so, and their great abundance.

Prof. Ehrenberg's view, that these vesicles are real stomachs or blind pouches leading out of an alimentary tube, is well known, and has been received for some time. It was founded upon the fact, that colouring and other matters upon which they feed, after having been drawn into the oral orifice of the canal, are next conducted to these cavities, where they remain a certain time; they are then propelled onwards, sometimes into other similar cavities, sometimes through the tract of the canal to the opposite extremity of the tube, whence either they or their undigested remains are expelled, or they are ejected by the same orifice at which they entered. Lately doubts have been thrown over these views, and many accurate observers are opposed to the doctrines of Ehrenberg. Having had considerable opportunities of observing these interesting objects under a great variety of conditions, I am convinced that the views of the different authors which I shall presently mention are each *generally* correct, and that with slight modifications they are readily reconcilable to one another. Professor Rymer Jones* says, "The positions of the mouth and anal aperture we are well assured by frequent examination to be such as are indicated by the illustrious Professor at Berlin; but with regard to the tube named by him intestine and the stomachs appended thereto, our utmost patient and long-continued efforts have failed to detect the arrangement depicted in his drawings. In the first place, as regards the function of the sacculi, which he looked upon as organs in which digestion is accomplished: in carnivorous animalcules which devour other species, we might expect, were these the stomachs, that the prey would be at once conveyed into one or other of these cavities; yet, setting aside the difficulty which must manifestly occur in lodging large animalcules in these microscopic sacs, and having recourse to the result of actual experience, we have never in a single instance seen an animalcule when swallowed placed in such a position, but have repeatedly traced the prey into what seemed a cavity excavated in the general parenchyma of the body. In the second place, the parenchyma has no appearance of being pedunculated, and consequently, in a certain degree fixed in definite positions: during the last two hours we have been carefully examining some beautiful specimens of *Paramecium aurelia*, an animalcule, which from its size is peculiarly adapted to the investigation of these vesicles; and so far from their having any appearance of connexion with a central canal, as represented in the figure copied from Ehrenberg, they are in continual circulation, moving slowly upwards along one side of the body, and in the opposite direction down the other,

* 'A General Outline of the Animal Kingdom.' Although these views have been previously extracted into this Journal (vol. iii. p. 105.), as Professor Owen's observations obviously apply to some part of them, the subject would be incomplete without them.

and resembling in every respect the coloured granules which have been described as visible in the gelatinous parenchyma of the *Hydra*. With respect to the central canal, we have not in any instance been able to detect it, or even any portion of the tube seen in the figures, much less the branches leading from it to the vesicles or stomachs, as they are called. Even the circumstances attending the prehension of food would lead us to imagine a different structure; witness, for example, the changes of form which *Enchelys pupa* undergoes when it devours an animalcule almost equal to itself in bulk, and is seen to assume a perfectly different shape as it dilates its mouth to receive the victim, with which its whole body becomes gradually distended. Such a capability of taking in and digesting a prey so disproportionate would in itself go far to prove that the minute sacculi were not stomachs, as it evidently cannot be in one of these that digestion is accomplished." Professor Jones then says he considers that there is an analogy between the organization of the so-named *Polygastrica* and of the *Hydra viridis*. He also says, "that the vesicles becoming coloured by the coloured food given to the animalcules cannot be considered as a proof of their being stomachs, as in the experiments of Trembley, the granules circulating in the body of the *Hydra* became dyed with the juices of the animals with which it was fed precisely in a similar manner."

M. Meyen says* he never admitted the observations of M. Ehrenberg, because in the first place "I never could see the intestines which form the communication between the stomachs, and likewise because I have observed, many years since, that the supposed stomachs were moving in the interior of the body of many species with great rapidity, in the same manner as the granules which circulate in the joints of the *Chara*. I have often seen *Vorticellæ* with nine or ten large globules of indigo in the belly, which always moved round a centre, and thus showed in the most evident manner that they could not have a communicating canal between the stomachs provided with an oral orifice and an extremity directed to the mouth." M. Meyen considers that the inner surface of the first part of the canal is provided with cilia, which roll up alimentary and colouring matters into the form of a ball. When the ball has acquired the size of the stomach, it is expelled by its other extremity and pushed into the cavity of the animal. If solid substances do not exist in the surrounding liquid, then the balls are less solid, and appear in the forms which they present in the Infusoria existing in colourless liquids. "In this case the balls are composed of a small number of particles, and principally of a considerable mucous mass which unites them."

* Annals. of Nat. Hist. vol. iii. p. 100; also inserted in Pritchard's 'Gen. Hist. of Animalcules.'

The observations of Mons. Dujardin on this subject will be found in vol. iii. p. 170. of this Journal.

The objection (which M. Dujardin considers well-founded) advanced by M. Bory de St. Vincent, again presented by Dr. Foeke and Prof. Rymer Jones, the latter of whose words we have just quoted, rests on the inner motion of the globules or sacculi, which "can in no way be reconciled with the hypothesis of an intestine connecting all these globules together, and which, on the contrary, proves their entire independence." The reader will be able to estimate the validity of this objection when he has perused the remainder of this paper.

The following are the observations of Mr. Addison on this subject*:—"A singular fact † is stated with regard to the animalcules; it may be witnessed in all of them by the liquor potassæ. It penetrates the transparent tunic composing the body of the animalcule by imbibition, and soon causes it to burst open or explode, and the so-called stomachs of the creatures are forcibly discharged or thrown out one after another, thus becoming objects for minute microscopical scrutiny. The stomachs (?) swell and burst in like manner, precisely as the granules discharged from the lymph corpuscles of the frog. These stomachs he believes to be granulated vesicles performing their functions by imbibition, and not by assimilating or digesting food voluntarily taken. The vital powers of the animalcules are totally inefficient in opposing the imbibition of the poison, and their stomachs may be seen enlarging in the interior of the body prior to the rupture of the integument."

Dr. Carpenter says ‡, Ehrenberg's account of the numerous globular particles has been objected to by other observers, on the ground that these particles are seen to undergo a regular movement, as if they were floating in the midst of a fluid filling the general interior cavity of the body, and that they are sometimes discharged through the anal orifice. Of the validity of this objection his own observations have satisfied him. I cannot (says he) "doubt that these particles are cells which float in the fluid of the body, and elaborate the materials of its nutrition in the same manner as do those of the chyle and blood of higher animals."

Professor Owen's observations § answer some of the objections which have been raised to Ehrenberg's views. He says (speaking of the *Enchelys pupa* swallowing another animalcule nearly equal to itself in bulk, and thereby undergoing a total change in the form of its body), "but this may only imply great dilata-

* Prov. Med. and Surg. Journal, Aug. 20, 1842.

† These are not Mr. Addison's words, but an extract from his paper read before the British Association made by the editor of the journal.

‡ Brit. and For. Med. Review, Jan. 1843.

§ Hunterian Lectures, 1843.

bility of the œsophagus or common canal, such as we observe in the boa constrictor, which becomes in like manner deformed after gorging a goat or other animal much thicker than itself; doubtless the little sacculi successively receive and digest, like the stomach of the boa, the dissolved parts of the swallowed prey. Then again it is objected that the sacculi are not fixed in definite positions, but are seen constantly, though slowly moving, and apparently rotating through the general cavity of the animal. But the peristaltic wave-like undulations of a common connecting canal, by drawing them successively in and out of focus of the observer, is quite sufficient, and very likely to occasion the deceptive appearance of their circulatory movements. If these stomachs were actually separate and closed sacs imbedded in the transparent gelatinous plasma of the animalcule and endowed with a circulatory movement, it is inconceivable that they should commonly present the characteristic arrangement which Ehrenberg has described and figured in particular species; as for example in the *Vorticella*, a circular arrangement, or the wavy disposition in *Leucophrys*; yet such a constancy in the arrangement of the assimilative sacs in these genera is the result of my experience. Add to this, if they have not orifices of communication with the alimentary tract, the difficulty of accounting for the rapid and ready transmission of the coloured aliment into their interior without the surrounding parenchyme being stained."

In support of the views of Prof. Ehrenberg I refer the reader to vol. ii. p. 121. of the 'Annals,' wherein is contained an account of a discussion between this indefatigable observer and Prof. Jones. It will there be found that Ehrenberg considers the objection of Prof. Jones's not having been able to detect the stomachs in one or two instances as not sufficient to bring into doubt "the mass of relations which have been gradually established after many years of observation." Moreover, Prof. Ehrenberg says that *Paramecium Aurelia* is unfavourable to such observation, and that he himself has not been able to recognise the alimentary canal in all the species of the various genera. The Berlin Prof. says he had seen the circular motion of Prof. Jones, and states that "the great contractility of the body of the animalcules was, to less practised observers, not seldom a cause of enigmatical phenomena, of which continued patient observation of the object would gradually bring the explanation. Thus at times the intestinal canal of the animalcule extends at the expense of the ventral sacs so far, that it occupies the whole space of the body, and then the devoured substances, very similar to the ventral sacs, circulate in the whole body." He then gives three sketches of *Loxodes Bursaria*, wherein the first represents the animalcule in its ordinary state, with the alimentary canal and sacculi; the second, where

the direction of particles in the alimentary canal is depicted; and the third, where the currents or motions of particles are indicated in the distended intestinal canal.

In addition to this, I refer to the Proceedings of the Royal Prussian Academy of Sciences at Berlin for Feb. 1841*, wherein is related an account of the observations of Dr. Werneck, which agree in support of those of Prof. Ehrenberg; nay, go further, for Dr. Werneck renders more probable than heretofore, that the alimentary canal exists in all the Polygastrica.

I extract the following observations from the report of Prof. Ehrenberg on Dr. Werneck's discoveries as made to the Academy: "Indeed what I, from caution, mentioned as only a supposition, viz. that probably even in the monads (*Bodo socialis*) a distinct anus, consequently an intestine, existed, whereby then the division of the *Anentera* would be destroyed, is shown by Dr. Werneck to be decided. He also has discovered the anus in *Bodo grandis*, *Prorocentrum micans*, *Cyclidium Glaucoma*, whereby the family of *Pseudopoda* only would remain without an alimentary canal. But he has also seen in a *Navicula (undulata)* among the Bacillaria group, a convoluted canal, which he considers as the alimentary tube, filled with infusoria. Most interesting are the representations (Dr. Werneck's) of many varieties of intestinal canal with their sacculi or globular pouches or recesses, which present exactly the same appearances as those laid before the Academy in 1830, but lately denied by Prof. Rymer Jones and Meyen after imperfect examinations."

I shall now make some observations on the various statements I have enumerated, and point out in what particulars they disagree with my own experiments. In the first place, as regards our not being able to see the alimentary tube, this I cannot imagine to be any impediment or ground for our disbelieving its existence. Doubtless the whole substance of the gelatinous bodies of these minute beings is very elastic, and the walls of the tubes in which the alimentary matters are conveyed are always in apposition except when alimentary matters separate them. The outline of the intestine in many of the Infusoria depicted by Ehrenberg has been, without doubt, drawn from the course which that illustrious observer has noticed the granules of colouring matter and food to take. In fact, he says, "In many this direct observation is impossible, although the result, viz. the colouring of the filled stomachs, is evident†." The solid particles cannot arrive at the sacs in which they are contained and accu-

* Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königl. Preuss. Akademie der Wissenschaften zu Berlin, im Monat Februar 1841.

† Die Infusionsthierchen als vollkommene Organismen, page 2.

mulated without passing through some communicating canal; this canal is part of the intestinal tube. The minute alimentary particles which arrive in the sacs entire could not be conveyed in that state by solution and imbibition. Moreover we cannot, I think, wonder at our not being able to detect the walls of the tube; first, because, as I have previously mentioned, the elasticity of the substance of the animalcule would keep the walls in contact except where actually distended; and secondly, the minute size of such a canal, and our being obliged to view it through the substance of the animalcule which intervenes between the sacculi and the upper surface of their bodies as lying under the field of the microscope, is well calculated to prevent this. Could we make a delicate transverse section of their bodies, we might then perhaps be able to perceive the tube. M. Dujardin's objection to the existence of an intestine in Infusoria, "that no fibres remain when the animal is decomposed by diffuence," is undoubtedly futile; it must indeed require a subtle imagination to expect we can see or even contemplate the size of the fibres of the intestine of the Polygastrica, whose diameter, did they exist, must be almost beyond the power of calculation, much more of vision. That the masses of colouring matter which have been received into the sacculi revolve or circulate, as it has been called, is a truth which is very readily proved. Currents are established by the oral cilia; particles floating or suspended in these currents are drawn into the mouth of the minute creature, these then enter the body one at a time, and apparently accumulate in one of the sacs (*i. e.* really accumulate in the upper portion of the alimentary tube); this then moves down one side of the animalcule; others are filled in the same manner. The circulation, as it has been called, of these alimentary boluses may then, after having been distinctly followed down one side, be seen returning in an ascending direction. In some cases when these masses have arrived near the oral extremity they can be detected approximating the depression by which they entered, until at last their contents are gradually ejected; when the masses are solid, this ejection often takes place particle by particle; when in the liquid or semifluid state, in a fine stream; the sac can be seen emptying itself of its contents; it then disappears. In some of the animalcules this movement of particles may be very readily detected; it is very tardy in others, and seldom visible at all times. The addition of reagents to the liquid in which they live produces effects somewhat similar to vomiting or purging; the motion of the alimentary boluses is increased, and their ejection is easily viewed; weak solutions of potash or æther produce this effect. Now in all these cases of movement I am convinced that it is not the sacculi or stomachs which move: we must recollect the sacs are made visible

to us by their contents, and in many cases there are no stomachs visible when they are empty, and it is their contents which we see circulating or moving in their proper canal or alimentary tube, and not the sacculi themselves. The motions of these masses may not inaptly be compared, but merely for the sake of illustration, to those of the alimentary masses in our own intestines; the revolution of these (if viewed under similar circumstances) would produce the appearance of circulation; when the masses have arrived at the termination of the canal they are ejected, but here the portion of tube or stomach is not ejected. This comparison exemplifies to my mind the true nature of the sacs in the Infusorial Polygastrica.

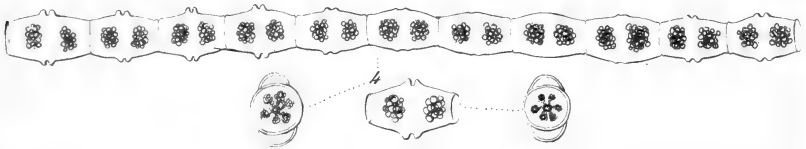
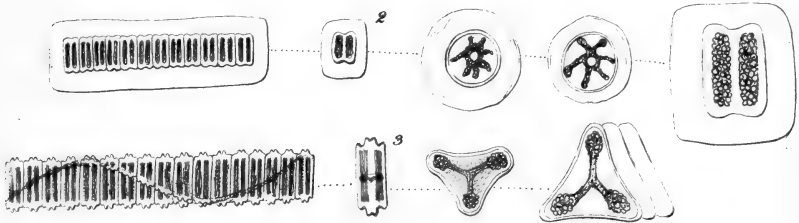
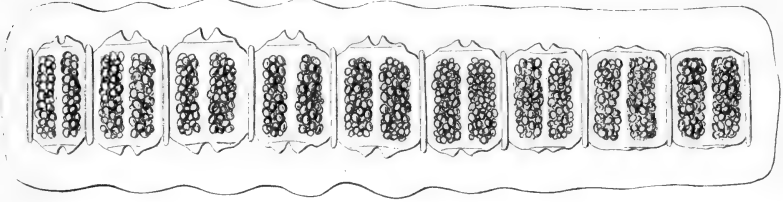
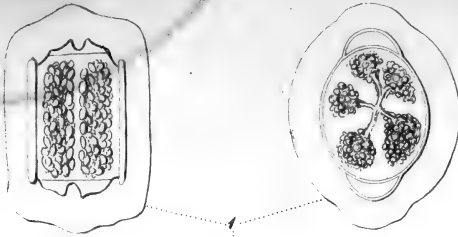
We certainly cannot admit, as in the explanation of Prof. Ehrenberg, that the rotation of the globules or balls of alimentary matter takes place in a cavity formed from a distended portion of the alimentary tube. We see this rotation when the intestinal tube is very slightly distended and when the balls of food are very small; but I believe it to be capable of explanation in the manner I have stated; the appearance of one of the sacculi when really distended is so readily recognised that it could hardly be mistaken; but the stomachs (*i. e.* their contents) have been seen to rotate, by observers, when neither the animalcule nor its stomachs are at all distended; and undoubtedly this is a real rotation, not an optical illusion from any peristaltic action. Moreover the rotation of these bodies is so constant as to be considered as their *ordinary* state; whereas, did it arise only in distended states of a stomach or the alimentary tube, it would be rare, or at least only to be seen when the animalcule takes in a large portion of aliment; and I think that any one who has distinctly seen (as I often have) various floating alimentary particles taken in at the oral orifice separately, then accumulating into a small ball, and this ball descending in the body of the animalcule, and "circulating" as I have described, will be convinced that this explanation is correct.

I cannot believe they are recesses from a common tube; I have never been able to detect a horizontal or retrograde course which would be pursued by the boluses, were such the case. The alimentary canal is most commonly in a convoluted form, or coiled; and there is doubtless a difference in the extent and arrangement of the tube in those which feed upon other animalcules and those on vegetable matter. The fact of the portions of food contained in their sacculi being gradually approximated to the surface of the depression, and there being separately emptied, is, I think, a clear conviction that there can be no single stomachal cavity, and also, that the rotation of particles does not take place in a single dilated tube. Moreover it must be recol-

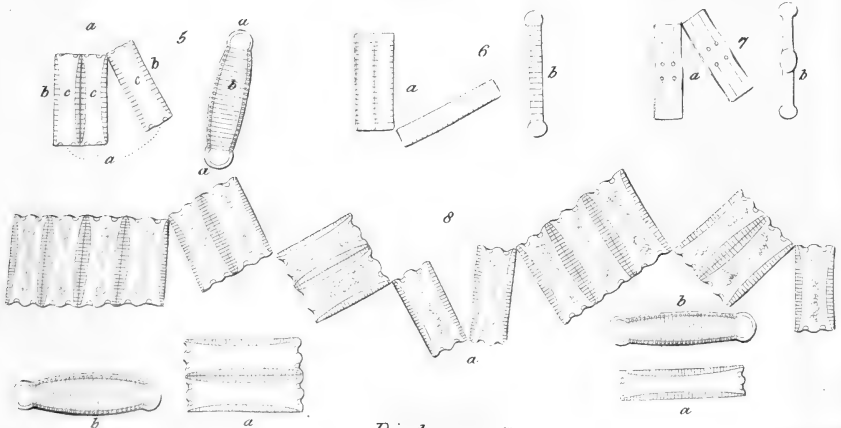
lected that the different portions of the intestinal tube or sacculi are not stained, they are coloured from their cavitory contents, their walls are colourless. M. Meyen's opinion concerning the cilia I have not been able to verify; but the rolling up of the alimentary matters, whereby these masses rotate on their axes, is never to be seen. The account given by Mr. Addison concerning the action of liq. potassæ is, as has been observed, very remarkable. The best mode for the observer to perceive the true effects of potassa on the *Polygastrica* is to use it slightly diluted, for when used of the strength of the ordinary liquor potassæ, the effect takes place so suddenly as to lead to the inaccurate interpretation of the appearances that gentleman has given. The effect of the addition of this reagent, is solution of the external covering of the animalcule, whereby the internal elastic parts of the body, being liberated from the compression of the external tunic, at first rush out, but are soon dissolved in the same manner, when the alimentary matters remain. This phenomenon is the result of the chemical action of the potash on the substance of the highly elastic animalcule, most certainly not of any imbibition or endosmosis. What are the conditions of the fluids requisite for the production of this physical phenomenon? Difference in their density; the liquid in the cavity towards which the fluid flows must be the most dense. The cavity of the body, supposing such to exist, must contain a fluid of greater density than that in which it floats or is suspended; in most of these *Infusoria* it is so at all times, and their medium* being of extremely low specific gravity, almost equal to that of distilled water, the most favourable conditions for the action of imbibition are combined; yet no endosmosis and consequent bursting takes place. But we are told that when solution of potash, a liquid of much greater density than that of the medium in which these minute atoms are immersed, is added to their ocean, imbibition does take place, their bodies burst; whereas we have added the conditions requisite for the opposite effect, viz. that of exosmosis, and that this does not occur, the "bursting" of the body of the animalcules proves. I believe the greater part of the confusion which has existed on this subject has arisen from considering the alimentary matters in different portions of the intestinal canal as the dilated portions of that canal themselves. That these particles (stomachs) are cells which float in the fluid of the body and elaborate the materials for its nutrition, in the same manner as do those of the chyle and blood of higher animals, may certainly be correct, but we have not the slightest evidence of any analogy between them. The globules of the blood and lymph are contained in those fluids, from whose

* I allude to the water in which they ordinarily exist.



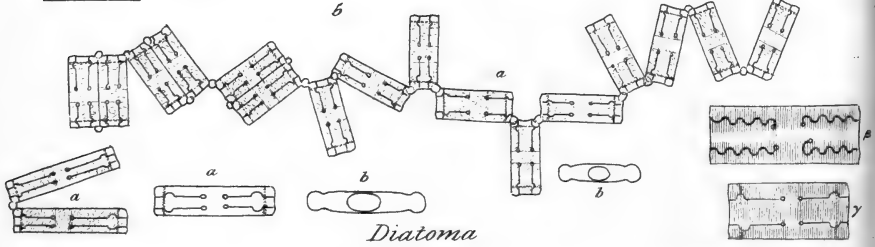
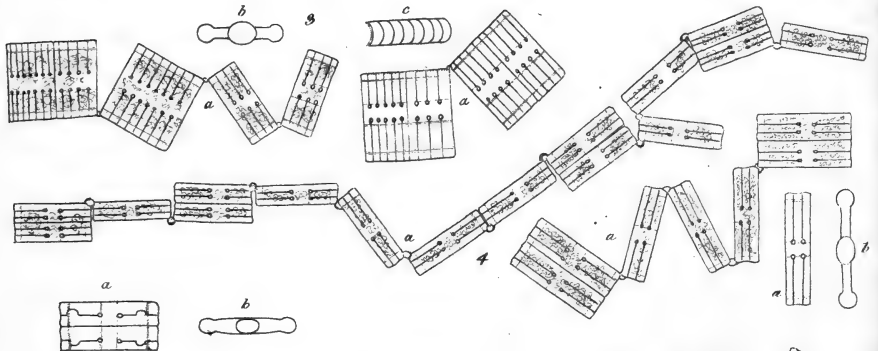
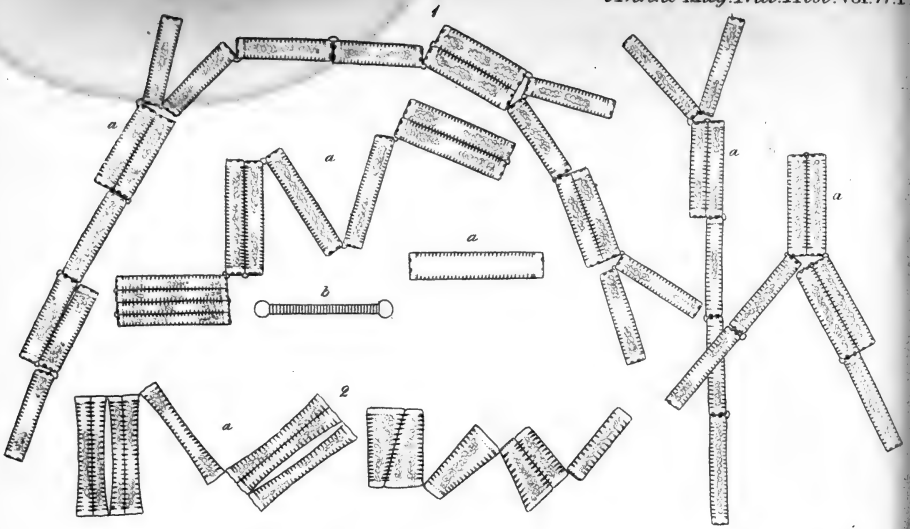


Desmidia.

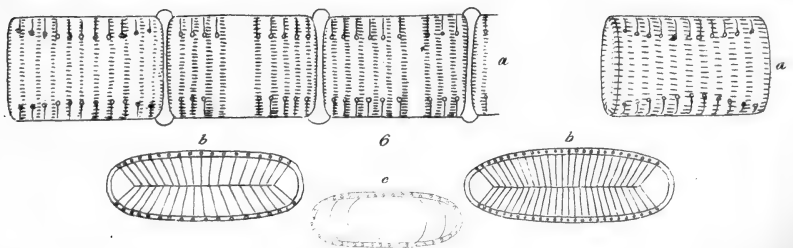


Diatomacæ.





Diatoma



Striatella arcuata.

liquid parts doubtless the whole fabric of the body is renewed or nourished.

Now if the sacculi of the Polygastrica perform the same functions, as regards the fluid in which they are suspended, as do the suspended particles in the chyle and blood, where is the fluid in which these sacculi are suspended? It has certainly never been demonstrated; and the only experiment upon which such a view can have been based, is that of the action of imbibition, and which is undoubtedly an error. Moreover, were this view correct, the cavity of the animalcule would be that in which the blood, so to speak, of the animalcules is contained; and what a remarkable anomaly would be the introduction of a large animalcule into the cavity in which the blood is contained, as would undoubtedly be the case in the carnivorous Infusoria, were such a view correct! Again, foreign alimentary solids have been traced into and detected in the sacculi; but solid alimentary matters have never been traced into, or detected within, the blood or chyle globules.

In conclusion we must remark, that all the phænomena relating to the digestion and circulation of the Polygastrica may be explained—1. By the existence of an internal convoluted alimentary canal, whose existence is made known to us by its contents and the course they take. 2. These contents, sometimes solid, sometimes fluid, or semifluid, distending different parts of the canal, in which they are detained, produce the appearance of vesicles or sacs, which have been denominated, and probably perform the real office of stomachs. 3. That the portions in which the contents are delayed are not blind pouches leading from a common tube seems positive, from the circular direction assumed by these contents, which indicate its direction. 4. There is, without doubt, a difference in the length and direction of the alimentary tube in the Polygastrica as well as in other animal beings, depending upon variations in the nature of their food. 5. When solution of potash is added to the liquid in which these atoms exist, it dissolves the external tunic, and liberates for a short time its contents; these are next partly dissolved, when nothing is left but the alimentary matter.

LXII.—On the Diatomaceæ. By JOHN RALFS, Esq., M.R.C.S.,
Penzance*.

[With Plates.]

ON commencing the study of the *Diatomaceæ* I experienced considerable difficulty in determining several of my plants from the descriptions in our British works, and soon found that in this

* Read before the Botanical Society of Edinburgh.

division of the Algæ (except in the *Schizonemata*, to which genus Mrs. Griffiths and Mr. Harvey have more particularly directed their attention,) we had latterly made much less progress than in the others, and indeed that we were now far behind the continental observers.

Having during the last two years paid much attention to the subject, and examined specimens from as many habitats as possible, I conceive that I have acquired some useful information respecting this interesting tribe, and intend from time to time to draw up my observations on such genera and species as have fallen under my notice. But I must preface what I have to say respecting them, by mentioning the names of those friends who have in various ways assisted me in this pursuit.

I wish to take this and every opportunity of acknowledging the invaluable assistance I have at all times received from Mr. Borrer, and without which I should not have been able to have studied these microscopic plants with any success.

To the Rev. M. J. Berkeley I have been indebted for his observations on many species, and also for portions of specimens taken from the collections of dried Algæ published by Jurgens and Desmazières.

Not having access to Ehrenberg's work on the Infusoria, my thanks are due to Mr. Dalrymple for numerous extracts and copies of many of the figures, as well as his assistance in identifying several of his species.

The *Diatomaceæ* (*Bacillaria*, Ehrenb.) form one of the four great series into which the Algæ are divided, and comprise plants belonging to two very distinct families, *Desmidiæ* (*Desmidiaceæ*, Ehrenb.) and *Cymbelleæ* (*Naviculaceæ*, Ehrenb.)*.

The *Desmidiæ* have a membranous covering destitute of silica, and their form is consequently altered in drying. When in perfection they are generally of an herbaceous green colour, and most frequently have the frustules divided into two portions, resembling each other in form but sometimes differing much in size. This division is marked in *Desmidium mucosum* merely by a shallow groove passing round the joint, and in *Desmidium Swartzii* by notches in the angles, by which it is rendered still more apparent; whilst in *Euastrum* (*Eutomia*, Harv.) the two portions are connected only by a central chord.

To this family belong the following genera, so far as regards our British flora: *Desmidium*, *Staurastrum*, *Pentasterias*, *Tessar-thra*, *Xanthidium*, *Scenedesmus*, *Micrasterias* and *Euastrum*†.

* See Pritchard's History of the Infusoria, p. 173.

† If *Closterium* be considered to belong to the vegetable kingdom it may find a place in this family; for my own part, I think the view taken by Meyen is the correct one. For some interesting observations by him on this subject, see Pritchard's 'History of the Infusoria,' p. 179.

The *Cymbelleæ* have a siliceous covering, their form therefore is not altered in drying, nor are they destroyed by fire. When in perfection they are generally brownish, and not unfrequently become greenish when dry. They are usually either of a quadrilateral or a prismatic form, and often marked with striæ and puncta.

The striæ are useful in forming the generic and specific characters, and are best examined by subjecting a portion of the specimen to a red heat, which, by destroying the internal colouring matter in all, as well as the mucous connecting portion in *Diatoma* and its allies, and the covering in *Schizonema*, renders the figure and markings of the frustule more evident.

The method of examination here described has been advantageously employed by Ehrenberg and other naturalists in the comparison of fossil with recent species, since it deprives the latter of all but the siliceous covering; but I am not aware that it has been used by any British algologists in the investigation of recent specimens*.

As the presence of silica is an invariable characteristic of the *Cymbelleæ*, its absence in *Hydrurus* justifies Mr. Harvey's removal of it from the *Diatomaceæ*, but we must on the same account exclude some plants placed among them in his 'Manual of British Algæ.'

All the genera placed by Mr. Harvey in his 'Manual' under *Diatomaceæ* will be included in *Cymbelleæ*, with the exception only of *Desmidiium*.

DIATOMA, Ag. (BACILLARIA, Ehrenb.)

Filaments flat or compressed, free; frustules quadrangular, partially separating and cohering by the angles, generally by the alternate ones.

This genus is distinguished from *Exilaria*, *Striatella*, *Achnanthes* and *Isthmia* by its unattached filaments, from *Biddulphia* by the angles not being produced, and from *Fragilaria* by the connexion of the frustules at their angles in a zigzag chain.

The second section (*Tabellaria*) appears to be distinguished from Ehrenberg's genus *Tessella* by a transverse canal interrupting the striæ.

The corrections in the nomenclature are made on the authority of Mr. Shuttleworth.

In this as well as other genera of the *Diatomaceæ* sufficient attention has not been paid by British botanists to the lateral view, which not only assists in ascertaining the shape of the frustule, but often affords good specific distinctions.

* In this, as well as in other instances, my residence at a distance from the sources of information must excuse my omission of references.

The different use of the terms length and breadth by botanists serves to perplex the student; for when they are applied to *Diatoma* and to *Fragilaria* they have exactly opposite meanings, although the only difference between the genera is, that in *Fragilaria* the separation of the frustules is complete, whilst in *Diatoma* they still adhere at their angles.

Those naturalists who regard the *Diatomaceæ* as belonging to the animal kingdom have been more consistent; they consider each frustule as an individual, and apply the same terms to the same parts in *Fragilaria* as in *Diatoma*.

In the following remarks I shall employ the terms length and breadth in the sense in which they are used in our British works and in Agardh. Thus the length of the frustule will be the breadth of the filament, and its breadth a portion of the length of the latter. The ends of the frustule will form part of the margin of the filament, and its sides will be those surfaces which were in contact before any separation: thus in Plate VIII. fig. 5, where *a* represents the ends, *b* the sides, and *c* the front.

The British species of this genus form two very distinct groups, considered by Mr. Shuttleworth, and I believe rightly, to belong to distinct genera, which are called by him *Diatoma* and *Tabellaria*.

1st, *Diatoma*.—In this group no striæ are seen on the front surface, and there is no transverse canal*, whilst the lateral surfaces have transverse striæ, the ends of which appear along the margins of the frustules when these are in their usual position. Pl. VIII. fig. 6.

2nd, *Tabellaria*.—In this group two or more longitudinal striæ, interrupted in the centre by a canal, are seen on the front surface, but there are no striæ on the lateral surfaces. Pl. VIII. fig. 7.

The figures in Dillwyn's 'Conf.' t. 28. fig. B. and D, and in Berkeley's 'Alg.' t. 6, which have been supposed to represent changes of form, seem to be rather oblique views of the sides of the frustules united in chains.

I am happy to find that Mr. Borrer and Mr. Shuttleworth have arrived at the same conclusion, and still more that in a letter received from Mr. Berkeley in April last, he expresses his own belief that these changes are merely various views of the thread.

* *Inner or lateral surface striated, without a transverse canal, and destitute of striæ on its front surface. (Diatoma.)*

1. *D. vulgare*, Bory. Frustules convex, three or four times as long as broad. *D. vulgare*, Kutz. in Linnæa 1833, p. 582. f. 66. *D. tenue*, Grev. Crypt. Fl. t. 354; Berk. Brit. Alg. t. 6!; Hook. Br. Fl. v. ii. p. 406; Harv. Man. of Br. Alg. p. 202. *D. tenue*, *a. moniliforme*

* I here gladly adopt Mr. Shuttleworth's term *canal* in preference to *rib*, by which I had previously designated it in my correspondence.

(young), Kutz. in Linnæa 1833, p. 580. f. 60? *D. tenue*, β . *intermedium*, Kutz. p. 580. f. 61? *D. flocculosum*, Ag. Consp. Crit. Diatom. p. 53. exc. syn. Dillw. *Bacillaria vulgaris*, Eh. p. 197. pl. 15. f. 2; Pritchard's Hist. of Infusoria, p. 217. f. 168.

PLATE VIII. fig. 8. *a*, front view; *b*, side view.

Pools and streams. King's Cliff, Northamptonshire, *Rev. M. J. Berkeley*; Henfield, Sussex, *Mr. Borrer*; Shoreham, Kent, and several stations about Lewes and Tunbridge Wells, *Mr. Jenner*; Shrewsbury, *Mr. Leighton*; Oswestry, Shropshire, *Rev. T. Salwey*; Cheshunt, Herts, *Mr. A. H. Hassall*; Ireland, *Mr. D. Moore*.

This species is distinguished from *D. tenue* by the greater breadth of the frustules, by their convexity, and by the lateral striæ being more apparent along the margin. The frustules have two puncta at each end, and the margin between them is slightly rounded. These puncta are wanting, or much less distinct in the other species.

As the frustules are thicker than in the other species, it is more easy to obtain a view of the lateral surfaces. These are also convex, so that the striæ, even before the separation of the frustules, appear to occupy part of the front surface.

It is brownish when recent and turns green in drying.

2. *D. tenue*, Ag. Frustules plane, four times or more longer than broad; sides mostly parallel. *D. tenue*, Ag. Consp. Diatom. p. 52. *D. tenue*, δ . *normale*, Kutz. in Linnæa 1833, p. 580. t. 17. f. 63. *D. elongatum*, Berk. Brit. Alg. t. 6; Hook. Br. Fl. p. 406; Harv. Brit. Alg. p. 202. *D. sulphurascens*, Ag. Consp. Diatom. p. 53? *Conf. flocculosa*, Dillw. Br. Conf. t. 28. f. C? *Bacillaria pectinalis*, Eh. Infusoria, p. 198. pl. 15. f. 4; Pritchard's Infusoria, p. 218.

PLATE IX. fig. 1. *a*, front view; *b*, side view.

Pools and streams. Near Tunbridge Wells, *Mr. Jenner*; Shrewsbury, *Mr. Leighton*; Cheshunt, *Mr. A. H. Hassall*; Bangor and Dolgelly, N. Wales; Penzance; Aberdeen, *Dr. Dickie*; Stevenston, Ayrshire, *Rev. D. Landsborough*.

This is a very protean species. Sometimes the frustules are thrown quite back until the ends touch, so as apparently to form a filament, the width of which is much less than the length of the frustules. In this state it forms the *D. elongatum* of Berkeley's 'Brit. Algæ,' and the *D. tenue* of Agardh's 'Consp. Crit. Diatom.' Indeed Agardh in his 'Conspectus' forms a section of *Diatoma* upon this very circumstance of the frustules being longer than the breadth of the filament.

Sometimes the frustules are thrown back in pairs, and then appear like filaments united longitudinally; but with a little attention the observer will understand this arrangement, and he will derive assistance in tracing it from the connected angles having

a kind of mucous hinge which is easily seen in this state of the plant.

Having submitted my observations to Mr. Berkeley, I had the pleasure of finding that he concurred in my views, and that he has long considered the longitudinally connected species as very doubtful.

The frustules are sometimes, on the contrary, broader and not thrown back. This state I believe is the *Diatoma sulphurascens* of Agardh's 'Conspectus.' It differs from *Diatoma elongatum* in having the sides straight, and thus before the frustules separate they are in contact along their entire length. Different however as *D. elongatum* appears to be, I am doubtful whether it may not be a form of this species.

3. *D. elongatum*, Ag. Frustules plane, several times longer than broad; front surface with the ends dilated. *D. elongatum*, Ag. Syst. p. 4; Kutz. in Linnæa 1833, p. 582. t. 17. f. 65. *Bacillaria elongata*, Eh. Infusoria, p. 198. pl. 15. f. 5; Pritchard's Infusoria, p. 218. f. 169.

I notice this very doubtful British species chiefly in order to call attention to it, and because it has been confounded with the last, of which I am by no means certain that it is not a variety.

I have seen no authentic specimens, and am only acquainted with it from the descriptions and figures in Kützting and Pritchard.

Mr. Borrer informs me that he believes he saw a few scattered frustules of it among other Algæ gathered at Henfield, Sussex; and in a mass of Diatomaceous plants sent me from Shropshire by Mr. Leighton, I observed what I supposed might be fragments of this species.

As the frustules are narrowest in the centre and dilated at the ends, and before separation are in contact only at the angles, this would seem to be a sufficient distinction, but I have received some specimens of *D. tenue* which lead me to doubt whether the frustules do not become dilated at the ends in the same way as often occurs in *Frustulia Ulna*. In a specimen of *D. tenue* gathered near Tunbridge Wells by Mr. Jenner, I found mixed up with the common state a few threads with somewhat longer frustules, some of which had the sides parallel, and others in the same chain exactly resembled the figures of *D. elongatum*, Pl. IX. fig. 2.

I observed the same appearances in a less degree in a plant found by myself near Bangor, N. Wales, and considered by Mr. Shuttleworth to be the *D. tenue* of Agardh.

A specimen sent me by Mr. Hassall, gathered in Scotland by the Rev. D. Landsborough, presented still more curious forms. Although most of it seemed to be the true *D. tenue*, a few frustules not only presented the form described above, but some of them were dilated at one end only; and the next frustule was either

of the normal form or dilated at the opposite end. In one chain I perceived in union four frustules thus formed, which answers to the description of *Bacillaria cuneata*, Eh., but the frustules were longer than in Pritchard, f. 170, or in Kutzing.

I subjoin Ehrenberg's specific character of *Bacillaria cuneata*:—

“*Bacillaria striata*, testula pyramidalis cuneata, truncata subquadrata, alternis apicibus dilatatis, intus læte flavo-viridis, p. 198. pl. 15. f. 6. *Diatoma tenue*, γ . *cuneatum*, Kutz. in Linnæa 1833, p. 580. t. 17. f. 62.”

I am also informed by Mr. Dalrymple that Ehrenberg states that “this characteristic little form is apt to be overlooked, and not unfrequently taken for *Bacillaria pectinalis* (*Diatoma tenue*).”

** *The front surface with two or more striæ, interrupted in the centre by a canal; lateral surfaces without striæ.* (Tabellaria.)

4. *D. flocculosum*, Ag. Frustules varying from square to twice as long as broad; striæ three to seven; canal inflated. *Diatoma flocculosum*, Ag. Syst. p. 4; Kutz. in Linnæa 1833, p. 584. t. 17. f. 67; Hook. Br. Fl. v. ii. p. 406; Harv. Br. Alg. p. 202. *Conf. flocculosa*, Dillw. Conf. t. 28.; Eng. Bot. t. 1761. *Bacillaria tabellaris*, Ehrenb. Infusoria, p. 199. pl. 15. f. 7; Pritch. Infusoria, p. 218.

PLATE IX. fig. 3. *a*, common form; *b*, side view; *c*, end view.

Common in pools, rivulets, &c.

Frustules generally a little longer than broad, often nearly equal in length and breadth, sometimes twice as long as broad. The striæ are generally five or six, in the narrower specimens only three. The inflated canal is much broader than the incrassated ends. It is brown when recent, whitish when dry.

Mr. Borrer considers the plant figured in ‘Eng. Bot.’ as distinct from that figured by Dillwyn. The chief difference appears to be, that in the front view the inflated canal and incrassated ends are more strongly marked in the latter. I have gathered near Swansea specimens exactly resembling Mr. Dillwyn’s fig., but I am unable to find any good specific difference between them and the ‘Eng. Bot.’ plant, and after they were dried I could perceive no distinction.

5. *D. fenestratum*, Lyngb. Frustules four times or more longer than broad; canal inflated; striæ two. *D. fenestratum*, Lyngb. Hydr. Dan. t. 61. E. 3; Ag. Consp. Diatom. p. 53; Hook. Br. Fl. v. ii. p. 406; Harv. Br. Alg. p. 202.

PLATE IX. fig. 4. *a*, front view; *b*, side view.

Pools and rivulets. Sussex, *Mr. Jenner*; Cheshunt, *Mr. Hassall*; Barmouth, N. Wales, *Rev. T. Salwey*; Dolgelley and near Pont-Aberglas-lyn, N. Wales, and Penzance, Cornwall.

This species varies much in the length of its frustules. The

longer specimens, when the striæ are obscured by the endochrome, somewhat resemble *D. tenue*; but in this species the frustules are generally broader in proportion to their length, and the lateral striæ which give a punctated appearance to the margins of *D. tenue* are wanting.

The shorter frustules are very similar to *D. flocculosum*; there are however not more than two striæ on each side, and the canal, which is much less inflated, is but little broader than the incrassated ends.

This species, like *D. tenue*, is often found with the frustules thrown quite back. In this state it is figured by Lyngbye and by Agardh placed in the same section as *D. tenue*. It is brown when recent, and becomes paler when dried.

6. *D. marinum*, Lyngb. Frustules varying from nearly square to six times as long as broad; canal not inflated; striæ two. *D. marinum*, Kutz. in Linnæa 1833, p. 584; Ag. Consp. Diatom. p. 53; Hook. Br. Fl. vol. ii. p. 405; Harv. Br. Alg. p. 201. *D. teniæforme*, Ag. Consp. p. 54. *D. brachygonum*, Hook. Br. Fl. p. 406. *Conferva teniæformis*, Eng. Bot. t. 1883! *Tessella interrupta*, Ehrenb. Infusoria, p. 202? Pritch. Infusoria, p. 220?

PLATE IX. fig. 5. *a*, front view; *b*, side view.

Common on marine algæ. Dark brown when recent, greenish when dry, gradually becoming paler.

This species is very variable in the length and breadth of its frustules; they are generally two or three times longer than broad; but most specimens contain some frustules nearly square, and others from four to six times longer than broad.

The lateral view shows the frustules nearly plane, sometimes slightly convex, and the canal not inflated. The colouring matter is darker, and the granules are larger than in the other British species, so that the striæ can scarcely be seen when the plant is recent.

The mucous substance which forms the connecting medium between the angles of the frustules is more developed in this than in the other species; it is consequently more difficult to obtain them in a state of separation so as to observe them laterally.

The best method of separating them is to submit a portion to a red heat, which destroys both the connecting hinge and also the internal colouring matter, and thus has the further advantage of rendering the striæ more perceptible.

On a front view the longer frustules resemble those of *D. fenestratum*; but *D. marinum*, besides its much deeper colour, is more rigid; its frustules are broader; its striæ also are nearer the margin, and most frequently have a bend towards it near the end of the frustule.

I am indebted to Mr. Borrer for a specimen of *Conf. teniæformis*,

and can find in it nothing different from the common form. I have seen no specimen of *D. brachygonum*, Carm., but there is nothing in the description to distinguish it from *D. marinum*.

Analysis.

- | | |
|----|---|
| 1. | { Frustules with two or more striæ on their front surfaces,
interrupted in the centre by a canal 4
{ Frustules without striæ on their front surfaces 2 |
| 2. | { Frustules convex, thickest in the centre <i>vulgare</i> .
{ Frustules plane, the ends the thickest 3 |
| 3. | { Frustules linear <i>tenue</i> .
{ Frustules before separation in contact only at the angles
of the dilated ends <i>elongatum</i> . |
| 4. | { Marine; canal not inflated <i>marinum</i> .
{ Aquatic; canal inflated 5 |
| 5. | { Frustules not more than twice as long as broad; striæ
several on each side <i>floculosum</i> .
{ Frustules four times (or more) longer than broad; striæ
two on each side <i>fenestratum</i> . |

I shall place for the present in an appendix a recently discovered plant, the characters of which, on account of its minuteness, I have not yet been able to determine with any certainty.

7. *D. minimum*. Frustules very minute, about twice as long as broad, nearly colourless. *Tetraspila minima*, Shuttleworth in lit.

On *Conferva uncialis*, Penzance.

This species is certainly distinct from any of those described above. I can find no striæ on either surface; but, if these exist, its pale colour and small size well distinguish it from *Diatoma marinum*, the only other marine species I am acquainted with.

STRIATELLA, Ag. (*Ehrenb.*)

Filaments attached by a stipes; frustules cohering by the angles, longitudinally striated.

This genus differs from *Achnanthes* by its frustules cohering at their angles and having longitudinal striæ. Its character approaches closely to that of *Tessella*, Eh., from which it differs only in the stipitate filaments.

Filaments attached by a stipes at one of the lower angles of the basal frustule.

1. *S. arcuata*, Ag. Stipes shorter than the frustules; filaments elongated; frustules with seven or more longitudinal series of short transverse striæ. Ag. Consp. Diatom. p. 61; Harv. Br. Alg. p. 199; Eh. Die Infus. p. 229. t. 20. f. 6; Pritch. Infus. p. 223. f. 203. *Diatoma striatulum*, Grev. in Br. Fl. ii. p. 405. *Achnanthes arcuata*, Kutz. Syn. Diatom. p. 574. *Ach. unipunctata*, Berk. Br. Alg. p. 39. t. 15. f. 1. *Conf. striatula*, Eng. Bot. t. 1928. *Fragilaria striatula*, Ag. Syst. p. 7.

PLATE IX. fig. 6. *a*, front view; *b* and *c*, lateral views.

On marine algæ: not uncommon. Ardrossan, Ayrshire, *Rev. D. Landsborough*. Ireland, *Mr. D. Moore* and *Mr. W. Thompson*. Devonshire, *Mrs. Griffiths*; Sussex, *Mr. Jenner*; Aberystwith, Penzance.

Filaments, when recent of a dark olive-brown, become greener in drying; they are rigid, thick, elongated, very fragile, and do not adhere to paper; the frustules irregularly separate, and cohere by their angles. Stipes very short and thick.

Frustules vary from nearly equal in length and breadth to twice as broad as long, with numerous longitudinal series of short transverse striæ, which are fainter towards the ends of the frustules.

The lateral surfaces are linear-elliptic with close transverse striæ, and are divided by a line passing down the centre, a small space at each end being destitute of striæ. The endochrome sometimes forms a central spot.

2. *S. unipunctata*, Ag. Stipes slender, much longer than the frustule, which has several longitudinal striæ. Ag. *Consp. Diatom.* p. 61; *Harv. Br. Alg.* p. 199. *Achnanthes unipunctata*, Grev. *Cryp. Fl.* t. 287; Kutz. *Syn. Diatom.* in *Linnæa* 1833, p. 573. *Diatoma unipunctatum*, Ag. *Syst. Alg.* p. 6; Grev. in *Br. Fl.* vol. ii. p. 405.

On marine algæ: autumn. Ireland, *Mr. D. Moore*. Torquay, *Mrs. Griffiths*; Little Hampton, *Mr. Borrer*; Penzance.

Filaments minute, pale yellowish brown, consisting of but few frustules, which cohere at the alternate angles. Stipes slender, long; frustules generally rather longer than broad; the angles slightly truncated, with two series of longitudinal striæ, one series occupying the middle and the other the ends; the latter is more strongly marked and its striæ are of different lengths, longer in the centre and shorter towards the lateral margins of the frustule, and all are terminated by puncta, which in consequence of the different lengths of the striæ are arranged in a curve. Endochrome pale, generally collected into a central spot of a deeper colour. Lateral surfaces lanceolate, without striæ.

P.S. Since my description of *Diatoma marinum* was written, I have received from *Mrs. Griffiths* some interesting varieties of that plant. In some specimens longitudinal series of transverse striæ were more or less evident on the central portion of the frustules. Mixed with this variety I found another, in which the longitudinal striæ, extending from the ends towards the middle, are serpentine.

I find this species generally attached at the angle of the basal frustule by a short stipes. As therefore it differs in no respect from *Striatella*, it should be removed to that genus; and as all the species of *Striatella* are marine, its old specific name *teniaeformis*, which has a prior claim, might be conveniently restored.

The different states of this species may be characterized as follows:—

Striatella teniaformis.

α. Frustules without transverse striæ.

β. *striata*. Frustules with longitudinal series of transverse striæ; the two longitudinal striæ on each side have a single curve near the base. Pl. IX. fig. 5. β.

γ. *serpentina*. Frustules with longitudinal series of transverse striæ, the longitudinal striæ on each side undulated. Pl. IX. fig. 5. γ.

α. Common. β. Torquay, Mrs. Griffiths. γ. Torquay, Mrs. Griffiths; Hastings, Mr. Jenner.

In the variety γ. there is also in general a narrow longitudinal space without any markings, and appearing like a white band occupying the centre.

In the remarks on *Striatella unipunctata* I observed that there were two series of striæ. I have since examined this subject more minutely, and find the same structure in *Tabellaria*, *Striatella*, *Tessella* and *Tetracyclus*. The appearance of longitudinal striæ is in fact produced by siliceous plates arising internally from the margins of the filament, and extending towards but not reaching the centre. The interior is thus divided into chambers opening into a central space. When viewed laterally, this central space has the appearance of a canal, especially as the inner edge of each plate has a concave outline. This appearance is more striking in *Tabellaria*, *Striatella teniaformis* and *Tetracyclus lacustris*, where all the plates are nearly equal; but in *Striatella arcuata*, *S. unipunctata* and *Tessella catena* they are shortest near the angles, and gradually longer as they approach the middle. In the latter the outlines of two plates are frequently seen at one time when viewed laterally, in consequence of the unequal size of the plates. Plate IX. fig. 6. c.

[To be continued.]

BIBLIOGRAPHICAL NOTICES.

The Zoology of the Voyage of H.M.S. Sulphur, under the Command of Capt. Sir Edward Belcher, R.N. &c., during the years 1836–42. Published under the authority &c. Edited and superintended by Richard Brinsley Hinds, Esq., Surgeon R.N. attached to the Expedition.—Mammalia, by John Edward Gray, Esq., F.R.S. No. I. London, Smith, Elder and Co., 4to. 1843.

By the attention of the author or publishers, we have now before us the first part of the "*Zoology of the Voyage of H.M.S. Sulphur.*" This is one of the series of zoological works arising from our Voyages of Discovery, published under the patronage of "the Lords Commissioners of the Admiralty:" as such we wish it success, and as public

property we feel ourselves at liberty to speak freely of it. Long before the British Government gave assistance to works of this kind, we were of opinion that it ought to have been granted: we had the example before us of many continental works sumptuously published at an expense which few private individuals could have defrayed, while in this country our splendid examples were all completed at the risk either of wealthy gentlemen, or by the enterprise of publishers to whom a limited patronage had been secured, but frequently resulting in inconvenience to both parties. The beautiful volumes of the Northern Zoology were, we believe, the first to which a Government grant was given in this country, and the work was singularly fortunate in having men employed on it who were not only naturalists of the highest standing, but were also artists, or capable of judging of art. The more recent grants have been given to the publications of Smith, Elder and Co., the publishers employed to bring out the results of one or two of the later voyages, and they are now continued with that for the work before us. The plan in all these later works has been, we believe, to delegate the different departments to men who have made them their particular study; the publishers having the control of the expense and risk, and we presume the benefit of the Government grant, and for this the public receive the work at a price said to be cheaper than that at which it otherwise could have been published. We have always considered that the Government should maintain a greater control over these works, or should give a portion at least of their grant in a subscription for a certain number of copies; the public are comparatively little benefited by the small reduction of the price of the Numbers, for we do not consider ten shillings for nine plates (one of them uncoloured) and a very limited letter-press so great a bargain. The present work will, when completed, cost at least six pounds sterling unbound, and can only be expected to be found in the possession of a few interested in the subjects, or in one or two of our principal libraries; while by the Government giving their grant in the form of a subscription, and sending their copies to provincial libraries whose funds would not allow them to devote so much to one work in a single branch of science, the extension of a taste for natural history would be spread, the knowledge of it diffused, and the public would at the same time receive some value for their grant. There are many publishers both in England and in Scotland who would at once take the risk, and bring out these works in the first style of art, were the sale of one hundred or one hundred and fifty copies guaranteed to them by Government*.

The voyage of the Sulphur embraced a range so extensive, that many interesting objects might be expected to have been discovered; accordingly in the first Number, devoted to Mammalia, and under the direction of J. E. Gray, Esq., we have figures of *Brachy-*

* We do not know the amount of the grant for the present work, but to the former publications of Smith, Elder and Co., we believe the liberal sum of 3000*l.* was given. A subscription for 150 copies of the present work would not exceed the amount of a proportional grant.

teles frontatus, from the shores of the harbour of Culebra; *Pithecia leucocephala* and *pogonias* contrasted on the same plate, the latter considered as new; and *P. irrorata*, allied to the *P. hirsuta* of Spix; *Lemur coronatus* from Madagascar, differing from *L. rufifrons*, Benn., in having the black streak on the head expanded between the eyes and continued to the end of the nose, the under part of the base of the tail being also black; *Phyllophora megalotis* and *nigra*, previously not figured, from tropical America; *Phyllostoma elongatum*, from tropical America, also not before figured; *Carollia verrucata*, from tropical America—all these are described. But we have also figures of *Sturnira Spectrum*, *Neosia nigrescens*, *Centurio Senex* from Amboina; and *Diclidurus Freyreissii*, of which we presume the descriptions will appear in the following numbers.

The plates in this number are well executed, superior to some of the modern works in drawing, at the same time inferior to others as artistical pictures; the colouring is also careful, but wants harmony: where trees or foliage are introduced, the slightest wash or tint, without an attempt to finish, would harmonize with the colouring of the animals and take off the rawness incident to the severe contrast of the white paper, in the same way that the tint of the sky has assisted to do in several of the plates. In plate 2 we see no reason why the head looking round the tree should have the sole benefit of the blue; a tint upon the branch and other parts would have improved the picture. Let Mr. Hawkins, in the next number, insist that justice be done to his careful lithographs. The same remarks apply to the other plates except 7 and 8, where nothing pictorial is attempted, and where the figures should stand as exact representations without other assistance.

A History of the Molluscous Animals of the counties of Aberdeen, Kincardine and Banff; to which is appended an account of the Cirripedal Animals of the same District. By William Macgillivray, A.M., Professor of Natural History in the University of Marischal College, Aberdeen, &c. Lond. 1843. Duod. pp. 372.

We are not going to review this volume, but we are anxious to introduce it to the notice of our readers. The name and reputation of the author led us to expect a work of interest and originality—not fashioned on a mould that others had cast and approved—but bearing the impress of a mind that could track a course of its own, and much more willing to follow it than walk at greater ease in a beaten path. And we have not been disappointed, for indeed we have rarely spent a pleasanter hour than the one which we last night devoted to the perusal of this little manual. It is the work of a good workman—the best local fauna in our language—a sure and pleasant guide to the naturalists of the counties illustrated—with many a fact that concerns all those who are interested in the study of the British Mollusca. It boots little to us that it contains descriptions of some thirty new species—two or three of them really fine additions to our native list, and which we greet heartily—but we admire these new descriptions of many an old friend and acquaintance, and these ad-

ditional traits of their habits and structural peculiarities. Mr. Macgillivray has observed much, and what he has observed he has told well. There is, perhaps, a claim made to a greater degree of originality in these than a critical survey would altogether allow in equity; but what is not new has been elaborated and kneaded together by one whom personal experience had taught to know the genuineness of the materials he was handling. Let any one examine the family and generic characters of the book with care, and we think the justice of our remark will be allowed: they are excellently well done. We are, however, inclined to blame some unnecessary innovations in nomenclature; to differ from our talented author in the application of some few names; to wish that the sources whence the characters of the genera were taken had been more often and precisely quoted; and to smile good-naturedly (are we not fathers?) on the paternal storgè which pullulates forth with rather a too frequent and rash growth in the mention of all and every the leetle Macgillivrays—God bless them—Miss and Marion, Isabella and Anne, “my son” John, and not forgetting Paul-Howard and the rest of the family.

We end as we began—by our hearty recommendation of the book to our readers. To all who concern themselves in making a ‘population return’ of the molluscan natives the work is indispensable; and for the value of six shillings they have here matter which some peddling dilettanti might have been excused had he published as much for a guinea sterling.

Annales des Sciences Naturelles:—*Zoologie*, M. Milne Edwards. *Botanique*, MM. Ad. Brongniart et Guillemin. Paris: Fortin, Masson and Co.

Jan. 1843.—*Zoology*.—Some Observations on the *Ongulina*, by M. Deshayes. M. Duvernoy, in his account of the animal of *Ongulina*, proposed the removal of that genus from the neighbourhood of the *Lucinæ* to that of the *Mytilaceæ*. M. Deshayes, in this paper, approves such a change, pointing out that M. Duvernoy’s animal is a true *Lucina*, and that the structure of its branchiæ, separated at their anterior margin and united elsewhere, is after all rather a specific than a generic anatomical distinction. M. Deshayes’ arguments are sound throughout this paper.—On the Ravages of *Scolytus pygmaeus* among Ash and Oak Trees, and on the proposed Remedies, by M. Robert. The author proposes two antidotes to the destruction caused by this pestiferous insect: 1st, to varnish the bark of trees affected; and 2nd, to make longitudinal and oblique incisions at regular distances in the bark.—M. Poiseulle on the Flux of Liquids in the Living Capillaries.—On the habits, development and metamorphoses of *Caridina Desmarestii*, with reflections on the metamorphoses of Decapodous Crustacea generally, by M. Joly (commencement).

Botany.—On the Temperature of Plants, by Professor Rameaux. A summary of what has been done on this subject, with an account of the author’s own observations, and elaborate tables.—M. Decaisne on *Drymispermum*, *Pseudais*, and *Gyrinopsis*.—Count Jaubert and Ed. Spach on the *Argyrolobiæ* of the Northern Hemisphere.—The

Ninth and Tenth Decades of the Third Century of New Exotic Cellular Plants, by Dr. Montagne. The portion of these valuable papers in this Number is occupied by descriptions of the Lichens of Guiana.

WORKS JUST PUBLISHED.

Arcana Entomologica; or, Illustrations of New, Rare, and Interesting Insects. By J. O. Westwood, F.L.S., Sec. Ent. Soc. London, &c.

The first volume, containing 48 coloured plates, of this work, which was established with the view of describing and figuring some of the many interesting and splendid novelties with which our entomological collections have, within the last few years, been so greatly enriched, is now completed.

The plates comprise 176 coloured figures, of which nearly 160 are representatives of insects now for the first time given to the scientific world, or of which no previous figures existed. The work is to be continued in each alternate month.

Manual of British Botany. By Charles C. Babington, M.A., F.L.S., F.G.S. &c.

Containing generic and specific characters of British plants, in one volume, 12mo, as a travelling companion.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

December 20, 1842.—E. Forster, Esq., V.P., in the Chair.

A. H. Hassall, Esq., exhibited an Apple in which decay had been artificially induced by inoculating it with decayed matter from another apple containing filaments of Entophythal *Fungi*.

“Some further Observations on the Nature of the *Ergot* of Grasses.” By Edwin John Quekett, Esq., F.L.S.

This paper contains the results of experiments made by the author with the view of determining the mode in which the sporidia of the fungus which he regards as the cause of *Ergot* are introduced into the infected grass.

In March 1840 twelve healthy grains of rye, of wheat and of barley were placed in a shallow glass vessel containing a sufficient quantity of distilled water to moisten them, and covered with a glass shade. When germination commenced an ergot of wheat of the preceding year was immersed in the water, the sporidia on its surface were detached, and the ergot itself was then removed. The same experiment was performed with sporidia obtained from an ergot of *Elymus sabulosus*. Several days afterwards, when the leaves had attained a length of three or four inches, the young plants were conveyed into the country and planted side by side in a garden. At the period of harvest there remained alive only four plants of the rye (one of which had been infected from the ergot of *Elymus*, and the

remaining three from that of wheat), three of the barley and four of the wheat. Of the rye scarcely a single ear produced healthy grains, the paleæ being generally quite empty; but nine of the ears contained ergots, some furnishing only a single specimen, and others as many as six. The ears of the barley were filled with healthy grains, and only one apparently diseased grain was detected; while in the wheat the ears were full and without disease.

As in these experiments no grains from the same sample were sown which had not been subjected to the influence of the sporidia of the fungus, Mr. Quekett made in the following autumn another experiment with the view of supplying this deficiency. Twelve grains of rye, of wheat and of barley were again made to germinate under similar circumstances to the last, and the sporidia obtained from the surface of one of the ergots of rye produced in the first experiment were diffused in the water in which they grew. These were planted in October on the same estate, but not within half a mile of the former spot; and twelve healthy grains of each kind which had been carefully kept apart from the others were planted in the same locality. Very few of the plants arrived at maturity, and in August last there remained of the infected plants only two of rye, two of wheat, and one of barley; and of the uninfected plants one of each kind. On each of the plants of rye which had been subjected to the influence of the sporidia an ergot was discovered, and the ears as before were almost entirely devoid of healthy grains; while the plants of wheat and barley subjected to the same influence produced perfect ears and healthy grains. The three plants of rye, wheat and barley planted at the same time without exposure to the sporidia of the fungus presented no unhealthy appearance.

Mr. Quekett argues that all the grains of rye subjected during germination to the influence of the sporidia of the fungus in both sets of experiments having produced plants infected with ergot, while the plants derived from grains not so subjected escaped disease, a convincing proof is afforded that their infection could not have been the effect of chance, but must have resulted from the artificial introduction of the sporidia; and that the infection of the rye only, while the wheat and barley escaped, is to be attributed to the greater susceptibility of the rye to infection, as proved by the much greater frequency of the production of ergots in that species of grain.

January 17, 1843.—E. Forster, Esq., V.P., in the Chair.

William Taylor, Esq., F.L.S., presented specimens of the seeds, oil, and oil-cake of *Camelina sativa*, Crantz, accompanied by some observations strongly recommending its cultivation in preference to that of flax for the production of oil.

February 7.—E. Forster, Esq., V.P., in the Chair.

The Rev. William Hincks, F.L.S., exhibited a specimen believed to belong to *Neottia gemmipara*, Smith. The specimen, which was from the collection of Dr. Wood of Cork, was obtained by him from

very near the original locality named by Mr. Drummond. Mr. Hincks stated that he had taken some pains in comparing the specimen, not only with the description, but also with the original sketch made by Mr. James Drummond on a blank leaf of the pocket-book in which he noted down the occurrences of the tour upon which he made the discovery of this curious plant. The specimen now exhibited was marked by Dr. Wood when fresh, and he had no doubt of its identity; and the result of Mr. Hincks's examination was a confirmation of this opinion.

Read an "Essay on the Distribution, Vitality, Structure, Modes of Growth and Reproduction, and Uses of the Freshwater *Confervæ*." By Arthur Hill Hassall.

The principal part of Mr. Hassall's observations on the growth of *Confervæ* have been already published in various Numbers of the 'Annals and Magazine of Natural History.'

At the period of their publication he was not aware of the observations of M. Morren, M. Dumortier and M. Mohl on the growth of *Confervæ* by the subdivision of their cells; but he states that his views of the mode in which this subdivision is effected differ considerably from those of M. Morren. He does not believe that when the endochrome of a cell has become separated into two masses, leaving a transparent space between them, this space is occupied by a formative intercellular matter such as M. Morren describes. On the contrary, he states that the first indication of the partitions which are to divide the parent cell into two consists of a solution of the continuity of a portion of the periphery of the cell, the divided edges of which become inflected and gradually approach the centre, where they coalesce.

March 7.—The Lord Bishop of Norwich, President, in the Chair.

J. O. Westwood, Esq., F.L.S., presented specimens of the aerial processes of the roots of *Sonneratia acida*, L., sent by Mr. Templeton from Ceylon, and described by him as affording a wood of an extremely light and close texture, admirably adapted for lining insect-boxes, on account of the facility with which it admits, and the tenacity with which it retains, the finest pins.

March 21.—The Lord Bishop of Norwich, President, in the Chair.

J. Janson, Esq., F.L.S., exhibited living flowering plants of the "hungry rice" of Sierra Leone, *Paspalum exile*, Kipp., described at p. 235, raised from seeds brought from Sierra Leone by Robert Clarke, Esq.

Read a memoir "On *Pectinura*, a new genus of *Ophiuridæ*, and on the species of *Ophiura* inhabiting the Eastern Mediterranean." By Edward Forbes, Esq., F.L.S., Professor of Botany in King's College, London.

Professor Forbes states that in his late researches in the Ægean Sea he found ten species of Starfishes of the order *Ophiuridæ*, several of which are undescribed. In the present memoir he confines him-

self to those belonging to the genus *Ophiura*, and to an allied genus, hitherto uncharacterized, to which he gives the name of *Pectinura*. This genus is founded on a small starfish brought up by the dredge from the depth of 100 fathoms on the coast of Lycia, and is characterized as follows :—

PECTINURA.

Corpus orbiculare, squamosum, granulosum, ad peripheriam radiatum; radiis simplicibus, squamosis, in corporis discum subprolongatis; squamis radiorum lateralibus adpressis, in marginibus superioribus spiniferis; ossiculis ovarialibus binis in corporis lobos non productis.

P. VESTITA, disco orbiculari, radiis convexiusculis; squamis superioribus rotundatis: lateralibus 8 spiniferis.—Lat. disci $\frac{1}{3}$ unc.

Professor Forbes states that he should scarcely have ventured to establish a genus on the single specimen of this species which he possesses, and which is somewhat imperfect in the rays, had he not had an opportunity of examining a large foreign species, which shows it to be a well-marked genus, having a rather closer affinity with *Ophiura* than with *Ophiocoma*. It differs from the former in having the disc clothed with granules, in the absence of the pectinated scales embracing the origins of the rays, and in the ovarian plates (not soldered into one as in *Ophiura*) not encroaching on the body; and from *Ophiocoma* by the lateral ray-plates overlapping each other and the posterior ray-plates as in *Ophiura*, and instead of having the spines on a transverse ridge or keel having them articulated to their superior margins, so that when the animal is dead they lie close to the rays and do not bristle out as in *Ophiocoma*.

Of *Ophiura* Professor Forbes found three species, *O. texturata*, *O. albida*, and a new species to which he gives the name of *O. abyssicola*, on account of its being found in deeper water than any recorded starfish, at the depth namely of from 150 to 200 fathoms. A comparison of the characters of this new species with those of its described allies, has enabled him to revise the characters of the genus *Ophiura* as follows :—

OPHIURA, Lam., Agass.

Corpus orbiculare, squamosum, læve, ad peripheriam radiatum; radiis simplicibus, squamosis, in corporis discum prolongatis, ad origines squamis pectinatis adpressis; squamis radiorum lateralibus adpressis, in marginibus superioribus spiniferis; ossiculis marginis ovarialibus simplicibus, in corporis lobos productis.

The following are the specific characters of the Ægean species :—

O. texturata, Lam. Squamis pectinatis ad radiorum origines plus quam 20-dentatis, ossiculis ovarialibus lyratis, radiis carinatis; squamis superioribus transversè oblongis: lateralibus 7 spiniferis.

O. albida, Forbes. Squamis pectinatis ad radiorum origines 16-dentatis, ossiculis ovarialibus scutatis, radiis convexis; squamis superioribus triangularibus: lateralibus 4 vel 5 spiniferis.

O. ABYSSICOLA, squamis pectinatis ad radiorum origines binis 5—9-dentatis, ossiculis ovarialibus pentagonis, radiis carinatis; squamis superioribus quadratis: lateralibus 3 vel 4 spiniferis.—Lat. disci $\frac{2}{3}$ unc.

ENTOMOLOGICAL SOCIETY.

July 4, 1842.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Mr. F. Smith exhibited a number of British *Vespidæ*, *Crabronidæ* and *Apidæ*, accompanied by specimens of their nests, &c.

Mr. Westwood exhibited a specimen of a new *Goliath Beetle* from the East Indies (*Cyphonocephalus smaragdulus*, W., Arc. Ent.), and some rare Papilionideous and Cimicideous insects from the collection of the Bristol Institution, communicated by G. H. K. Thwaites, Esq. Likewise a new and singular genus of *Coleoptera*, but of doubtful family, from the collection of M. Dupont. Likewise *Orchestes Quercus* and its parasites reared from mined leaves of oak from Weybridge.

Mr. S. Stevens exhibited a box of British moths taken in June in the Hammersmith marshes, including the following rare species: *Leucania obsoleta* and *Vectis*, *Nudaria senex*, *Melia sericea*, *Chilo giganteus* and *phragmatellus*; &c.

The Rev. F. W. Hope exhibited a number of new and rare *Coleoptera* from Cape Palmas.

Mr. W. W. Saunders exhibited numerous gall-like nidi of an insect upon a twig of *Leptospermum* from New Holland. Likewise specimens of *Triphæna pronuba* stuck upon thorns by the butcher-bird, remarking that this species of moth was the only one selected by the bird at the time they were observed. Mr. Hope however stated that he had occasionally observed *Libellulæ* and *Geotrupides* also similarly affixed.

Mr. J. F. Stephens exhibited a specimen of *Calosoma sycophanta* recently captured at Herne Bay, Kent.

Mrs. North of East Acton exhibited a minute wasp's nest found in the interior of a hive of bees, which had in consequence been deserted by the inhabitants.

Mr. Inghen exhibited a fossil wing of a large species of *Limnobia* obtained by the Rev. P. B. Brodie from the lias near Gloucester, and similar to some found in the Wealden strata of Wiltshire.

Mr. Raddon exhibited a specimen of *Goliathus Drurii*, Westw., taken at Frisa, on the west coast of Africa, 5° 20' lat. N. and 6° west long.: its food was stated by the natives to be the common bamboo canes, in which it lodges for a considerable time, entering at the but and ascending nearly eight feet, when it is generally found in the state of a grub.

Mr. Hope read several extracts from a letter received from Mr. Savage at Cape Palmas, by whom a considerable number of *Goliath Beetles* (*G. Drurii*, *Cacicus princeps* and *torquatus*) and other rare insects had been transmitted to Mr. Hope.

A paper by S. S. Saunders, Esq., Consul of Albania, containing further observations on *Mygale Ionica*, was read (since published in the Transactions of the Society).

August 1.—The President in the Chair.

Mr. W. W. Saunders exhibited various interesting *Lepidoptera* from Van Diemen's Land.

Mr. Westwood noticed the peculiar construction of the scutellum of the large species of *Goliath Beetles*, which does not allow the elytra to be elevated beyond a very little distance above the back.

Mr. F. Smith exhibited a specimen of *Macropis labiata* ♂, taken by Mr. S. Stevens during the excursion to Weybridge in June; also specimens of the male, female and two kinds of neuters of *Formica sanguinea*.

Mr. S. Stevens exhibited some Egyptian beans greatly eaten by *Anobium paniceum*, and Mr. Saunders stated that a cargo of the Pady or Divi Divi, a South American legume, had been very greatly injured by a species of *Bruchus*.

Mr. Ingpen exhibited some radishes from Battersea fields, the stems of which were greatly swollen in parts, probably resulting from the punctures of some insect.

Mr. Westwood exhibited some *Dipterous larvæ* which feed on the heads of lettuce seed. He also read a memoir entitled "Descriptions of some new Exotic *Reduviidæ* of large size:"—

Ectrichodia imperialis, W. *E. purpurascens, hemelytris atris, abdominis marginibus detectis fulvo purpureoque alternatim maculatis; antennis 6-articulatis, radiculâ basali hæud computatâ.*—Long. corp. unc. $1\frac{3}{4}$.—Hab. Cape Palmas, Mr. Savage. Mus. Hope.

Platymeris ducalis, W. *Nigra nitida, hemelytris maculâ laterali, femoribus fasciâ latâ subapicali, abdominis maculis lateralibus rufis, pronoto scutelloque spinigeris.*—Long. corp. unc. $1\frac{1}{2}$.—Hab. Cape Palmas, Mr. Savage. Mus. Hope.

Ectinoderus, W. Subg. nov. *Pronotum maximum anticè suprâ basin pedum anticorum dilatatum in medio transversè impressum, posticèque in lobos duos suprâ basin hemelytrorum protensum. Pedes antici valdè elongati, femoribus crassis tibiisque rectis. Antennæ 4-articulata, articulo 1^{mo} longo, tribus ultimis sensim brevioribus et tenuioribus (inter art. 1 et 2 et 2 et 3 articuli minimi apparent). Abdomen subrotundum depressum lateribus detectis.*

Ectinoderus longimanus, W. *Obscurè luteus, capite antennis et hemelytrorum membrânâ nigris, femoribus fasciâ mediâ apiceque tibiisque anticis (nisi ad basin) nigricantibus hemelytrorum corio et abdominis lateribus luteo nigroque variis.*—Long. corp. unc. $1\frac{1}{3}$.—Hab. Singapore? Mus. Westwood.

Obs. Mr. Cuming has brought another species of this subgenus from the Philippine Islands.

ZOOLOGICAL SOCIETY.

June 28, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

A paper by G. B. Sowerby, Esq., containing descriptions of new species of Shells belonging to the genus *Cyclostoma*, was read.

The species described in this paper were collected in the Philippine Islands by H. Cuming, Esq., by whom they were exhibited.

CYCLOSTOMA ACUTIMARGINATUM.

Cycl. testâ suborbiculari, conicâ, tenui, lævi, subpellucidâ, badâ, albido-marmoratâ, spirâ subacuminatâ, submammillari, anfracti-

bus quatuor, raptim crescentibus, suprâ infrâque rotundatis, margine carinato, acuto, prope suturam marginemque coloribus articulatis; aperturâ magnâ, orbiculari, peritremate reflexo, albo, incrassato, prope ultimum anfractum subinterrupto, supernè productiore, minimè reflexo; umbilico mediocri, profundo. Long. 0·9; lat. 1·1 poll. Operculo corneo, multispirali.

Hab. supra foliis Palmarum apud Catbalongan Insulæ Laman Philippinarum.

An elegant species, remarkable for the sharpness of its edge (in which it resembles a Carocolla), as well as for the beautiful arrangement of the colouring.

CYCLOSTOMA LUZONICUM.

Icon. Sowerby, Species Conchyliorum, Pars 2^{da}, Cyclostoma, f. 133.

Cycl. testâ suborbiculari, albidd, castaneo-variegatâ, spirâ depressiusculâ, obtusâ; anfractibus quatuor ad quinque, rotundatis, concinnè spiraliter striatis, fasciâ albidd infrâ suturam fusco-articulatâ; suturâ profundâ; aperturâ circulari, peritremate crasso, reflexo; umbilico maximo. Long. 0·7; lat. 1·3 poll. Operculum corneum, tenue, anfractuum marginibus lamellosis.

The first specimens of this species were brought from Luçon by J. K. Smith, Esq. Mr. Cuming has collected the following varieties, viz:—

a. Shell variegated, with a brown and white articulated band close to the front of the suture, median band variously mottled. Found under decayed leaves on Mount Isarog in the province of South Camarinas, island of Luçon.

b. Shell variegated, upper or posterior part of the two last volutions with four or five rather prominent elevated striæ. Found under decayed leaves in the island of Masbate.

c. Upper part of the volutions of a pale colour, with a brown and white articulated band next to the suture; median line articulated with brown and white, in front of which the shell is dark brown, becoming paler toward the umbilicus. Found under decayed leaves at St. Jaun in the province of Cagayan, island of Luçon.

d. Shell dark chestnut-brown, articulated with white in front of the suture; median line brown and white mottled; umbilicus and peritreme white. Found under decayed wood at Calauang in the province of Laguna, island of Luçon.

e. Shell brownish, with an articulated band next to the suture, and two median bands, the posterior of which is white and the anterior dark brown; spire more elevated than in the former varieties. Found in earth under decayed leaves at Sinit in the province of South Ilocos, island of Luçon.

f. Shell rather smaller and with a more elevated spire than in varieties *a.* to *d.*, variously mottled. Found under decayed leaves in the woods at Dolores in the province of Pampanga, island of Luçon.

g. Shell rather paler coloured than most of the varieties, but ha-

ving the inside of the aperture of an orange-brown. Found under decayed leaves on Mount Isarog, with var. *a*.

h. Similar to var. *e*, but altogether paler, and from the same locality.

CYCLOSTOMA CANALIFERUM.

Icon. Sowerby, Species Conchyliorum, Pars 2^{da}, Cyclostoma, f. 195, 196.

Cycl. testâ orbiculari, subdepressâ, crassiusculâ, albicante, brunneo-marmoratâ, spirâ depressâ, obtusâ; anfractibus quatuor, rotundatis, spiraliter striatis et supernè cariniferis, prope suturam brunneo albidoque articulatis et cingulo centrali brunneo ornatis; suturâ canaliculatâ, margine canalis elevato; aperturâ circulari, peritremate incrassato, reflexo, umbilicum patulum versus lamellosopatente. Long. 0·8; lat. 1·4 poll. Operculum corneum, anfractuum margine lamellari, levatiusculo.

This species bears a general resemblance to the last; it may be distinguished by the flexuose lamella proceeding from the peritreme and overlying the umbilicus, so as nearly to cover it when adult; and also by the narrow channel at the suture. I received the first specimens of this shell from J. K. Smith, Esq. Mr. Cuming has collected two different varieties.

a. Shell depressed, pale in colour, J. K. Smith, Esq.

b. Shell with a more prominent spire and much darker colours. Found under decayed leaves on the island of Burias, H. Cuming, Esq.

c. Shell with the spire prominent as the last; of a rich dark brown, with a white median line and angular flashes of white on the upper side. Found under decayed leaves in the province of Tayabas, island of Luçon, H. Cuming, Esq.

CYCLOSTOMA VALIDUM.

Cycl. testâ orbiculari, crassiusculâ, pallidâ, brunneo-variegatâ, spirâ elevatiusculâ, anfractibus quinque rotundatis, spiraliter striatis, et nonnunquam obtusè quatuor- ad quinque-carinatis; suturâ distinctâ; aperturâ circulari, peritremate incrassato, reflexo, umbilicum versus patente; umbilico mediocri. Long. 1·5; lat. 1·8 poll. Operculum corneum, tenuiculum, margine anfractuum lamellari.

The young shell of this species appears to have been of comparatively large size at its first development from the egg, the edge of its aperture being usually distinguished by a broad and dark brown oblique band at about the middle of the third volution from the apex. Mr. Cuming has brought several varieties, as follows:—

a. This is the largest and coarsest variety, and its colours are the least brilliant; the lower part, near to the aperture, appears to be constantly worn away, probably from age; the peritreme also is extended far beyond its first formed edge. It is found on the leaves of trees at Tanauan, in the island of Leyte.

b. Shell of a dark brown, with sometimes angular flashes of nearly white over the upper part of the shell; the median edge is obtusely

keeled. It is found under decayed leaves in the province of Taya-bas, island of Luçon.

c. Shell of a light brown colour, variously mottled with very dark brown. Found under decayed leaves in dense woods at Catbalonga, and at Basay, in the island of Samar.

d. Smaller than the last, and generally paler in colour, with less of the dark brown. Found under decayed leaves at Cagayan in the province of Misamis, Island of Mindanao.

CYCLOSTOMA STAINFORTHII.

Cycl. testá tenui, albicante, pyramidali, carinatá; spirá acuminatiusculá, anfractibus quinque ad sex, lateribus subventricosis, ultimo longè maximo, margine mediano carinato, lineis spiralibus fuscis quatuor ad sex ornato; suturá subobsoletá; aperturá magná, suborbiculari, latere columellari rectiusculo; peritremate albo, subincrassato, reflexo, supra anfractum penultimum subinterrupto, umbilico mediocri. Long. 0·7; lat. 0·8 poll. *Operculum corneum, tenue, marginibus anfractum lamellosis, levatiusculis.*

A very elegant species, which I have the pleasure of dedicating to my kind and liberal friend, the Rev. F. J. Stainforth. Mr. Cuming has brought the following varieties:—

a. Shell nearly white, variegated with brown mottlings and from four to six dark brown spiral lines. Found upon the leaves of trees on the island of Ticao.

b. Shell smaller, and altogether paler. Found on leaves of trees on the island of Masbate.

c. Shell of a pale rosy brown colour. On leaves of bushes on the island of Siquijor.

d. Shell of a pale colour, mottled with dark brown. On leaves of bushes in the island of Siquijor.

e. Shell nearly white. From the same locality as c. and d.

f. Shell larger than var. e. and nearly white. On leaves of trees in the island of Panay.

CYCLOSTOMA TUBA.

Cycl. testá suborbiculari, depressiusculá, tenui, levi, albicante rufescente-fusco-variegatá et nubeculatá; spirá brevi, subdepressá, acuminatá, anfractibus quinque, planiusculis, primis carinatis, ultimo maximo, rotundato; aperturá maximá, circulari, expansá, albicante; peritremate albicante, tenui, lato, revoluto, supra anfractum penultimum interrupto; umbilico magno. Alt. 1·5; lat. 2·3 poll.

Hab. sub foliis putridis prope Montem Ophir, Malaccæ.

This species is remarkable for the extent of the reflected lip of the aperture. Mr. Cuming has brought two varieties, differing only in size.

CYCLOSTOMA PHILIPPINARUM.

Sowerby, Species Conchyliorum, Pars 2^{da}, fig. 180 to 183.

Cycl. testá globoso-conicá, pallidá, fusco-marmoratá, spirá subacuminatá, anfractibus quinque subrotundatis, superne longitudinaliter

sulcatis, ultimo infrà lævigato; aperturâ subrotundâ, peritremate obtuso, reflexo, supernè producto, latere umbilici subsinuato; umbilico parvo. Alt. 0·6; lat. 0·5 poll. Operculum tenue, corneum, læve.

Of this species, which is very variable in size and colouring, the first specimens I met with were brought from Manilla by J. K. Smith, Esq. Mr. Cuming has collected the following varieties, viz.

a. Shell small, light brown, elegantly marbled with dark chestnut-brown. Found in the earth at the roots of plants at Puerto-galero, in the island of Mindoro.

b. Shell rather larger than *a*, of a pale colour, with very slight dark brown mottlings; apex rosy. From Bai, in the isle of Negros.

c. Nearly similar to *b*, but the apex scarcely rosy. Found under decayed leaves at Piddig, in the province of North Ilocos, island of Luçon.

d. Shell larger, with a pale band round the circumference, and a dark one beneath. Found under decayed leaves at Sinaï, and in earth at Bolinao.

e. Shell very darkly coloured, size of *d*. On leaves of bushes at Calauang, and on leaves of trees at St. Christoval, in the province of Batangas.

f. Shell smoother and paler than the other varieties; apex blackish. Found on leaves of bushes at Daleguete, island of Zebu.

g. Shell larger than the other varieties, dark brown, with a white and brown articulated band close to the suture, and a nearly white circumferential band. Found on leaves of bushes at the island of Luban.

CYCLOSTOMA ALTUM.

Cycl. testâ acuminato-turritâ, crassiusculâ, fuscâ, lævi, tenuissimè striatâ, apice obtusiusculo, anfractibus 7 ad 8 rotundatis; suturâ distinctâ, tenui; aperturâ circulari, labio subincrassato, reflexo-patente, duplici, margine externo magis, interno minus expanso, intùs canali parvâ ad basin columellarem munito; umbilico mediocri extùs carinâ obtusâ marginato; operculo corneo, tenui, multispirali. Long. 1·; lat. 0·3 poll.

Hab. supra truncos arborum in montibus insulæ Negros, Philippinarum.

This species is remarkable for having a double lip, the inner or newer portion of which is not quite so much expanded as the outer. It may be regarded as the first link of affinity, connecting *Cyclostoma* with *Pupina* by the intervention of the next species, *C. Pupiniforme*.

CYCLOSTOMA PUPINIFORME.

Cycl. testâ subcylindrico-turritâ, crassiusculâ, obscurâ, fuscâ, lævi, tenuissimè striatâ, apice subabruptè acuminato, anfractibus senis, rotundatis, suturâ validâ; aperturâ circulari, peritremate discontinuo; labio externo subincrassato, revoluto, flavido, ad basin columellarem canali angustissimâ spirali interrupto; deindè supernè latiori, demùm supra ultimum anfractum leviter expanso, canali

angustâ tenuique inter anfractum ultimum et partem posticam labii positâ; umbilico parvo, carinâ obtusâ marginatâ, hæc carinâ externam partem canalis angustissimæ basis columellaris efformante. Long. 0·7; lat. 0·25.

Hab. supra truncos arborum apud S. Juan provinciæ Cagayan insulæ Luçon, Philippinarum.

This species, which is related to the last and to *Cycl. tortuosum* of Gray, approaches very nearly to the genus *Pupina*, appearing to differ only in having a dull unpolished external surface, while that of *Pupina* is extremely brilliant. It proves the genera *Cyclostoma* and *Pupina* to belong to the same family.

The next communication is from Dr. L. Pfeiffer, and contains the following descriptions of shells belonging to the genera *Helix* and *Bulimus*, also collected by H. Cuming, Esq. in the Philippine Islands.

HELIX ZONIFERA, SOW. *Hel. T. imperforatâ, subglobosâ, tenui, fulvâ, zonis variis opacis lutescenti-albidis ornatâ, obsoletè angulatâ; anfractibus 4 convexis, supremis depressis; columellâ planâ, rectâ, elongatâ; aperturâ lunato-rotundatâ, intus nitidâ; peristomate simplici, expanso, albo, cum callo columellari angulatim juncto.*

Diam. 1·60; alt. 1·10 poll.

Hab. ins. Leyte.

β. *T. tenuissimâ, luteo-virente, basi unicolore, ad peripheriam fasciâ latâ nigricante et angustiore albidâ, supernè fasciis pluribus albidis interruptis ornatâ.*

Hab. ins. Leyte.

γ. *T. rufo-nigricante, fasciis variis sordidè albidis.*

Hab. ins. Samar.

δ. *T. crassiusculâ, cinnamomeâ, fasciis lutescenti-albidis.*

Hab. ins. Samar.

Differt ab *H. pulcherrimâ*, cui valdè affinis, spirâ depressâ, anfractu ultimo minus inflato, et columellâ neque excavatâ neque dentatâ.

HELIX NORRISII, SOW. *Hel. T. imperforatâ, globoso-depressâ, solidâ, glabrâ, fulvo-citrinâ, zonis opacis candidis et infra suturam maculis irregularibus albis notatâ; spirâ semiglobosâ; anfractibus 4½ convexis, ultimo ad columellam subexcavato; columellâ latâ, albo-cullosâ, arcuatim prolongatâ; aperturâ ferè orbiculari, intus lacteâ; peristomate crasso, latissimè expanso.*

Diam. 1·80; alt. 1·15 poll.

Hab. insula Luçon, ad Montem Triga.

Species intermedia inter *H. pulcherrimam* et *zoniferam*, ab illâ spirâ depressâ et columellâ arcuatâ, ab alterâ columellâ excavatâ, nec angulatâ diversa.

HELIX LUZONICA, SOW. *Hel. T. imperforatâ, conico-globosâ, crassiusculâ, obliquè striatâ, rufâ, apice sanguineâ, epidermide liberâ ferè omnino tectâ, medio fasciâ latâ albidâ ornato; spirâ conoideâ; anfractibus 5 — 5½ convexiusculis; columellâ obliquâ, dilatatâ, tuberculosâ; aperturâ lunato-orbiculari, intus lacteâ; peristomate incrassato, latè reflexo, albo vel purpureo latè limbato.*

Diam. 1.60; lat. 1.15 poll.

Hab. Provincia Cagayan insulæ Luçon.

Differt ab *H. pulcherrimâ* testâ crassâ, conoideâ, anfractibus pluribus et sensim accrescentibus, columellâ vix excavatâ et labro incrassato.

HELIX MINDANAENSIS, Sow. *Hel. T. imperforatâ, globoso-conicâ, solidâ, obliquè rugoso-striatâ, apice obtuso, pallidâ, luteo-fuscâ, opacâ, maculis variis rufis pellucidis ornatâ; spirâ conoideâ; anfractibus 4½ convexiusculis, ultimo medio obtusè angulato, infra angulum fasciâ latâ, hydrophanâ, albidâ signatâ; columellâ lividâ, subrectè descendente, medio subintortâ; aperturâ tetragono-ovâtâ, intùs plumbeâ; peristomate subincrassato, parùm reflexo, livido-fusco, margine supero arcuatim dilatato.*

Diam. 2.20; alt. 1.65 poll.

Hab. insula Mindanao.

Forma et magnitudo sicut *H. Pan.* Differt anfractu ultimo angulato, colore et formâ columellæ et aperturæ. Ab *H. Harfordii* differt formâ conicâ, maculis non hydrophanis, sed in ipsâ testâ positis, et margine dextro aperturæ sinuato.

HELIX CARBONARIA, Sow. *Hel. T. imperforatâ, subtrochiformi, lævi, purpureo-nigricante, epidermide fuscâ, hydrophanâ, obliquè strigatâ, apice rubrâ vel violacèâ; suturâ lineari; anfractibus 5 planiusculis, ultimo carinato, basi plano; columellâ subrectâ, dilatâtâ, fusciculâ; aperturâ subtetragonâ, intùs lividâ; peristomate simplici, vix incrassato.*

Diam. 1.20; altit. 0.95 poll.

Hab. Insula Zebu. 'Daleguete.'

Variat carinâ obtusiore, basi convexiore.

HELIX (CAROCOLLA) PANAYENSIS, Brod. *Hel. T. imperforatâ, depressâ, orbiculari, carinatâ, crassiusculâ, supernè griseo-fuscâ, minutissimè granulatâ, basi radiatim striatâ, nitidissimâ, olivacèâ; spirâ depresso-conoideâ; anfractibus 6 planulatis, ultimo non deflexo; aperturâ angulato-lunari, intùs albidâ; peristomate supernè simplici, basi incrassato, ad columellam expansiusculo.*

Diam. 1.60; altit. 0.85 poll.

Hab. Insula Panay. 'Dingle.'

Var. (Cagayan ins. Luçon). *Spirâ elatiore, anfractibus ultimis tumidis, supernè saturatè rufa, basi nigricans, deorsùm pallescens.*

HELIX MORICANDI, Sow. *Hel. T. umblicatâ, semiglobosâ, basi planiusculâ, nitidâ, albedo-flavâ, fasciis rufis 2-3-cinctâ; anfractibus 5½ convexis, ultimo margine dextro subitè deflexo; umbilico angusto, pervio; aperturâ transversè pyriformi, basi parallelâ; peristomate connexo, margine superiore expanso, basali latè reflexo, ad basin dente unico crasso instructo.*

Diam. 1.35; altit. 0.70 poll.

Hab. Insula Bohol. 'Jacna.'

Differt ab *H. zonali*, Fér., cui persimilis, basi planâ, aperturæ parte supremâ deflexâ, indè horizontali, et marginibus peristomatis junctis.

HELIX SAGITTIFERA, Pfr. an Nanina? *Hel. T. subperforatá, tenui, pellucidá, obliquè striatá et obsolete rugosá, fulvá, maculis seriatis sagittiformibus et ad carinam obsoletam fasciá unicá rufá ornatá; suturá impressá, ad anfractum ultimum subcanaliculatá; anfractibus $4\frac{1}{2}$ planiusculis, ultimo inflato; aperturá perobliquá, lunato-ovatá, intùs lacteá; peristomate simplici, ad columellam subincrassato, vix reflexo, margine superiore deflexo.*

Diam. 2; altit. 1·10 poll.

Hab. Sinait insulæ Luçon.

Affinis *H. Lamarckianæ*, Lea. Differt formá minus depressá, anfractibus spiræ lentè crescentibus, ultimo vix carinato, et colore.

Varietas: testá distinctè carinatá, supernè intensè rufá, infra carinam fasciá nigricante dilutá circumdatá, basi olivaceo-fulvá, maculis sagittiformibus obsoletis.—Bolinao insulæ Luçon.

HELIX FULVIDA, Pfr. an Nanina? *Hel. T. subperforatá, subglobosá, tenui, pellucidá, pallidè fulvescente, supernè confertissimè et minutissimè granulósá, basi glabrá, nitidá; spirá elatá; anfractibus $5\frac{1}{2}$, supremis planis, $1\frac{1}{2}$ ultimis rotundatis; aperturá lunari; peristomate simplici, margine columellari subincrassato, ad perforationem obsoletam reflexo.*

Diam. 1·25; altit. 0·85 poll.

Hab. Insula Mindanao.

HELIX JANUS, Chemn. xi. 3016. 17.—*Helicella*, Fér. pr. 233.—An Nanina? *Hel. T. sinistrorsá, perforatá, orbiculari, tenui, diaphaná, obliquè regulariter et confertim striatá, supernè fuscá, basi convexá, rufá, nitidiusculá; spirá latè depresso-conoideá; anfractibus 7 planulatis, ultimo carinato; aperturá lunari; peristomate tenui, acuto, margine columellari reflexiusculo.*

Diam. 1·30; altit. 0·80 poll.

Hab. in monte Ophir, peninsulæ Malaccanæ.

H. Mackensiana, Saul in Revue Zool. 1841, p. 347, eadem esse videtur.

HELIX PORPHYRIA, Pfr. an Nanina? *Hel. T. perforatá, depressá, solidá, obliquè rugoso-striatá, rufá, maculis et strigis creberrimis, flavido-albidis subprominulis marmoratá, carinatá, infra carinam rufo-fasciatá, basi olivaceo-fulvá, nitidiore; anfractibus $4\frac{1}{2}$ planulatis, regulariter crescentibus, ultimo circa perforationem apertam excavato; aperturá subrhombé; peristomate simplici, tenui, margine columellari arcuatim reflexo.*

Diam. 1·80; altit. 1·00 poll.

Hab. Insula Burias.

HELIX SAMARENSIS, Pfr. *Hel. T. umbilicatá, depresso-conoideá, tenui, obliquè striatulá, fulvido-albá, fasciis rufis ornatá; basi planulatá; suturá lineari; anfractibus $4\frac{1}{2}$ planiusculis, ultimo basi subcarinato; umbilico angusto, pervio; aperturá horizontali, ellipticá; peristomate simplici, margine supero expanso, basali latè reflexo, edentulo.*

Diam. 0·90; altit. 0·50 poll.

Hab. Insula Samar.

HELIX BUTLERI, Pfr. *Hel. T. imperforatâ, globosâ, tenui, lævi, apice obtuso albâ; spirâ semiglobosâ; suturâ mediocri; anfractibus 4½ planiusculis, ultimo inflato, pallidè lutescente, lineis parvis confertis, crispulis vel interruptis ornatâ; columellâ subrectâ, latâ, profundè intrante; aperturâ rotundato-lunatâ; peristomate simplici, vix expanso.*

Diam. 1·25; altit. 1·00 poll.

Hab. Mountains of the Igorrotes.—Forma affinis *H. versicolori* Bornii.

HELIX BECKIANA, Pfr. *Hel. T. umblicatâ, orbiculari, tenui, obliquè striatâ, fuscâ, vix nitidulâ; spirâ parùm elatâ; suturâ lineari; anfractibus 6 planiusculis, ultimo deflexo, ad peripheriam angulato; angulo ad aperturam obsoleto; basi planiusculâ; umbilico mediocri, pervio; aperturâ ferè horizontali, subtrapezoidali; peristomate simplici, margine columellari brevi, basali reflexo, quasi in tuberculum incrassato.*

Diam. 0·85; altit. 0·40 poll.—Nueva Ecija.

HELIX CUMINGII, Pfr. *Hel. T. imperforatâ, depressâ, obtusè subcarinatâ, apice violaceo, obtusâ, obliquè striatâ, nigricanti-rufâ, epidermide rufâ, supernè maculis irregularibus, basi fasciis multis stramineo-cinereis ornatâ; anfractibus 4, supremis planiusculis, ultimo subinflato; columellâ rectè descendente, latè callosâ; aperturâ latâ, subquadrangulari; peristomate latè expanso, margine inferiore incrassato.*

Diam. 1·60; altit. 0·90 poll.

Hab. Insula Zebu.—Affinis *H. Zebuensi*, Brod.

HELIX SCROBICULATA, Pfr. *Hel. T. umblicatâ, lenticulari, tenui, obliquè rugosâ, fulvido-albidâ, fusco-zonatâ, carinatâ; spirâ parùm elatâ, apice obtuso nitidâ, glabrâ; suturâ lineari; anfractibus 4½ convexiusculis, ultimo deflexo; carinâ subacutâ; umbilico angusto, pervio; aperturâ transversè pyriformi; peristomate simplici, continuo, supernè expanso, basi latè reflexo, unidentato; dente obtuso, extûs scrobiculum formante.*

Diam. 1·15; altit. 0·45 poll.

Hab. Insula Bohol.

Affinis *H. rotæ*, spirâ elatiore, carinâ simplici, subacutâ, et costis deficientibus diversâ.

BULIMUS BREVICULUS, Pfr. *Bul. T. imperforatâ, ovatâ, apice obtuso, obliquè obsoletè striatâ, nitidâ, albâ, epidermide lutescente deciduâ obductâ; anfractibus 6 angustis, convexiusculis; columellâ subrectâ, in laminam tenuem expansâ; aperturâ perobliquâ, transversè semiovali; peristomate simplici, expanso.*

Long. 1·15; diam. 0·75 poll.

Hab. Insula Romblon.

Affinis *Bulimo stabili*, Sow., formâ abbreviatâ, anfractibus convexiusculis et aperturâ diversis.

BULIMUS CUMINGII, Pfr. *Bul. T. imperforatâ, ovatâ, tenuissimâ, obliquè striatulâ, pellucidâ, albedo-virente, ad suturam lineâ rufâ*

circumdatâ ; anfractibus 4½ convexiusculis, ultimo obsolete angulato, spiram paulò superante ; columellâ planâ, subexcavatâ, fuscâ ; aperturâ lunato-ovali ; peristomate simplici, margine dextro latè expanso, basali subreflexo.

Long. 1·35 ; diam. 0·95 poll.

Hab. Insula Camiguang.

BULIMUS LIGNARIUS, Pfr. *Bul. T. imperforatâ, conoideo-globosâ, solum obliquè striatâ, subepidermide lignariâ nitide nigricante, sursùm pallescente, apice obtusiusculo, nitide fulvo ; spirâ conoidè ; anfractibus 5 convexis, ultimo spirâ paulò breviorè ; columellâ subrectâ, extrorsùm latè expansâ, fusco-plumbeâ ; aperturâ lunato-ovali, intùs nitidè cærulescente ; peristomate simplici, reflexo, saturatè plumbeo, margine dextro valdè arcuato.*

Long. 3·05 ; diam. 2·20 poll.

Hab. Provincia Cagayan insulæ Luçon.

a. *Ferè unicolor, epidermide pallidâ, saturatius strigatâ, fasciâ unicâ angustâ, nigrâ suprâ, latiore albâ infrâ medium anfractus ultimi.*

β. *Epidermide albo-strigatâ, fasciis pluribus angustis nigricantibus, unicâ latiore albâ infrâ medium anfractus ultimi.*

γ. *Minor, spira subelongata ; color sicut in a.*

BULIMUS JUGLANS, Pfr. *Bul. T. imperforatâ, elongato-globosâ, apice obtuso, solidiusculâ, obliquè distinctè striatâ, unicolore, rufâ ; anfractibus 5 convexis, ultimo spiram æquante ; columellâ latâ, albâ, introrsùm arcuatim prominente ; aperturâ magnâ, irregulariter subovali, ad basin columellæ sinuatâ, intùs pallidè lividâ ; peristomate vix reflexo, rufo-marginato.*

Long. 2·20 ; diam. 1·50 poll.

Hab. 'Mountains of Igorrotes.'

BULIMUS NYMPHA, Pfr. (*Achatina* ?) *Bul. T. ovato-turritâ, solidiusculâ, lævi, sulphureâ, epidermide hydrophanâ, lignè crebrè et latè strigatâ, lineâ suturali rufâ et areâ columellari nigricante ornatâ ; apice obtuso, nitide roseo ; anfractibus 6 vix convexiusculis, ultimo ½ longitudinis æquante, obsolete angulato ; columellâ rectâ, planâ, vix truncatâ ; aperturâ magnâ, ovali, intùs albâ ; peristomate subsimplici, albo, margine dextro valdè arcuato.*

Long. 2·00 ; diam. 0·95 poll.

Hab. Insula Luçon, 'San Miguel.'

Var. Testâ rufâ, sursùm pallescente, apice roseo ; epidermide albidâ, peristomate rufo. Mt. Triga.

Differt a *Bulimo* (*Achatina*) *Boholensi* formâ ventricosiorè, anfractu ultimo brevi, aperturâ latâ, peristomate non expanso.

July 12.—William Horton Lloyd, Esq., in the Chair.

The following "Descriptions of two new species of *Oniscia*, a genus of pectinibranchiate Mollusks," communicated by Mr. Lovell Reeve, was read.

ONISCIA DENNISONI. *Onisc. testâ trigono-ovatâ, decussatim costatâ, costis tuberculo squamæ ad juncturas instructis ; anfractibus su-*

pernè angulatis, superficie albá, fusco-maculosá, leviter striatá; labro columellari rutilo, albo-granuloso, latissimè effuso; labro externo valdè incrassato, internè denticulis albis irregulariter ornato.

Reeve, Conch. Syst., vol. ii. pl. 253. f. 5 and 6.

Hab. ——— ?

Long. 2; lat. $1\frac{1}{10}$ poll.

In dedicating this very chaste and beautiful shell to its fortunate possessor, J. Dennison, Esq., we memorize the name of a gentleman whose collection is perhaps unequalled in excellency and preservation. The very rare and valuable specimen before us is closely allied to the *Oniscia cancellata* (*Cassidaria cancellata*, Lamarck), so much so indeed that we at first hesitated to consider it a distinct species; the rich and rosy appearance of the columellar lip is, however, remarkable, and as this part of the shell exhibits its chief generic character, may not so decided a variation of it be considered of *specific* importance?

ONISCIA STROMBIFORMIS. Onisc. testá trigono-pyriiformi, albá, transversim irregulariter costatá et nodosá; anfractibus supernè angulatis, angulis valdè nodosis; labro columellari albo, granuloso, leviter effuso; labro externo denticulato.

Reeve, Conch. Syst., vol. ii. pl. 253. f. 1.

Hab. ——— ? Mus. Cuming.

Long. $\frac{7}{8}$; lat. $\frac{1}{2}$ poll.

An interesting small species, figured in 'Conch. Syst.' together with the former, and which appears to be very distinct from any hitherto described.

A series of birds' skins, being the remaining portion of the collection presented by Walter Ewer, Esq., part of which was exhibited at the previous meeting, was laid on the table. These birds were collected in the north-western province of the Bengal presidency, in north latitude 29° to 31° , and east longitude 77° to 80° , and are chiefly inhabitants of the plain. Mr. Ewer, however, observes, that there are perhaps also a few from the Himalaya mountains in the collection.

The following is a list of the species:—

<i>Neophron percnopterus</i> , Temm.	<i>Merops Philippinus</i> , Linn.
<i>Haliaëtus Macei</i> .	—— <i>viridis</i> , Linn.
—— <i>Ponticerianus</i> .	<i>Hirundo filifera</i> , Steph.
<i>Circaëtus brachydactylus</i> , Vieill.	—— <i>riparia</i> ? Linn.
<i>Aquila Vindhiana</i> , Frankl.	<i>Halcyon Smyrnensis</i> , Linn.
<i>Morphnus cristatellus</i> .	<i>Alcedo rudis</i> , Linn.
<i>Astur Hyder</i> , Sykes.	—— <i>Bengalensis</i> .
<i>Accipiter nisus</i> .	—— <i>Graucalus Papuensis</i> , Cuv.
<i>Falco Chicquera</i> , Lath.	<i>Collurio erythronotus</i> , Vig.
<i>Circus rufus</i> , Briss.	—— <i>Lahtora</i> , Sykes.
—— <i>pallidus</i> , Sykes.	<i>Phanicornis peregrina</i> , Vig.
<i>Elanus melanopterus</i> , Leach.	—— <i>brevirostris</i> , Vig.
<i>Milvus Cheele</i> .	—— <i>rubeculoides</i> , Vig.
<i>Ketupa Leschenaulti</i> , Less.	<i>Turdus albicollis</i> .

- Turdus pæcilopterus*, Vig.
 — *sularis*, Auct.
 — — ?
Oriolus Galbula.
Malacocercus striatus, Sw.
Hypsipetes psaroides, Vig.
Ixos cafer.
 — *leucotis*, Gould.
Ianthocinclia albogularis, Gould.
 — *leucocephala*, Gould.
 — *erythrocephala*, Gould.
Enicurus maculatus, Vig.
Myophonus Temmincki, Vig.
Megalurus palustris, Sykes?
Anthus Chendoola, Frankl.
Pyrhulauda cruciger.
Saxicola bicolor, Sykes.
Phænicura ruticilla, Sw.
Motacilla alba.
Prinia inornata, Sykes.
Timalia hypoleuca, Frankl.
Parus atriceps, Horsf.
Emberiza cristata, Vig.
Pyrgita domestica, Cuv.
Fringilla leuconota, Temm.
Ploceus Philippinus, Cuv.
Sturnus vulgaris, Linn.
Pastor Galla.
Lamprotornis spilopterus, Vig.
Dendrocitta Sinensis, Vig.
 — *vagabunda*, Vig.
Garrulus bispecularis, Vig.
 — *lanceolatus*, Vig.
 — *striatus*, Vig.
Pica erythrorhyncha, Vig.
Nucifraga hemispila, Vig.
Fregilus Graculus, Cuv.
Corvus culminatus, Sykes.
Eudynamys orientalis, V. & H.
Centropus Philippensis, Cuv.
 — *Cirkeer*, Gray.
Palæornis torquatus, Vig.
 — *flavicollaris*, Frankl.
- Picus occipitalis*, Vig.
 — *Mahrattensis*, Lath.
Bucco caniceps, Frankl.
 — *Philippinensis*, Auct.
Yunx Torquilla, Linn.
Sitta castaneoventris, Frankl.
Pomatorhinus erythrogegens, Vig.
Phasianus albocristatus, Vig.
Perdix Chukar, Vig.
Francolinus Pondicerianus.
 — *vulgaris*.
Coturnix Cambaiensis.
Pterocles exustus.
Cursorius Coromandelicus.
Ædicnemus crepitans, Temm.
Vanellus Goensis, Auct.
 — *cristatus*, Meyer.
 — *Keptuschka*, Temm.
Gallinago stenurus.
Tringa pugnax, Linn.
 — *Temmincki*, Leisler.
Totanus glottoides, Vig.
Herodias Gazetta.
Botaurus stellaris, Steph.
Anas pæcilorhyncha, Gmel.
Dafila acuta, Leach.
Mareca Penelope, Selby.
Fuligula rufina, Steph.
 — *cristata*, Steph.
Nyroca leucophthalma, Flem.
Rhynchaspis clypeata, Steph.
Chauliodes strepera, Sw.
Querquedula Crecca.
Tadorna rutila, Steph.
Anser Indicus, Steph.
Mergus albellus, Linn.
 — *merganser*, Linn.
Podiceps minor, Lath.
Sterna aurantia, Gray.
Plotus Levallanti, Temm.
Phalacrocorax Javanica.
 — *Cormoranus*, Temm.

An abstract of a letter from E. Blyth, Esq., curator to the museum at Calcutta, was then read. It contains the following list of birds, with observations upon them, which are found both in India and Europe:—

- Aquila chrysaëtos*, Vig. Inhabits the mountains.
Falco peregrinus, Gmel. Inhabits the mountains.

- Falco Tinnunculus*, Linn. Common.
Pernis apivorus, Auct. Moderately common.
Circus rufus, Auct. Moderately common.
 — *cyaneus*, Auct. Moderately common.
 — *cineraceus*, Auct. Moderately common.
Otus brachyotus, Flem. Not rare.
Strix flammea, Linn. Common.
Hirundo rustica, Linn. Found in the Himalayas.
 — *riparia*, Linn. Inhabits the Himalayas.
Saxicola Rubetra, Temm. Not uncommon.
 — *rubicola*, Temm. Not uncommon.
Sylvia Hippolais, Lath. Not uncommon,
 — *Suecica*, Lath. Not uncommon.
Turdus viscivorus, Linn. Inhabits the Himalayas.
Pyrgita domestica, Auct. Very common.
 — *montana*, Auct. Inhabits the Himalayas; is found also at Chusan on the east, and Affghanistan on the west, in both places representing the house-sparrow.
Corvus pica, Linn. Is found, according to report, in Affghanistan. I have seen the true British species from Chusan. There is a distinct but nearly allied species at Bootan, which may also be that of Affghanistan.
Corvus Corax, Linn. Inhabits the mountains, but not the plains; it is there replaced by a smaller species*, often mistaken for the common raven.
Fregilus Graculus, Selby. Abounds in the Himalayas.
Sturnus vulgaris, Linn. Is seen commonly in the bird-shops at Calcutta, being brought from the hills.
Cuculus canorus, Linn. Rare; but the nearly allied species, *Cuculus micropterus* of Gould, is less so.
Yunx Torquilla, Linn. Not rare.
Charadrius minor, Meyer. Very common.
Œdicnemus crepitans, Temm. Inhabits the peninsula of India.
Ardea. All the European species of Heron are to be met with.
Botaurus stellaris, Linn.
Ciconia alba, Ray. Rare.
 — *nigra*, Ray. Rare.
Platalea Leucorodia, Linn. Very common.
Ibis Falcinellus, Temm. Very common.
Numenius arquata, Lath. Common; but the *Numenius phaeopus* (Lath.) is not found here.
Totanus fuscus, Leisl. Common.
 — *calidris*, Bechst. Common.
 — *ochropus*, Temm. Not very common.
 — *glareola*, Temm. Excessively abundant.
 — *hypoleucos*, Temm. Not very common.
Recurvirostra Avocetta, Linn. Not very common.
Himantopus melanopterus, Temm. Very common.

* Mr. Blyth probably alludes to the species to which Col. Sykes gave the name *culminatus*.

Limosa melanura, Leisl. Very common; but the *Limosa rufa* (Briss.) is not found here.

Scolopax Rusticola, Linn. Abounds in the hills.

— *Gallinago*, Linn. Not rare.

— *Gallinula*, Linn. Not rare.

Tringa pugnax, Linn. Common.

— *subarquata*, Temm. Tolerably common.

— *Temmincki*, Leisl. Very common.

— *minuta*, Leisl. Very common.

Phalaropus platyrhynchus, Temm. Rare.

Tadorna rutila, Steph. Common.

— *Bellonii*, Steph. Very rare.

Anas clypeata, Linn. Moderately common.

Chauliodus Strepera, Swains. Moderately common.

Dafila acuta, Linn. Common.

Querquedula circea. Very common.

— *Crecca*. Very common.

Mareca Penelope, Selb. Not common.

Fuligula Rufina, Steph. Very common.

— *Nyroca*, Steph. Very common.

— *cristata*, Steph. Not common.

— *ferina*, Steph. Not common.

GEOLOGICAL SOCIETY.

June 15, 1842.—A communication was made by Dr. Grant, F.G.S., "On the Structure and History of the Mastodontoid Animals of North America."

The chief object of this communication was to point out the structural differences and zoological distinctions of the Mastodons and Tetracaulodons of North America; and the inquiries were instituted in consequence of the favourable opportunity afforded by the temporary exhibition, in this metropolis, of Mr. Koch's large collection of organic remains from the State of Missouri, consisting principally of the relics of these two genera.

After pointing out the important applications of the study of these remains, and the geological relations of Mastodontoid animals, and the discordant opinions of zoologists as to their specific distinctions, Dr. Grant entered into extended details regarding the general structure and the peculiarities of the skeleton in the three principal Mastodontoid genera, Mastodon, Tetracaulodon, and Deinotherium, which are compared with those of the elephant and other allied genera. The fifth section of the memoir is occupied with the description of the development, forms, structure and changes of the dental system of Mastodontoid animals; and each tooth and tusk of the three principal genera are described and compared, and the principal modifications they exhibit according to difference of age, sex, and species. After pointing out the necessity of including the entire series of successive teeth, in the dental formulæ of genera, where the teeth are constantly displacing and succeeding each other through

the whole of life, the author announces the dental formulæ of the four Proboscidian genera of *Pachyderma* to be

$$\text{Elephas, Inc. } \frac{2}{0}, \text{ can. } \frac{0}{0}, \text{ mol. } \frac{8-8}{8-8}, = 34.$$

$$\text{Mastodon, Inc. } \frac{2}{0}, \text{ can. } \frac{0}{0}, \text{ mol. } \frac{6-6}{6-6}, = 26.$$

$$\text{Tetracaulodon, Inc. } \frac{2}{2}, \text{ can. } \frac{0}{0}, \text{ mol. } \frac{6-6}{6-6}, = 28.$$

$$\text{Deinotherium, Inc. } \frac{0}{2}, \text{ can. } \frac{0}{0}, \text{ mol. } \frac{5-5}{5-5}, = 22.$$

For the determination of the dental formulæ of *Mastodon* and *Tetracaulodon*, Dr. Grant relied entirely on the splendid collection of jaws, crania, and teeth in Mr. Koch's possession, which afford ample means for the solution of that problem. For the dental formula of *Deinotherium* he has been indebted solely to the casts and fragments of that genus in the British Museum. After explaining the uncertainties and fallacies to which naturalists have been exposed in the identification of species, from not having ascertained the entire dental series in any *Mastodon*, the sixth section of the memoir describes the distinctive characters and the distribution of the *Mastodon angustidens*, *M. latidens*, *M. Elephantoides*, *M. minutum*, *M. Tapiroides*, *M. Andium*, *M. Borsoni*, *M. Humboldtii*, *M. Turicense*, *M. Avernense*, *M. giganteum*, *M. Cuvieri*, and *M. Jeffersoni*. The seventh section of the memoir is devoted to the examination and description of the generic characters of *Tetracaulodon*, as established by Dr. Godman, and as founded on the number and form of the teeth, the peculiarities of their microscopic structure, the form of the jaws, the tusks, the alveoli of the tusks, the intermaxillary fossa, the infra-orbitary foramina, and other influential characters. The eighth and last section of this paper is occupied with an account of the distinctive characters and the distribution of the known species of this genus; viz. *Tetracaulodon Godmani*, *T. Collinsii*, *T. Tapiroides*, *T. Kochii*, *T. Haysii*, and *T. Bucklandi*.

June 29.—“Notice on the Discovery of Insects in the Wealden of the Vale of Aylesbury, Bucks, with some observations on the distribution of these and other Fossils in the Vale of Wardour, Wiltshire.” By the Rev. P. B. Brodie, F.G.S.

In a former notice Mr. Brodie announced the discovery of insects as well as a new genus of Isopods in the Wealden beds of the Vale of Wardour, and in this communication he gives an account of additional localities in the same Vale, where he has found both the insects and crustaceans, and of the strata belonging to the Wealden series, in which he has obtained fossil insects, in the Vale of Aylesbury.

Vale of Wardour.—The precise spot noticed in the former paper is a quarry at Dallards, and the first point to which the author now calls attention, is situated about two miles to the south-east of it. The following section is given of the beds at the new locality, the dip being slightly to the south:—

	ft.	in.
1. Top. Debris of rounded fragments of greensand and Portland stone, with their usual fossils, a few inches thick.		
2. Chert, full of <i>Cyclas</i> ; it also contains occasionally <i>Bufonites</i>	1	6
3. Hard, brownish white limestone, with <i>Ostrea</i> and casts of other shells, some resembling those of <i>Cyclas major</i> . The upper layers much disturbed	2	0
4. Black earthy clay, a few inches.		
5. Purbeck stone, varying in character but containing <i>Cyclades</i>	5	0
6. Fissile, soft stone full of <i>Modiolæ</i> , palates and other remains of fishes, also bones of a species of tortoise	1	0
7. White limestone, containing <i>Isopods</i> and elytra of <i>Coleoptera</i>	3	0
Hardstone.		

In an escarpment in the banks of the adjoining river are two beds of limestone, from the upper of which Mr. Brodie obtained small elytra, and from the lower *Cypris*, and from both carbonized wood, also a species of *Cyclas*. Under these strata is a very oolitic limestone, in which the author found a small *Melanopsis* and a seed-vessel.

A mile distant Mr. Brodie procured from a bed of limestone, about five inches thick, *Cyclades*, *Isopods*, and a small fish of the species which occurs at Dallards; and in a bed of clay, bones of a tortoise. The hard crystalline limestone of the Lady-down beds are noticed as yielding, but rarely, *Cyclades* and *Cyprides*. In the neighbourhood of Tisbury, in a soft, gritty, slightly oolitic stone, the author found *Isopods* of a larger size than elsewhere, likewise an elytron of a coleopterous insect. Though the number of beds of limestone vary in different parts of the Vale of Wardour, yet *Isopods* and insects characterise the whole of them; and as respects lithological characters, notwithstanding the great varieties which occur at different localities, there is throughout the district that general peculiarity of aspect which is so remarkable in freshwater formations of very different ages, and which serves to identify detached quarries with each other.

Vale of Aylesbury.—In Buckinghamshire the Wealden beds possess a certain similarity with those in Wiltshire, but with clearly marked local differences. At Quainton Hill Mr. Brodie could not discover any traces of fishes, insects, or *Isopods*. In a quarry near the village of Stone he obtained the following section:—

1. Rubble, several feet.
2. Hard white stone, no fossils 2 to 3 feet.
3. Greenish stone, with *Cypris*..... 2 feet.
4. Black clay, containing bones of a Tortoise 1 foot.
5. White and blue limestone (*Pendle*), yielding *Modiolæ* in abundance; also a few *Cypris* and *Cyclas*; likewise bones and palates of fishes, coprolites, and, but rarely, remains of insects; fragments of carbonized wood are common; and Mr. Brodie obtained a specimen of *Sphenopteris Mantelli*, and another minute but beautiful species

of Fern. This limestone bears a close resemblance to one of the beds at Dallards.

In his general observations on the fossils from these different localities, the author states, that though he has greatly added to the number and variety of insect-remains since his former communication, yet he has not found any of the larger kinds, almost every specimen requiring a high magnifying power to be seen distinctly. Next to the Coleoptera, the most prevalent orders are the Homoptera and Tricoptera; and Mr. Brodie observes, that this fact accords with the habits of the two latter orders, the first living on plants, remains of which are found abundantly in the Wealden, and the second hovering over the surface of streams. From the fragmentary state of these remains, and from the wings never being expanded in the more nearly perfect specimens, he considers it probable, that they were carried for some distance down the streams which flowed into the Wealden estuaries. A few of the insects which have been examined by an eminent entomologist, have been pronounced to possess, with one exception, a decidedly European character, to differ from those at Aix, and to be less tropical than those found at Stonesfield.

Since the reading of his prior communication, Mr. Brodie has obtained Isopods an inch and a half in length and an inch broad. These crustaceans, so interesting from the analogy to Trilobites, presented by allied genera, are rarely found in single specimens, but in groups, and therefore present this additional agreement with the habits of recent species. The fossils appear to have been deposited tranquilly at the bottom of the water which they inhabited, being always found imbedded with their legs downwards, and they are generally well-preserved. The whole of the freshwater remains of these Wealden beds, including the testacea, afford the natural characters of such deposits by yielding abundance of specimens, but few genera.

Associated with the above-mentioned organic remains of the Vale of Wardour, Mr. Brodie has obtained three species of small fishes quite distinct, he says, from those found at Lady Down and Chicks-grove. With a single exception they were all procured at one spot.

None of the localities mentioned in the paper afforded the least trace of the "dirt-bed," or of Cycadeoidea.

A letter, addressed to the Secretaries by C. Kaye, Esq., "On a Collection of Fossils discovered by the writer in Rocks in Southern India."

The localities from which Mr. Kaye procured his suites of specimens are Pondicherry, Trichinopoly, and Verdachellum.

Pondicherry.—From a limestone in the neighbourhood of this city, Mr. Kaye obtained Nautili in great abundance, belonging to at least three species; Ammonites in even greater numbers and well-preserved, and although assignable to thirteen distinct species, the author has not been able to identify a single specimen with any European Ammonites of which he has seen a description. Baculites likewise occur in such quantities as often to constitute the entire mass of large blocks; and Hamites in a great variety of forms, besides numerous genera of conchifera and mollusca; likewise Echinidæ,

Polyparia, fishes' teeth, and considerable masses of calcareous wood bored by Teredines.

All these fossils were discovered by Mr. Kaye and a friend within the last two years, and are entirely new to European palæontologists.

In the neighbourhood of Pondicherry and bordering on the limestone is a bed of red sand containing an immense quantity of the silicified wood long known to collectors.

Trichinopoly.—The spot in this district from which Mr. Kaye procured his specimens he was not able to visit. The fossils occur also in a limestone, preserve their shelly matter with occasionally the colour, and belong principally to marine genera, but some are considered to be of freshwater origin. Cephalopods appear to be of very rare occurrence, Mr. Kaye having obtained from the locality only one fragment of a large Ammonite. Wood bored by Teredines is also found in the limestone.

Verdachellum.—From a calcareous rock near Verdachellum, forty miles from Pondicherry, Mr. Kaye procured a variety of marine shells, including a considerable number of Ammonites, considered by him to be distinct from those found near Pondicherry; also a few imperfect Nautili and a few Echinidæ, corals, &c.

Among the testacea are several considered to belong to species found in the Trichinopoly deposit, and a few believed by Mr. Kaye to be identifiable with Pondicherry shells. This limestone is likewise bordered by a red sand which contains specimens of silicified wood. The formation was discovered only a short time before the writer quitted India, and he consequently considers his collection as defective; but he regards the deposit whence it was obtained as of interest, affording, by its position and organic contents, a link between the other two localities.

MISCELLANEOUS.

NOTE ON SAXIFRAGA STELLARIS AND S. LEUCANTHEMIFOLIA, LAP.

I HAVE gathered in the Cetzthal in the Tyrol the plant described as *S. leucanthemifolia* (Lap.) by Reichenbach and other German botanists, and am quite of the opinion of Bertoloni (Fl. Ital. iv. 482) that it is only a state of *S. stellaris*, L. The plant in question has the leaves more oblong and dentate nearly to the base, the panicle somewhat more spreading, the bracts (as in *S. stellaris*) for the most part lanceolate, but the lower one sometimes obovate and dentate; the petals are slightly unequal, but this occurs (perhaps always) in *S. stellaris*; the capsule is quite the same, as are the seeds. As the description of the latter in DeCandolle's 'Prodromus' may give rise to mistakes, I may mention that the seeds of *S. stellaris* are oviform-semilunulate (not ovato-subglobose), light brown (scarcely fuscous) with longitudinal striae, which are beautifully fringed with elevated semitransparent points. In a paper in the 'Ann. Nat. Hist.' ii. 35, I mentioned a variety of *S. stellaris* found on Curslieve in Mayo, which is much more different from the ordinary form; it is much

larger, hairy, and somewhat viscose, the panicle widely spreading, lower bracts foliaceous, and the seeds appear more elongated, but this probably depends on their maturity: I found no flowering specimens. I should think that this may probably be the same as *S. Clusii*, var. *α.* of DeCandolle's 'Prodromus.'—J. BALL.

GEOGRAPHICAL DISTRIBUTION OF SOME AMERICAN BIRDS.

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

GENTLEMEN,—Having received a small collection of birds formed in the summer of 1840 by Murdoch M'Pherson, Esq., at Fort Simpson on the Mackenzie, in lat. 62° 11' N., I send you a list of the species for insertion in the 'Annals,' as it may interest the cultivators of American ornithology, by showing that several of the species have a higher range than has hitherto been recorded.

1. *Merula wilsonii*, Fauna Boreali-Americana, ii. p. 182. *Turdus wilsonii*, Audubon, pl. 144; Ornith. Biography, ii. p. 362, and v. p. 456.

2. *Tyrannula pusilla*, F. B. A. ii. p. 144.

3. *Sylvicola petechia*, F. B. A. ii. p. 215; Aud. pl. 145. f. 1. pl. 163. f. 2; Ornith. Biogr. i. p. 260, and v. p. 458.

4. *Sylvicola maculosa*, F. B. A. pl. 40; Aud. pl. 50; Orn. Biogr. i. p. 260, and v. p. 458.

5. *Vermivora peregrina*, F. B. A. pl. 42. p. 221; Aud. pl. 154; Orn. Biogr. ii. p. 307.

6. *Vireo olivaceus*, F. B. A. ii. p. 233; Aud. pl. 150; Orn. Biogr. ii. p. 290.

7. *Setophaga ruticilla*, F. B. A. ii. p. 223; Aud. pl. 40; Orn. Biogr. i. p. 202.

8. *Fringilla iliaca*, F. B. A. ii. p. 257; Aud. pl. 108; Orn. Biogr. ii. p. 58.

9. *Fringilla pennsylvanica*, F. B. A. ii. p. 256; Aud. pl. 8; Orn. Biogr. i. p. 42.

Mr. M'Pherson says that this bird sings the first five notes of "O dear, what can the matter be?"

10. *Fringilla leucophrys*, F. B. A. ii. p. 255; Aud. pl. 114; Orn. Biogr. ii. p. 88.

11. *Fringilla hyemalis*, F. B. A. ii. p. 259; Aud. pl. 13; Orn. Biogr. i. p. 72.

12. *Fringilla socialis*, Aud. pl. 104; Orn. Biogr. ii. p. 22.

I remain, Gentlemen, yours &c.,
Haslar Hospital, May 8th, 1843. JOHN RICHARDSON.

FRUCTIFICATION OF CHÆTOPHORA TUBERCULOSA.

The true fruit of *Chatophora* appears hitherto to have been observed only by Mr. Berkeley, who communicated specimens to Capt. Carmichael, who made a drawing from them, which, with his other manuscripts, is in the hands of Sir W. J. Hooker. Mr. Berkeley also published a figure of it in his 'Gleanings of British Algæ.' Dr. Müller of Detmold has been so fortunate as to meet with similar fruit in *Chatophora tuberculosa*, and has given figures of it in the

place cited above. He has made moreover a very curious observation, viz. that the fruit is accompanied by, and at length connate with, a red globule of a similar form but smaller size, which he considers as the male fructification. As the female capsule advances to maturity, the male approaches it, becomes elongated, and at length is united with it, emptying the pollen-globules into the female fruit. This process being accomplished it falls off.

Whatever may be thought of this, his account of the development of the spores formed within the capsule, which are about five in number, and disposed round an aperture occasioned probably by the pressure of the male capsule, is not less wonderful. From each of the seeds a hyaline thread is developed, formed of the globules which press forward from the inside of the seed; this at length becomes green, and consists of a very tender hyaline tube filled with a moniform row of globules. Finally, the uppermost globule is elongated into a new tube, which is of a paler green than the rest of the thread. The capsule is now no longer visible, and the whole resembles a *Rivularia* which soon assumes the true form of *Chætophora tuberculosa*.

The above observations are at least curious, and if there has been no error, are of much importance. We recommend them to the consideration of some of our practical algologists, hoping that they may be able to throw some light upon the matter.—*Flora*, 1842, p. 513.

LECIDEA WAHLENBERGII.

To the Editors of the Annals of Natural History.

GENTLEMEN,—I have pleasure in being able to add to the number of British Lichens already published, the "*Lecidea Wahlenbergii*," Ach., which I found last July upon the black soil among the loose rocks on the west side of Ben Nevis, Inverness-shire, above Loch Nevis. A single specimen is all I could find, but that in fine order. I should wish you to make this public in the 'Annals and Mag. of Nat. History.'

Yours obediently,

2 Beulah Place, Harrogate, Yorkshire.

FRED. BAINBRIDGE.

LETTERS FROM RAY TO SIR HANS SLOANE.

[A volume of original letters, just published by the Camden Society, with notes and illustrations by Sir Henry Ellis, contains several from our illustrious countryman John Ray, some of which, as being interesting to the lovers of natural history, we shall take the liberty to extract.—ED.]

[MS. Sloan. Brit. Mus. 4056. fol. 132. *Orig.*]

SIR,—Not long since one Mr. Pratt, a gardener, a person (as himself told me) well known to you, who now lives with Sir Thomas Willughby, son and heir of my worthy friend and benefactor Francis Willughby, esquire, being heer with me, and hearing that you were returned from Jamayca, and had brought over with you, among other naturall rarities, diverse seeds, not common, by yourself discovered

in that and the neighbouring Islands, engaged me to write to you, to entreat you, if you have not already disposed of them, to communicate some part to Sr Thomas, who I know will be very thankfull to you for them. Mr. Pratt will take care of them, and part of the product you may command. Being advised by Dr. Robinson that my first letter in answer to yours miscarried, I wrote a second, which I hope came to your hands. I should be glad to hear what progresse you have made in order to the publishing your curious Observations and Discoveries, whereby you will much oblige the learned Naturalists of this Age, and erect a lasting monument to your own memory.

Black Notley,
Jan. 8, —89.

I am, Sir, your very humble servant,

JOHN RAY.

For Dr. Hans Sloane, to be left at Mr. Wilkinson's, at the Black Boy, over against St. Dunstan's Church, in Fleet Street, London.

[Ibid. fol. 136. *Orig.*]

SIR,—Monday last I received your kind Letter, attended with a rich Present of Sugar to my wife. They were both very gratefull and acceptable; onely the latter was too great and inadequate to any merit of mine to be received without some shame; as well the quality as quantity concurring to render it valuable. You have so highly pleased and obliged my wife, that she is much in commendation of your generosity, and returns you her humble service and hearty thanks; wishing that you were heer to partake of some of the effects of your kindnesse.

I have been importunate with you to hasten the publication of your Discoveries in the History of Nature, as well for the advancement of reall knowledge and gratification of the learned and inquisitive, as for your own deserved honour; that some other man might not prevent you, and by some means or other intercept what is yours. I am glad you make such progresse, and cannot but approve your deliberation and circumspection; and agree with you that the clearing up of difficulties and reconciling of Authors, and reducing and settling the severall histories and relations of species, will be a thing of eminent use, and of as much advantage to the Reader as pains to the Author.

The little plant you sent formerly you now conclude to be the *Callitriche Plinii* of Columna, and so it may be, I having never seen that; I find it overseen and omitted by me in my History; I suppose because, being seminiferous, I deferred it when I entred the *Lenticulae*; thinking to put it in in another place, and afterwards forgate it.

Those instances you would have added to my Discourse concerning the Wisdome of God, I know are so considerable, that I am sorry my Book wants them, which might have recommended it to the Reader. If I had thought you would have been willing to spare time to peruse it, you should have had a sight of the Copy before it had been committed to the Presse.

I am this morning sending away my Discourses concerning the Primitive Chaos and Creation of the World, the General Deluge,

and future Conflagration, with Additions for a second Edition. If you please to revise and correct it before it be printed, I will order Mr. Smith to deliver the Copy to you for that purpose.

Mr. Beaumont is a person that hath been very diligent in searching out and collecting, and curious in observing of petrified Shells and other bodies, and I suppose well qualified to write concerning them. I heard that he once threatened to write something in contradiction to Mr. Burnet's Theory of the Earth; which piece I could wish to see.

I am now upon a methodical Synopsis of all British Animals excepting Insects, and it will be a general Synops. of Quadrupeds. It will take me up more time to finish then I thought when I first set upon it; indeed so much as, if I had foreseen, I should hardly have been induced to undertake it. But now I must goe on.

The Remainder is, great thanks for your extraordinary kindnesse, attested by reall effects; and profession of readinesse to shew myself gratefull if any occasion of serving you offers to,

Black Notley,
May 25, — 92.

Sir, your affectionate friend and servant,

JOHN RAY.

For Dr. Hans Sloane, at the Dutchesse of Albemarle
in Clerkenwell, London.

METEOROLOGICAL OBSERVATIONS FOR APRIL 1843.

Chiswick.—April 1. Rain. 2. Cloudy: clear and fine. 3. Slight rain: clear. 4. Rain: cloudy and windy. 5. Fine. 6. Overcast: slight rain. 7. Rain: clear and fine. 8. Clear and fine. 9. Easterly haze. 10. Clear and fine. 11. Frosty: clear and dry: frosty at night. 12. Sharp frost: clear: cloudy: clear and frosty at night. 13. Cloudy: frosty at night. 14. Uniformly overcast. 15. Hazy. 16. Hazy: fine. 17, 18. Light haze: dry air: clear and fine. 19. Dry easterly haze. 20, 21. Very fine. 22. Showery. 23, 24. Cloudy and fine. 25. Rain: clear. 26. Cold rain: very fine: rain at night. 27. Cloudy and fine. 28. Slight rain. 29, 30. Cloudy and fine.—Mean temperature of the month $0^{\circ}36$ above the average.

Boston.—April 1. Rain: rain early A.M. 2. Rain: rain early A.M.: rain P.M. 3. Cloudy. 4. Cloudy: rain early A.M.: stormy with rain P.M. 5. Windy. 6. Cloudy: rain A.M. 7. Cloudy. 8. Fine: rain P.M. 9. Cloudy. 10. Fine: snow A.M.: snow P.M. 11—13. Fine. 14. Windy: rain early A.M. 15, 16. Cloudy. 17—21. Fine. 22. Cloudy: rain early A.M. 23. Fine: rain early A.M. 24. Fine. 25. Cloudy. 26. Fine: rain P.M. 27. Fine: rain A.M. 28. Windy. 29. Fine: rain A.M. 30. Cloudy.

Sandwich Manse, Orkney.—April 1. Damp: fog. 2. Bright: damp. 3. Bright: fog. 4. Cloudy. 5. Damp: drizzle. 6. Rain: clear: aurora. 7. Cloudy: rain. 8. Cloudy: snow-showers. 9. Snow-showers: hail-showers. 10. Snow-drift: showers. 11. Snow-showers. 12. Snowing: drift. 13. Snow-showers: snowing. 14. Bright: cloudy. 15. Cloudy. 16. Clear. 17. Clear: cloudy. 18. Cloudy: damp. 19. Cloudy. 20. Damp: cloudy. 21. Damp: fog. 22. Damp: rain. 23. Damp. 24. Bright: cloudy. 25, 26. Rain. 27. Bright: cloudy. 28. Rain. 29. Fog: cloudy. 30. Fog: bright: fine.

Applegarth Manse, Dumfries-shire.—April 1, 2. Heavy rain. 3. Fair and fine. 4. Rain. 5. Fair and fine: aurora. 6, 7. Rain. 8. Rain: thunder: hail. 9. Fair: frost. 10, 11. Hail: frost. 12. Frost A.M.: snow: rain. 13. Frost. 14—16. Fair and temperate. 17. Fair and temperate: fine spring day. 18—20. Fair and temperate. 21. Fair and temperate: showers. 22. Rain nearly all day. 23. Rain A.M. 24. Rain early: very fine day. 25. Heavy rain: flood. 26. Fair. 27. Fair: hoar-frost. 28. Heavy rain. 29. Fair and fine. 30. Fair.

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

SUPPLEMENT TO VOL. XI. JULY 1843.

LXIII.—*Contributions to the Ichthyology of Australia.* By
JOHN RICHARDSON, M.D., F.R.S., &c., Inspector of
Hospitals, Haslar.

[Concluded from p. 428.]

LEUCISCUS (PTYCHOLEPIS) SALMONEUS.

Mugil salmoneus, J. R. Forster, MS. iv. 14. apud Schneid. G. Forster,
No. 237.

Mugil lavaretoides, Solander, Pisc. Austr. p. 15. ?

No. 29. Mr. Gilbert's list.

THIS fish is stated to be in general an inhabitant of deep water, and rarely seen within the harbour of Port Essington, though the natives occasionally spear it close in shore. Mr. Gilbert's specimen was obtained at Point Smith. The existence of this fish in the collection is important, as it serves to rectify a mistake in the 'Règne Animal,' ii. p. 324, respecting a species discovered at the island of Tanna by the Forsters. Cuvier's expression is, "L'Elops de la mer des Indes est l'*Argentina machnata* de Forskål, et le *Mugil salmoneus* de Forster, Bl. Schn. 121, quoiqu'il ne lui donne que quatre rayons branchiaux, je m'en suis assuré par sa figure. C'est aussi le *jinagow*, Russell, 179, &c." Forster's figure measures a foot and a half, within an inch of the length of our specimen, which it exactly represents, with the single exception of the caudal fin being a trifle smaller. The four gill-rays are correctly drawn, and show that the fish cannot be ranked in the Clupeoid family; and in fact neither the figure nor the specimen has, even excluding the great dissimilarity of the number of the gill-rays, more than a distant resemblance to the *Elops jinagow* of Russell.

The following brief notice of a New Zealand fish occurs in the 'Pisces Australiæ':—" *Mugil lavaretoides*. Piscis dorso e cæruleo-virescens (uti in Harengo), inferne argenteus. In occipite supra et paulo pone oculos area magna ex argenteo sordide virescens, quasi subpellucida. Iris ex argenteo-flava; pupilla parva nigra. Pinnæ ex albido-cinerascentes. Habitat Tolaga." (p. 15.) Though there is nothing in this extract to point out the genus of the fish it alludes to, yet, as both the specific appellation of *lavaretoides* and the tints

of colour spoken of agree well with the Port Essington fish, it is possible enough that Solander may have had before him an example of the same or of a nearly allied species. He may have given an equal latitude to the generic term *Mugil*, as the Forsters afterwards did; and indeed as is done vulgarly by the English residents on the Indian coasts, who apply the term 'mullet' to several *Leucisci* as well as to the true *Mugiles*. M. Valenciennes says, "Il y a dans les manuscrits de ce même naturaliste (Solander), un *Mugil lavaretoides* qu'il est difficile de caractériser par le peu de mots qu'il en dit; mais nous avons cependant quelques raisons de soupçonner que c'est de l'Elops dont il s'agit ici." (C. & V. xi. p. 118.) Mr. J. McClelland, who has contributed so largely to our knowledge of the Indian *Cyprinidæ*, writes, "Nor is anything whatever known, as far as I am aware, of the existence of Cyprins in New Holland, or any of the Polynesian islands." (Annals of Nat. History for Nov. 1841, p. 198.) And after carefully examining the South-Sea drawings of Parkinson and George Forster, and all the collections of New Zealand, Australian, and Polynesian fish that have come in my way, the *Leuciscus salmoneus* is the only Cyprinoid that I have found among them*.

Two of Russell's *Cyprini*, the *tooleloo* (No. 208) and the *palah-bontah* (No. 207), agree with *L. salmoneus* in possessing four gill-rays, as well as in a portion or the whole of the scales being closely furrowed, producing numerous narrow delicate ridges which terminate on the free edge of the scale in acute projecting points or teeth. For these, as a subgenus or minor division of *Leuciscus*, I propose the designation *Ptycholepis*. In the *palah-bontah* the scales above the lateral line only are striated; the *tooleloo* agrees with *salmoneus* in the striated structure being common to all the scales of the body. Both of Russell's species receive the name of "mullet" from the English residents on the Coromandel coast, the *palah-bontah* being distinguished as the "milk mullet," and the *tooleloo*, which is caught in the river at Madepollam only when the freshes come down and never in the sea, as the "mountain mullet."

In shape and general aspect this fish strongly resembles a *Coregonus*. The head is small and forms only a fifth part of the total length, excluding the lobes of the caudal. The profile is a narrow ellipse, the back and belly being bounded by equal curves, which rise regularly from the mouth to midway between the gill-openings and ventrals, where the body is highest. The posterior curves are flatter and one-third longer, and the body tapers gradually to the base of the caudal, where the height is only one-third of that before the ventrals.

The head is covered with a smooth nacreous skin which is continued

* Mr. McClelland, in pointing out the analogical relations which exist between the Rasorial birds and the *Cyprinidæ*, says, that "while there is no instance of Rasorial birds possessed of aquatic habits, so no species of *Cyprinidæ* is known to belong to the sea; in India they are exclusively confined to fresh water, mostly keeping beyond the influence of the tides." The *Ptycholepis salmoneus* is an exception.

evenly over the cheeks and gill-covers, so that the opercular bones can scarcely be distinguished from each other even in the dried specimen. The under border alone of the preoperculum is marked out by a slight fold of the skin, and the membrane, which is stretched from the fore-part of the interoperculum to the under lip, is not attached to the integument which covers the limb of the hyoid bone over which it passes, a kind of pocket opening downwards being thus formed. The posterior part of the interoperculum and rest of the opercular pieces form one continuous surface with the gill-membranes. The top of the head is flattish, and narrows gradually from the nape to the snout. In the dried fish the flat space is bounded laterally by a slightly elevated line which extends from the nostrils to the nape. The upper edge of the orbit is prominent and rounded, and a scarcely raised line is continued from it to the upper angle of the gill-cover. The eye is large, and is only half the length of the orbit from the orifice of the mouth, but twice as far from the gill-opening. The mouth is small, but the true shape of its orifice cannot be ascertained from the specimen, the under lip having been injured. The maxillary widens gradually towards its lower end, which is rounded away: it forms half the upper lip, which is arched, and is received a short way under the bulging edge of the preorbital. The upper lip has no soft parts beyond the thin integument covering the bone. There are no vestiges whatever of teeth either on the jaws or roof of the mouth. A mucous canal with short branchlets traverses the surface of the preorbital, and closely skirts the orbit beneath and behind. The gill-rays are strap-shaped, very thin and flat.

There are no scales on any part of the head. The scales of the body are of moderate size, there being eighty-five rows and some small ones between the gill-opening and caudal fin, on which the scales terminate by an obtusely oval outline, and cover the central rays more than half-way. The lateral line, with the exception of a short inclination at its commencement, keeps a perfectly straight course a little above mid-height from the gill-opening to the end of the scales. The texture of the scales is thin and their form suborbicular. The basal half is divided by a notch into two rounded lobes, and shows no other impressions than the very fine concentric lines of structure. The uncovered portion is marked by about twenty-six slightly divergent furrows, producing an equal number of rounded ridges which terminate on the edge in acute points.

RAYS:—B. 4; D. 15; A. 11; C. 19 $\frac{9}{8}$; P. 17; V. 11.

The pectoral is small and situated low down; it is composed of seventeen rays and a short incumbent one, and there is a long pointed scale beneath it. The acute point of the fin reaches nearly half-way from the gill-opening to the ventrals. The dorsal fin commences exactly midway between the mouth and base of the central caudal rays: its margin is lunate with acute points, and the anterior point is thrice as high as the posterior one. The first three rays are simple without visible joints, short and closely incumbent; the rest are

more or less divided at their tips. The fourth and fifth are the tallest, and form the anterior tip of the fin. The bases of the rays are covered by a scaly fillet, which runs to a point posteriorly and rises a little from the back. The ventrals stand opposite to the middle of the dorsal, or midway between the mouth and tips of the central caudal rays. There are eleven rays, the outer one being strong, flat and bony, but divided at the tip, the others becoming gradually smaller as they are more and more interior. There is a long acute scale above the fin, and a scaly plate between the fins. The anal is small, with a wide notch in its edge, and is composed of eleven rays, including three short, graduated, incumbent ones. A scaly fillet rising obliquely from the base of the anterior rays nearly covers the posterior half of the fin. The caudal fin is very deeply forked, its acute and widely separated lobes being five times the length of the central rays. The divergence of the points exceeds the height of the body, and nearly equals the distance between the tips of the dorsal and ventrals; it consists of nineteen rays, with nine shorter, graduated, incumbent ones above and eight below. The exterior simple ray which reaches to the point of the lobe above and below is broad and bony, and is crossed at regular distances by oblique lines, which are nearly obsolete on the bases of the more interior branched rays, and are less conspicuous on the exterior short incumbent ones.

There are no distinct traces of colour remaining, except some dark shades along the back. The sides and belly have a bright silvery lustre, and the sides of the head a somewhat golden hue.

DIMENSIONS.		inches.	lines.
Length from intermaxillary to tip of upper lobe of caudal	.....	19	0
———— tips of central rays	.....	15	1
———— base of ditto	.....	14	6
———— beginning of anal	.....	11	6
———— ventrals	.....	8	0
———— dorsal	.....	7	5
———— pectorals	.....	3	5
———— tip of gill-cover	.....	3	3
Length of orbit	.....	0	11
Distance between angle of orbit and orifice of mouth	.....	0	7
Height of body	.....	4	0
———— dorsal fin	.....	2	7
Length of ditto	.....	2	2
———— pectoral rays	.....	2	2
———— ventral rays	.....	1	8
———— anal fin	.....	1	5
Depth of ditto	.....	0	9½
Length of caudal lobes	.....	5	6
Divergence of points of ditto	.....	5	6
Depth of caudal fork	.....	3	6

Obs. This subgenus and many of the other species described in this paper have already been named by me in a Report on the Ichthyology of New Zealand, read at the Meeting of the British Association in June 1842, and in the Appendix to Dr. Dieffenbach's account of New Zealand.

MEGALOPS SETIPINNIS, Forster's Megalops.

Clupea setipinna, Forster, fig. 242. Banks. Biblioth. (A reference to *Clupea cyprinoides*, Brouss., is added to the fig. by Dryander.)

No. 3. Mr. Gilbert's list.

Mr. Gilbert informs us that this fish is named the "fresh-water herring" by the settlers at Port Essington, and "or-roree" by the natives. It inhabits all the freshwater streams, swamps and lakes of Cobourg Peninsula, and may be taken readily with a hook and line. In the latter end of the dry season, when the waters have become shallow, it is caught in great numbers in clap-nets by the Aborigines; and when the swamps have altogether dried up, this fish is found living in the mud at the depth of several feet, where it remains until the ponds fill again; then it reappears in multitudes and of full size, although the mud may be covered merely by a few inches of water. It is an indifferent acquisition to the table, being not only full of bones like the English herring, but soft as if putrid, however early it may be cooked after it is caught.

The Banksian library contains a pencil sketch made by Forster of a fish taken by him in a freshwater pond on the island of Tanna in August 1774, which is a tolerable representation of the form of our fish*. Broussonnet confounds Forster's fish with Bloch's *Clupea cyprinoides*, a native of the Caribbean Sea, noticing however the difference of the fin-rays in Forster's and Bloch's specimens. He mentions the habit the fish has of burying itself in the mud. The Atlantic and the Pacific species are again confounded in Schneider's posthumous edition of Bloch under the name of *Clupea thrissoides* (p. 424), and in quoting the numbers of the rays from Broussonnet, Forster's name is transposed and placed against the rays of Bloch's species. The *Megalope filamenteux* (Lacep. v. pl. 13. f. 3, Russell, 203), which is stated in the 'Règne Animal' to have sixteen rays in the dorsal, has a smaller eye with a larger space between it and the edge of the intermaxillaries, and also larger fins, especially pectorals, than *setipinnis*. Although the term *setipinnis* refers more to a generic character than to a specific distinction, I do not think myself authorized to change it.

The profile of Mr. Gilbert's specimen is a pretty regular and elegant ellipse, whose vertical diameter at the ventrals is equal to one-fourth of the axis from the snout to the extremity of the central caudal rays. The caudal is deeply forked. The length of the head, measured to the extreme edge of the gill-cover, is exactly equal to

* The size of the eye and shortness of the snout correspond with Mr. Gilbert's specimen, but the dorsal is placed too far forward, probably from inadvertence.

the vertical axis of the body. The belly is rounded, and not serrated like *Chatoëssus*. The *under jaw* exceeds the snout in length, so that the mouth opens obliquely upwards when the jaw is moderately depressed. The maxillary bone is large and strong, and consists of three pieces; a long and slightly arched one, which carries the teeth on its anterior edge, and receives the two shorter pieces into its posterior arc, so that the form of the whole bone is a long oval, whose tip reaches backwards beyond the middle of the eye. The intermaxillaries, maxillaries, and lower jaw are armed on their thin edges only with very narrow bands of minute teeth, which have more resemblance to the asperities of a fine file than to the pile of shorn velvet. The whole surface of the palate-bone is rough, and when examined with a lens appears like shagreen, or as if densely powdered with very fine sand.

The eye is large, and is situated the breadth of itself from the scales on the nape, and half that distance from the end of the snout, and a diameter and a half from the extreme edge of the gill-cover. It just touches the profile of the forehead, but is nearly its own height above the inferior outline of the head. The crest of the preoperculum is defined in the dried specimen by an arc of irregular pits, from whence fine furrows radiate over the broad and delicately thin limb of the bone. Similar streaks are visible on the suborbitars, and are connected with a chain of pores which surround the orbit.

The *scales* are large, there being only forty in a longitudinal row, exclusive of one or two small ones on the base of the caudal, and there are nine in a vertical row between the dorsal and ventrals. The *lateral line* runs straight along the middle of the side, and each of its scales, which are of the same size with the rest, is marked by six or seven slightly undulating and mostly forked furrows, which radiate from an irregular eminence at the back of the uncovered surface. The area of the scales resembles frosted silver with a thin, narrow margin imitating the polished metal, and yielding silvery, greenish and purplish reflexions. The top of the head and summit of the back retain a dark olive tint, which gradually fades away above the lateral line. The belly appears to have been white. The head is nacre with metallic lustre, and yields golden reflexions. The vertical fins are dark gray, thickly powdered with minute dark dots, as was the case with Forster's fish. The colours are described from the specimen after being washed and while still wet.

RAYS:—1st spec. B. 21; D. 19; A. 25; V. 10; P. 15; C. 20 $\frac{1}{4}$.

2nd do. 22; 18; 25; 10; 15; 20 $\frac{1}{4}$.

Forster's spec. 22; 17; 25; 10; 15; 20 $\frac{5}{8}$ (Brous.)

The first specimen is the left side of a fish, and the second one the right. A difference of one ray in the branchiostegous membrane of the right and left sides of the same individual is common among the *Salmonidæ*, and it is very probable that Forster did not reckon the two very short incumbent rays at the beginning of the dorsal which I have included in my enumeration.

The dorsal, standing directly over the ventrals, commences exactly

midway between the tip of the snout and base of the anal; its first four rays are graduated and closely incumbent on the base of the fifth, without intervening membrane. The fifth is nearly as long as the sixth and seventh, the more posterior ones again decrease in length till the sixteenth, but the seventeenth and eighteenth are a little longer, and the nineteenth is prolonged and tapers to a point, which, when turned back, falls but little short of the base of the caudal. It is about one-fourth longer than the sixth ray, is broader than the rest, and is grooved behind so as to show very clearly its binate structure: it has a short anterior branch, which is not longer than the preceding ray. The anal is placed much further back than the dorsal and has more rays, but is otherwise very similarly constructed. Its last ray resembles the last one of the dorsal in form, being forked, with the posterior portion wider, grooved and tapering, but not much prolonged beyond the preceding rays. There is a small fold of the skin above the upper ray of the ventral, producing an acute ridge about half as long as the fin. No such ridge can be perceived at the pectoral.

	DIMENSIONS.	
	inches.	lines.
Length from snout to tip of caudal	9	2
————— base of caudal	7	2
————— anus	5	0
————— beginning of dorsal or ventrals	3	7½
————— edge of gill-cover	1	9
————— nape	1	6
Diameter of eye	0	6½
Length of dorsal	1	0
Height of its sixth ray.....	1	5
————— last ray	2	2
Length of anal.....	1	3
Height of its fifth and sixth rays	1	3
————— last ray	0	6
Length of caudal lobes	2	2
————— caudal central rays	0	6
————— pectorals	1	5
————— ventrals	1	1

RHOMBUS LENTIGINOSUS (Nob.).

Rh. lentiginosus; cum pinnis verticalibus ellipticus; pinna caudæ rhomboidali, pinnis ventralibus invicem et a pinna anali discretis; oculis approximatis sinistris; squamis apice ciliatis, singulis macula lunata verticali notatis; linea laterali super pinnam pectoralem curvata, dein recta.

RAD.—Br. 7; D. 73; A. 59; C. 15½; P. 1|11; V. 6.

No. 35. Mr. Gilbert's list.

This fish, which as far as I can ascertain is hitherto undescribed, inhabits all parts of the harbour of Port Essington, and the whole coast of Cobourg Peninsula. The Aborigines name it "wooneerung."

Its profile, excluding the vertical fins and extremely short trunk of

the tail, is an ellipse, whose axis is twice the length of its vertical diameter. The ellipse is not however quite regular, being more taper in its posterior half. This is compensated by the greater, though graduated length of the dorsal and anal rays bordering that part of the fish, so that instead of the rhomboidal outline usual in the genus, these fins produce an ellipse more regular than that of the body, and having a vertical diameter equal to the entire length from the end of the snout to the tip of the rhomboidal caudal.

The tolerably large orifice of the mouth is in the anterior apex of the ellipse, and runs backwards and downwards with a moderate curve: when it is shut, the oblique end of the lower jaw projects a little beyond the intermaxillaries. The whole edge of the lower jaw and the upper jaw near the symphysis are armed by short awl-shaped teeth set rather remotely in a single row. On the lateral parts of the upper jaw the teeth are minute, short and crowded, but also in a single row. The roof of the mouth is toothless. The perfectly smooth chevron of the vomer projects considerably, while the articular heads of the maxillaries are but just visible within the mouth.

On the lower dilated and truncated end of the left maxillary there is a small cluster of scales. The right maxillary is scaleless. Each limb of the lower jaw is traversed by two furrows divided from each other by an acute ridge, and the uppermost furrow on the coloured side is lined by a row of small ciliated scales, which do not exist on the other side.

The head is flattened on the pale side, and the nostrils of that side are much nearer the dorsal or mesial line than the left ones are. The eyes are on the left side close to each other, and not much out of the same vertical line, the upper one being but a very little posterior to the under one. The orbits are bordered posteriorly at a little distance by a line of slightly raised tubes with porous mouths, the line belonging to the under eye being a semicircular one, while the upper one encloses an acutely triangular area whose apex terminates in a slight but evident ridge, which runs to the occiput and is covered with scales like the adjoining parts. The disc of the lower limb of the preoperculum is roughened by irregular tubular elevations, covered with epidermis and a very few interspersed scales; the upper limb is smooth, the rest of the opercular pieces and the whole cheek is densely scaly. The interoperculum has an oval form, and is longer and wider than the suboperculum. The edges of all the pieces of the gill-cover are smooth. A flexible cartilaginous tip extends from the suboperculum under the operculum to the membranous edge of the gill-cover, as is usual in most acanthopterygian genera.

RAYS:—Br. 7; D. 73; A. 59; P. 1|11; C. $15\frac{2}{2}$; V. 6—6.

The (left) pectoral is obliquely rounded; its second articulated ray is the longest, and but just exceeds the first and third; the under ones are regularly graduated to the lowest, which is half the length of the uppermost ones. There is a short, slender spine incumbent on the base of the upper ray. The membrane is very delicate and perfectly scaleless. The dorsal commences over the posterior nasal orifices, and the membranous edge of its first ray turns towards the

right side, and originates at the margin of the nostril. The rays between the thirty-fifth and fifty-fifth are equal to each other and longer than the rest, which shorten very gradually each way; the first being about half the length of these, and the last only about one-third of their length. The tips of ten or twelve of the most anterior rays are more tapering and their membrane more notched. A single row of scales reclines against the fore-side of each ray, on both sides of the fin. The anal* is formed like the dorsal. The trunk of the tail, included between the caudal and these fins, is very short, and consists of little more than the swelling base of the caudal. The ventrals are not connected with the anal, and are not even in the same plane with it, but are attached one on each side of the edge of the belly. The outline of the fin is rounded; all its rays are jointed, its outer one is bound down nearly to its tip; the membrane is scaleless and is notched between the rays. The caudal is rhomboidal, its central ray is the longest, and all its rays are scaly.

The scales of the head and body are of moderate size. A longitudinal line between the gill-cover and caudal contains seventy, and a vertical line at the broadest part of the fish forty-four. Each scale is bordered on its exterior tip by a small elliptical disc, which appears under the microscope to be thickly tiled with subulate teeth, the exterior ones being the largest and forming a rough fringe; next the rough disc there is a semilunate spot, which in the dried specimen contrasts strongly with the shining greenish epidermis of the rest of the exposed disc, and was most probably more gaily coloured in the recent fish. The concealed basal half of the scale shows many of the usual fan-like furrows with corresponding shallow crenatures on the margin. The lateral line is boldly curved over the pectoral fin, and perfectly straight from thence to the tip of the caudal. A curved line of similar construction proceeds from the posterior end of the cranial ridge upwards to the base of the tenth dorsal ray. All the colourless side of the specimen, posterior to the jaws, has been removed in the preparation of it.

DIMENSIONS.		inches.	lines.
Length from tip of upper jaw to extremity of caudal		9	5
_____ base of ditto		7	10
_____ anus		2	0
_____ pectoral		2	1½
_____ ventral.....		1	7
_____ anterior angle of lower eye .		0	5½
_____ upper eye .		0	6
Length from tip of pectorals		1	5
_____ ventrals		0	6
_____ caudal		2	8
_____ highest dorsal or anal rays		0	10
Vertical diameter of body		3	6
Diameter of eye		0	3

* This fin has been injured in Mr. Gilbert's specimen while the fish was alive, four or five of the middle rays having been destroyed, though the membrane remains.

ECHENEIS NAUCRATES (*Linn. Auct.*), Ship-master Echeneis.

No. 7. Mr. Gilbert's list.

This species is named "munnènullergo" by the natives of Port Essington, who take it occasionally in the harbour. Schneider's account of the fish is in many respects erroneous, the caudal fin being stated to be rounded instead of lunate on the margin, and the numbers of the rays, probably from typographical error, are wrongly noted. The Port Essington specimen agrees in every respect with one from the West Indies, preserved in the Haslar Museum. The rays are as follows:—

Br. 9—9; discal plates (1st dors.?) 24; D. 37; A. 37; C. $16\frac{2}{3}$; P. 21; V. 7.

Artedi and Cuvier mention twenty-two as the usual number of discal plates.

LXIV.—On some new Genera of the Class Myriapoda.

By G. NEWPORT, Esq.*

THE family *Geophilidæ* of Leach, composed of those little, gliding, wormlike Myriapodes so abundant in our gardens, and yet so imperfectly known to the scientific naturalist, includes at least two distinct genera, one of which only has hitherto been characterised. Dr. Leach himself, to whom we are indebted for the foundation of nearly all the scientific knowledge we possess of these animals, appears to have regarded one of the five native species with which he was acquainted as distinct from the others, and placed it accordingly in a division of his genus *Geophilus*, founding his divisions on the comparative length of the joints of the antennæ. These divisions, with the same distinguishing characters, have been retained by M. Gervais, who in 1837 published a monograph on the whole class, and added a third section to the genus *Geophilus*, composed of two species, one of which, *Geophilus ferrugineus*, had been described by Koch; and the other, *Geophilus maxillaris*, was then first described by M. Gervais as a new species. It is this division, added by M. Gervais, the *Geophili maxillares*, which I now propose to establish as a separate genus, under the name of *Mecistocephalus*, the characters of which, derived from the peculiarly elongated form of the head, are as distinctly marked as in any genus of this order.

In a collection of *Myriapoda*, from the magnificent cabinet of the Rev. F. W. Hope, which that gentleman many months ago, in the most handsome manner, placed entirely at my control for the purpose of describing, I discovered a third species, brought to this country by the late Rev. Lansdowne Guilding, from the island of St. Vincent, which I immediately recognized as a new genus; and on examining the unarranged specimens of *Myriapoda* in the collections of the British Museum, which the head of the zoological depart-

* From the Proceedings of the Zoological Society for Dec. 13, 1842.

ment, J. E. Gray, Esq., has kindly permitted me to describe and arrange, I have since found two other species, both new to science, one of which was brought from India by — Elliot, Esq., but the locality of the other is unknown. The genus I am now about to propose will thus include five species, agreeing most accurately in their generic characters. They are all of them foreign to this country. The only native species which at all approaches to *Mecistocephalus* is the *Geophilus longicornis* of Leach, supposed by M. Gervais to be *Scolopendra electrica* of Linnæus, which constitutes Leach's second section of *Geophilus*. This I propose to separate as a distinct sub-genus, by the name of *Necrophlæophagus*, although its characters are not so distinctly marked as in the preceding. The name proposed for it is derived from its being mostly found under rotten wood, or under the rotten bark of trees.

Before I proceed to characterize these genera, it may be well to remark, that the construction of the head in these, as compared with the other *Geophili* and the *Scolopendræ*, seems to throw much light on the number of parts which are included in this division of the body in the higher *Articulata*, and on the manner in which these parts are united; and although I do not intend on the present occasion to enter on the consideration of these structures, which I propose to do hereafter, it is necessary to state that I regard the head of the *Chilopoda* as formed of two compound moveable portions, the anterior of which, bearing the antennæ, I shall designate the *frontal segment*; and the posterior, which gives attachment to the large forcipated foot-jaws, which I regard as the analogues of the mandibles of insects, I shall call the *basilar segment*. Posterior to these there is a third part, which, although perfectly distinct in all the *Geophilidæ*, is united to the basilar in the *Scolopendræ* and higher genera of this order, forming a kind of cephalo-thorax or cephalo-prothorax. This I shall consider the second or *sub-basilar segment*.

It is on characters derived from these parts that I now propose to establish the genera.

Class MYRIAPODA.

Order 1. CHILOPODA.

Family GEOPHILIDÆ, Leach.

Section A. *Geophili maxillares*, Gervais.

Genus *Mecistocephalus**, Newport.

Characters.—*Frontal segment* very narrow, elongated, four-sided, more than twice as long as broad, antennæ inserted on the frontal margin, subapproximated, three times as long as the frontal segment; joints obconic, rather elongated, slightly hairy; *basilar segment* quadrate, very short, and much narrower than the frontal, almost atrophied on the dorsal surface; *labium* and inferior surface of the basilar segment very large, quadrate, extending backwards beneath the sub-basilar segment, with its anterior margin slightly excavated; *mandibles* enlarged, straightened, and projecting, but curved and pointed

* From *μήκιστος*, longest, and *κεφαλή*, head.

at their apex, with the internal margin acute and denticulated, and the basilar joint encroaching on the dorsal surface of the basilar segment. *Sub-basilar* segment large, transverse, with the anterior margin straight, and the posterior angles rounded. Body gradually tapering; legs from forty-five to seventy pairs; posterior pair styliform.

Species 1. *Mecistocephalus ferrugineus*, Koch.

2. *Mecistocephalus maxillaris*, Gervais.

3. *Mecistocephalus punctifrons*, Newport.

Frontal segment and mandibles deeply punctured, with the basilar segment and labium dark chestnut; body testaceous, mandibles each with two large acute teeth; legs forty-nine pairs.

Length two inches three-tenths. India: — Elliot, Esq.

In the collection at the British Museum.

Frontal segment polished, with small scattered punctures; mandibles very strong, polished, and deeply punctured on the superior surface, with the internal margin acute, with two large sharp teeth; labium flattened, polished, with a longitudinal depression, and a few minute, scattered punctures; body gradually tapering, but broad and strong anteriorly; legs forty-nine pairs, broad, strong.

I am uncertain whether this specimen had arrived at its full growth, the number of legs being less than in the other species. It may nevertheless have acquired its proper number since the species described by M. Gervais has but forty-six pairs, and I have ascertained most satisfactorily that the whole of the *Chilopoda* acquire very nearly their full complement of legs before they have attained to one half of their adult size.

4. *Mecistocephalus Guildingii*, Newport.

Frontal segment polished, with a few scattered punctures; sides and posterior angles rounded, ferruginous; mandibles quadridentated; basilar segment and labium polished, ferruginous, with a broad, longitudinal sulcus and deep punctures on the latter; body yellowish, testaceous; legs forty-nine pairs. Length one inch and a half.

Island of St. Vincent. Rev. Lansdowne Guilding.

In the cabinet of the Rev. F. W. Hope.

There are five specimens of this species, varying considerably in size, but agreeing most accurately in the number of their legs.

5. *Mecistocephalus punctilabium*, Newport.

Head, mandibles, labium and sub-basilar segment ferruginous; mandibles tridentated; body brownish-green, with the two posterior segments antennæ and legs ochraceous. Frontal segment and labium flattened, the latter deeply, and thickly punctured. Legs sixty-one pairs.

Length two inches. Country?

In the collection of the British Museum.

The frontal segment of this species is flattened and punctured, with the posterior margin straight, and the anterior somewhat rounded; the mandibles are smooth, polished, rather straightened, and rounded, with the internal margin less acute, with two or three very small teeth; labium flattened, polished, with large, numerous

and deeply impressed punctures, and a longitudinal median sulcus, with a slight emargination; dorsal surface of the body with three longitudinal sulci; anal styles five-jointed; second and third joint short, but the fourth and fifth longer.

The characters of this species are less strongly marked than in others of this genus, and they seem to form a transition to those of the next genus. The anal styles are still very distinctly organs of locomotion, in which respect they resemble those of *Scolopendra* and *Cryptops*.

Subgenus *Necrophlæophagus**, Newport.

*Geophilus*** , Leach.

Geophili longicornes, Gervais.

Characters.—*Frontal segment* quadrate, a little longer than broad, with the angles obtuse; antennæ inserted on the front, sub-approximated, more than three times as long as the frontal segment, with the joints twice as long as broad, conic; *basilar segment* short, with the posterior margin much wider than the frontal; *mandibles* short, strong, with the internal margin rounded, toothless; *labium* broad, almost quadrate, with the border emarginated; *body* somewhat tapering; legs more than fifty pairs; preanal segment narrow, styles short.

Species *Necrophlæophagus longicornis*, Leach.

Yellow, with the segments of the head, mandibles and labium dark ferruginous; antennæ hairy, four times as long as the frontal segment, with the three or four terminal joints smaller than the others; labium smooth, with minute punctures, subconic; anteriorly wide and almost straight, posteriorly rounded; legs yellow, fifty-five pairs, anal styles small, slightly hairy.

Length two and a half to three inches. Europe: very common.

I have retained Dr. Leach's original name to this species, which has been supposed by M. Gervais to be the *Scolopendra electrica* of Linnæus. But Linnæus's species is described as "*pedibus utrinque 70*;" while Leach's species, of which there are four specimens in the cabinet at the British Museum, besides ten collected by other persons, has at most only fifty-five.

Genus *Gonibregmatus* †, Newport.

Characters.—*Frontal segment* short, transverse, anteriorly pointed; *basilar segment* very short, wider than the frontal; *antennæ* moniliform, approximated at their base, joints very short, with the terminal one slightly elongated; eyes absent; *mandibles* very slender, long, pointed, arcuate, toothless, compressed and twisted near their base; *labium* very short, transverse, with the anterior border slightly produced and emarginated; *labium internum* projecting, thick, folded, and formed for sucking; palpi with the terminal joints slender and acute; *sub-basilar segment* short, but larger than the basilar; body elongated, segments more than 160; legs inserted into little foveolæ in

* From νεκρός, *dead*; φλοιός, *bark*; and φάγω, *to eat*.

† From γωνία, *angle*, and βρέγμα, *the fore part of the head*.

the lateral ventral plates; the two or three posterior segments of the body enlarged and tuberoso; anal styles small, not used in walking.

1. *Gonibregmatus Cumingii*, Newport.

Greyish ash-colour; frontal segment very convex, rounded posteriorly; mandibles blackish; labium smooth; all the segments of the body very short, convex; dorsal surface with numerous irregular longitudinal sulci; antepenultimate segment with the dorsal and ventral plates atrophied; anal styles slender, with their basilar internal margin carinated; anal scale convex, subcordate, posteriorly rounded with two thin marginal plates; legs 161 pairs, naked, claws black. Length $4\frac{3}{4}$ to 5 inches.

From the Philippine Islands. Mr. Cuming.

In the collection at the British Museum.

I have never seen the *Geophilus Walckenaeri* of Gervais, but from the description given of that species I strongly suspect that it ought to be included in this genus.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

May 4, 1842.—Read “A Postscript to the Memoir on the occurrence of the Bristol Bone-Bed in the neighbourhood of Tewkesbury,” by Hugh Edwin Strickland, Esq., F.G.S.

Since the reading of the former communication (vol. x. p. 147), Mr. Strickland has ascertained that the bone-bed occurs at least ten miles further north, or at Defford Common, in Worcestershire, making a total range of 104 miles. At this locality are some old salt-works belonging to the Earl of Coventry, and the shaft, which was sunk about seventy years ago to the depth of 175 feet, was emptied a few months since of the brine with which it is wont to overflow. At the bottom of the shaft, which descends through the lias into the grey marl of the triassic series, but without reaching the red marl, is a tunnel that follows the dip of the strata for about 160 yards. The shaft, Mr. Strickland says, consequently intersects the horizon of “the bone-bed,” and among the rubbish thrown out, he found considerable quantities of the peculiar white sandstone with bivalves (*Posidonomya*), shown in his former paper to represent in Worcestershire the bone-bed of Aust and Axmouth; but he also found specimens of the sandstone charged with the same description of teeth, scales and coprolites so abundant at Coomb Hill and the localities just mentioned.

The occurrence of an abundance of pure salt water within the area of lias, Mr. Strickland says, is an interesting phenomenon, and for a solution of it, he refers to Mr. Murchison's Account of the Geology of Cheltenham, p. 30.

June 29.—“On the minute Structure of the Tusks of extinct Mastodontoid Animals.” By Alexander Nasmyth, Esq., F.G.S.

The author, at the commencement of his memoir, acknowledges his obligations to Dr. Grant for having first called his attention to the

minute anatomical structure of the tusks of Mastodontoid animals; and for having placed at his disposal a copy of the Swedish edition of Retzius's demonstration of the typical structure of the dental organs of animals.

Availing himself of the able tuition afforded by the Swedish Professor, Mr. Nasmyth says, he has prosecuted the subject, and that these inquiries, besides explaining to him the structure of that portion not completely investigated by Retzius, have unfolded to him some observations which are now generally acknowledged to be truths in the valuable but intricate department of animal development. He further says, that he has been led to results differing somewhat from those of Retzius, so far as the physiology of the cellular tissues is concerned; yet the general appearances exhibited and the manner of displaying them will remain, he adds, lasting memorials of the talents and ingenuity of the Swedish Professor.

The specimens to which Mr. Nasmyth's attention has been directed form part of the collection of Mr. Koch, and they were delivered to him as belonging to *Mastodon giganteum*, *Tetraacaulodon Godmani*, *T. Kochii*, *T. Tapiroides*, and the *Missourium*. In the analysis of each specimen he considers—

1st. The constituent structures of the tusk,

2nd. The comparative extent of each of the constituent structures, as far as it can be ascertained.

3rd. Each constituent structure regarded separately in its minute and individual elements.

4th. The conclusions derived from the premises as to the place which the animal should occupy in zoological classifications.

The principle upon which this mode of analysis is based, is that of the infinite variety which nature affects from limited materials, while the constancy of each variety throughout the same species is perfect. This constancy extends, Mr. Nasmyth observes, not only to the constituent structures of each tooth, but to the extent of each constituent, as well as to the peculiar arrangement of the minute elements of which each of these structures is composed.

The examination of each tusk evinces so marked and peculiar a structure, that a cursory inspection will, the author thinks, sufficiently demonstrate specific distinctions, which he supposes must have been accompanied by concomitant peculiarities of organization subservient to separate and distinct habits,

In the following descriptions the word *corpuseule* is used to designate those appearances constituting the characteristic of bone, but denominated by Retzius *cells*, because the author is persuaded that those appearances are truly of a corpuscular character; and the word *cell* is used to designate the structure of the interfibrous material which was left almost entirely out of account by Retzius, and described by others as structureless, but demonstrated by the author to be most characteristically organized in the different groups of animals. The term *fibres* is used, moreover, to define those appearances which Retzius considers due to a tabular structure, because the author has been unable to find anything which confirms this theoretical

appellation founded on the existence of a series of continuous ramifying tubes. This question therefore he leaves in abeyance.

Mastodon giganteum.—The constituent structures of the upper tusks are only two, *crusta petrosa* and *ivory*. The *crusta petrosa*, in the specimens examined, is comparatively thin, or about half a line; but the extent of the investigation being necessarily limited, the author considers that the observations on this head are incomplete.

The corpuscles of the *crusta petrosa* are scattered irregularly; but they are numerous and give off radiating branched fibres, tending generally either from the surface or to the surface of the tusk. There are hardly any independent fibres. The cellular structure of the interspaces is clearly marked.

The junction of the *ivory* with the *crusta petrosa* is well defined by a clear line, succeeded by a plumose appearance arising from a congeries of very minute ramifying fibres. This appearance looks, Mr. Nasmyth says, as if it arose out of, and formed the termination of, the main fibres which join the layer undivided.

The compartments of which the main fibres are made up are parallelograms resembling those of the Elephant, and are most easily observed in vertical sections, while the cellular structure of the interfibril spaces is clearest in transverse sections. Minute corpuscular appearances are scattered over the substance, and so aggregated as to form at intervals concentric layers. The characteristic differences between the structure of the tusks of the Elephant and Mastodon, Mr. Nasmyth observes, consist principally in the presence of transverse fibres in the *crusta petrosa* of the Elephant, and the greater number and regularity of its corpuscles in the Mastodon, as well as in the peculiar disposition to a transverse direction of its radiating fibres. In the ivory the most striking peculiarity consists in the numerous bands of corpuscular-looking bodies in its substance. These appearances, so frequently observed in ivory, Mr. Nasmyth is of opinion, depend, as pointed out by him, on the thickness of the animal matter of the interfibril cells.

Tetracaulodon Godmani.—The author says there is a great dissimilarity in the constituent structures of tusks of this Pachyderm and those of the Mastodon, while on a cursory examination of the minute organization of these structures there is an apparent similarity. The crown of both the upper and under tusk is coated with enamel extending below the level of the alveolar process, with *crusta petrosa* external to it, the body of the tusk being composed of ivory. The alveolar process of the upper tusks is large and deep, greatly exceeding that of every other tusk which the author has examined, and showing, he says, that the actions in which these organs assisted, must have been very powerful.

The habits essentially necessary to the exigencies of an animal being, Mr. Nasmyth observes, the same in youth as in adult age, the organization of the individual tissues is the same at both periods, though certain modifications of instruments are exacted at successive stages of existence. Thus, in early youth, when the frame is not powerful, every efficiency is given to the cutting edges of the dental

apparatus ; and the author states a fact he believes never before remarked, though long noticed by himself, that the tusks of the young Elephant and Walrus are tipped with a very thin layer of enamel.

The head of the *Tetracaulodon Godmani* examined by Mr. Nasmyth is shown to have been that of an animal in which two of the adolescent teeth are well developed. The crusta petrosa of the tusk was about half a line thick, and extended over the whole of the visible surface. The corpuscles were irregularly disposed, but closely aggregated, and exhibited in the transverse section an irregularly circular shape with occasionally angular points. The radiating fibres were numerous, ranging in all directions ; and the independent transverse fibres were also numerous, traversing with a curved course the whole substance. The cells of the interspaces were visible. The enamel on the upper tusk was a line thick. The parallel rows of constituent cells throughout the external half ranged in straight lines, but throughout the internal half they were curved diagonally. There was no clear space between the enamel and ivory, but the line of junction was well defined. A plumose layer of fibres, apparently the peripheral termination of the main undivided fibres of the ivory, succeeded to the enamel. The component bulbs of the fibre were round, but not often visible, and were best seen in the longitudinal section. The fibres were placed at about the distance of two interfibril spaces, and curved in the transverse section as well as in the vertical, but in the latter direction slightly. A minute corpuscular appearance was scattered over the substance, and the cells of the interfibril material were visible.

The crusta petrosa, enamel and ivory of the under tusk were similar to those of the upper, except that the constituents were so transparent as hardly to betray any characteristic. The parietes of the cells of the enamel are more defined in the under tusk.

Besides the important characteristic of the thick coating of enamel, the tusk of the *T. Godmani* presents manifest differences from that of the other species, in the elements of each of the constituents. The radiating fibres of the corpuscles differ from those of *Mastodon giganteum* in being given off equally in all directions : in the *M. giganteum* the numerous independent fibres of the *T. Godmani* are also absent, and the zones or belts of minute corpuscles in the ivory of the *M. giganteum* are wanting in that of the *T. Godmani*.

Tetracaulodon Kochii.—The tusks of this Pachyderm have only two constituents, *crusta petrosa* and *ivory*. The crusta petrosa varies in thickness, equalling in some parts an inch. In the vertical section the corpuscles are irregularly oval and irregularly disposed at the distance of three or four corpuscular diameters, and they give off occasionally many fine radiating fibres. Numerous independent transverse fibres pass in a curved direction also throughout the substance, their beaded or minute corpuscular appearance being very visible, and they are of an irregularly twisted oval form. The cells of the interspaces are likewise visible.

The ivory of the upper tusks consists of very slightly undulating, undivided fibres, with the cells of the interfibril substance well

marked, but semi-transparent. The fibres of the under tusk slightly undulate, and present occasionally an appearance of thorny projections. The compartments of the fibres are easily seen, and are irregular in size, but rounded.

Tetracaulodon Tapiroides.—The tusks consist also of only *crusta petrosa* and *ivory*, and the resemblance in the microscopic structure of this species with that of *T. Kochii* is great. The thickness of the *crusta petrosa* is considerable. The very irregularly-shaped corpuscles, placed at intervals of two or three corpuscular diameters, are semi-transparent, and without radiating fibres in the external half; but those situated in the internal half are of the usual opacity, and give off numerous radiating fibres. Transverse, irregularly beaded, independent fibres traverse the substance, making one distinct curve in their passage across it. The cells of the interspaces are slightly visible.

The ivory is so translucent and homogeneous as to exhibit generally very little character. The fibres undulate but do not divide, forming an abrupt line of junction with the *crusta petrosa*. The form of the beaded compartments of the fibre is oblong, not rounded, as in *T. Kochii*, and they do not exhibit thorny projections. These are the only marked differences in the two species.

The cells of the semi-transparent interfibril space are generally visible.

Missourium.—The constituents of the tusks are likewise *crusta petrosa* and *ivory*; but their intimate structure, Mr. Nasmyth says, is more peculiar, so far as his examination has extended, than that of the tusks of the preceding animals.

The *crusta petrosa*, in the section which the author was permitted to make, was more than three-eighths of an inch thick. The corpuscles were very numerous, and generally within the distance of one diameter. The granulated compartments of which the corpuscles were composed, were very visible, and often without radiating fibres, but where these occurred they were of a coarse structure. The transverse independent fibres were beaded in coarse, somewhat tortuous, ovoid compartments, and ranged very close to one another, with interfibril spaces of about only two fibril diameters, and followed a straight, perpendicular and parallel course to the surface. The cells of the semi-transparent interfibril space were generally visible.

The appearances presented by the ivory at its junction with the *crusta petrosa*, Mr. Nasmyth was unable to ascertain; but in the substance of the ivory the fibres undulated, and their beaded compartments had a rounded shape: these fibres were frequently invested with an irregular congeries of granules distinct from the interfibril cells. Towards the central portion of the ivory the compartments forming the fibre were frequently so disposed as to give the fibre a peculiar tortuous appearance.

The peculiarities of the tusk of the *Missourium* are given by Mr. Nasmyth as follows; and, he says, they would certainly indicate a distinct species of Mastodontoid animal:—

1. The great extent of the *crusta petrosa*.
2. The close aggre-

gation of its corpuscles. 3. The granulated structure of these corpuscles. 4. The coarse granulated structure of the compartments of the radiating fibres. 5. The close parallel perpendicular arrangement of the fibres of the crusta petrosa. 6. The irregular congeries of granules surrounding the fibres of the ivory. 7. The peculiar tortuous appearance occasionally exhibited by these fibres.

On the whole, Mr. Nasmyth observes, the several species of animals noticed in his paper seem to be nearly allied, and fitted to exist under nearly similar conditions; and though the early eras to which these Pachyderms must be referred, present, he says, considerable uniformity of circumstance, yet they must have demanded some variety of detail in the animal organization.

Finally, the characteristics in the minute structure of the tusks of all the five animals betray, the author observes, greater varieties than are found to exist even betwixt some genera possessed of tusks; and if it be established that specific differences positively do exist among all these animals, then the value of this kind of observation is great; but if the five animals are all to be grouped in one category, then this mode of observation is of no value in palæontological researches.

Nov. 16.—“On some remarkable Concretions in the Tertiary beds of the Isle of Man.” By H. E. Strickland, M.A., F.G.S.

The north extremity of the Isle of Man consists of an arenaceous pleistocene deposit, occupying an area of about eight miles by six, bounded on the west, north and east by the sea, and on the south by the mountains of Cambrian slate which occupy the greater portion of the island. The arenaceous formation attains in some parts a height of about 200 feet above the sea, though the undulations of its surface prove that considerable portions of the deposit have been removed by denudation. This district, comprising about fifty square miles, furnishes perhaps the most extensive example in the British Isles of a marine newer pliocene or pleistocene deposit. In the Isle of Man the sea-cliffs on each side of this tertiary district afford a good insight into its structure and composition. On the north of Ramsey the cliffs average about 100 feet in height, and consist principally of irregularly stratified yellowish sand, sometimes clayey, with interspersed bands of gravel and scattered pebbles. The gravel is chiefly composed of slate-rock, quartz, old red sandstone, granites, porphyries and chalk flints, all of which occur *in situ* in the island except the two last, which may have been drifted, the former from Scotland, and the latter from the north of Ireland. About four miles north of Ramsey the cliffs attain 150 feet. Here the lowest portion, only visible at intervals, is a brownish clay loam, and the remainder of the cliff is sand and coarse gravel, less distinctly stratified than is the case near Ramsey, and containing rudely rounded boulders, some of which are upwards of a ton in weight. They consist of granite, and occasionally of carboniferous limestone.

Organic remains are sparingly diffused in this deposit: Mr. Strickland enumerates twenty species. Of these five, viz. *Crassina multicostata*, *Natica clausa*, *Nassa monensis*, *Nassa pliocena*, and *Fusus Forbesi* are not known in the British seas. *Crassina multicostata*

and *Natica clausa* are found living in the Arctic ocean, but the two species of *Nassa* and the *Fusus* are unknown in a recent state*.

Between three and four miles north of Ramsey, the beds of this deposit occasionally exhibit a very remarkable concretionary structure. The sand has here been cemented into masses, which are extremely hard, and even sonorous when struck, though the sand in which they are imbedded is perfectly loose. The cementing ingredient, which the application of acid proves to be carbonate of lime, seems to have been influenced in its operations partly by the planes of stratification, and partly by the direction in which the sand has

* Mr. Strickland gives the following characters of three species of shells found in the newer pliocene beds of the Isle of Man; specimens of which have been examined by several eminent conchologists in London, who all concur in believing them to belong to extinct species.

"1. *Nassa monensis*, Forbes, in Mem. Wern. Soc., vol. viii. p. 62. Small; volutions about six, rounded; suture deep; ribs, nine on the first volution, straight, rather distant, strong, subacute, and slightly oblique. The first volution has thirteen, and the second six, distinct, regular, thread-like, spiral striæ, crossing alike the ribs and their interstices. Aperture orbicular-ovate, canal very short and oblique, pillar-lip simple, outer lip with about five slight marginal denticles on the inside, and an external rib slightly more developed than the ordinary ribs. Total length, 7 lines; first volution, $3\frac{1}{4}$ lines; breadth, $4\frac{1}{2}$ lines; angle of spire, 40° .

"Obs. Resembles the recent *N. macula*, but is larger, more ventricose, has fewer ribs, and the terminal rib is less suddenly developed.

"2. *Nassa pliocena*, Strickland, 1843. Large; volutions about seven, rather flat, with a distinct thread-like suture; ribs, twelve on the first volution, straight, distant, rounded, very slightly oblique; the interstices flat, exceeding the width of the ribs by one-half. The first volution with thirteen, and the second with about nine fine spiral striæ, only visible in the interstices, the ribs being smooth; but this may be due to attrition. Aperture ovate; canal very short and oblique; pillar-lip with about five obscure denticles, and a spiral groove immediately behind the canal, continued into the interior of the shell. Outer lip with about eight internal marginal denticles; no rib at the back. Total length, 1 inch 8 lines; first volution, 8 lines; breadth, 9 lines; angle of spire, 40° .

"3. *Fusus Forbesi*, Strickland, 1843. *Fusus* nov. sp. Forbes, Malacologia Monensis, pl. 3. f. 1. Middle-sized; volutions about six, slightly rounded, suture distinct; ribs, eleven on first volution, straight, rounded, smooth (perhaps from attrition); interstices concave, and hardly wider than the ribs. First volution with about fifteen, and second with about seven distinct, rather irregular spiral striæ, of which those on the first volution are alternately large and small. They are only visible in the interstices of the ribs. Aperture ovate, double the length of the canal, which is straight, and rather oblique to the left. Pillar-lip smooth, with one obscure denticle at the posterior end. Outer lip with about ten small linear denticles within, continued a short way into the mouth, and a well-marked external rib remote from the margin. Total length, 1 inch 3 lines; first volution, 7 lines; breadth, 8 lines; angle of spire, 43° .

"Obs. This species belongs to a group of *Fusus* which seems closely allied to *Nassa*. First described by Mr. E. Forbes, from a worn specimen found on the coast of the Isle of Man, and supposed by him to be an existing species, but the discovery of additional specimens *in situ* proves it to be a genuine fossil."

been originally drifted by currents. In the former case the concretions are in the form of flat tabular masses parallel to the stratification, often mammillated on their surfaces, or perforated obliquely by tubular cavities. In the latter case they assume a subcylindrical or spear-shaped form, and occur parallel both to the stratification and to each other. A pebble is frequently attached to the larger end of the concretion, which springs from it as from a root, to the length of a foot or more, and gradually terminates in an obtuse flattened point. All these varieties are sometimes combined together into vast clusters of several tons weight, resembling masses of stalactite, the component portions being nearly parallel to each other. Mr. Strickland supposes that currents of water (or possibly of wind, operating during ebb tide), flowing in a certain direction, may have disposed the sand in ridges parallel to that direction, and the carbonate of lime may have afterwards been attracted into these ridges in preference to the intermediate portions. This view is confirmed by the fact, that these concretions have frequently a pebble attached to the larger end, as though it had protected a portion of sand from the current, and caused it to accumulate in a ridge on the lee side, a circumstance which may frequently be observed where sand is drifted by the wind or water.

Nov. 30.—“Notice on the discovery of the Remains of Insects in the Lias of Gloucestershire, with some remarks on the Lower Members of this Formation.” By the Rev. P. B. Brodie, F.G.S.

The lower beds of the lias, in which these organic remains occur, are extensively developed in the neighbourhood of Gloucester and Cheltenham, and occupy the greater part of the vale. In the upper part of the lower beds, in a hard blue limestone, was found the elytron of a coleopterous insect of the family *Buprestidae*, apparently a species of *Ancylocheira* of Escholtz. This was the only fossil of the kind met with by Mr. Brodie in this portion of the lias. With this exception, the numerous fossil insects he has obtained occur in the bottom parts of the lower beds near the base of the lias, which are seen at several points in the neighbourhood of Gloucester. At Wainlode Cliff, the lower beds of lias, resting on red marl, form a bold escarpment on the south bank of the Severn, and afford the following section in descending order:—

1. Clay : 3 ft.
2. Blue limestone, with *Ostrea*, &c. (the “bottom bed”): 4 in.
3. Yellow shale with fucoid plants: 6 in.
4. Gray and blue limestone, termed by Mr. Brodie “insect limestone” from its characteristic fossils, passing into yellow shale above, where it is nearly white, and has the aspect of a fresh-water limestone : 3 to 5 in.
5. Marly clay : 5 ft. 3 in.
6. Hard yellow limestone, with small shells like *Cyclas*, plants and *Cypris* : 6 to 8 in.
7. Marly clay : 9 ft. 6 in.
8. Bed with fucoid bodies : 1 in.
9. Shale : 1 ft. 6 in.
10. Pecten bed : 4 in.

Nine feet below this is the bone-bed, 20 feet above which is the yellow *Cypris* limestone, and 26 feet 2 inches the insect limestone. The total height of the cliff is about 100 feet.

The insect remains consist chiefly of elytra belonging to the several genera of Coleoptera, which are not very rare; and a few wings, not unlike the genus *Tipula*, which bear a close resemblance to some Mr. Brodie had previously found in the Wealden; the latter are much rarer than the former. The elytra are generally of a light brown colour and small size; in some cases both the elytra are attached. With these were found abdomens of some insects and larva apparently of the gnat tribe. Shells are not common, but *Ostrea*, *Unio*, and a small species of *Modiola* are the most abundant. The fossils from the yellow limestone, No. 4, bear a close resemblance to those from the Wealden. The real genus of the bivalve resembling *Cyclas* is undetermined. The plants belong to a species of *Fucus*, apparently an inhabitant of fresh water. At Combe-hill Mr. Brodie also observed both the insect limestone and that containing the small bivalves. To the south-west of this point the insect limestone is well seen, and yielded the greatest number and variety of insect remains. Here the yellow limestone was not traced, and the bone-bed was wanting. The fossil insects are, as at Wainlode Cliff, for the most part remains of small Coleoptera, sometimes tolerably preserved, and in one specimen the eyes were visible. None of the beetles resemble those of the Wealden, but some wings of insects, allied to *Tipula*, are very similar. A few imperfect but large wings of *Libellula* occur: there are also numerous singular impressions of a doubtful nature, many of which may however owe their origin to the partially decomposed bodies of various insects. With these are numerous small plants, some resembling mosses, but very different from those in the yellow *Cypris* limestone, a few seed-vessels and leaves of fern. A small species of *Modiola*, probably *M. minima*, is exceedingly abundant. Remains of Crustacea occur, one of which resembles the genus *Eryon* from the Solenhofen slate.

Near Gloucester the same strata occur at a much lower level. At Westbury, eight miles below Gloucester, the following section is presented:—

1. Bottom bed with *Ostrea*, equivalent to that at Wainlode and other places: 3 in.
2. Insect limestone with numerous small shells (here characteristic): 4 in.
3. Clay: 5 in.
4. Green, yellow and gray sandy stone, in places becoming a limestone, with the small *Cyclas*-like bivalve, plants and *Cypris*, identical with those at Wainlode, about 1 ft.
5. Shale and clay: 10 ft.
6. Hard grit, bone-bed: 3 or 4 ft.

A little further to the north the beds below this are more developed and are seen resting upon the red marl.

If the *Cypris* found in these beds be of freshwater origin, it forms a new and highly interesting feature in the history of this deposit; at any rate the occurrence of the remains of such delicate creatures

as insects, many of which are well-preserved, and could not, therefore, have been long subject to the action of the waves, or have been carried far out into the water, gives a greater probability to the supposition that this part of the lias may have been formed in an estuary which received the streams of some neighbouring lands, perhaps numerous scattered islands, and which brought down the remains of insects, *Cypris*, and the plants above referred to. The shells usually found in the insect limestone are *Modiola* and *Ostrea*, both of which frequently inhabit estuaries, and are capable of living in brackish water as well as in the open sea. The shells, however, so abundant at Westbury in the same stratum are exclusively of marine origin; the wing of a dragon-fly from Warwickshire is a solitary instance of its kind. Mr. Brodie observes, that such stray specimens had probably been carried out to sea, which might also have been the case with a small wing he discovered in the *upper lias* at Dumbleton near Tewkesbury; which also proves the existence of insects during the deposition of the upper portions of this formation.

Thus it will be seen that the remains of insects are of very rare occurrence in the upper beds, and in the higher portions of the lower ones in the lias, while at the base near its junction with the red marl they are abundantly distributed. The discovery of small elytra of coleopterous insects and portions of the wings of *Libellula* in the lower division of the lias near Evesham, by Mr. H. E. Strickland, shows that these fossils are characteristic of the same beds in distant parts of the system.

“On certain impressions on the surface of the Lias bone-bed in Gloucestershire.” By H. E. Strickland, M.A., F.G.S.

The singular markings described, which the author in a former communication suggested might be caused by the crawling of crustacea, but which further opportunities and observations have induced him to refer to a different cause, have been noticed only at Wainlode Cliff on the Severn. There they occur on the uppermost surface of the band of micaceous sandstone which represents the “bone-bed,” and which appears to have consisted of a fine-grained muddy sand, capable of receiving the most minute impressions, while the pure black clay which forms the superincumbent stratum has preserved this ancient surface in the most unaltered condition. The ripple-marks produced by currents on the surface of this bed of sand are very interesting, from their perfect preservation, and from often exhibiting two sets of undulations oblique to each other, indicating two successive directions in the currents, such as would result from a change of tide.

The impressed markings were evidently produced by living beings, probably by fish or invertebrate animals. To determine their nature Mr. Strickland observed the progression of two species of *Littorina* among Gasteropodous Mollusca, and of *Carcinus Menas* among Crustacea, but the impressions produced were very different from those under consideration.

The fossil impressions are of four kinds:—

1st. Lengthened and nearly straight grooves, about one-tenth of

an inch in width, and several inches long, very shallow, with a rounded bottom. These, Mr. Strickland considers as caused by some object striking the surface of the sand with considerable impetus. They may often be seen to cut through the ridge of one ripple-mark, and after disappearing in the depressed interval, they are again seen pursuing their former direction across the next ridge. They may have been caused by fish swimming with velocity in a straight direction, and occasionally touching the bottom with the under part of their bodies.

2nd. Small irregular pits averaging one-fourth of an inch wide and one-eighth of an inch deep. These might have been caused by some small animal probing the mud and turning up the surface in quest of food. Mr. Strickland conjectures that some of the numerous species of fish found in the bone-bed may have produced them, the heterocene form of tail common to most of which, Dr. Buckland has suggested, enabled them to assume an inclined position with the mouth close to the ground.

3rd. Narrow deep grooves, about one-twelfth of an inch in width, the sides forming an angle at the bottom, irregularly curved and often making abrupt turns, apparently formed by a body pushed along by a slow and uncertain movement, such as might arise from the crawling of Mollusks. Mr. Strickland refers them to the locomotion of Acephalous Mollusca, and supposes that the only shell found in this bed, a small bivalve named by him *Pullastra arenicola*, might have produced them*.

4th. A tortuous or meandering track consisting of a slightly raised ridge about one-tenth of an inch wide, with a fine linear groove on each side. These tracks are analogous to those formed by the crawling of small annelidous worms, as may often be seen on the mud of the sea or fresh water.

About eleven feet above the stratum which presents the impressions above described, a second ossiferous bed occurs at Wainlode Cliff, which escaped Mr. Strickland's notice in the section formerly given (Geol. Proc. vol. iii. p. 586). It is a band of hard, grey, slightly calcareous stone, about an inch thick, containing a plicated shell resembling a *Cardium*, and scales and teeth of *Gyrolepis tenuistriatus*, *Saurichthys apicalis*, *Hybodus Delabechei*, *Acrodus minimus*, and *Nemacanthus monilifer*, all of which occur in the true "bone-bed" below. On the upper surface of that bed are numerous impressions, termed by Mr. Strickland fucoid, consisting of lengthened wrinkled grooves, variously curved, about three quarters of an inch wide, one-eighth of an inch deep, and of variable length. The bone-bed seems to be a local deposit, not being met with in the other localities examined by the author, and being confined to a

* Mr. Strickland describes this species as follows:—"Its form is nearly a perfect oval, depressed, nearly smooth, but with faint concentric striations towards the margin. The apex is about halfway between the middle of the shell and the anterior end. The general outline closely resembles that of the recent *Pullastra aurea* of Britain. Maximum length 7 lines, breadth $4\frac{1}{2}$ lines, but the ordinary size is less."

portion only of Wainlode Cliff, where it constitutes No. 9. in the following corrected section :—

	Ft.	in.
1. Blackish lias clay	3	6
2. Limestone, with <i>Ostrea</i> and <i>Modiola minima</i> (the bottom bed)	0	4
3. Yellowish shale	1	0
4. Limestone, with remains of insects	0	4
5. Marly shale and clay	5	3
6. Yellowish limestone nodules, with occasional remains of <i>Cypris</i>	0	6
7. Yellowish marly clay	6	0
8. Black laminated clay	3	6
9. Stone, with scales and bones of fish, and on the upper surface fucoid impressions.	0	1
10. Black laminated clay	1	6
11. Slaty calcareous stone, with <i>Pectens</i>	0	4
12. Black laminated clay	9	0
13. BONE-BED and white sandstone, with casts of <i>Pullastra arenicola</i>	0	3
14. Black laminated clay	2	0
15. Greenish angular marl	23	0
16. Red marls with greenish zones	42	0
	98	7

Jan. 4, 1843.—“ Notice on a Suite of specimens of Ornithoidicnites, or foot-prints of Birds on the New Red Sandstone of Connecticut.” By Gideon Algernon Mantell, LL.D., F.R.S.

These specimens were accompanied by a letter from Dr. James Deane of Greenfield, Massachusetts, the original discoverer of the Ornithoidicnites, of which more than thirty varieties had been found, bearing a striking resemblance to the foot-prints of birds. In this letter Dr. Deane gives an account of his discovery of the impressions eight or nine years ago, and which he then communicated to Professor Hitchcock. He remarks, that “ the footsteps are invariably those of a biped, and occur on the upper surface of the stratum, while the cast or counter-impression is upon the lower. In some instances we may follow the progress of the animal over as many as ten successive steps.” He has seen a course of steps twelve inches in length by eight in breadth, extending several rods. The intervening space was uniformly four feet. One impression of a foot was fourteen inches in length. The impressions are accompanied by those of rain-drops.

Extract of a Letter from W. C. Redfield, Esq., on newly discovered Ichthyolites in the New Red Sandstone of New Jersey. Communicated by Charles Lyell, Esq., V.P.G.S.

Mr. Redfield has found two distinct fish-beds in the new red sandstone of New Jersey, both containing ichthyolites of the genus *Paleoniscus*. In the sandstone between the fish-beds he discovered an Ornithoidicnite, and observed numerous slabs exhibiting impressions

of rain-drops and ripple-marks. The rain-marks appear as if the rain had been driven by a strong wind, and the direction of the impressions indicated that the wind blew from the west, a quarter from which violent squalls or thurgusts are still prevalent in these latitudes.

ZOOLOGICAL SOCIETY.

July 26, 1842.—William Yarrell, Esq., Vice-President, in the Chair.

The following memoirs were read:—

“Observations on the Semen and Seminal Tubes of Mammalia and Birds,” by George Gulliver, F.R.S.

It has long been known that the testicles of Birds become much enlarged in the spring, and that the same organs of Mammalia are more or less increased in size at the rutting-season, and in young animals generally as they become capable of reproduction. Professor R. Wagner (*‘Physiology,’* translated by Willis, pp. 23 and 27) has noticed also the enlargement of the seminal tubes of all these animals at the periods above named; but as I am not aware that we possess any observations on this head sufficiently numerous and precise to be useful for reference and comparison, I am induced to submit to the Society a contribution towards this object, particularly as it appears to me that the condition of the semen and testicles at different periods is an interesting inquiry in relation to the habits and economy of animals.

During winter the coats of the seminal tubes of Birds are tolerably strong and thick. The increased size of the tubes at the season of procreation arises from the accumulation of semen within them, by which their coats are so much distended and attenuated that they are most easily ruptured, and are much thinner than the corresponding parts of Mammalia are at any time.

In the following table the measurements are all expressed in vulgar fractions of an English inch*, and where only one fraction is given it denotes the average size. With the exceptions dated November and December, the animals were all examined during the present year, and, unless noted to the contrary, they were adults. In Birds the left testicle, which is commonly somewhat larger than the right, was generally the subject of observation.

Table of Measurements of the Seminal Tubes, and of remarks on the state of the Semen and Testicles at different seasons.

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Feb. 4.	Man, æt. 22	1-142 to 1-77	Scarcely any fluid in testes. Died of pulmonary consumption.
Nov. 9.	Ditto, æt. 56	1-150 to 1-73	Died of chronic pericarditis. No spermatozoa.

* I take this opportunity of remarking, that all my microscopic measurements have been invariably given in vulgar fractions of an English inch, however they may have been set up in type for the sake of convenience.

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Nov. 11.	Man, æt. 53	1-150 to 1-80	Died of pericarditis, enlarged heart, and old pleuro-pneumonia. A few spermatozoa in epididymis.
Dec. 7.	Ditto, æt. 42	1-133 to 1-86	Died of phthisis. Some spermatozoa in epididymis.
Nov. 14.	Ditto, æt. 73	1-133 to 1-73	Died of phthisis. Tubes filled with dark, round, and very minute particles; these chiefly aggregated together in irregular masses, and occasionally in the form of round or oval corpuscles with delicate cysts. No spermatozoa.
Nov. 17.	Ditto, æt. 60	1-146 to 1-82	Died of phthisis. Seminal tubes in the same condition as the preceding.
Dec. 10.	Ditto, æt. 86	1-160 to 1-100	Died of pneumonia. Had fatty matter in liver, lungs, and testes; no spermatozoa; tubes in the same condition as in the two preceding.
Aug. 25.	Child, æt. 8	1-422	Died of pulmonary consumption.
Dec. 1.	Child, æt. 18 months	1-400 to 1-266	Child puny and emaciated. Died of pneumonia.
July 15.	Child, æt. 4 months	1-308	Died of tubercles of mesenteric glands.
Oct. 25.	Child, æt. 6 weeks	1-333 to 1-230	Body much emaciated. Died of pneumonia.
Aug. 25.	Child, still-born	1-307	Well-nourished fœtus; born at the full period of utero-gestation.
Oct. 14.	Ditto	1-363 to 1-210	Fœtus weighed 7 lbs.
Oct. 23.	Ditto	1-300 to 1-222	Fœtus weighed 6 lbs.
Nov. 5.	Ditto	1-400 to 1-266	Weight of fœtus 5½ lbs.
June 15.	<i>Vespertilio Pipistrellus</i> , <i>Geoff.</i> ..	1-200 to 1-171	Seminal matter containing abundance of molecules, but no spermatozoa.
June 15.	<i>Erinaceus Europæus</i> , <i>Linn.</i> ...	1-109 to 1-75	No animalcules. Died of disease.
April 30.	<i>Sorex tetragonurus</i> , <i>Herm.</i>	1-109 to 1-85	Semen and spermatozoa very abundant. Many male shrews found dead, with marks of injuries, apparently from fighting; and in

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
July 16.	<i>Canis familiaris</i> , <i>Linn.</i>	1-125 to 1-85	all these the testes were very turgid. A mongrel. Spermatozoa abundant.
Feb. 15.	Ditto; a still-born puppy	1-250	
Dec. 30.	<i>Felis Leo</i> , <i>Linn.</i> (3 years old) ...	1-200 to 1-150	Died of disease of the brain. Molecules abundant, and a few cells containing spermatozoa.
Nov. 6.	<i>Felis domestica</i> , <i>Briss.</i> (nine months old)	1-141 to 1-85	Spermatozoa plentiful.
Oct. 4.	<i>Arctonyx collaris</i> , <i>F. Cuv.</i> .....			1-100 to 1-60	Tubes large. Spermatozoa rather plentiful. Some cells and numerous molecules. Died in confinement.
Oct. 15.	<i>Ursus Americanus</i> , <i>Pall.</i>	1-200 to 1-125	No spermatozoa. Seminal tubes full of dark-coloured pulp, in which were only visible some altered epithelial cells and numerous oily globules. Died in confinement.
Jan. 6.	<i>Mustela vulgaris</i> , <i>Linn.</i>	1-171 to 1-109	Molecules plentiful in semen; no spermatozoa.
May 20.	<i>Mustela erminea</i> , <i>Linn.</i>	1-120 to 1-80	Spermatozoa plentiful; scarcely any molecules.
April 30.	<i>Cervus Wapiti</i> , <i>Mitch.</i>	1-160 to 1-100	Many perfect spermatozoa; molecules scanty; animal 24 months old. Died of diseased kidneys.
Jan. 12.	<i>Cervus Elaphus</i> , <i>Linn.</i>	1-117 to 1-105	Perfect spermatozoa very abundant; many in different stages of development.
Jan. 12.	<i>Cervus Dama</i> , <i>Linn.</i>	1-160 to 1-100	Perfect spermatozoa very numerous; many in cells.
April 6.	Ditto	1-160 to 1-100	Spermatozoa abundant; none in cells.
Jan. 26.	Ditto, foetus 6 inches long	1-666 to 1-363	Tubes full of corpuscles about 1-2300th of an inch in diameter: no molecules.
March 26.	Ditto, 14 inches long	1-333 to 1-285	Ditto.
June 22.	<i>Antilope picta</i> , <i>Pall.</i>	1-120 to 1-80	Semen and spermatozoa abundant.
Dec. 31.	Ditto (died a few hours after birth)	1-571 to 1-363	Contents of tubes as in other immature animals.
May 28.	<i>Capra Hircus</i> , <i>Linn.</i> (12 weeks old)	1-266 to 1-171	Semen containing abundance of molecules, and rudimentary spermatozoa in cells.

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
Feb. 24.	<i>Ovis Aries</i> , <i>Linn.</i> (just born) ...	1-571	Tubes very small.
Nov. 2.	<i>Camelus Dromedarius</i> , <i>Linn.</i> ...	1-120 to 1-75	Died of dropsy. Spermatozoa plentiful; some rudimentary in cells, with corpuscles; molecules scanty.
Dec. 10.	<i>Sciurus vulgaris</i> , <i>Linn.</i>	1-120 to 1-60	A few spermatozoa.
Nov. 29.	<i>Lepus cuniculus</i> , <i>Linn.</i>	1-150 to 1-92	But few spermatozoa.
Jan. 18.	<i>Mus decumanus</i> , <i>Linn.</i>	1-46 to 1-42	Spermatozoa very abundant; tubes large.
Jan. 18.	Ditto, two-thirds grown	1-120 to 1-109	No spermatozoa.
Jan. 18.	Ditto ditto	1-153 to 1-120	Ditto.
Nov. 3.	<i>Mus musculus</i> , <i>Linn.</i>	1-80 to 1-66	Spermatozoa abundant.
Nov. 11.	Ditto, three-fourths grown	1-120 to 1-86	A few free spermatozoa; a great number immature in cells; molecules pretty abundant.
Feb. 17.	Ditto (blind sucking young one).	1-400 to 1-222	
May 5.	<i>Strix flammea</i> , <i>Linn.</i>	1-230 to 1-133	Died in confinement. Testis one-third of an inch long and one tenth broad.
March 16.	<i>Corvus frugilegus</i> , <i>Linn.</i>	1-75 to 1-46	Testis one inch long and three-fourths broad; semen and animalcules very abundant; no molecules.
Feb. 25.	<i>Sturnus vulgaris</i> , <i>Linn.</i>	1-250 to 1-166	Testis black, one-fifth of an inch long and one-eighth broad; no spermatozoa; molecules very abundant.
March 18.	Ditto	1-80 to 1-50	Testis brownish white, three-fourths of an inch long and four-tenths broad; spermatozoa abundant; no molecules.
April 27.	<i>Philomela luscinia</i> , <i>Sw.</i>	1-75 to 1-60	Testis one-fourth of an inch long and one-fifth broad, containing a little black pigment; spermatozoa abundant.
April 6.	<i>Sylvia Phragmitis</i> , <i>Bechst.</i>	1-68	Spermatozoa abundant; testis same size as the Nightingale's.
Jan. 9.	<i>Fringilla domestica</i> , <i>Linn.</i>	1-333 to 1-222	Testis one-twelfth of an inch in diameter; no spermatozoa.
Feb. 2.	Ditto	1-250 to 1-200	Testis one-twelfth of an inch in diameter; no spermatozoa; many molecules.
March 4.	Ditto	1-166 to 1-109	Testis one-seventh of an inch long and one-tenth broad; numerous cells, about 1-

Table (continued).

Date.	Name of Animal.	Size of Tubes.	State of Testes, &c.
May 3.	<i>Fringilla domestica</i> , Linn.	1-80 to 1-66	1000th of an inch in diameter; great abundance of molecules; no perfect spermatozoa. Testis one-third of an inch long and one-fourth broad; spermatozoa plentiful; molecules not abundant.
Feb. 28.	<i>Fringilla Cœlebs</i> , Linn.	1-90 to 1-71	Testis one-tenth of an inch in diameter; numerous cells containing rudimentary spermatozoa, but none perfect; molecules very numerous.
May 4.	<i>Emberiza Citrinella</i> , Linn.	1-80 to 1-60	Testis one-third of an inch long and one-fourth broad, containing a little yellow pigment; spermatozoa very numerous; molecules not abundant.
May 22.	<i>Cuculus canorus</i> , Linn.	1-100 to 1-66	Testis one-fifth of an inch in diameter, of an intense yellow colour; numerous staff-like bodies in semen 1-2666th of an inch long and 1-25,000th broad. Died in confinement.
Nov. 26.	<i>Picus minor</i> , Linn.	1-571 to 1-363	Testis size of a rape-seed; no spermatozoa or molecules.
May 31.	<i>Cypselus Apus</i> , Flem.	1-130 to 1-100	Testis one-third of an inch long and one-fifth broad; spermatozoa numerous; molecules scanty.
Dec. 5.	<i>Columba Livia</i> , Briss.	1-444 to 1-285	Testis about as big as a hemp-seed; no spermatozoa; a few molecules.
May 12.	<i>Sterna Hirundo</i> , Linn.	1-240 to 1-200	Testis one-tenth of an inch in diameter; no spermatozoa; molecules plentiful.

Molecules of the Semen.—The molecules mentioned in the preceding table are minute, smooth, circular particles, much resembling, both in chemical and physical characters, the “minute oil-like spherules” which I have depicted in the juice of the supra-renal bodies (Appendix to Gerber’s Anatomy, p. 103). The “minute shining globules and smaller molecules,” described by Professor R.

Wagner in the semen of some Mammalia, and the "apparently spherical and dense particles" observed by Dr. Davy (Researches, Physiological and Anatomical, vol. i. p. 332) in the fluid of the human testicle, and which particles he conjectures may be the ova of the spermatozoa, are perhaps identical with the molecules of the semen. They are commonly rather smaller than the particles of the supra-renal gland. I have made many measurements of the molecules of the semen, and find them generally to be 1-20,000th of an inch in diameter, but almost always varying from 1-35,000th to 1-8000th, and of course not at all approaching in size and other respects to the well-known corpuscles and cells of the semen. The molecules, especially those of larger size, refract the light strongly; the smaller ones appear dark and opaque in the centre when the focus of the object-glass is elongated, and bright and transparent when the focus is shortened; while the smallest of all, like those of the supra-renal gland, often seem quite black or opaque, and exhibit very lively vibratory motions, particularly when diluted with water or acetic acid.

That the molecules are connected with the perfecting of the semen, would appear from the fact that they are most abundant in birds and reptiles when the testicles begin to enlarge, and either wholly disappear or become scanty as soon as the testicles are perfectly ripe and the spermatozoa most completely evolved. But very minute vibratory particles are often observable in the seminal tubes of foetal animals.

The figure of the molecules, like that of many other particles equally small, is apparently spherical, and, as already mentioned, they may present either a dark or bright central spot. But, as noticed in the Atlas to Gerber's Anatomy, p. 59, it is difficult to determine the exact shape of particles so exceedingly minute; and the elaborate researches of Dr. Barry (Phil. Trans. 1841, part 2) have rendered it probable that some of the particles which I have formerly mentioned (Appendix to Gerber's Anatomy, and London Medical Gazette for May and November, 1839) as "minute spherules" and "spherical molecules," are in reality discs.

Pigment.—In the foregoing table the black and yellow colour of the testicles of certain birds is noticed. I have carefully examined the black matter of the starling's testicles, and found it to be composed of very distinct pigmentary ramifications, made up of most minute particles, many of which, when floating in the field of vision, exhibit exceedingly active motions. In the winter the testicles are quite black, and the pigment, perhaps from the small size of the tubes, seems to be contained within them; but when the testicles are enlarged in the spring, they present a lighter or brownish white colour, from the accumulation of semen, and the pigmentary ramifications are evidently situated in or close to the coats of the tubes, the boundaries of which may be easily seen with a common hand-lens to be marked out by the black pigmentary dots.

Spermatozoa of the Cervidæ and Camelidæ.—Professor Wagner (Physiology, by Willis, p. 34) regards the spermatozoa as essential

elements of the seminal fluid; and that the spermatozoa are essential to prolific semen seems now to be generally allowed. I merely mention the subject in connection with the statement of Sir Everard Home (Lectures on Comp. Anat., vol. v.; well commented on in Dr. Davy's Researches, vol. i. p. 339), that the seminal animalcules have no real existence, and especially that he and Mr. Bauer had searched for them in vain, and with the best instruments and opportunities, in the seminal fluid of the fallow deer during the season of the rut.

I now exhibit to the Society drawings of the spermatozoa of the fallow deer, wapiti, and red deer, and shall be happy to show my preparations of the animalcules to any one who may be curious about them. I have repeatedly had opportunities of examining the spermatozoa of the fallow deer, and though they are most abundant at the time of the rut, they may be found commonly enough at other seasons. After the rut was passed in January and February, I found the spermatozoa plentiful in the red and fallow deer at Windsor. The animalcules were even then in various stages of development; some coiled up two or three together, in cells, with granular matter; others were still more rudimentary; many appeared just ready to escape from the cells, while a still greater number were free and lively in the seminal canals. In the body of the spermatozoon of the red deer there is occasionally an appearance of internal granules or vesicles, as shown in the drawing.

As the *Camelidæ*, like the oviparous *Vertebrata*, have oval blood-corpuscles, it was interesting to ascertain the form of the spermatozoa of this ruminant family. In the dromedary I found that the seminal animalcules were much like those of other Mammalia, and so nearly resembling the animalcules of the *Cervidæ*, that there was a difference only of size, the spermatozoa of the dromedary being slightly smaller than those of the deer.

Chemical characters of the spermatozoa.—It is remarkable that the spermatozoa of Mammalia are but little or not at all affected by many chemical agents which quickly act on various other animal matters. These spermatozoa preserve their form and appearance when treated severally with nitric, muriatic, acetic, oxalic, tartaric and citric acids; with concentrated solutions of earthy, alkaline, and metallic salts; and with liquid ammonia.

But the spiral spermatozoa of birds are quickly dissolved, destroyed, or reduced to the most minute particles, by the acetic and other vegetable acids, while these animalcules are not much affected by muriatic acid, nor by caustic ammonia and saline solutions. Yet the cylindrical or club-shaped spermatozoa of birds are more nearly allied in chemical characters to the spermatozoa of Mammalia. The seminal animalcules of the common swift (*Cypselus Apus*), for example, remain perfectly entire and distinct after having been subjected to the action of citric or acetic acid. It may be incidentally mentioned that the spermatozoa of the snake (*Natrix torquata*) are not affected by acetic acid.

The matter in the seminal canals of Mammalia and Birds, when it

contains plenty of corpuscles, of which indeed it is almost entirely made up in immature animals, from the embryo upwards, is renderedropy by alkalis and by saline solutions. This action of these solutions, which is very remarkable on all animal fluids containing a great quantity of fresh primary or isolated cells, appears to take place from the effect on them of the reagents, as I have elsewhere described with respect to the lymph-globules (Gerber's Anatomy, Appendix, pp. 91, 96, and 97). In some recent experiments, however, these globules were not destroyed, but only a little misshapen or made rather fainter, after having been kept some days in solutions of muriate of ammonia and other salts.

“Descriptions of new species of *Delphinula*, a genus of Pectinibranchiate Mollusks (Family *Turbinacea*),” by Mr. Lovell Reeve.

DELPHINULA TYRIA. *Delph. testâ subdiscoideâ, squameâ, anfractibus argenteo-albis, supernè et infernè Tyrio-purpureis, laxè convolutis, umbilicum lævem lacco-purpureum formantibus, angulatis, squamis minutis, in seriebus parallelis dispositis, totaliter tectis; angulo serie unicâ majore funiculato; spirâ depresso-planâ.*

Icones Reeve, Conch. Syst., vol. ii. pl. 211. f. 6.

Long. $2\frac{1}{2}$; lat. $1\frac{3}{4}$. Mus. Cuming, &c.

Hab. Ad oras Novæ Hollandiæ.

This is the first discovered large species of *Delphinula* that is absolutely destitute of spines or nodules. The surface of the shell, which is entirely covered with small scales ranged in parallel series, is of clear silvery white; the upper and lower portions of the whorls are tinged with a rich Tyrian purple, and the umbilicus, which is smooth, is of a lighter lake purple.

DELPHINULA IMPERIALIS. *Delph. testâ subdiscoideâ spiniferâ et squameo-lirâtâ, anfractibus olivaceo-viridibus, ultimo palidè purpureo, laxè convolutis, umbilicum amplum formantibus, subangulatis, angulo spinis gracillimis, squamæformibus, nigris, supernè inflexis, coronato; anfractuum parte alterâ spinis brevioribus, contrariè inflexis, in seriebus dispositis, interstitiis squamis nigris, minutis sigillatim impositis, ornatis; spirâ depresso-concavâ.*

Delphinula melanacantha, Reeve, Conch. Syst., vol. ii. pl. 211. f. 4. and pl. 212. f. 10.

Long. $2\frac{1}{4}$; lat. $1\frac{3}{4}$ in. Mus. Cuming.

Hab. Ad insulam Mindanao, Philippinarum.

A magnificent specimen of this remarkable shell was dredged up by Mr. Cuming in — fathoms' water at —, one of the Philippine Islands, and we need only refer to our figures of it in the 'Conchologia Systematica,' in addition to the above description, to show how distinct is this species from any other of the genus. The shell is of a palish-green colour towards the apex, but the last whorl is purple and elegantly surmounted with a row of tall, black, slender, scale-like spines, bending over towards the point of the spire. Below these are five other distinct rows of black spines; they are,

however, shorter, and bend the contrary way, whilst the entire surface of the shell is ornamented with a number of very fine ridges of minute scales. We gladly avail ourselves of the opportunity of restoring to this shell the name by which it is commonly known amongst collectors, though not hitherto published.

DELPHINULA INCISA. *Delph. testá globoso-discoidéá, liris purpureis angustis, subflexuosis, interstitiis albis profundè incisis, totaliter tectá; anfractibus tuberculis grandibus, complicatis, distantibus, in seriebus duabus dispositis, ornatis; aperturá rotundá, margine inferiori lacunatá; spirá depresso-planá.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 11.

Long. $1\frac{9}{10}$; lat. $1\frac{1}{2}$ in. Mus. Cuming.

Hab. Ad insulam Burias, Philippinarum.

This shell, which we believe to be at present unique, in the collection of Hugh Cuming, Esq., is well-characterized, by having a double row of large, pinched, stunted tubercles; and the tubercles, as well as the entire surface of the shell, is covered with a number of purple flexuous ridges, the interstices being white and unusually deeply cut.

DELPHINULA FORMOSA. *Delph. testá rotundá subdiscoidéá, levitèr nodiferá, aureo-ochraceá, cocceo-tinctá, anfractibus perangulatis, angulo squamis grandibus, triangularibus valdè compressis, coronato; anfractuum parte inferiori squamarum minorum seriebus duabus, squamulisque ochraceo-coccineis minutis in seriebus parallelis, subflexuosis, dispositis, ornata; umbilico amplo purpureo-lacco vividè colorato; spirá plano-convexá.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 9.

Long. $1\frac{5}{10}$; lat. 1 in. Mus. Cuming.

Hab. Ad insulam Capul Philippinarum.

A very richly-coloured shell, found by Hugh Cuming, Esq., at Capul, one of the Philippine Islands, in seven fathoms' water. The upper portions of the whorls are clothed with a rich golden yellow colour, deeply tinged with scarlet or crimson; the lower part of the whorls are of a peculiarly soft white, and the umbilicus in all the specimens we have seen is coloured with a deep purple lake, entirely free from any indication of the yellow that ornaments the obverse portion of the shell.

DELPHINULA ACULEATA. *Delph. testá subdiscoidéá, aculeatá, albidá, anfractibus perangulatis, angulo spinis squamæformibus flexuosis, dorsim coccineis, coronato, anfractuum parte inferiori spinarum seriebus duabus, aculeolisque squamæformibus in seriebus parallelis dispositis, ornata; spirá depresso-planá.*

Icon. Reeve, Conch. Syst., vol. ii. pl. 212. f. 8.

Long. $1\frac{1}{10}$; lat. $\frac{9}{10}$ in. Mus. Cuming.

Hab. Ad insulam Ticao Philippinarum.

This shell is not much unlike that of the preceding species; it differs, however, in having the angle of the outer whorl crowned with a row of irregular, thin, flexuous, scale-like spines, the back of each being ornamented with scarlet, the only portion of colour in the

shell; the surface is remarkable in being covered with a number of sharp prickles, particularly within and around the umbilicus.

Mr. Reeve also described a new species of the genus *Murex*.

MUREX STAINFORTHII. *Mur. testâ subsolidâ, globoso-ovatâ via fusiformi, multivaricosâ, superficie pallido-aurantiâ, epidermide tenui indutâ, transversim liratâ, liris fusco-lineatis; spirâ breviusculâ, apice subobtusâ; anfractibus quinque, suturis indistinctis; anfractu ultimo varicibus octo ornato, cæteris, varicibus decorticatis, ferè obsoletis; varicibus per totam longitudinem densissimè frondosis, frondibus acutissimis, recurvis; canali brevi, latiusculo; aperturâ rotundâ, fauce crenulatâ, politâ, utrinque vividè aurantiâ.*

Long. $2\frac{1}{10}$; lat. $1\frac{1}{2}$ in. Mus. Inwood.

Hab. — ?

The very beautiful and characteristic shell above described has been handed to us by its fortunate possessor, Henry Inwood, Esq., accompanied with a request that it be named in honour of one of our most assiduous collectors, the Rev. Mr. Stainforth. And it is with no little pleasure that we have executed the task; for a shell more chaste in its colour and development, or more striking in its specific character, we do not remember to have seen. It is of a solid and somewhat globose structure, and is profusely ornamented with varices; there are eight distinct varices on the last whorl, and the remains of a similar number are visible on each of the former; but in the specimen before us, and which we believe to be unique, they are so decorticated as to have become almost obsolete. Each varix appears to have been formed by the sudden development of a number of coatings laid successively one upon the other. The edge of each of these coatings is then ornamented with a row of fine prickly branches, recurved back over the shell, and they only remain perfect to the last coating in consequence of those of the previous or under coatings having been necessarily in part removed or absorbed; unless indeed the under coatings are too rapidly developed, the one over the other, to allow of their marginal branches attaining the regularity and beauty of the last. The varix altogether has thus the appearance of being thickly studded from top to bottom with these delicate prickles: so delicately indeed are they formed, that it is only on the last or marginal varix of the shell that they remain in perfect order; in tracing them back round the body whorl, they may be observed to have become gradually more and more eroded. Should a specimen of this shell be found with all the varices in the same beautiful order as the marginal varix in this, it would indeed be "fair to look upon." The canal is rather short; the outer lip is strongly crenulated, and the crenulæ extend within the mouth of the shell, the whole of them, together with the broad columella, being covered with a highly polished orange enamel.

A letter from George Robert Gray, Esq., addressed to the Curator, was next read. This letter refers to the members of J. E. Gray's genus *Tetraogallus*, or Mountain Partridge, a rare species of which is at

present in the Society's menagerie, having been brought from Northern Persia, and presented to the Society by E. W. Bonham, Esq., H.B.M. Consul at Tabrez. Mr. G. R. Gray is of opinion that there exist three species of the genus *Tetraogallus*, each peculiar to one of the three following localities, viz. Caucasus, the Himalayan and the Altai Mountains.

The bird in the Society's menagerie, Mr. G. R. Gray observes, is well figured in plate 76 of Jardine and Selby's 'Illustrations,' and the specimen figured is, like that belonging to the Zoological Society, from Persia. It is peculiar in having the head, neck and breast of a slate colour, passing into pale reddish brown on the upper part of the back; a dingy white streak extends from the nostril to the anterior angle of the eye; the chin and throat, as well as an oblong patch on the side of the neck, are white; the breast is of a dark slate colour, and has short wavy black lines, especially just below the white of the throat. The figure referred to represents the typical *Lophophorus Nigelli*, which is most probably identical with the *Tetrao Caucasica* of Pallas; and if this supposition be correct, the earlier specific name given by the author just mentioned should be retained, as *Tetraogallus Caucasicus*.

Mr. G. R. Gray also believes the *Chourтка alpina* of Victor to be the same species as the bird under consideration.

In plate 141 of Messrs. Jardine and Selby's 'Illustrations,' a *Tetraogallus* is represented, which the authors suppose to be the male of the bird figured in plate 76; this is also delineated under the name of *Tetraogallus Nigelli* by Mr. J. E. Gray in the 'Indian Zoology.' This bird Mr. G. R. Gray, however, considers a distinct species, which is peculiar to the Himalaya Mountains, whence he has seen many specimens, all agreeing in colour. For this species the name *Tetraogallus Himalayensis* is proposed. It is distinguishable by its silky white neck and breast; a deep chestnut-brown line runs down, and partly surrounds the base of the neck, and the breast is variegated in front with black, each plume having a transverse band on the middle, which partly appears below the white tips of the other feathers.

The third species, *Perdix altaica* of M. Gebler, the distinctness of which there can be no doubt of, has the breast-feathers grey-black at the base; and this colour extends along the shafts, and forms an arched spot on each side of each feather: the under tail-coverts are white. It should be named *Tetraogallus altaicus*.

August 9.—Richard Owen, Esq., Vice-President, in the Chair.

The following paper, "On the Blood-Corpuscles of the Ibex," by George Gulliver, Esq., F.R.S., was read.

Before my discovery of the singularly minute size of the blood-corpuscles of the Musk Deer*, those of the Goat were the smallest known. I have since found that the corpuscles of the Ibex are slightly smaller than those of the Goat, and therefore intermediate in size to the corpuscles of the Goat and those of the Musk Deer,

* See Annals of Nat. History, Dec. 1839.

as will be shown by the following measurements, which are given in vulgar fractions of an English inch; the average size of those of the Ibex from Candia (*Capra Caucasica*, Guld.), = 1-7020 inch, and of the pale globules of the blood, = 1-3200 inch; of the Common Goat (*Capra Hircus*, Linn.), = 1-6366 inch, and of the pale globules of the blood, = 1-3032 inch; and of the Napu Musk Deer (*Moschus Javanicus*, Pallas), = 1-12325 inch, and of the pale globules of the blood, = 1-3200 inch.

I may add that Mr. Siddall, who has lately at my request measured the blood-corpuscles of the Ibex and of the Goat, has obtained almost exactly the same results as those above specified.

Mr. Gulliver also communicated a paper "On the Blood-Corpuscles of the British Ophidian Reptiles." To this communication are added some observations on the figure of the blood-corpuscles of other oviparous Vertebrata.

"The observations were made on perfectly fresh blood, and the corpuscles measured as they floated in the serum.

"Though the blood-discs of Birds and Reptiles preserve their shape very clearly when rapidly dried on a slip of glass, they generally appear in this state slightly but distinctly smaller than when suspended in the serum of recent blood; whereas, when the blood-discs of Mammalia are dried in precisely the same way they are commonly slightly larger than in the wet state, as I have noticed more particularly in the 'Philosophical Magazine' for January and February 1840, pp. 25 and 105."

"In Mammalia the envelope of the corpuscle is more delicate, more susceptible of contraction and of modifications of form, and apparently softer, than in Birds and Reptiles; so that the corpuscles of Mammals are more liable to shrink a little soon after removal from the circulating channels, than the corpuscles of Birds and Reptiles; and it may be that this softness of the blood-disc of Mammals allows it to spread out in some degree, even when dried ever so quickly. But it is more probable that the corpuscles preserve their usual size and form when dried almost instantaneously, and that the shrinking or modifications of shape which the corpuscles may undergo in liquid, coagulating, or slowly-dried blood, may be influenced as much by changes in the surrounding fibrine as by a contractility inherent in the corpuscles. The envelope of the blood-disc of Fishes is much more delicate and evanescent than the same part in Birds and Reptiles; hence in the blood of Fishes, even soon after death, the nuclei will be observed in great abundance, while the envelopes have partially or entirely disappeared; and the form of the entire corpuscles is not so easily preserved by drying as in the other oviparous vertebrate animals."

The following average dimensions of the blood-corpuscles of the Slow Worm, Snake, and Viper, deduced from measurements of the small, large, and common-sized discs, are all expressed in vulgar fractions of an English inch. L.D. stands for Long Diameter, and S.D. for Short Diameter.

March 19, 1842.—Slow Worm (*Anguis fragilis*, Linn.): L.D. =

1-1178 inch, S.D. = 1-2666 inch; and of the pale globules of the blood (abundant) = 1-2626 inch.

Sept. 9, 1841.—Common Snake (*Natrix torquata*, Ray): L.D. = 1-1371 inch; S.D. = 1-2157 inch; thickness = 1-8341 inch; nuclei, exposed by dilute acetic acid, L.D. = 1-3835 inch; S.D. = 1-6817 inch; and of the pale globules of the blood (tolerably numerous) = 1-2322 inch.

“The pale globules were generally granular and opaque, though some of them were thin and transparent at the edges, as if growing into discs. In the blood there were many circular discs of a deep red colour, and generally 1-2666th of an inch in diameter. The regular discs were rounded at the edges, and almost all flat; but a very careful search might occasionally detect one or two with slight gibbosity of the surfaces opposite to the nucleus.

March 24, 1842.—Viper (*Coluber Berus*, Linn.): L.D. = 1-1274 inch; S.D. = 1-1800 inch; and nuclei, exposed by acetic acid, L.D. = 1-3227 inch; S.D. = 1-4986 inch.

“The discs were clearly gibbous on the surfaces opposite to the nucleus. The pale globules were very numerous, and their common diameter was 1-2666th of an inch.

“*Figure of the Corpuscles.*—From the preceding measurements it results, that although the blood-discs of the Viper and Snake present the form of an ellipse rather less than twice as long as it is broad, in the Slow Worm the elliptical figure of the discs is more elongated, since its length is considerably more than twice its breadth.

“As M. Mandl states, all observers had agreed that the long diameter of the oval blood-corpuscles of vertebrate animals was never more than one and a half or twice the short diameter, when he described the corpuscles of the *Crocodylidae* as forming a singular exception to this rule; because he found that the long diameter of the blood-discs of *Crocodylus Lucius* was between two and three times as much as the short diameter. I am not aware whether M. Mandl had examined any other species of this family; but, as described in the ‘Proceedings of the Zoological Society,’ Nov. 10, 1840, I found that in *Crocodylus acutus* and in *Champsia fissipes* the corpuscles had the most common oval form, the length being rather less than twice the breadth*.

“In the ‘Proceedings of the Zoological Society,’ June 9, 1840, I showed that the blood-corpuscles of some birds differ greatly in figure from the corpuscles of other congenerous species. The corpuscles of the Snowy Owl (*Syrnia nyctea*), for example, are singularly elongated ellipses, while the corpuscles of the Common Brown Owl have the usual oval form; and a similar peculiarity, though in a less degree, was observed in comparing the corpuscles of the Passenger Pigeon (*Columba migratoria*) with those of other allied species.

* In an alligator, the species of which was not determined, I found the blood-corpuscles of the same shape. The animal came from Tampico Bay, Vera Cruz, and died at the gardens of the Society in the beginning of October 1842.

“Subsequently I have mentioned, in the ‘Appendix to Gerber’s Anatomy,’ that the corpuscles of Birds may present, comparatively, either the figure of a very broad or of a very narrow ellipse. Of the latter shape, examples may be found in the corpuscles of the Great Butcher Bird (*Lanius excubitor*), Nightingale (*Philomela lusciniæ*), Snow Bunting (*Plectrophanes nivalis*); and of the former shape in the corpuscles of the Java Sparrow (*Loxia Javensis*), and several other granivorous birds.

“The nucleus of the blood-corpuscles of Birds, when exposed by acetic acid, has almost always a more elongated form than the unchanged envelope, as mentioned in the book just quoted. But to this rule I have since found a few remarkable exceptions. In the Common Fowl (*Gallus domesticus*), for instance, the nucleus is a very short ellipse, and even sometimes nearly or quite circular. For the difference between the shape of the nucleus, when exposed by acetic acid, or by soaking the corpuscles in water, a figure may be consulted which I have given to illustrate this subject in my ‘Contributions to Minute Anatomy,’ Lond. and Edin. Phil. Mag., August 1842, page 109.”

A paper was then read from Mr. Gould, in which he gives the characters of two new genera of Birds, one belonging to the family *Sylviadæ* and the other to the *Psittacidæ*.

“Having observed,” says Mr. Gould, “during my late visit to Australia, much difference to exist in the habits of the birds usually placed in the genus *Platycercus*, I was naturally led to investigate the matter as fully as circumstances would admit, and on examination of the two birds known as *Pl. erythropterus* and *Pl. scapulatus*, I found that the difference of their habits from those of the typical *Platycerci* was accompanied by a sufficient difference in their anatomy to warrant their separation into a distinct genus. Independently of the variations indicated in the generic characters given below, these birds are remarkable for possessing a tolerably well-developed *os furcatorium*, which bone is entirely wanting in the true *Platycerci* and *Euphemi*: in their habits they approach nearer to the Lories, are of a dull and sullen disposition, and do not readily become tame and familiar like the *Platycerci*; they are also essentially arboreal, procuring their food among the branches of the trees; while the *Platycerci* resort to the ground and feed principally upon grass seeds.”

These two birds he therefore proposed to erect into a new genus, under the appellation of

APROSMICTUS.

Gen. Char. ut in Platycerco.—*Rostrum* attamen debilius, ceromate plumis tenuibus instar pilorum nares adumbrantibus instructo. *Alæ* longiores et minùs concavæ. *Cauda* magis quadrata. *Tarsi* breviores. *Digiti* longiores.

Types.—*Platycercus scapulatus* and *erythropterus*, which will now stand as *Aprosmictus scapulatus* and *A. erythropterus*.

The other birds which Mr. Gould proposed to form into a new

genus are the *Petroica rhodinogaster* of Messrs. Jardine and Selby, and the *Petroica rosea* of himself. These birds are much more arboreal in their habits than the true Petroicas, which are expressly adapted for the ground, while these are equally so to the thick brushwood, to the deepest gullies among which they usually resort. For this group he proposed the designation of

ERYTHRODRYAS.

Gen. Char. ferè ut in Petroicâ.—*Rostrum* attamen brevius, ad basim magis depressum, et vibrissis tenuibus anticè ductis naresque adumbrantibus instructum. *Alæ* breviores, magis rotundatæ; primariis primo et secundo brevissimis, quinto longissimo. *Tarsi* breviores. *Digiti* longiores; externi inter se ferè æquales. *Ungues* acutiores et magis incurvati.

Type.—*Erythrodryas rhodinogaster* (*Petroica rhodinogaster*, Jard. and Selb.).

To this genus also belongs the species characterized by him in the Proceedings of the Zoological Society for 1839, p. 142, under the name of *Petroica rosea*, which will now stand as *Erythrodryas rosea*.

August 23.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Prince exhibited, on the part of Mr. Gould, two new species of Australian Birds. These Mr. Gould characterizes as follows:—

ASTUR CRUENTUS. *Ast. capite et occipite plumbeis; torque nuchali castaneo dorso, alis, caudâque eplumbeo-fuscis; fusco colore apud dorsum magis prævalente, plumbeo apud ceteras partes; remigum primorum pogoniis internis ad basim albescentibus et plumbeofasciatis; corpore inferiore ferrugineo, fasciis crebris, angustis et semicircularibus ornato.*

Male.—Crown of the head and occiput dark slate-colour; sides of the face grey; at the back of the neck a collar of chestnut-red; back, wings and tail slaty brown, the brown hue predominating on the back and the slate-colour upon the other parts; inner webs of the primaries fading into white at the base, and crossed by bars of slate-colour; the interspaces freckled with buff; inner webs of the tail-feathers marked in a precisely similar manner; chin buffy white; all the under surface rust-red, crossed by numerous narrow semicircular bands of white; irides bright yellow; cere dull yellow; bill black at the tip, blue at the base; legs and feet pale yellow; claws black.

Total length, $14\frac{1}{2}$ inches; bill, $\frac{7}{8}$; wing, 7; tail, 6; tarsi, $2\frac{1}{2}$.

Hab. Western Australia.

This species is intermediate in size between *Astur approximans* and *Accipiter torquatus*, but is of a more grey or blue colour on the back, and has the transverse lines on the breast narrower and more rufous.

LOBIVANELLUS PERSONATUS. *Lob. vertice et occipite nigerrimis; faciei lateribus nuchâ, uropygio, et corpore inferiore albis; dorso et plumis scapularibus pallidè fuscescenti-cinereis; paleis penden-*

tibus flavis; rostro ad basim flavis ad apicem nigris; pedibus e carneo-rubris.

Crown of the head and occiput jet-black; sides of the face, back of the neck, rump, and all the under surface pure white; back and scapularies light brownish grey; wing-coverts grey; primaries deep black; secondaries white at the base on their inner webs, cinnamon-grey on their outer webs, and largely tipped with black; the extreme ends of the feathers being cinnamon-grey, particularly the two central ones; irides primrose-yellow; wattles lemon-yellow; bill lemon-yellow at the base, black at the tip; legs and feet carmine-red; the scales in front blackish green.

Total length, 12 inches; bill, $1\frac{3}{4}$; wing, $8\frac{3}{4}$; tail, 4; tarsi, $2\frac{3}{4}$.

Hab. North coast of Australia.

This species is of the same size, but more elegantly formed than the *Lob. lobatus*, the fleshy wattles more extensively developed, the crown of the head only black, and not the back and sides of the neck, as in that species.

Mr. Waterhouse exhibited several species of Mammals, collected in Borneo by the Society's Corresponding Member, James Brooke, Esq., and recently forwarded to England by that gentleman.

Among these specimens was a fine example of the *Paradoxurus Derbianus*, Gray, an animal which has also received the names *Paradoxurus Zebra*, *Hemigalea Zebra*, and *Viverra Boiei*.

Two specimens of *Gymnura*, a specimen of the *Prionodon gracilis*, and two species of Squirrel, also formed part of the collection.

The *Gymnuri* differ much in colouring from the *G. Rafflesii*. Instead of having the fur black, and with longer interspersed white hairs, the Bornean specimens are entirely of a yellowish white colour, with the exception of the long bristly hairs interspersed with the ordinary fur, which are some of them black. In other respects the Sumatran and Bornean specimens of *Gymnura* agree so closely that Mr. Waterhouse did not regard the difference in colouring as indicative of specific distinction.

The existence of the *Prionodon gracilis* in Borneo is noticed by Müller, who applies to the animal the name *Linsang gracilis*. Believing the skull of this animal had never been described or figured, Mr. Waterhouse called attention to the peculiarities in its structure.

In some of its external characters, especially in the structure of its feet, with their truly retractile claws, the *Prionodon* evinces an affinity to the Cats, which would lead the naturalist to seek for some corresponding points of resemblance in the skull; this, however, presents all the characteristics of the *Viverridæ*: it is of the same elongated form; the lower jaw is long and slender, and the rami are curved, so that the angular portion and symphysis are raised. Compared with other *Viverridæ*, the *Prionodon* skull is remarkable for the thinness of the bones and the very slight development of the muscular ridges. In general form it approximates more nearly to *Paradoxurus* than to *Viverra* or *Genetta*. The zygomatic arch, which is slender, is thrown more boldly outwards than in the last two mentioned genera, and the posterior portion of the cranium does not

exhibit the sudden contraction immediately behind the posterior root of the zygomatic arch which we observe in the *Viverras* and *Genets*. The post-orbital process of the temporal bone is but little prominent, being in the form of an obtuse angle; the skull differing in this respect from that of *Paradoxurus*, as well as in having the palate continued considerably beyond the line of the posterior molars. The muzzle is much compressed. The temporal ridges are rather widely separated and but slightly marked, though, judging from the dentition, the animal was adult. The ant-orbital opening is larger than in *Genetta* and less advanced, and hence the branch of the superior maxillary which forms its upper boundary is narrower, as in *Paradoxurus*. In the form of the lower jaw there is a close approximation to *Paradoxurus*; the only important difference consists in the smaller antero-posterior extent of the coronoid process.

The teeth in *Prionodon* differ much from those of *Paradoxurus*; indeed, were the dentition alone to be considered, these two genera would be placed at opposite extremes of the Viverrine group, the last-mentioned genus evincing the nearest approach to an omnivorous diet, whilst the *Prionodon* possesses teeth the most unfitted for mastication.

The incisors are arranged closely together, and in a straight line; the incisor on each side of both jaws, nearest the canines, is rather larger than the others, which are slightly notched at the extremity. The canines are rather long, very slender, and moderately curved. The false molars, which are $\frac{3 \cdot 3}{4 \cdot 4}$, are much compressed, high, and sharply pointed. The foremost false molar, both of upper and lower jaws, is small, and has a small tubercle on the hinder part of the principal cusp. The second and third false molars of the upper jaw have each two small notches, and a corresponding number of small tubercles on the posterior margin and at the base of the principal cusp; and there is an indistinct tubercle in front, near the base: the second, third, and fourth false molars of the lower jaw have also the double notch behind, but differ in having a distinct, though small, anterior cusp. The first and second false molars of both jaws are separated from the other teeth and from each other by interspaces, of which the broadest is that which separates the second and third of these teeth in the upper jaw, the space here being nearly a line in width. The carnassier of the upper jaw very nearly resembles that of the Cat, but the central cusp is higher, and the inner tubercle is proportionally smaller. The carnassier of the lower jaw may be best described by comparing it with the corresponding tooth in the Genet, from which it differs only in having the cutting edges rather more produced, in being more compressed; the inner tubercle is more pointed, and the heel proportionately smaller. As regards the true molars, the present animal differs from other *Viverridæ* in possessing but one of these teeth on each side of the upper jaw; its true molars are therefore $\frac{1-1}{1-1}$, and this certainly does not arise from immaturity in the animal. The form of this tooth closely resembles

that of the foremost of the two upper true molars in *Genetta*, but is proportionately rather smaller and the tubercles are somewhat more developed. The true molar of the lower jaw is a mere rudimentary tooth, and differs from that of *Genetta* and other *Viverridæ*, not only in its small size, but in being of a compressed form: its cutting edge is divided by notches into three parts.

In the possession of but one true molar in the upper jaw, *Prionodon* would appear to approach the *Felidæ*; but the structure of this tooth, it must be observed, is essentially the same as in the *Viverridæ*, and it is combined with a small true molar in the lower jaw, which is never found in the Cats.

On the whole, *Prionodon* approaches most nearly to the *Genets* as regards its dentition; but in the general structure of the skull, Mr. Waterhouse observed, it evinced an affinity with the *Paradoxuri*, to which group it appeared to be linked by the *Paradoxurus Derbianus*, or *Hemigalea Zebra*. Links are nevertheless wanting to prove that *Prionodon* should be regarded as an offset from the *Paradoxurine* group.

One of the two Squirrels alluded to is the *Sciurus ephippium*, described in Dr. Müller's great work on the Zoology of the Dutch Possessions in the Indian Archipelago. The other closely resembles the *Sc. Prevostii* or *Rafflesii*, and may be a variety of that species; it differs in being smaller; the cheeks are freely pencilled with rusty red, instead of being grey as in *Rafflesii*, and the sides of the muzzle are of the same reddish hue, not having the white patch which is observable in Sir S. Raffles's Sumatran specimen; the outer side of the thighs has a grey tint, produced by the admixture of black and white; the hairs being of the former colour, but white or yellowish white at the point. In the type of *Rafflesii* the same part is furnished with uniform white hairs, excepting the hinder part of the thigh, which is black. The tail is uniform black in that animal, but the Bornean specimen has the hairs tipped with white in such a way as to produce rings; these rings, however, do not extend to the apical portion of the tail, about two inches of which is uniform black. The hairs covering the ears are partly black, but chiefly of the same rich rusty red as are all the under parts of the animal. The Sumatran animal has black ears. Dr. Müller, in the work before quoted, describes specimens of a squirrel from Borneo, which he regards as a variety of *Sc. Rafflesii*, and which agree closely with the specimen from Mr. Brooke's collection; this, however, has the hairs on the upper parts of the body of a uniform glossy black colour; Dr. Müller observes they are generally terminated with yellowish points in the specimens he met with.

Sept 13.—William Yarrell, Esq., Vice-President, in the Chair.

The first paper read was from J. O. Westwood, Esq. It contains descriptions of some Coleopterous Insects from tropical Africa, belonging to the section *Heteromera*, and is the continuation of a paper on the same subject, communicated to the Society August 24th, 1841, an abstract of which will be found in the 'Proceedings' of that date.

Genus CALOSTEGIA.

Corpus magnum oblongum. Caput mediocre, clypeo margine antico recto, angulis anticis valdè porrectis basin labri recipientibus. Antennæ crassæ breves, articulis 7-10 præcedentibus majoribus, ultimo majori apice subacuto. Mandibulæ ad apicem bidentatæ dentæque altero majori in vel versus medium marginis interni armatæ. Maxillæ lobo interno in dentem corneum obtusum hamatum terminato. Palpi maxillares articulo ultimo securiformi. Mentum latum lateribus rotundatis, basi valdè constrictum. Labium quadratum. Palpi labiales articulo ultimo ovali. Prothorax subquadratus anticè paullò latior, lateribus versus angulos anticos serratis. Elytra oblongo-ovalia lævia metalli-colorata. Pedes crassi, femoribus omnibus ante apicem bispinosi; tibiis intus, ante et pone medium sinuatis.

CALOSTEGIA PURPURIPENNIS. *Cal. nigra subopaca lævis, elytris purpureis sub lente tenuissime striato-punctatis.*

Long. corp. lin. 17; lat. elytror. ferè lin. 6.

Hab. in Ashantee. Mus. D. Hope.

NYCTOBATES MÆRENS. *Nyct. niger subnitidus, capite thoraceque sub lente tenuissime punctatis, elytrisque tenuissime striato-punctatis, pedibus longis, tibiis subincurvis, thoracis angulis posticis acutis.*

Long. corp. lin. $8\frac{1}{2}$; lat. elytr. pone medium lin. $3\frac{3}{4}$.

Hab. in Guineâ. In mus. nost. communic. D. Raddon.

Totus niger parùm nitidus. Caput margine antico (clypeo incluso) subsemicirculari, clypei utrinque incisione parvâ in lineâ obliquâ impressâ desinente distinguendo; lineâque alterâ impressâ longitudinali utrinque ad marginem internum oculorum. Superficies capitis regulariter punctata punctis parvis. Antennæ articulo primo crasso longitudine 4^{ti}, 2^{do} minuto, 3^{tio} longo, cæteris longitudine ferè æqualibus at sensim latioribus, 5 ultimis compressis setosis, ultimo ovali, basi truncato, apice rotundato. Mandibulæ subtrigonæ apice acutæ, intus edentatæ sed spatio mediano membranaceo. Maxillæ lobo interno in unum corneum terminato. Palpi maxillares articulo ultimo securiformi. Mentum subquadratum anticè paullò latius, anticè carinâ curvatâ instructum: labium breve transversum ciliatum. Palpi labiales breves articulo ultimo dilatato-ovalis apice truncato. Prothorax capite multo latior, margine antico truncato, lateribus rotundatis, angulis posticis acutis; marginatus, margine antico tamen in medio interrupto; superficies tota crebre punctata, punctis minutis et non approximatis. Elytra basi thorace latiora, humeris rotundatis; sensim latiora, apice utrinque parùm sinuata; dorso gibboso superficies sub lente quasi coriacea; singulo striis 9 e punctis minutis formatis oculo nudo vix conspicuis, striâ internâ propè scutellum abbreviatâ. Pedes longi, graciles, femoribus anticis crassioribus; omnibus apice inermibus; tibiis anticis pone medium parùm intus curvatis, apice externè intus setoso, extus obliquè truncato, tibiis 4 posticis subrectis, medio vix subincurvato, apiceque subinflexis; calcaribus omnibus minutissimis.

NYCTOBATES CONFUSUS. *Nyct. niger lævis subnitidus, elytris latioribus, pronoti lateribus in medio sinuatis et sanguineo-marginatis.*

Long. corp. lin. 1 ; lat. elytr. pone med. lin. 5.

Hab. in Africâ æquinoxiali. Mus. Soc. Linn. Lond. D. Banks.

Caput nigrum, sub lente tenuissime punctatum carinâ longitudinali utrinque versus marginem internum oculorum. *Antennæ* articulis apicalibus latioribus. *Pronotum* transversè quadratum, angulis anticis obliquè truncatis et parùm rotundatis, lateribus in medio sinuatis tenuissime marginatis, angulis posticis acutis ferè rectangulis ; sub lente tenuissime punctatum ; lateribus latè et obscurè sanguineis, colore sanguineo ante medium intus acutè producto, dorso nigro ; margine postico in medio versus scutellum parùm producto. *Elytra* nigra nitida lævia, latiora quàm in congenericis, præsertim pone medium, apicem versus attenuata ; sub lente seriebus 8 longitudinalibus punctorum minorum. *Pedes* longitudine mediocres, graciles, tibiis simplicibus ferè rectis.

Individuum in mus. D. Hope vidi lineas $9\frac{1}{2}$ tantum habens, staturâque parùm minus robustâ ; vix tamen species distincta.

NYCTOBATES PUNCTATUS. *Nyct. niger obscurus, prothoracis angulis anticis rotundatis, lateribus in medio incisus angulisque posticis acutis, elytris punctato-striatis, antennis sensim dilatatis.*

Long. corp. lin. $9\frac{3}{4}$; lat. elytr. pone med. lin. ferè 4.

Hab. in Guineâ. In mus. D. Hope, comm. D. Westermann.

Syn. Helops punctatus, *Fabr.*, Syst. Eleuth. i. 161.

Caput obscurum sub lente tenue punctatum ; clypeo posticè impressione transversâ e vertice separato, carinâque utrinque ad marginem oculorum. *Antennæ* mediocres sensim ad apicem incrassatæ compressæ, linea tenui mediâ impressâ posticâ. *Prothorax* subquadratus angulis anticis rotundatis, lateribus in medio sinuatis, tene marginatis, angulis posticis acutis et parùm extus productis ; margine postico versus scutellum posticè producto. *Elytra* thorace haud multo latiora pone medium parùm latiora, singulo seriebus 8 longitudinalibus punctorum impressorum magnitudine irregularium, striâque alterâ abbreviatâ versus scutellum ; striis 1 et 2 ad basin connexis ; striæ 5 et 6 longe ante apicem conjunguntur ; striæ 3 et 4 propiores, 2 et 7, et 1 cum 8vâ connexis. *Pedes* longitudine mediocres, tibiis simplicibus et ferè rectis. *Mesosternum* anticè bidentatum, prosterni apicem acutum recipiens.

I give the insect here described as the true *H. punctatus*, Fab., on the authority of a specimen received by the Rev. F. W. Hope from Copenhagen, from M. Westermann, who has such excellent opportunities of determining those Fabrician species which were described from the cabinets of Lund and Schestedt, as was the case with the present species. This is the more important, as the Fabrician description is so slight as to be applicable to scores of species of Heteromerous insects.

NYCTOBATES HYPOCRITA. *Nyct. niger subobscurus tenuissime punctatus, prothoracis lateribus subrotundatis integris angulis anticis acutis, antennis longioribus apice parùm latioribus.*

Long. corp. lin. $8\frac{3}{4}$; lat. elytr. pone med. lin. $3\frac{1}{2}$.

Hab. in Guineâ. In Mus. D. Hope, comm. D. Westermann.

Syn. *Iphthinus Hypocrita*, Dej., Cat. sine descr.; *Iphthinus Guineensis*, Westermann, MSS.

Niger subobscurus. *Caput* (præsertim in clypeo) et prothorax punctata; clypeus e vertice lineâ impressâ curvatâ vix separatâ, carinâ utrinque parùm elevatâ ad marginem internum oculorum. *Antennæ* graciles articulis 3 vel 4 ultimis parùm latioribus compressis. *Prothorax* subquadratus, lateribus subrotundatis marginatis integris angulis posticis acutis; margine postico ferè recto tenuè marginato. *Elytra* parùm convexiora quàm in reliquis; singulo sulcis 8 profundis longitudinalibus et punctatis, inter se connexis ut in specie præcedenti; pone medium paullò latiora et posticè acuminata. *Pedes* longiores, simplices, tibiis parùm curvatis.

NYCTOBATES TRANSVERSALIS. *Nyct. niger subobscurus subpunctatus, capite parvo, oculis magnis, antennis apice haud incrassatis, prothorace transverso angulis anticis rotundatis, lateribus integris, elytris striato-punctatis.*

Long. corp. lin. $9\frac{1}{2}$; lat. elytr. lin. 4.

Hab. apud Sierram Leonam. In mus. D. Hope et Waterhouse.

Caput sub lente punctatum, præsertim in clypeo magno transverso-ovato, e vertice lineâ forti impressâ semicirculari diviso; oculi magni, angulis internis intus productis, spatio parvo intermedio tantum relicto; carinæ duæ interoculares subobsoletæ. *Antennæ* breves subdepressæ, articulis 7 ultimis subæqualibus apicem versus haud incrassatis. *Prothorax* latior quàm longus lateribus tenuè marginatis subrotundatis integris angulis posticis vix acutis; margine postico ferè recto; dorso tenuè punctato. *Elytra* ferè parallela, thorace latiora, angulis humeralibus obliquè truncatis longitudinaliter sulcatis, sulcis sub lente punctatis, striâque alterâ abbreviatâ versus scutellum. *Pedes* graciles simplices, tibiis ferè rectis.

NYCTOBATES BREVICORNIS. *Nyct. niger, capite et pronoto tenuissime punctatis, antennis brevibus, prothorace quadrato lateribus parallelis, elytris punctato-striatis, pedibus brevibus.*

Long. corp. lin. 11; lat. elytr. lin. $4\frac{1}{4}$.

Hab. in mus. D. Hope.

Caput sub lente tenuissime punctatum, clypeo e vertice vix separato, carinisque interocularibus obsoletis, oculi margine interno rotundato. *Antennæ* vix capite longiores articulis 6 apicalibus compressis subæqualibus. *Prothorax* quadratus lateribus ferè rectis et parallelis angulis anticis rotundatis, posticis vero acutis margine postico in medio paullò rotundato-producto; disco tenuissime punctato lineâ tenuissimâ punctorum medianâ. *Elytra* subparallela elongata, prothorace parùm latiora, singulis seriebus 8 punctorum profundè impressorum, striâque basali interruptâ punctatâ versus scutellum. *Pedes* breves simplices, tibiis ferè rectis.

NYCTOBATES ROTUNDICOLLIS. *Nyct. niger subopacus, capite pone oculos utrinque sulcato, thorace rotundato varioloso-punctato, elytris profundè punctato-striatis.*

Long. corp. lin. 7; lat. elytr. lin. $2\frac{3}{4}$.

Hab. in Sierrâ Leonâ. In mus. D. Hope et Waterhouse.

Caput punctatum, clypeo magno e vertice impressione curvatâ separato. *Oculi* majores, carinis interocularibus obsoletis, sulco utrinque ex angulo interno oculorum ad prothoracem ducto. *Antennæ* breves, articulis 6 ultimis majoribus subæqualibus subtriangularibus latis depressis ultimo majori. *Prothorax* rotundatus lateribus rotundatis, angulis posticis subobtusis, disco varioloso punctatissimo; margine postico magis marginato quàm laterali, et in medio parùm versus scutellum rotundato. *Elytra* lateribus ferè parallelis, angulis humeralibus rotundatis, singulo striis 9 punctorum profundè impressorum, striis 4 et 5, 3 et 6, 7 et 8, 2 et 9, ad apicem conjunctis. *Pedes* breves simplices, tibiis rectis, femoribus anticis crassioribus.

Genus NESIOTICUS.

Corpus breve rotundatum valdè gibbosum. *Caput* mediocre, breve margine antico (clypei) et lateribus (ante oculos) elevatis, vertice parùm concavo. *Labrum* breve transversum, angulis anticis rotundatis, ciliatum. *Mandibulæ* trigonæ crassæ, extus rotundatæ, intus sinuatæ, cavitate parvâ in medio. *Maxillæ* lobo externo majori, subarticulato, valdè setoso, interno setoso inermi. *Palpi maxillares* crassi, articulo ultimo maximo securiformi. *Mentum* oblongum, anticè paullò latius angulis anticis acutè productis. *Labrum* subquadratum angulis anticis rotundatis, setosum. *Palpi maxillares* breves articulo ultimo ovato, apice subtruncato. *Antennæ* prothorace ferè longitudine æquales articulo basali detecto, 3^{to} 4^{to} duplo longiori, hoc ad 10^{um} latitudine parùm crescentibus compressis, longitudine æqualibus, articulo 11^{mo} præcedenti parùm longiori subrotundato. *Prothorax* transversus, anticè angustior, lateribus subrotundatis, angulis posticis acutis. *Scutellum* triangulare. *Elytra* valdè convexa ovali-rotundata, thorace ferè duplo latiora. *Pedes* simplices longitudine ferè æquales, tibiis rectis, tarsis subtùs setosis, marginibus acutis. *Mesosternum* obtusum paullò porrectum. *Venter* 5-annulatus.

NESIOTICUS FLAVOPICTUS. *Nes. niger nitidus lævis, elytrorum humeris apicibusque signaturis flavo-notatis.*

Long. corp. lin. 8; lat. elytr. lin. 4½.

Hab. Gold Coast, Africæ tropicæ. In mus. Westw. comm. D. Raddon.

Niger nitidus lævis sub lente haud punctatus capite excepto. *Labrum* piceum. *Antennæ* nigrae articulo ultimo apice brunneo. *Vertex* tenuissime punctatus. *Thorax* lateribus tenuissime marginatis. *Elytra* valdè convexa nitida, singulo lineis 8 punctorum minorum impresso; fasciâ tenui transversâ flavâ versus basin ad suturam interruptâ, et cum strigâ marginali, alterâque mediâ longitudinali versus basin elytrorum extensâ connexâ; singulo elytro etiam versus apicem signaturâ tenui subtriangulari ejusdem coloris notato.

Genus OGCSOMA.

Corpus breve latissimum. *Caput* mediocre carinâ utrinque e margine antico et interno oculorum ferè ad basin mandibularum ductâ. *Antennæ* longitudine capitis et prothoracis, graciles, vix versus apicem crassiores, articulo 3^{to} longissimo, 4^{to} et reliquis sub-

æqualibus setosis. *Mandibula* crassæ, extus rotundatæ, apice subbifidæ, margine interno ferè recto. *Labrum* transversum emarginatum. *Mandibulæ* lobis duobus membranaceis ciliatis. *Palpi maxillares* articulo ultimo magno securiformi. *Mentum* obconicum basi truncatum et angustatum angulis anticis acutis, in medio longitudinaliter carinatum. *Labium* cordatum. *Palpi labiales* articulo ultimo majori ovali, apice acuminato. *Prothorax* latior quàm longus, convexus, lateribus in medio rotundato-angulatis, angulis anticis et posticis acutis. *Elytra* prothorace multo latiora, convexa, rotundata, interrupto-costata. *Pedes* mediocres graciles setigeri.

OGCOSOMA GRANULARE. *Ogc. nigrum sericeum prothorace punctis duobus rotundatis discoidalibus, elytris irregulariter et interrupto-costatis, antennis pedibusque cinereo-setosis.*

Long. corp. lin. 6; lat. elytr. lin. 4.

Hab. in Gambiâ. In mus. Westwood.

Caput et *thorax* nigra, sericea, (sc. sub lente) tuberculis minutissimis alterisque majoribus sparsis nitidis obsita; hoc lateribus sub medio angulato-rotundatis, marginatis. *Elytra* nigra et magis nitida, minutissime granulata, tuberculisque numerosis majoribus elongatis et irregularibus, costas duas in singulo elytro quodammodo formantibus; lateribus marginatis et deflexis latera abdominis cingentibus. *Pedes* sat breves graciles, tibiis posticis parùm curvatis.

GENUS MEGACANTHA.

Corpus robustum, crassum, convexus. *Caput* breve, punctatum, lateribus ante oculos elevato-tuberculatis. *Oculi* reniformes. *Labrum* transversum, angulis anticis rotundatis. *Mandibula* crassæ, apice parùm bidentatæ. *Maxilla* lobo interno membranaceo, externo magno valdè setigero. *Palpi maxillares* articulo ultimo securiformi. *Mentum* crateriforme. *Labium* cordatum. *Palpi labiales* breves, articulo ultimo crasso ovali, apice subtruncato. *Antennæ* sat longæ, articulo 3^{to} vix 4^{to} longiori, 7^{mo} cæteris parùm crassiori, hoc et reliquis præcedentibus paullò latioribus. *Prothorax* rotundatus anticè et posticè subtruncatus, capite multo latior. *Elytra* brevina oblongo-ovalia, thorace latiora, convexa, punctato-striata. *Pedes* satis elongati, femoribus anticis crassis ante apicem internè dente valido curvato armatis; tibiæ anticæ ante medium paullò extus curvatæ; intermediæ intus subserratæ; posticæ rectæ.

Fœmina differt capite et prothorace paullò minoribus, hoc minus rotundato, pedibus anticis brevioribus et gracilioribus, dente femorem anticorum multò minori, tibiisque anticis minus curvatis, tibiisque intermediis haud serrulatis.

MEGACANTHA TENEBROSA. *Meg. nigra subnitida punctata, elytris striato-punctatis, angulis humeralibus distinctis.*

Long. corp. lin. $9\frac{1}{2}$ - $10\frac{1}{2}$; lat. elytr. lin. $4\frac{3}{4}$.

Hab. Ashantee. In mus. D. Hope.

Caput nigrum punctatum, clypeus brevis vix e vertice separatus. *Oculi* intus subapproximati, lunulâ tenui lævi subnitidâ et subelevatâ interjectâ, tuberculi anteoculares magni, basin antennarum tegentes. *Prothorax* tenuè punctatissimus lateribus rotundatis, angulis anticis

acutis, posticis subacutis. *Elytra* sat profundè 8 striato-punctata; striaque alterâ valdè abbreviatâ versus scutellum; strii 4 et 5, 3 et 6, et 2 et 7, posticè conjunctis. *Pedes* et corpus infra nigra subnigra. An *Helops dentatus*, Fab.?

Mr. Reeve then communicated to the Meeting "Descriptions of four new species of bivalve shells by Mr. Hanley."

SOLENI ACUMINATUS. *Sol. testâ albidâ, epidermide tenui griseo-viridescente indutâ, elongatâ, latitudine longitudinem tripliciter superante; posticè rotundatâ; anticè acuminatâ extremitate rotundatâ; marginibus arcuatis, ventrali propè in medio incurvatâ; dentibus in utraque valvâ duobus, angustis, uno valdè minore.*

Long. $\frac{3}{4}$; lat. $2\frac{2}{5}$ poll.

Hab. in flumine Hoogley, Indiarum Orientalium.

This shell, which has been found in great abundance at the mouth of the river Hoogley, is somewhat allied to the *Solen acutidens* of Broderip; it is well distinguished by its anterior acumination.

PSAMMOBIA COSTATA. *Psam. testâ subellipticâ, anticè angulatâ; posticè breviorè angustatâ, extremitate rotundatâ; pallidâ, radiis angustis roseo-lividis ornatâ; transversim irregulariter costatâ, costis rudibus, planulatis, anticè subfurcatis; intus vel purpureâ, vel aureâ.*

Long. 1; lat. $1\frac{3}{4}$ poll.

Hab. ad oras Novæ Zealandiæ.

The coarse and somewhat prominent ribs render this shell easily distinguishable from the rest of the *Psammobia*.

CYTHÆREA EFFOSSA. *Cyth. testâ ovali-subcordiformi, subæquilaterali, crassâ, nitidâ, convexâ, transversim profundè sulcatâ; sulcis subremotis, interstitiis planulatis; albido-lividâ, lineis angularibus, saturatoribus, venulatâ; ano impresso, lanceolato; vulvâ effossâ lateribus candidis, fasciis spadiceis undulatis, transversim pictâ; disco interno purpureo, marginibus crenatis.*

Long. $\frac{2}{3}$; lat. $1\frac{1}{2}$ poll. Mus. Stainforth.

Hab. — ?

The very singular manner in which this and the following species are excavated on the anterior side forms their prominent and distinguishing characteristic.

CYTHÆREA EXCAVATA. *Cyth. testâ rotundato-ovatâ, subæquilaterali, posticè expansâ, anticè propter marginis ventralis obliquam curvationem angustatâ; crassâ, levi, nitidâ, depresso-convexâ, pallidè fulvâ, venis lividis angularibus, plus minusve distinctis, marmoratâ; ano lanceolato; vulvâ valdè excavatâ, lateribus planulatis, candidis, spadiceo leviter venulatis; disco interno roseo; marginibus tenuiter crenulatis.*

Long. 1; lat. $1\frac{1}{2}$ poll. Mus. Stainforth.

Hab. — ?

This shell resembles the preceding by its anterior excavation, but differs both in shape and in the absence of the transverse grooves.

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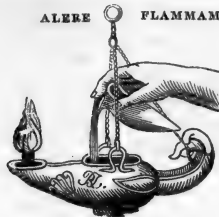
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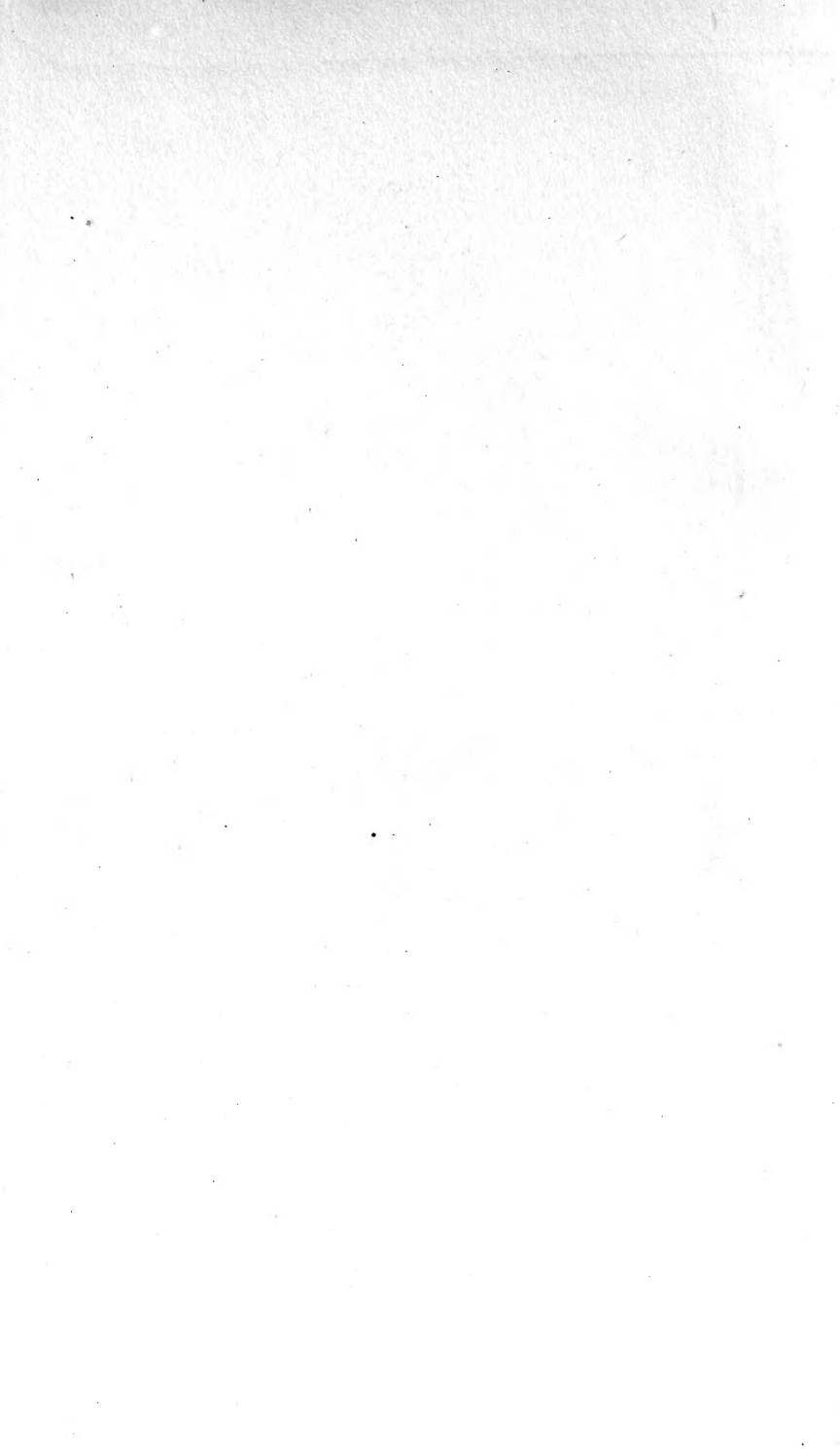
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