THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

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

CONDUCTED BY

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

ALERE FLAMMAM.

. . . . . . hîc obitus rerum contemplor et ortus,
  Et quibus è causis ordine cuncta fluant.
Et disco, quidquid medicos mare gignit ad usus,
  Quidquid et omnifero terra benigna sinu.
Sæpe juvat solem gelidâ vitare sub umbrâ,
  Multaque de plantis arboribusque loqui.

Quid varios pisces, et nata corallia ponto
  Eloquar, et conchis ostrea tecta suis?
Ille sed æquoreæ numerum subducat arenæ
  Qui volet undivagos enumerare greges.

P. LOTICHII Elegiarum lib. iii. eleg. 4,—lib. ii. eleg. 6.

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ERRATA.

P. 351, line 26 from top, *for* Robert Dairs *read* Robert Davis.
— 357, last line, foot note, *for* hood *read* head.

In the Meteorological Table for March (May Number), the average temperature observed at Sandwick Manse, Orkney, is stated to be 48·40 instead of 38·72.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

"................ per litora spargite muscum,
Naiades, et circùm vitreos considite fontes :
Pollice virgineo teneros hìc 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. 102. JULY 1845.

I.—*On some species of* Cuscuta. By Charles C. Babington, M.A., F.L.S., F.G.S. &c.*

[With a Plate.]

SINCE the paper upon *Cuscuta* (Ann. xiii. 246) was published, I have had an opportunity of examining recent specimens of *C. approximata*, and been favoured with a drawing of it (Pl. I. fig. 1.), and also of the flowers of *C. Epithymum* and *C. Trifolii* from the accurate hand of my friend Mr. J. W. Salter. I learn from these beautiful drawings and an examination of numerous specimens, that some slight alteration is necessary in the specific characters and descriptions of the plants, all however tending to show their distinctness in a clearer manner; and I trust that the difficulty inseparable from the examination of such inconspicuous objects, after the specimens have been dried, will be considered as a sufficient excuse for the inaccuracies which I am now endeavouring to correct.

In this paper I shall give revised specific characters for the three species above-mentioned, and append to each of them such observations as are requisite.

1. *C. Epithymum* (Murr.) ; florum glomerulis bracteatis sessilibus, *calyce campanulato* quam tubum corollæ breviori : segmentis ovatis, corona adpressa : *lobis* (squamis) *tubo corollæ cylindrico* subæquan-

* Read before the Botanical Society of Edinburgh, May 8, 1845.

tibus *apice rotundatis* fimbriatis *convergentibus basi approximatis*, stigmatibus *filiformibus*. (Pl. I. fig. 2.)

Calyx bell-shaped, thin, shorter than the tube of the corolla, usually tinged with red; segments broad, ovate-apiculate, longer than their tube. Tube of the corolla cylindrical, rather shorter than the ovate-acute spreading segments of the limb. Anthers roundish-oblong, without an apiculus, and even notched at the end. Corona closely adpressed to the tube of the corolla below; its processes (usually called "scales") nearly as long as the tube of the corolla, broad, rounded, fimbriated and converging at the end, scarcely narrowed below, separated from each other by deep narrow interspaces, which are not rounded at the bottom, and the membrane at that point is closely adpressed to the corolla. Occasionally, as in some specimens from Norfolk, the divisions between the processes disappear, and the corona becomes a deeply-lobed membrane, the lobes of which exactly resemble the upper parts of the usual processes, and are fringed almost to their base, the line of connexion between the corona and corolla remaining unaltered. In one instance this change had extended still further, and a rounded emarginate projection occupied the place of the usual division, having down its centre an appearance of being thickened: unfortunately this curious specimen has been lost during its transmission for the inspection of a friend. "Germen spherical." Stigmas simple.

The figures and descriptions of *C. Epithymum* differ so much from each other that I have considered it advisable to omit all synonyms, and give the authority for the name (Murray in Linn. Syst. Veg. ed. 13. 140) with considerable hesitation. The plant described above is probably that of Smith (Eng. Fl. ii. 25), although the figure in 'Eng. Bot.' (t. 55.) will admit of doubt. It seems also to agree sufficiently with the description given by Bertoloni (Fl. Ital. iii. 69); and is, I believe, identical with a specimen from the neighbourhood of Hamburg, kindly sent to me by Mr. W. Sonder of that city. It is worthy of remark, that in that specimen the anthers have an apiculus, and that I have never detected such a structure in British specimens.

The error committed in my former paper in describing the coronal processes as "spathulatis basi distantibus" may perhaps admit of some excuse when it is remarked that, if a specimen is softened in water, spread out and then allowed to become dry in that position, the processes shrink in such a manner as quite to agree with that description. It is hoped that the figure of the interior of the flower now given will enable botanists to ascertain the similarity or difference of their plants from that described by me, as it is the opinion of some botanists that there is still, notwithstanding the separation of *C. Trifolii* and *C. approximata*, more than one species included under the name of *C. Epithymum.* My plant inhabits heathy places, growing upon *Erica, Ulex, Sarothamnus,* &c.

2. *C. Trifolii* (Bab.); florum glomerulis bracteatis sessilibus, *calyce infundibuliformi* tubum corollæ subæquante: segmentis lanceolatis, *interstitiis coronæ saccatis: lobis dimidium tubi infundibuliformis corollæ subæquantibus* apice rotundatis fimbriatis convergentibus *basi distantibus,* stigmatibus filiformibus. (Plate I. fig. 3.)

C. Trifolii, *Bab. in Phytol.* (Feb. 1843), i. 467; *Ann. Nat. Hist.* xiii. 252; *Eng. Bot. Suppl. ined.* t. 2898.
C. Epithymum, *β.* trifolii, *Bab. Man. Brit. Bot.* 302.
C. minor, *β.* Trifolii, *Choisy in DeCand. Prod.* ix. 453.

Calyx funnel-shaped, rather thick, about as long as the tube of the corolla, cream-coloured, but occasionally tinged with red; segments lanceolate, about as long as their tube. Tube of the corolla rather irregularly funnel-shaped, about equal in length to the lanceolate-attenuate spreading segments of the limb. Anthers cordate-ovate with a minute apiculus. Corona with saccate interstices below; its processes about half as long as the tube of the corolla, narrow, rounded, fimbriated and converging at the end, narrowed below, separated from each other by broad interspaces rounded at the bottom. Between each process the membrane projects towards the centre of the flower so as to form a cup-like space between it and the corolla. Germen truncate, narrowed below, elevated upon a longish stalk. Styles filiform, seated upon small sunken tubercles. Stigmas simple.

A comparison of the above description and character with those which precede them will, I think, prove conclusively that *C. Trifolii* is a really distinct species from *C. Epithymum.* It can scarcely be necessary to call attention to the saccate corona and the difference in the proportions and shape of the other parts of the flower.

The natural place for this plant is upon clover (*Trifolium pratense*), but it can live upon many other herbaceous plants.

3. *C. approximata* (Bab.); florum glomerulis bracteatis sessilibus, *calyce campanulato carnoso* quam tubum corollæ paulo breviori: *segmentis latis* truncatis apiculatisque vel rhomboidalibus, corona adpressa: *lobis latis adpressis tubo corollæ cylindrico* paululum brevioribus *bifidis segmentis divergentibus* apice fimbriatis *basi approximatis,* stigmatibus filiformibus. (Plate I. fig. 1.)

C. approximata, *Bab. in Ann. Nat. Hist.* (April 1844), xiii. 253.

Calyx bell-shaped, fleshy, rather shorter than the tube of the corolla, green, tinged with purple at the edge; segments broad, transverse, truncate and apiculate or rhomboidal, usually shorter than their tube. Tube of the corolla cylindrical, longer than the triangular-ovate bluntly-pointed spreading segments of the limb. Anthers cordate-ovate, apiculate. Corona closely adpressed to the corolla; its processes rather shorter than the tube of the corolla, broad, adpressed, deeply notched: the lobes diverging, truncate and fimbriated; separated by narrow linear interspaces, which occasionally extend almost to the base of the corolla, but usually the corona is continuous throughout half its length. The form of the summit of the coronal processes will be seen to vary considerably, but always retains a general outline very different from that of any other species with which I am acquainted. Germen roundish. Styles seated upon elevated prominent tubercles. Stigmas simple.

Introduced from the East Indies with the seed of *Melilotus officinalis*, upon which plant it preys.

EXPLANATION OF PLATE I.

Fig. 1. *Cuscuta approximata*, Bab.
- *a*. The growing plant.
- *b*. Clusters of flowers.
- *c*. The calyx with an unopened corolla. Magnified.
- *d*. An expanded flower. Magnified.
- *e*. The corolla greatly magnified and laid open in order to show the structure and proportions of the corona.
- *e'*. Slightly different forms of the corona observed in other specimens.
- *f*. The germen.

Fig. 2. *Cuscuta Epithymum*, Murr.
- *c*, *d*, & *e*. The calyx, expanded flower, and the corolla laid open, showing the corona.

Fig. 3. *Cuscuta Trifolii*, Bab.
- *c*, *d*, *e* & *f*. The same parts as before.

II.—*Miscellanea Zoologica*. By George Johnston, M.D., Fellow of the Royal College of Surgeons of Edinburgh.

[Continued from vol. xv. p. 148.]

[With a Plate.]

Class Annelides. Order Errantes. Family Nereides.

Section Nereides non-tentaculatæ.

No tentacular cirri: the antennæ rudimentary.

Genus Pollicita*, *Johnston*.

Char. *Body* serpentiform: *head* rather indistinct, with three small frontal antennæ: *eyes* four: *proboscis* large, without jaws,

* This worm has been already published under the name of *Bebryce Peripatus* (Thompson's Rep. on the Fauna of Ireland, p. 273), but, having discovered that the generic name has been used by Philippi, I am under the necessity of changing it.

the orifice naked: *segments* numerous: *branchiæ* in the form of a globular tubercle over each foot, which is uniramous; the *bristles* simple: *tail* truncate, without styles.

Obs. The relations of this genus are rather obscure. To *Nephtys* and *Glycera* it may be considered to approximate in the rudimentary state of the antennæ, but in all other respects there is too great a dissimilarity to allow us to consider them as very nearly affined. The branchial tubercles over the feet might suggest a comparison with *Phyllodoce*, but there is no structural resemblance; the lamellæ in *Phyllodoce* being merely modifications of the superior cirrus, moveable and jointed at the base, and acting as a kind of oar in the animal's locomotion, while in *Pollicita* they are branchial only, being immoveable, and of no use or applicability as locomotive organs. The difference in internal structure is equally great, for in the one genus the organ is veined with the ramifications of the blood-vessels, while in this it is very distinctly areolar. I have seen one species only, which may be named—

1. *P. Peripatus.* Plate II. fig. 1—6.

Hab. In deep water amid corallines, &c. Berwick bay.

I have seen several Irish specimens in the collections of Mr. W. Thompson of Belfast.

Desc. Worm about 2 inches long, very slender, narrowed towards both extremities, almost cylindrical, of the usual yellowish-brown colour, roughish: *head* small, indistinctly separated from the following segment, longer than broad, rounded in front, where there are three unjointed *antennæ*, the medial nearly as long as the lateral; on the sides of the head there are besides a few minute fleshy papillæ, and the feet advance on each side rather before the eyes, which are placed unusually backwards: *eyes* small, four, the anterior pair most approximate: *mouth* inferior: *proboscis* exsertile, large, smooth, emandibulate, the orifice plain: *segments* numerous, about the length of their own diameter, each of them furnished with a globose lamella or branchial tubercle on each side placed over and above the foot, immoveable, unjointed, smooth, with a small papillary tip: *feet* about sixty pairs, one pair to every segment, conoid, uniramous, papillary, not projecting beyond the branchiæ when at rest, but capable of being protruded beyond them, armed with four or five bristles and a spine; the *bristles* simple, sharp, curved like a hedge-knife, altogether retractile: the *skin* is covered with minute papillæ or granules, only visible under a high magnifier: *anal segment* truncate, without styles, but on each side there is a mammillary foot, which is larger than the penultimate, and, like it, appears to be destitute of bristles.

The specific name attached to this worm was suggested by the resemblance it has to the *Peripatus juliformis* of the Rev. L. Guilding (Zool. Journ. vol. ii. pl. 14). It is slow in its motions. In some positions what appeared to be a minute antenna was visible on the top of the head, and such as our figure represents it, but of its real nature I could not satisfy myself, and the appearance may have been produced by a mere fold, or possibly by some refraction of the light. The areolated structure of the branchiæ seems to be peculiar; and a foot bristled with papillæ is a very rare formation among the *Annelides Errantes*.

Plate II. fig. 1. *Pollicita Peripatus* of the natural size. Fig. 2. The same highly magnified. Fig. 3. The anterior portion of the body from below, to show the situation of the mouth and proboscis. Fig. 4. A few segments from nearly the middle of the body. Fig. 5. A single foot and branchiæ to show their structure. Fig. 6. Three of the branchial globes separate from the feet.

The figures were taken from a specimen that was only eight lines in length. The larger specimens were from the Irish coast.

Family Eunicæ.

Onuphis tubicola.

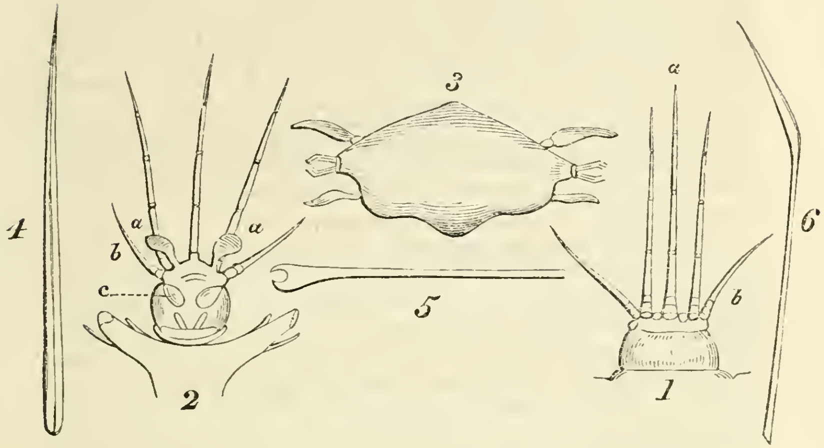
Nereis tubicola, *Müll. Zool. Dan. Prod.* 2625. *Zool. Dan.* i. 18. *tab.* 18. *fig.* 1—6. *Turt. Gmel.* iv. 87. *Aud. and M. Edw. Litt. de la France,* ii. 154.

I am indebted to Mr. C. W. Peach for my specimen of this worm It has lost the posterior half of the body, but what remains is in excellent preservation, and will enable us to supply some deficiencies in the figures and description of Müller, which are very good so far as they go.

The shape of the body is similar to the *Nereis,* and composed of numerous homologous segments; it is somewhat compressed, but convex or rounded on both dorsal and ventral surfaces, which are smooth and polished. The colour appears to have been a uniform yellowish-brown.

The *cephalic segment* (for it can scarcely be recognised as a head) is very narrow, even behind, but tri-sinuated in front, and in each sinus there originates a long awl-shaped *tentaculum* (woodcut, fig. 1 *a*), the three being of nearly equal length. They are smooth but annulated, the three basal joints very distinct and short, the others less distinct, elongate, and rather irregular. At the base of the tentacula are the *eyes,* which appear to be four in number, but they are so obscurely marked that the two outer ones may possibly be only dark spots. Underneath the tentacula and partly concealed by them are the *antennæ* (fig. 2 *a a*), which are minute organs reminding us of the antennæ of some beetles, having a short moveable pedicle with a clavate head. They arise from the rounded front margin.

The *mouth* is inferior, and so concealed that it can be seen only from the ventral aspect. The wide undefined orifice is surrounded by a thick *lip*, the upper lip being formed of two comparatively large egg-shaped tubercles (fig. 2 *c*); and within the under lip there are two processes like palpi. From the external side of the



anterior tubercles there arises, on each side, a *tentacular cirrus* (figs. 1, 2 *b*), similar to the tentacula in all respects, and projected in the same direction, but only one-third of their length.

The *proboscis* is armed with several small dark corneous jaws, denticulated on the inner side, and arranged in two rows, in the same way as in the genus *Eunice*. See Aud. and Edw. Litt. de la France, pl. 3. fig. 11.

The *occipital segment* has no appendages. The segment behind is nearly of the same size, but those which follow are narrower, the length being about one-third of the transverse diameter. Above and below the foot there is a *cirrus* (fig. 3). On the anterior segments the superior cirrus does not project beyond the foot, but it becomes considerably longer on the posterior, and is simple on all of them, with a joint at the base. The *foot* is formed of a tubercle and sheath, armed with bristles collected into two fascicles. Each fascicle is furnished with a *spine* (fig. 4), with two *forceps* (fig. 5), and with many lanceolate *bristles* curved at the points (fig. 6) and very sharp, with a double edge at the point of curvature. I have not before met with a worm furnished with forceps-like bristles; and none of the kind are figured by Audouin and Edwards.

The worm lives in a tube which has a singularly exact resemblance to the barrel of a dressed quill. It is about three inches in length; and the superior portion is thinner than the lower, which is very tough and not easily cut with a knife. I made a vain attempt to form it into a pen.

Let us see if, in its curious structure, we can find a key to the habits of the animal. We learn from Müller that it lives in soft mud, and one unceasing object of its life is the capture of prey. For this end it must protrude the anterior portion of the body beyond its tube, and raise it above the surface of the mud, and in this position remain on watch. To enable the worm to do this with ease, is, I conjecture, the office of the forceps-like bristles of the feet: with their ends it may hook itself to the rim of the tube, and thus support itself extended without the waste of muscular power. A long watch is thus rendered less irksome, while at the same time its capacity to seize upon a passing prey is increased.

The prey caught, analogy leads us to believe that the worm will instantly retreat and sink within its tube, where it can feed without disturbance or fear. But as the entry and passage are narrow and unyielding, it seems to follow that the prey should be held by the mouth alone when in the act of being dragged within the tube, and hence surely the reason that the mouth has been furnished with the hard tubercles to the lips; for, when contracted, they must give a firmer gripe and hold than could otherwise be taken.

The use of the tube is to protect the body from the pressure of the soft mud in which it stands immersed. When the tube is overset or cast out by the waves or accident, the worm leaves it, and becomes, in its turn, exposed to enemies. To protect itself from these while a new tube is being secreted, nature has amply furnished the *Onuphis* with a series of bristling lances on each side. These arms are of exquisite make, very fine and very sharp; and those of the upper bundle have their points bent and inclined towards those of the lower bundle, which are likewise bent to meet them. Do examine a foot under the microscope, and I defy you not to admire them: and your wonder will increase when you consider that a complex mechanism is also provided by which these polished instruments can be drawn within their sheaths, and pushed forwards and beyond at will. I can easily suppose that the wounds they inflict upon the tiny assailants of the *Onuphis* are severe and painful; but worms are too retentive of life to permit us to believe that the repulsed foe ever dies of them.

Family Aphroditaceæ.

Genus Spinther, *Johnston.*

Char. Body oval, exannulate, scaleless, acephalous; antennæ

——— ?; eyes none; proboscis emaxillary: feet very numerous, all alike, uniramous, and all furnished with an inferior cirrus.

1. *Spinther oniscoides.* Plate II. fig. 7.

"Dredged off Castle Chichester (Belfast Bay) Aug. 26, 1844, in 6—10 fathoms, Mr. Hyndman," *W. Thompson.*

Desc. Body ovate, convex dorsally, flat on the ventral surface, of a uniform cream-yellow colour, rounded and obtuse at both extremities, which are so much alike, that, without a close examination, the anterior is not to be distinguished from the posterior. There is no head, tentacula nor tentacular cirri. With a common magnifier we perceive that the back is crossed by numerous (about thirty) narrow roughish edges (fig. 8), the roughness being produced by a series of minute bristles which scarcely protrude beyond the skin: the ridges are regular and equidistant, and are continuous with the feet on each side. The *feet* form a close-set range round the body, interrupted only in front by a very narrow fissure in which the mouth is situated. They are all alike, short and equal, formed of a single thick stump armed with a bundle of bristles (fig. 10) that project very little beyond the margin, and are all glued together by a sort of albuminous membrane. There did not seem to be any cirrus above the foot, but at the root of each of them underneath there is a *cirrus* shorter than the foot itself, and with a large bulb at the base (fig. 11). The *bristles* are of three kinds: viz. (1.), the spinous (fig. 12), sharp and fashioned like a needle; (2.), the forked (fig. 13), which are filiform with a bulbous root, and cut into two scarcely equal prongs at the apex; and (3.), the clawed (fig. 14), a bristle which has a stem slightly incrassated upwards, where a strong curved and sharp claw is articulated by an oblique joint. The forked bristles are the most numerous; and I did not observe more than one clawed bristle in each foot, but there were two or three from which the claw appeared to have been broken away. There are no anal styles.

For the only specimen of this singular worm that I have seen, I am indebted to Wm. Thompson, Esq. of Belfast. It is half an inch in length, with a breadth fully one half of the long diameter. It has at first glance more resemblance to a *Doris* than to any Annelide; and when it was placed under a common magnifier, it was compared, aptly enough, to the *Cypræa europæa*, the comparison being suggested by the similarity in the ridges that cross the back.

The description, I am aware, is in several respects imperfect, but from the distinctness of the worm as a species, it is assuredly sufficient for its future recognition. Observations on living individuals seem necessary to ascertain the number and nature of the oral appendages. That it is a member of the *Aphroditaceæ* no one can doubt, although it possesses few of the technical characters by which that family has been hitherto defined. It has no near ally in the family. In common with the *Palmyre,* the back is naked or destitute of scales; but there is nothing else in which the two genera agree.

Plate II. fig. 7. *Spinther oniscoides* of the natural size. Fig. 8. The dorsal aspect viewed through a common magnifier. Fig. 9. A view of the ventral surface. Fig. 10. Two feet detached and viewed from the back. Fig. 11. A foot as seen from below. Figs. 12, 13, 14. The bristles.

[To be continued.]

III.—*On the British* Desmidieæ. By John Ralfs, Esq., M.R.C.S., Penzance*.

[With a Plate.]

Didymoprium, *Kütz.*

Filaments elongated, gelatinous, fragile, cylindrical or subcylindrical, with a bidentate process or angle on each side of the joints.

The filaments are elongated, simple, jointed, gelatinous and very fragile, and finally separate into single joints; each joint has two opposite, bidentate angles or processes. Hence the margins of the filaments are crenate, and as it is regularly twisted it not only appears of unequal breadth, but the form of its joints also varies as more or less of the angles is seen at the margin; in short, as they are at one time fully visible and at length entirely disappear.

For synonyms, habitats, and description of the species, I must refer to my former article on *Desmidium.*

1. *D. cylindricum,* Ktz. Filaments subcompressed, inclosed in a distinct mucous sheath; joints broad as long. Kütz. Phy. Gen. p. 165. *Desmidium cylindricum,* Annals of Nat. Hist. vol. xi. p. 373. pl. 8. fig. 1; Menegh. *l. c.* p. 204.

Plate III. fig. 4. *Didymoprium cylindricum,* joint dividing into two.

2. *D. Borreri.* Filaments cylindrical, not inclosed in a sheath; joints inflated, twice as long as broad. *Desmidium Borreri,* Annals of Nat. Hist. vol. xi. p. 375. pl. 8. fig. 4.

Additional habitats. Ashdown Forest and near Battle, Sussex, *Mr. Jenner*; Ireland, *Mr. Andrews.*

Plate III. fig. 5. *Didymoprium Borreri,* joints dividing.

Glæoprium, *Berk.* (*in lit.*)

Filaments elongated, simple, cylindrical, very gelatinous; joints

* Read before the Botanical Society of Edinburgh, July 11, 1844.

with either a slight constriction which produces a crenate appearance, or a grooved rim at one end which forms a bifid projection on each side.

The filaments are cylindrical, simple, jointed, invested with a broad gelatinous sheath, and very fragile in one species, but not so in the other. Either a groove passes round each joint, giving a crenate appearance to the margins of the filament, and dividing the endochrome into two portions, or else a grooved rim at one extremity of the joint appears on each side like a bifid process.

A transverse view shows a radiate endochrome in one species, but in the other I was unable to obtain this view on account of its want of fragility.

The cylindrical filaments distinguish this genus from *Desmidium* and *Sphærozosma*. From *Didymoprium* it differs in the absence of angular projections, in not being twisted, and in always having the same apparent breadth.

1. *G. dissiliens*. Filaments fragile, crenate; a shallow groove round each joint divides the endochrome into two portions. *Desmidium mucosum*, Breb. Alg. Fal. p. 65. pl. 11; Menegh. Synop. Desmid. in Linnæa 1840, p. 204; Ralfs in Annals of Nat. Hist. vol. xi. p. 374. pl. 8. fig. 2.

This plant is apparently common, as, in addition to the habitats already given, Mr. Jenner has gathered it in numerous stations both in Sussex and in Kent. It has also been gathered in Ireland, near Bandon, by Dr. Allman, and in Kerry by Mr. Andrews.

In an advanced state it becomes of a pale opake green.

The mucous sheath is easily perceived, and is on each side of the filament as broad as the central coloured portion. The endochrome is divided into two portions by the central constriction, which can always be detected on a careful examination with the higher powers of the microscope.

This plant has been involved in much confusion; it was by mistake figured in 'Eng. Bot.' for the *Conferva dissiliens* of Dillwyn, and afterwards altogether omitted in Hooker's 'Br. Flora' and in Harvey's 'Manual of the British Algæ.' From the synonyms in Meneghini's 'Synopsis Desmidiearum,' it seems that De Brébisson considered it the *Conferva mucosa* of Mertens and Dillwyn.

2. *G. mucosum*. Filaments scarcely fragile; joints not constricted, but having at one of the ends a minute bidentate projection on each margin, the adjoining end of the next joint bearing similar projections. *Conf. mucosa*, Mert.; Dillw. Brit. Conf. tab. B.; Hook. Br. Fl. vol. xi. p. 351; Harv. Br. Alg. p. 127. *Gloeotila moniliformis*, Kütz. Phyc. Generalis, p. 245?

In shallow pools and gently-flowing streams, probably not uncommon. Most plentiful in the autumn. Bantry, *Miss Hutchins*; Appin, *Capt. Carmichael.* Trentishoe, Devonshire; Penzance and Dolgelley, *J. R.*; Cheshunt, *Mr. Hassall*; Chiltington Common near Pulborough, Sussex; and in the peat bog at Fisher's Castle near Tunbridge Wells, *Mr. Jenner*.

Filaments elongated, very gelatinous, of a pale translucent green, not fragile. Under the microscope the joints are generally about equal in length and breadth, and the endochrome forms a single irregular patch. The joints are not constricted, but at one end they have on each margin a minute bidentate projection: as the similar ones of the next joint are at its adjoining extremity, these projections occur only near the alternate dissepiments. When, however, the joint is elongated, preparatory to the formation of two joints, the endochrome is divided into two portions, and then these processes are present at both ends, the next joint undergoing a similar change. These projections are extremely minute, and can only be detected by employing the highest power of the microscope, and even then are liable to be overlooked if not carefully sought for.

I examined many specimens of this plant in 1841, but did not perceive these curious projections until the following year. I believe they are really formed by a grooved rim round the end of the joint, because however the filament may be moved they are equally apparent; whereas if they were processes, as in *Didymoprium,* they would be sometimes either entirely concealed or rendered less apparent.

The filaments have a very broad mucous sheath, which from its great breadth and absence of colour is not easily discerned; it is more evident when a specimen is dried on talc or glass, as the margins are then generally perceptible. When gathered the filaments are very distinct, frequently parallel and subdistant even to the naked eye: this depends on the great breadth of their mucous sheaths, which prevent the coloured filaments coming into contact. By this character *G. mucosum* may in general be known even without the aid of a microscope. The same circumstance occurs in young plants of *G. dissiliens,* but is less remarkable, as its mucous sheath is not more than half as broad.

Under a low power of the microscope *G. mucosum* has considerable resemblance to *G. dissiliens,* with which it is probably not unfrequently confounded. But they may always be distinguished even without the aid of the microscope. The *G. dissiliens* is extremely fragile, and will break into pieces if a small portion be placed on the hand and the finger gently passed over it; this plant, on the contrary, will not break if it be taken out of the water and allowed to hang down in long strings. It always has a clear translucent appearance; the *G. dissiliens,* except when very young, is of an opake green. The latter if kept in water for a few days spontaneously separates into fragments; *G. mucosum,* although treated in the same manner for weeks, has not separated into fragments sufficiently small to enable me to obtain a transverse view. I am therefore unable to say whether the endochrome in that aspect appears stellate, as in *G. dissiliens.*

Under the microscope *G. mucosum* may be known by the joints not appearing crenate and by the endochrome being in a single patch, or if divided, the joints are longer than in *G. dissiliens.* Its mucous sheath is with difficulty detected, and when seen will be found to extend on each side twice the breadth of the coloured filament; whereas in *G. dissiliens* the mucous sheath is, except in old specimens, detected without difficulty.

This is a remarkable plant, and differs in many respects from the other *Desmidieæ;* indeed so much so, that I had some doubts whether it would be correctly placed in this family; but as the Rev. M. J. Berkeley, as well as every other algological friend whose opinion I solicited, considers that its place must be in the same genus with the preceding species, I have described it here.

The joints seem to be in pairs, and a single one is consequently unsymmetrical.

G. mucosum agrees with the other *Desmidieæ* in its capability of being kept a long time without undergoing decomposition.

I was indebted to Mr. Hassall for the information that the plant under consideration was the *Conferva mucosa,* Dillw., as also for an opportunity of examining a foreign specimen under that name from the herbarium of Dr. Greville.

I have since been able to compare our plant with a portion of an Irish specimen of *Conferva mucosa* presented to me by Mr. Borrer, who received it from Sir W. J. Hooker. From the latter I learn that this was an original specimen from Miss Hutchins. Sir W. J. Hooker has also presented me with an Appin specimen collected by Capt. Carmichael. All these are identical with the present plant.

PLATE III. fig. 6. *Glæoprium mucosum* : *a,* portion of a filament much magnified to show the bifid projections; *b,* less magnified to show the breadth of the sheath.

SPHÆROZOSMA, *Corda.*

Filaments gelatinous, plane, fragile; joints closely united by means of glandular processes, and deeply divided on each side, thus forming two segments and giving a pinnatifid appearance to the filament.

The filaments are pale green, gelatinous, simple, plane, have a pinnatifid appearance from the division of the joints into two segments, are fragile, and finally separate into single joints. I have not observed that the filaments are twisted, as in *Desmidium* and *Didymoprium*. At the junction of the joints there are on each margin one or two minute glands or processes which are scarcely discernible in the front view, and do not interfere with the close junction of the joints. The transverse view is linear or oblong, and the processes, one or two at each side, are much more evident than in the front view.

This genus differs from *Desmidium*, *Didymoprium* and *Glæoprium* in its flat filaments (which are not twisted), in the deep division of the joints into segments, and especially in the presence of the minute gland-like processes at the junction of the joints. From the *Odontella* of Ehrenberg it may be known by the joints being united along their entire breadth, whereas in *Odontella* they are connected only by the elongated angles which inclose a small vacant space between them.

On account of its deeply constricted joints, this genus forms a connecting link between the three preceding genera and *Staurastrum*.

In *Sphærozosma*, as in the other genera with deeply constricted cells, the segments are frequently unequal during the growth of the plant, and they become in like manner equal when it approaches maturity and its joints no longer divide.

1. *S. unidentata*. Joints as broad as long, divided into two segments by a linear notch on each side; junction-glands stalked, oblique, solitary at the centre of each margin. *Odontella unidentata*, Ehr. Infus. p. 159; Pritch. Infus. p. 191. *Desmidium compressum*, Annals of Nat. Hist. vol. ix. p. 253. *Isthmia vertebrata*, Menegh. *l. c.* p. 205?

This plant has been gathered at Rotherfield and near Tunbridge Wells by Mr. Jenner since the publication of my former notice of it. I then considered it an undescribed species of *Desmidium*. I have since been favoured by Mr. Berkeley with the following extract from Ehrenberg's observations on the *Odontella unidentata*:—"This species is surprising by reason of its evolution. There are always two great and two small joints alternately turned to one another, and the processes are found alternately between the small and large joints. This reminds one of *Scenedesmus convergens* and the *Euastra*." This extract leaves no doubt that Ehrenberg's *Odontella unidentata* is identical with the plant I described under the name of *Desmidium compressum*. He correctly points out the affinity between the joints in this plant and the frond in *Euastrum*. As in both genera he considers the segments of the cell to be distinct joints, he has described the process or junction-gland in the present plant as occurring at every alternate dissepiment. But his description of the alternate occurrence of two small and two large segments is incorrect, for although the smaller segments are necessarily in pairs, being formed during the elongation and bisection of the cells, I have never seen all the joints thus dividing at the same time, which must always happen if his statement be correct; on the contrary, many joints with equal segments will often succeed each other, here and there followed by the unequal segments, as I have described above. When the reproductive granules are perfected and the filament of the mature plant ceases to elongate, all the joints will be found similar and their segments equal.

In my former notice of this plant I described it as destitute of a mucous sheath; I have not gathered it since; but on further consideration I believe that the sheath exists, although I failed to detect it. The reason for coming to this conclusion is, that the filaments when gathered were remarkably distinct and parallel, exactly as those in *Glœoprium mucosum*; I have no doubt that in both this appearance is an effect of the same cause, and that broad colourless sheaths separate the coloured filaments. I suppose therefore its tenuity, want of colour and great breadth prevented its observation.

PLATE III. fig. 7. *Sphærozosma unidentata*: *a*, portions of filaments; *b*, front view of an empty joint; *c*, joint with one of its segments newly formed; *d*, transverse view.

2. *S. excavata.* Joints longer than broad, with a deep excavation on each side, and two sessile glands on each margin at their junction.

Pools, Dolgelley and Penzance, *J. R.*; Cross-in-Hand, and Ashdown Forest, Sussex, and bogs at Fisher's Castle, Kent, *Mr. Jenner.*

Very minute, seldom more than twenty joints in the filament, which is fragile, and finally separates into single joints; at their junction, in the front view, are two minute processes or glands invisible before the escape of the endochrome, and situated one near each angle. The joints are from one and a half time to twice as long as broad, much constricted in the middle; the constriction is like an excavation or broad sinus on each side, so that the margins of the filament appear sinuated. The transverse view is oblong with four sessile minute glands, two on each side and situated near their ends.

The endochrome is pale bluish green with minute scattered granules.

PLATE III. fig. 8. *Sphærozosma excavata*: *a*, portion of a filament; *b*, front view of an empty joint; *c*, transverse view.

IV.—*On the Colours of Leaves and Petals.* By William E. C. Nourse, M.R.C.S.

The colours of leaves and petals depend on several conditions; some mechanical or structural, and some chemical. The latter have been made the subject of many investigations. The former, though requiring little more than common observation, have been passed over, or but slightly noticed. It is to a clearer knowledge of these that the present paper, so far as it goes, is intended to contribute.

The structural or mechanical circumstances which influence the colours are, 1st, the situation of the coloured cells; 2nd, their size, form and number; 3rd, their mixture with each other; and 4th, their degree of visibility.

1. The situation of the coloured cells is different in leaves and petals, though their general structure is anatomically similar. If a leaf be torn, the green colour appears to be in the central substance; while in a petal the centre is nearly white, and the colour peels off with the cuticle. This difference merits a degree of attention which has not hitherto been paid to it.

The structural parts of a leaf or petal are, the *substance,* consisting of cellular tissue and venous ramifications; the *cuticle,* or epidermis; and a layer of cells immediately beneath the cuticle, to which we may give the provisional name of *Rete.*

This latter structure is seldom mechanically distinct, but is either continuous with the substance, as in leaves, or adherent to the cuticle, as in petals; though it can sometimes be shown in a separate form in petals of a large size. Its characters, however, effectually distinguish it from the other structures. It is the densest parenchyma of the organ, consisting of an immense number of nearly circular cells without any interstices. But the circumstance which makes it most conspicuous is, that it is the seat of colouring matters which are scarcely found in the other structures. The rete thus appears entitled to be considered as a distinct tissue, and may be found to perform important functions, especially in the petals, in which its development is most distinct.

The colours of the rete possess an almost endless variety, and, in fact, it is in this structure that the most highly coloured cells are always found. Of petals, it contains the entire colouring; the yellow, red, blue, brown, black, and all the intermediate tints are wholly produced in its cells, and can be completely removed by simply stripping it off with the cuticle. This can be easily done with any common flower. In leaves the rete is the seat of all the modifications of the green colour which those organs present, excepting variegation, cuticular changes, and what may be called venous colours, like red cabbage, &c. All dark shades of green are the effect of an immense crowding together of green cells in the rete, as may be readily seen in the yew, the bay, the holly, &c.; and all those lesser variations and shades, such as brownish and reddish, and a number of others, which add so much to the beauty of each leaf and to the picturesque effect of the whole, are due (with the above exceptions) to the different colours of the cells in the rete. Of this kind are the shadings in the leaf of the common wild ivy; the reddish tips and edges of rose- and peony-leaves, the purple of the cornel and cineraria, and many similar appearances.

The colours of the substance, on the contrary, are marked by their want of intensity and by their extreme simplicity. Few coloured cells are found in this structure. In petals it is either white or lightish, or some faint shade of the general colour of the flower. It requires some care to show this in small specimens; but in large ones, such as garden poppies or peonies, the cuticle and rete can be easily peeled off on both sides, and the colourless substance shown in a distinct form, having the exact shape of the petal.

The substance in leaves is always green, except in the light parts of variegated leaves, or in leaves of unusual thickness, like the aloe. With these exceptions, there is but little difference in the shade of green between the substance of one leaf and that of another, taking them, of course, in a state of health and maturity. Thus, in the holly and ivy, the substance is very little darker than it is in the beech or laurel. In a great number of leaves the difference of shade is not perceptible; and even in the holm-oak, remarkable for its gloomy foliage, the green of the substance is not by any means so dark as might be imagined.

It will thus be seen that the coloured cells both in leaves and petals are chiefly placed in the rete. A few are occasionally found in the substance of petals, and a certain number in that of leaves; but not in general sufficient to determine the outward colour.

2. The size, form and number of the coloured cells always vary with the intensity of the general colour of the structure. When the colour is very deep the cells are small, roundish, and densely packed together in immense numbers. This is their appearance in the rete. If the colour is lighter the cells are larger, more elongated, and less closely packed together, as they are seen in the substance of leaves, and of those petals which are somewhat coloured throughout; and where there is little or no colour, as in the substance of the greater number of petals, the cells are generally large and oblong, often muriform, and with distinct intercellular passages.

In white flowers, the cells which contain opake white matter are always rounder and more thickly packed together than the empty cells.

3. Tints may be produced by the mere mechanical mixture of the coloured cells. In these cases no union of the colours takes place, but they remain distinct in their separate cells, side by side. When the cells are mixed with regularity, a uniform tint results; but when the colours are more or less massed together, variegation or marking is the consequence. Coloured cells sometimes lie over one another, causing a new tint by one layer being seen through the other.

The leaf of the *Pelargonium zonale* is well-known for its peculiar dark stain. This is entirely in the rete, for the substance of the leaf is pure green. The rete however, viewed carefully in various sections beneath the microscope, appears to consist, not of dark cells, but of distinct red and green ones, very minute, densely packed together and intermingled; and it is by this juxtaposition of the red and green, and by the green cells of the substance being partially visible through it, that the effect of a dark tint seems to be caused. The leaf of the variegated elder presents an appearance of similar origin. Some parts of the leaf are of a decided green, and some almost white; but there are also patches of a sort of imperfect green, paler, and somewhat glaucous. The substance in these parts is not less green than in the darkest parts of the leaf, as may be seen by looking at the under surface; but the rete, instead of containing dark green cells, consists of a thin layer of white ones; and these, with the cuticle, to which they are adherent, by lying over the green substance, produce the glaucous appearance.

4. The cuticle in this instance contributes to the effect. This structure has not yet been mentioned, because coloured cells are never found in it; and it merely modifies the appearances of colours by regulating the visibility of the coloured cells. This is so obvious, that it only needs to be referred to, as well as the effects of the cuticular appendages.

In most petals the cuticle is extremely delicate; often consisting of the finest web, impossible to be detached, and only to be seen occasionally at the carefully torn edges of a flower. It is somewhat thicker in large petals, and can then be raised and torn off in shreds. Of course, in these instances, it is perfectly transparent, and permits the colours to be seen through it in the most distinct manner.

Such are the structural circumstances relating to the colours of leaves and petals. Simple as they are, and easily observed, they required to be stated, to receive their proper share of attention. The chief points about them are, the anatomical differences between leaves and petals in the situation of the colours; and the location of the colours of the petals in the rete, a fact hitherto unnoticed, and one which may hereafter throw light on some interesting points of vegetable physiology.

Reference was made to another kind of colours, also found in the leaves and petals. These, with their peculiarities, which may prove not devoid of practical interest, together with some other matters connected with the subject or suggested by it, remain to be brought forward at some future time.

London, June 9, 1845.

V.—*Descriptions of Coleopterous Insects collected by* Charles Darwin, Esq., *in the Galapagos Islands.* By George R. Waterhouse, Esq.

The insects here described are nearly all of small size, and none of them display any brilliant colouring. Some of the species are referable to a little group found in Chile and Peru,—the genus *Ammophorus,* a genus hitherto only found in those parts; others appertain to a genus (*Anchonus*) which is almost confined to the West Indian islands and the northern parts of South America. Again, in the collection under consideration are species of genera which are found all over the world or nearly so, such as *Feronia, Notaphus* and *Oryctes**; and, lastly, there are species

* It is from genera like these, which have a very wide geographical range, that the minor, local groups appear as it were to radiate. Those genera which are confined to comparatively limited districts, often containing but few species, and also often presenting very remarkable abnormal modifications of structure, are in most cases referable to some family which has representatives in most parts of the world. Groups of high value, such as classes, are never confined to any particular quarter of the globe; and even when we descend to families, restricted as they now are by naturalists, it is comparatively rare to find them so defined as not to embrace species from widely separated localities. Genera may be arranged under three principal categories as regards their geographical distribution. First may be noticed those of universal range, such as *Cicindela*; secondly, those which occur in both hemispheres but affect particular zones, such as *Megacephala*, which is confined to the tropical zone; and thirdly, those which are restricted to a comparatively small district, such as *Manticora*, which is confined to South Africa. These genera all belong to the same family of beetles, and of this family *Manticora* presents certainly one of the most aberrant forms. The genus *Cicindela* would by most entomologists be regarded as the typical genus of the family *Cicindelidæ*, and here we find, as in many other cases, the presumed typical genus has a universal range; it may be inquired, therefore, whether such is not generally the case.

I must here observe that Mr. Swainson has expressed the opinion that typical genera have a great geographical range; I was not aware, however, of this fact until after the idea had been suggested to me by a tabular arrangement which I had formed of the Mammalian order Rodentia, in which

which cannot be located in any known *genus*, but which appertain to *families* having representatives in most parts of the world, such as the *Pedinidæ*, *Tentyriidæ*, *Anthribidæ* and *Halticidæ*.

But four species amongst the Galapagos Coleoptera occur, so far as I have been able to ascertain, in any other quarter, and of these, two (*Dermestes vulpinus* and *Corynetes rufipes*) are insects which, feeding upon dried meat and such substances, have been carried to all parts frequented by ships; the third is a wood-feeding insect (genus *Apate*), and might be transported for a considerable distance by floating timber; and the fourth is a water-beetle which appears to me to be clearly identical with the *Hydrophilus lateralis* (genus *Tropisternus* of Solier), an insect found in the United States, Mexico, and some of the West Indian islands. I should observe, moreover, there is in the collection a second, minute, species of *Hydrophilus* closely resembling the *Philhydrus affinis* of our English collections, but which is rather smaller, less distinctly punctured, and of a darker hue. I have in my collection a species from North America from which the Galapagos *Philhydrus* differs only in being of a darker colour; perhaps this little *Hydrophilus* should therefore be incorporated amongst the species which are not peculiar to the Galapagos Islands. Some of the insects of the collection have labels attached, from which may be ascertained the particular island of the Galapagos group from which they were procured, and where this was the case I have not found any species which is common to two or more of the islands.

both the classification of the minor divisions and their geographical distribution were displayed at the same time. After working out the affinities of the groups of the Carnivorous quadrupeds, the idea again occurred to me; five out of the six great divisions I had formed from the consideration of characters furnished by the skull and dentition combined, had a typical form of very great geographic range. In the order Rodentia I had made three great divisions, and had pointed out the distinguishing characters of a fourth, though I hesitated to raise that fourth to the rank of the other three. Were the geographical range to be taken into consideration, there would be *four* great families of Rodents. In the order *Pachydermata*, the various species appear all to approach more or less to four principal forms, typified by the genera *Equus*, *Tapir*, *Sus* and *Mastodon*, and these genera, or very nearly related genera, are found either living or in a fossil state in all the principal quarters of the globe, Australia excepted, where only the last has been found. What is characteristic of part of a small group might also be characteristic of part of a larger group. I have noticed that in a certain family, *Cicindelidæ*, one genus is confined to a tropical zone; so might we find in an *order* of animals, a *family* which is confined to the tropical zone—the *Psittacidæ* among Birds is nearly a tropical family; and in the *class Mammalia* we have an instance (certainly a rare one) of an *order* (the *Quadrumana*) which is almost confined to the tropical zone. The sections of water insects have generally a wider range than most others, and the above generalizations, as regards the distribution of groups, will not apply to parasitic insects.

Section GEODEPHAGA.

Family Feroniidæ.

Feronia Calathoides. Fer. nigra oblongo-ovata, nitida; antennis piceo-rubris; pedibus piceis; thorace subquadrato, subplano, foveis duabus oblongis postice impressis, elytris sulcato-striatis.—Long. corp. $4\frac{1}{2}$ lin.; lat. $1\frac{2}{3}$ lin.

This insect very much resembles the *Calathus cistelloides*; its head however is rather longer, and both thorax and elytra are rather shorter; the latter, moreover, are much more deeply striated, and the interstices between the striæ are convex. With the exception of being a trifle shorter, the thorax resembles that of *Calathus cistelloides* in being nearly quadrate and but little convex: the sides are nearly straight and parallel behind, but slightly contracted in front; the posterior angles are right angles; the dorsal channel is distinct, and midway between the dorsal channel and either side of the thorax is a narrow, impunctate, longitudinal groove, in length occupying fully the basal third of the thorax. The elytra are of an oblong-ovate form, and rather broader than the thorax; the somewhat deep striæ with which they are marked are smooth, but a few punctures are observable on the outer margin of each elytron. The legs are sometimes pitchy and sometimes pitchy-red.

Feronia galapagoensis. Fer. angusta, nigro-ænea, nitidiuscula; antennis rufescentibus, pedibus piceis; thorace subquadrato, subplano, postice angustiore; foveis duabus postice impressis; elytris elongatis, lateribus subparallelis, leviter striatis.—Long. corp. $5\frac{1}{2}$ lin.; lat. $1\frac{3}{4}$ lin.

This species is equal in size to the *Calathus cistelloides*, but is of a narrower and much more elongated form. The broadest part of the thorax is rather in front of the middle, and from this point they are gradually contracted before and behind; in front in such a manner as to give to the sides a slightly rounded outline, but behind, the margins are nearly straight, and converge in no very marked degree. The elytra are elongated, but little broader than the thorax; the shoulders are obtusely rounded, and the sides form a very gentle curve, so that they might be compared to a very long oval; they have delicate simple striæ: on the second stria are two punctures rather remote from each other and situated on the hinder half of the elytron; and on the third stria is another puncture situated on the anterior half: besides these, there are a few punctures on the outer margin. The legs vary in colour from pitchy-black to pitchy-red. The æneous tinge on the body is nowhere very distinct.

These two insects will not associate well with any of the subdivisions of the great Feronian group; possessing the essential characters of *Feronia,* they have the general form and aspect of the species of *Calathus*: so like indeed is one of the species to *Calathus cistelloides,* that I could scarcely doubt its belonging to the same genus, and was somewhat surprised to find the claws of the tarsi destitute of the usual denticulations. The dilated tarsi of the males have the joints triangular, as in *Feronia.*

Family Harpalidæ.

Selenophorus (?) *galapagoensis*. Sel. piceus, marginibus thoracis elytrorumque rufescentibus; antennis, palpis, pedibusque ferrugineis; thorace transverso-quadrato, postice paululum angustiore, angulis posticis obtusis, foveis duabus postice obsolete impresso; elytris striatis, striis 2^a, 5^a et 7^a punctis remotis, indistinctis, impressis; interstitiis lævibus.—Long. corp. $4\frac{3}{4}$ lin.; lat. $1\frac{3}{4}$ lin.

But one specimen of this species was brought home by Mr. Darwin, and that being a female, I cannot feel certain that it belongs to the genus *Selenophorus*; it agrees in general aspect with the species of that genus, and in having no tooth in the emargination of the mentum.

Amblygnathus (?) *obscuricornis*. Ambl. niger subobscurus; antennis fuscis, articulis basalibus nigris apicibus piceis, palpis rufescentibus, tarsis piceo-rufis; thorace transverso, subquadrato, postice paulo angustiore, supra convexo, angulis posticis rotundatis; elytris subparallelis, convexis, striatis, striis 2^a, 5^a et 7^a punctis remotis obsolete impressis, interstitiis convexis.—Long. corp. $4\frac{2}{3}$ lin.

This insect like the last is a female, there being but one specimen in Mr. Darwin's collection; it is almost destitute of any gloss, and has a slight silky appearance. In general aspect it greatly resembles a *Cratognathus,* having the same convex form of body; the mandibles however are obtuse at the apex, the labrum much less narrow in the antero-posterior direction, the head smaller, and the anterior tibiæ less dilated. Both in this and the preceding insect there are three or four short spines on the outer side of the anterior tibiæ.

The thorax has the ordinary two impressions behind, but they are extremely indistinct: the elytra are distinctly striated; and the striæ are impunctate, if we except the second, fifth and seventh from the suture, in each of which are a few punctures which are widely separated and by no means distinct: at the apex of the elytron, near the outer margin, is a series of five or six tolerably distinct and large punctures; the interspaces between the striæ are rather strongly convex on the hinder part of the elytra, and but slightly convex on the anterior part.

I am not acquainted with Dejean's genus *Amblygnathus,* except through his description, and with that the present insect will not agree in all respects; like *Amblygnathus,* it has no tooth to the mentum, and the antennæ short, but the eyes must be more prominent. The tarsi are short.

Family Bembidiidæ.

Notaphus galapagoensis. Not. æneus, nitidus, antennis nigrescentibus, ad basin, pedibusque testaceis; thorace transverso, postice utrinque fovea oblonga impressa, lineaque longitudinali elevata notato; elytris punctato-striatis, fasciis duabus arcuatis, rufescentibus, ornatis.—Long. corp. $1\frac{1}{3}$ lin.

Body rather short and broad. Thorax broad and transverse, moderately convex, the sides boldly rounded and but slightly sinuated near the posterior angles, which are nearly right angles; dorsal channel distinct, and continued from the base to the apex of the thorax; a narrow oblong fovea is situated on each side behind, rather nearer the lateral margin, or angle, than the mesial line, and extending from the angle is a ridge which is about one-third of the length of the thorax and parallel with the mesial line, and hence, although the ridge springs from the angle, it is somewhat remote from the lateral margin at its apex,—the margin being bowed outwards; the disc of the thorax is smooth, but the lateral and posterior margins are coriaceous. The elytra are rather broad, of a brownish æneous hue, distinctly punctate-striated; rather in front of the middle is an irregular, transverse, yellowish band, which is subinterrupted in parts, and does not extend to the suture; it descends obliquely downwards as it runs in from the outer margin, where it is met by a humeral pale mark: there is a faint trace of two pale spots above this band: about the hinder third of each elytron is a curved mark which commences on the second interstice from the suture, runs outwards to the margin, and forming a segment of a circle, extends to the apex of the elytra. A largeish depression is observed on the third interstice from the suture on the anterior third of each elytron. The whole of the basal joint, and the base of the second, third and fourth joints of the antennæ are yellow; the rest of the joints are blackish.

This species is from James' Island.

Section HYDRADEPHAGA.

Family Dytiscidæ.

Copelatus (?) *galapagoensis.* Cop. ovatus, parum convexus, piceus; capite, marginibus lateralibus thoracis et elytrorum, antennis pedibusque rufo-testaceis; thorace disco nigro, punctis minutissimis subremotis impressis; elytris distincte sed anguste striatis.—Long. corp. $2\frac{2}{3}$ lin.

This is a small insect, and might be mistaken for a species of

Hydroporus before examined; it however belongs to the *Dytiscidæ* as defined by Aubé, and agrees with Erichson's genus *Copelatus*, excepting that its posterior tarsi are not ciliated. The hinder tarsi are provided with a few spines only: the three basal joints have each two large spines at the apex, and there are besides some few very minute spines on other parts. I have seen several species presenting this structure; among others I may notice the *Colymbetes elegans* of Babington, an insect which I have had sent to me with the name *Copelatus posticatus* attached. Another species was brought by Mr. Darwin from the Mauritius; they all possess the sharp distinct striæ to the elytra which are mentioned as characteristic of the genus *Copelatus*, and neither of the four specimens here alluded to have the slightest trace of dilatation of the anterior tarsi.

The Galapagos species differs from the *Colymbetes elegans* of Babington (which is found both in Rio de Janeiro and in Colombia) in being smaller and proportionately rather narrower; in having the legs of a paler hue (these being pitchy-black in *C. elegans* and pale testaceous in *C. galapagoensis*), and the striæ of the elytra more perfect. In *C. elegans* the second stria from the suture is obliterated on the hinder half of the elytron; the fourth, sixth, eighth and tenth are also obliterated, but continued for the most part to the hinder third (or rather beyond that point) of the elytra. In *C. galapagoensis* the same striæ are abbreviated, but the second and others mentioned, all terminate on the same line or nearly so, that line being about the posterior fourth of the elytron. The thorax presents extremely delicate punctures, and numerous minute longitudinal scratches, requiring a tolerably powerful lens to perceive them; they are most distinct towards the sides and hinder part of the thorax. Should this little section of water-beetles be not already characterized, I think it deserves the rank of a subgenus, which might be called *Chætosphyrus*, from χαίτη, *a bristle*, and σφύρα, *the ankle*; the spines at the base of the foot being much developed. I may further add, that all the species have the anterior tibiæ somewhat dilated at the apex, and obliquely truncated on the outer side at the same part; the truncated portion is provided with three or four spines.

Section BRACHELYTRA.

Creophilus, nov. spec. ?—Three specimens found under a dead bird in Chatham Island. These specimens approach very nearly in size and form to the *Cr. maxillosus* of Europe, and the *C. villosus* of North America. They have scarcely any hairs either on the head, thorax or elytra, and are but sparingly clothed on the meso- and metasternum; the hairs on these last parts are however entirely black, a character in which it approaches nearer to the European species, for the same part is white at the sides in *C. villosus*, and grayish black in the *C. maxillosus*. The few hairs which I can perceive of the elytra are perfectly black; they occur however almost entirely on the hinder margin of the elytron. It is possible that the insect may have had pale markings (which have been rubbed off) on these parts, but I cannot trace any pale hairs in either of the three specimens.

The abdomen is clothed throughout with hairs, but they are rather less dense than in *C. villosus* and *C. maxillosus*; on the upper surface of the abdomen the hairs are black, excepting on the second and third visible segments, where they are yellowish white, but interrupted with black on the middle of each segment: on the under surface the hairs are black on the first segment, and yellow-white on the second and third segments throughout; the remaining segments are rusty white in the middle only, and the pale hairs are almost confined to the posterior margin, the sides being black in all the specimens. In *C. maxillosus* I find the fourth segment white throughout beneath, with the exception of a small black dot on each side. *C. villosus* agrees with the Galapagos insect in having the side of the fourth segment black.

Section STERNOXI.

Family ELATERIDÆ.

Physorhinus (?) *galapagoensis*. Phys. oblongus sublinearis; piceo-fuscus, pube pallida tectus; capite rugoso-punctato, antice flavo; thorace rugoso-punctato, linea longitudinali leviter impresso; elytris punctato-striatis, interstitiis punctatis; antennis pedibusque flavescentibus; abdomine fusco.—Long. corp. $4\frac{1}{3}$ lin.; lat. $1\frac{1}{4}$ lin.

I have placed this Galapagos *Elater* in a genus founded by Eschscholtz, with which it agrees very closely in many of its characters; as Germar's definition of the genus* in question does not, however, in all respects apply to the insect before me, it will be necessary to notice the points of disagreement; but I will first observe, that the Galapagos insect agrees with *Physorhinus* in having the tarsi apparently but four-jointed, the fourth joint being very small; in having the third joint short, and produced on the under surface into a long, undivided, membranous lobe: the lobe in the insect before me is equal in length to more than half that of the terminal joint. The fourth joint is exceedingly small; forming a mere node, as it were, at the base of the claw-joint: the basal joint is long. The antennæ are rather less than half the length of the body, and composed of longish, conical, and

* The account I refer to will be found in Dr. Germar's 'Zeitschrift für die Entomologie,' Part 2 for 1840, p. 244.

slightly compressed joints; the first joint is rather stouter than the rest, and perhaps a trifle longer; the second and third joints are short, but the third rather exceeds the second in length; the remaining joints are very nearly equal. There is an agreement also in the form of the thorax, the length of which is about equal to the breadth behind; the fore-part contracted, and of the same width as the head; the posterior angles produced posteriorly, and acute; the antennal groove beneath, short, and confined to the anterior part of the præsternum, which has its point bent inwards. The mesosternum has a small hollow with raised margins in front. The metasternum is produced posteriorly so as partially to cover the trochanter. In all these characters the Galapagos insect appears to me to agree with the type of the genus *Physorhinus*; but, on the other hand, it differs in having the head rather shorter, presenting when viewed from above very nearly a semicircular outline, but slightly inclining to a conical form,—whilst Germar says of the genus *Physorhinus*, the head is longer than broad; and it differs also in having the terminal joint of the tarsus (as it would appear from the figure) rather longer, so that although the basal joint is long, it is not quite equal to the other four taken together, as it is said to be in *Physorhinus*. The claws are slender and simple, and the tarsi very hairy.

Section CLAVICORNES.

Dermestes vulpinus, Auct.
Corynetes rufipes, Auct.
From James' Island.

Section PALPICORNES.

Tropisternus (*lateralis*, Fab.).
Philhydrus —— ?

Section LAMELLICORNES.

Oryctes galapagoensis. Oryct. castaneus nitidus; capite punctato, carina transversa tri-emarginata obsito; ante oculos lobis subtrigonis productis; clypeo producto, antice recurvo, constricto, subemarginato; thorace punctis distinctis remotis, impresso; elytris latis, punctis minutissimis remote adspersis, rugisque indistincte notatis; stria punctarum apud suturam.—Long. corp. 10 lin.; lat. thoracis $4\frac{1}{6}$ lin.; lat. elytrorum $5\frac{2}{3}$ lin.

Head with large irregular scattered punctures; these most numerous, and confluent, on the fore-part; the vertex flat and smooth; the sides produced into an obtuse angle immediately in front of the eyes; the fore-part with a distinctly elevated ridge, which is most prominent in the middle, and has a deep notch; it becomes gradually less prominent towards the sides, but is there produced again into an obtuse angle. Clypeus broader than long, contracted and slightly recurved at the apex, which is indistinctly emarginated. Thorax convex, with the sides rather boldly rounded; the posterior margin also rounded, but forming a segment of a larger circle; the fore-part emarginated; anterior angles slightly acute, posterior obtusely rounded; the surface above with distinct punctures, but these remote from each other—most numerous on the fore-part; there is moreover a fovea on each side about midway between the anterior and posterior angles, and a little removed from the lateral margins. Scutellum triangular, slightly rounded at the tip. Elytra convex, much broader than the thorax, and broadest at the posterior third; the humeral angles obtusely rounded, the hinder part very obtusely rounded; they have a few exceedingly minute scattered punctures, some indistinct little rugæ, and one or two longitudinal larger impressions. The sutural stria is composed of a subinterrupted series of distinct punctures. The body beneath is well-clothed with yellow hairs, and so are the legs: the terminal segment of the abdomen, like the elytra, has exceedingly minute scattered punctures; it is convex, rounded at the extremity, and its transverse diameter is about three times greater than the antero-posterior; the penultimate segment above is tolerably well-clothed with yellow hairs (the last has but few hairs), presents a distinct longitudinal furrow in the middle, and this furrow is bounded on either side by a slightly elevated ridge. The legs are short and stout, and the anterior tibiæ have three tooth-like processes on the outer side. The insect is very glossy and of a bright chestnut-brown colour.

Section HETEROMERA.

Family TENTYRIIDÆ.

Genus *Stomion** (nov. gen.).

Clypeus truncated in front, its lateral boundaries indicated by two slightly impressed longitudinal grooves.

Labrum prominent, transverse, and slightly emarginated in front.

Mandibles projecting beyond the clypeus when closed, covered at the apex by the labrum, but with the sides exposed when the head is viewed from above; they are bidentate at the apex.

Mentum broad and transverse and very nearly semicircular, the rounded part being in front.

Maxillary palpi moderate; the terminal joint triangular, at least as long as broad: *labial palpi* short.

* Στόμιον, *a little mouth*; having allusion to a peculiar conformation of the mouth of this and some allied genera, viz. that of having the mouth closed beneath by a large mentum, by the sides of which there does not exist the usual emarginations for the maxillæ, which are therefore hidden.

Head small, in width not equal to more than half that of the thorax; inclosed in the thorax as far as the eyes; the outline of the part in front of the eyes, including the mandibles and labrum, is conical, but taking the arch formed by the outline of the clypeus, it is nearly semicircular;—slightly indented on each side of the clypeus.

Antennæ of moderate length; if extended backwards would scarcely reach the base of the thorax; slender, the joints of a long obconic form; the second joint short, the third long, but not equal in length to the two following joints taken together; the last three joints dilated; the antepenultimate and penultimate present a triangular outline; the last joint is about equal in size to these, but of an oval form.

Eyes tolerably large and moderately convex, kidney-shaped, being very slightly encroached upon in front by the lateral ridge of the head.

Thorax transverse, narrower before than behind, rather deeply emarginated in front, rounded at the sides and bisinuated behind, where it is closely applied to the thorax: the upper surface is convex, and there is an impressed line (not very distinct) following the margins, but interrupted in the middle of the anterior margin: the angles are acute in front and right angles behind,—or nearly right angles.

Scutellum rather small, but distinct; rounded behind.

Elytra soldered together, very convex, broader than the thorax and of an ovate form, but sinuated in front, where the curved outline corresponds to that of the hinder margin of the thorax; the humeral angles somewhat obtuse.

Præsternum with its hinder margin obtuse, notched, and not produced posteriorly beyond the anterior coxæ.

Abdomen but little inclosed at the sides by the elytra.

Legs slender and moderately long; the tibiæ nearly cylindrical, and terminated by two small spines: tarsi slender; the hinder tarsi equal in length to more than two-thirds of that of the tibia.

In general appearance the species of this genus greatly resemble those of the genus *Helops*, and more particularly those shorter-bodied species of which our common *Helops striatus* may be said to form the type. In size and general form, the *Stomion lævigatus* (hereafter described) greatly resembles the insect just mentioned, but its thorax and elytra are more convex. The *Stomion galapagoensis* is half as large again as the *H. striatus*, and of a much broader form and more convex above: the third species of *Stomion* known to me is considerably less than the *H. striatus*, and of a shorter and broader form. The structure of the mouth, however, shows that the present insects are in affinity remote from the *Helops* group, and indeed belong to the *Tentyriidæ*.

In having a distinct scutellum, the eyes transverse and not covered by the lateral ridge of the head, the mentum truncated, and the tibiæ simple, the genus *Stomion* approaches to *Anatolica*, and yet the general form of the species of *Stomion* is very different to that of the species of *Anatolica*; the more slender antennæ with the terminal joints incrassated, and the absence of emargination to the mentum, would alone, however, serve to distinguish *Stomion* from *Anatolica*. Perhaps Eschscholtz's genus *Eurymetopon* is more nearly allied to our present genus; the species of *Eurymetopon* are represented by Eschscholtz, however, as having the head broad, the thorax nearly as broad as the elytra, the eye small, and the tibiæ very short, all of which characters will not well apply to *Stomion*. The approach, on the other hand, is evinced, as it would appear, in the structure of the antennæ and the truncated form of the clypeus.

Stomion galapagoensis. Stom. ater, obscurus, antennis palpisque piceis, pedibus piceo-nigris; corpore ovato, convexo; capite thoraceque crebre punctulatis; elytris seriatim punctatis, interstitiis convexis, punctis minutissimis adspersis.—Long. corp. $5\frac{1}{2}$ lin.; lat. $2\frac{2}{3}$ lin.

The body is very convex, of a broad ovate form, and dull black colour; the head is flat above or slightly concave in the middle and thickly punctured; the thorax is broader than long, and narrower before than behind, slightly emarginated in front, where the angles are somewhat acute; evenly and gently rounded at the sides, and indistinctly sinuated behind; the posterior angles are right angles; the upper surface is distinctly convex, and very thickly and rather finely punctured; an impressed line runs parallel with, and close to the posterior and lateral margins, and is also continued on the anterior margin, but is interrupted in the middle. The scutellum is small and transverse; the elytra are very convex; at the base they are scarcely broader than the thorax, but in the middle they are considerably wider, and at the apex they are pointed; they have series of punctures forming the ordinary striæ, but these punctures are by no means strong; the interstices are convex and covered with very minute scattered punctures. The mentum is distinctly punctured, and the thoracic segments are strongly punctured in the middle beneath: the abdominal segments have fine scattered punctures.

Two specimens in Mr. Darwin's collection agree with this description; there are others of a much smaller size, being about four lines in length, and in which the notch on each side of the fore-part of the head, marking the outer boundary of the clypeus, is scarcely perceptible; these notches are tolerably distinct in the large specimens; in other respects they all agree.

Stomion Helopoides. Stom. fusco-piceus, antennis pedibusque fuscescentibus; corpore ovato, convexo; capite sat crebre punctato; elytris seriatim punctatis, interstitiis planis punctis minutis adspersis.—Long. corp. 3—$3\frac{1}{4}$ lin.; lat. $1\frac{1}{2}$ lin.

The punctures forming the striæ on the elytra of this species are less distinct, and those on the interstices are more distinct than in the *St. galapagoensis*; the interstices moreover are flat, or sometimes, the one or two nearest the suture are very slightly convex. The thorax is transverse, evenly rounded at the sides, and of equal width before and behind, or very nearly so; the angles are slightly obtuse; the upper surface is pretty thickly covered with smallish punctures; the under surface is smooth at the sides, but presents small rugæ and a few punctures near the base of the legs. The punctures which are arranged in rows on the elytra are by no means strong, and are distinctly separated; and the smaller punctures on the interstices are moderately numerous. The abdomen is finely punctured.

Two specimens in Mr. Darwin's collection agree with this description; there is a third individual which agrees in other respects, but is rather larger and almost of a black colour, and has the legs of a pitchy hue.

Stomion lævigatus. Stom. ater nitidus, antennis, palpis, pedibusque piceis; corpore valde convexo, oblongo-ovato; capite punctulato; thorace punctis minutissimis impressis; elytris lævibus.—Long. corp. 4 lin.; lat. $1\frac{3}{4}$ lin.

Both the antennæ and legs are rather shorter and a trifle thicker in proportion in this species than in others of the genus here described; the form of the body is more oblong, and the thorax is not sensibly broader behind than in front; the head moreover is larger. The insect is very glossy, and to the naked eye its thorax and elytra appear to be perfectly smooth. The head is distinctly and thickly punctured: the thorax is but little broader than long, has the sides nearly parallel and very indistinctly rounded; its upper surface is very convex and rather thickly punctured, but the punctures are extremely minute: the elytra are very convex and but little broader than the thorax; sometimes they exhibit excessively minute punctures arranged in striæ, and there are a few punctures in the interstices; it requires however a tolerably powerful lens to perceive these punctures: the thoracic segments are punctured beneath, and so is the mentum; the abdomen is smooth, or most indistinctly punctured.

Family Tagenidæ (Tagenites, *Solier*).

Ammophorus galapagoensis. Amm. ater, nitidus, antennis pedibusque rufo-piceis, vel piceis; capite thoraceque crebre punctatis, punctis oblongis, prope latera plerumque confluentibus, interstitiis angustissimis longitudinaliter parum elevatis; thorace angulis anticis acutis, posticis subacutis; elytris sulcatis, sulcis catenato-punctatis, interstitiis costatis; corpore subtus profunde punctato. —Long. corp. $2\frac{1}{2}$—$2\frac{3}{4}$ lin.

This species is smaller and proportionately rather shorter than the *Amm. peruvianus*. The head is thickly covered with narrow oblong punctures which run into each other, so as to leave very narrow, irregularly longitudinal ridges. The thorax is moderately convex above, rather broader than long, moderately rounded at the sides, and but slightly sinuated near the posterior angles, which are nearly right angles, but slightly acute; the anterior angles are prominent, project forwards, and are somewhat acute. The elytra are rather broader than the thorax and of an oblong form, rounded at the apex, and moderately convex; the humeral angles are produced laterally into an acute angle (more prominent and distinct than in *Amm. peruvianus*); each elytron presents eight sulci, in each of which are a series of impressions or largeish shallow punctures; the interstices form narrow ridges, on which a few very minute punctures are scattered. The mentum is rugose and has two oblong depressions; the thoracic segments present a few large, irregular punctures beneath; the abdominal segments are very coarsely punctured, if we except the last two; the penultimate has a transverse groove, and like the terminal segment is rather finely punctured. The palpi are red; the legs and antennæ pitchy-red, and sometimes pitchy.

Found by Mr. Darwin under stones upon a hill in Chatham Island.

Ammophorus bifoveatus. Amm. ater, nitidus; antennis pedibusque piceo-nigris; capite punctato; thorace angulis anticis acuminatis, posticis acutis, extrorsum productis, supra punctulato, foveis duabus et rugis tenuibus impressis; elytris crenato-striatis, interstitiis angustis elevatis.—Long. corp. 3 lin.

The *Amm. bifoveatus* is so named from its having two largeish but shallow depressions, situated, one on each side, about the middle of each lateral half of the thorax: the thorax is moderately convex, broader than long, broadest in the middle, and about equally contracted before and behind; the sides are contracted rather suddenly near the angles, which are prominent; the hinder angles, which are most prominent, are acute: the surface of the thorax is rather finely punctured, and presents numerous little longitudinal rugæ, which are most distinct on the sides, hinder part, and in the foveæ described; two grooves, more distinct and longer than the rest, are observed on the middle of the thorax, where they are separated by a narrow ridge. The elytra are broader than the thorax, oblong, and have the humeral angles produced laterally into small acute processes; the ordinary interstices of the striæ of the elytra are very narrow and elevated; the punctures of the striæ are large, transverse, and separated from each other by narrow spaces. A few large punctures are seen on the under surface of each of the thoracic segments; the abdominal segments are more thickly punctured; the penultimate however is nearly smooth, and the last is very delicately punctured. The abdomen is depressed in the middle.

Two specimens from James' Island present the above characters; some other specimens in the collection which cannot otherwise be separated, display the thoracic fovea rather less distinctly, and the double ridge on the disc is sometimes wanting.

Ammophorus obscurus. Amm. ater, obscurus; antennis pedibusque piceis; capite thoraceque rugoso-punctatis; angulis thoracis acutis extrorsum productis; elytris crenato-striatis, interstitiis angustis elevatis.—Long. corp. $2\frac{1}{2}$ lin.

This species has the thorax narrower than in either of the preceding, from which it may moreover be distinguished by its dull colour, the thorax being rugosely punctured: the sculpture of the elytra is rather more decided, and the suture is not raised as in the other species. In *Amm. galapagoensis* the suture is fully as much raised as the ridged interspaces of the striæ; in *Amm. bifoveatus* the suture is also distinctly raised, but not quite so much as the ridges between the striæ; in the present species the suture is flat. Like *Amm. bifoveatus,* the angles of the thorax are produced, and as in both the preceding species; the humeral angle of the elytra is produced and acute. The ordinary interstices of the elytra form very narrow and considerably elevated ridges, in the grooves between which are large transverse impressions, and similar impressions are observed on each side of the suture; not extending quite to the suture, they give that part the appearance of being slightly raised, and indeed it is so on the hinder part of the elytra.

The three species of *Ammophorus* here described have the third joint of the antennæ shorter in proportion than in *Amm. peruvianus,* but they agree in this respect with *Amm. costatus* and *Amm. rubripes* of Solier, with which they also agree in size; they all have the interstices of all the striæ of the elytra elevated, whilst in one only of the Chilian species (*A. costatus*) are any of these interstices distinctly ridged, and here it is only the alternate spaces between the striæ which present that condition.

Family PEDINIDÆ.

*Pedonœces**, nov. gen.

Clypeus distinctly emarginated.
Labrum small, transverse.

* From πέδον, *the ground,* and οἰκέω, *to inhabit.*

Mandibles short and obtuse, bidentate at the extremity, and hidden by the clypeus, when the head is viewed from above.

Mentum small, ovate, concave externally.

Maxillary palpi moderate; the terminal joint securiform: *labial palpi* short; the terminal joint swollen.

Head considerably narrower than the thorax; the visible portion broader than long; the fore-part in front of the eyes forms nearly a semicircle, but is emarginated in front; no indentation marks the posterior or lateral boundaries of the clypeus: the lateral ridge of the head, which protects the basal portion of the antennæ, is well-developed, and runs backwards so as to divide the eye into two parts; the upper portion of the eye is rather large and round, or very nearly so; the lower portion is nearly of equal size with the upper, and also nearly round.

Antennæ moderate; if extended backwards would reach the base of the thorax; the joints of a shortish obconic form; the second joint short; the third nearly as long as the two following taken together; the last three joints incrassated, and fully as broad as long; the terminal joint is round, and as large as the penultimate.

Thorax subquadrate, but little broader than long, emarginated in front, and with the anterior angles rather prominent and somewhat acute; the sides are indistinctly rounded, and the hinder part is but little broader than the front; the posterior margin is distinctly bisinuated, and the posterior angles are right angles, or somewhat acute: the surface is moderately convex, and there is a distinct impressed line running parallel with, and close to, both the lateral and posterior margins.

Scutellum distinct, triangular.

Elytra soldered together, oblong, convex, rounded at the extremity: the humeral angles nearly right angles, but somewhat obtuse, and presenting a slightly concave triangular surface in front, against which the thoracic angles are applied.

Præsternum rather contracted, pointed behind, and but little produced beyond the coxæ of the anterior legs.

Abdomen with the penultimate segment very narrow in the antero-posterior direction; the last segment semicircular and depressed, or concave, in the middle.

Legs moderate; the tibiæ straight, very little compressed, and but slightly dilated at the apex: the four anterior tarsi dilated in the male sex, the anterior pair distinctly so, the width of the second or third joint being nearly equal to the length of the four basal joints taken together; the first and fourth joints are small, the second and third equal or very nearly so; the three basal joints only appear to be covered with the velvet-like substance beneath: the middle pair of tarsi are less distinctly dilated; the claw-joint of each tarsus is nearly equal in length to the four basal joints taken together.

In general appearance, in the structure of the head and of the tarsi, the species of this genus approach very nearly to the members of Dejean's genus *Blapstinus*; they have the legs however rather longer, the thorax less distinctly transverse, and the elytra more convex; these are moreover soldered together, and there are no wings as in *Blapstinus*. Judging from the definitions of the various genera of *Pedinidæ*, the present genus presents a combination of characters not hitherto noticed. Those genera of the family of which I possess examples in my own collection I find are capable of being distinguished from each other by the following characters, which it will be observed are not peculiar to either sex, and are therefore preferable, as it appears to me, to those which have hitherto been pointed out, and which are chiefly derived from the variations in the structure of the tarsi of the male.

I. Apterous; elytra soldered together at the suture.
- A. Eye divided by the lateral ridge of the head.
  - *a*. Anterior tibiæ distinctly dilated at the apex.
    - *a* *. Antennæ short, submoniliform............... *Heliophilus*.
    - *a* **. Antennæ with the joints, most of them, obconic.
      - *a* * 1. Middle tibiæ dilated at the apex . *Pedinus*.
      - *a* * 2. Middle tibiæ not dilated at the apex *Isocerus*.
  - *b*. Anterior tibiæ not dilated at the apex .... *Pedonœces*.
- B. Eye uncovered (not divided by the lateral ridge of the head).
  - *a*. Clypeus truncated or slightly rounded in front ... *Platyscelis*.
    - *a* *. Clypeus emarginated in front.
      - *a* * 1. Antennæ distinctly incrassated at the apex .... *Eurynotus*†.
      - *a* * 2. Antennæ with the terminal joints oblong, not broader than the rest. *Dendarus*.

II. Winged; elytra free.
- A. Eye divided by the lateral ridge of the head............ *Blapstinus*.
- B. Eye uncovered at the sides .... *Opatrinus*.

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† The mentum in *Eurynotus* is distinctly trilobed, having a central principal portion and two lateral wings; these wings or lateral lobes diverge as they part from the base of the mentum and are acutely pointed at the extremity; they are separated from the mesial lobe by a deep hollow on each side. In the great Indian species, which Dejean arranges under the head *Platynotus*, the same structure of mentum is observable as well as in *Opatrinus*; but the lateral lobes do not exist in *Heliophilus*, or at least they are here exceedingly minute and curved inwards, as I have observed to be the case in the mentum of *Blaps*; *Dendarus* appears to agree with *Heliophilus* in this respect. *Platynotus* of Dejean must undoubtedly be placed near to

Pedonœces galapagoensis. Ped. ater, nitidus; antennis pedibusque nigro-piceis; capite thoraceque confertim punctulatis; elytris subsulcato-punctatis, interstitiis convexis punctis minutissimis adspersis.—Long. corp. 3 lin.; lat. $1\frac{1}{6}$ lin.

Var. β. Elytris sulcato-punctatis, interstitiis convexioribus, quarto et sexto elevatis, subcostatis.

This species has the general form of the *P. costatus*, but the thorax is rather longer in proportion; here the interstices of the striæ of the elytra are simply convex, and do not form narrow ridges as in *P. costatus.* The legs have minute yellow spiny hairs as in that species, and on the under surface of all the femora is a small brush of yellow hairs.

Pedonœces costatus. Ped. niger, parum nitidus; antennis pedibusque rufo-piceis; corpore oblongo, convexo; capite crebre punctato; thorace confertim punctato, punctis longitudinaliter confluentibus; elytris sulcato-punctatis, interstitiis subcarinatis, alternis elevatioribus, costatis.—Long. corp. $2\frac{2}{3}$ lin.; lat. 1 lin.

This species, which is from James' Island, is easily distinguished from the *Ped. galapagoensis* by the sharp keel-like ridges formed by the alternate interstices of the striæ of the elytra, and by the narrowness of the other interstices: the thorax, moreover, is more strongly and more thickly punctured, and the punctures are oblong, and the greater portion of them are confluent, joining each other in such a way as to leave little, narrow, irregularly longitudinal ridges for the interspaces. The thorax is rather broader than long, subquadrate, the sides but slightly rounded, and indistinctly sinuated near the posterior angle, which is nearly a right angle; the posterior margin is sinuated, presenting a convex outline in the middle, and a slightly concave emargination on either side near the angles. The elytra are scarcely broader than the thorax, of an oblong form, but little broader in the middle than at the base, and at the apex they are rounded. The legs, which, like the antennæ, are of a pitchy colour, have very small spiny yellowish hairs, and these become more dense and rather longer on the under side of the middle part of the hinder femora. The three terminal joints of the antennæ are pitchy-red. The body is distinctly punctured beneath throughout.

Eurynotus. In two species of *Platynotus* before me (one of which appears to be the *P. gigas*) I find the scutellum is scarcely to be seen, whilst in *Eurynotus* it is distinct; this, combined with the sinuated sides to the thorax of the former, and the thorax being broadest behind in the *Eurynotus*, will help to distinguish the two genera. I may add, the mesial lobe of the mentum is distinctly emarginated in *Platynotus* and truncated in *Eurynotus*: the structure of the tarsi and antennæ also differ in these genera.

Pedonœces pubescens. Ped. oblongo-ovatus, supra modice convexus; piceo-niger, pilis brevissimis, adpressis, fuscis, obsitus; antennis pedibusque piceis; capite thoraceque creberrime punctulatis; elytris punctato-striatis, striis non pilosis, interstitiis convexis.—Long. corp. $3\frac{1}{4}$ lin.

The thorax is rather broader than long, has the sides slightly rounded, the anterior margin rather narrower than the posterior, the hinder angles right angles: the elytra are of an oblong form, scarcely broader in the middle than elsewhere, and very little broader than the thorax; the pale brownish minute hairs have a tendency to a linear arrangement, and are confined to the interstices of the striæ, which under a strong lens have a coriaceous appearance; the punctures of the striæ are by no means deep, and distinctly separated from each other.

Mr. Darwin found this species under stones on a hill in Chatham Island in the month of September.

Section XYLOPHAGI, Latreille.

Genus *Apate*, Fabricius.

In Mr. Darwin's collection are three specimens of a species of this genus which are about equal in size to the *Apate capucinus* of authors, but differ in being of a black or pitchy-black colour, in having the elytra more convex in the transverse direction, with the punctures rather less deep and more distinctly separated; the hinder portion is obliquely truncated, but descends more suddenly than in *A. capucinus*, and each elytron is somewhat humped towards the apex: the upper surface of the thorax is covered with small flattened, polished tubercles which are extremely close together; the fore-part is covered with angular or acutely pointed tubercles of large size, and is produced into two largeish conical protuberances, the points of which are bent downwards and overhang the head; these protuberances are not only covered with tubercles, but have numerous pale hairs *: the mesial portion of the head, between the eyes, is smooth and polished; the anterior part is rough; the under parts are clothed with whitish hairs. I have an insect in my own collection from a part of the world which is much better known (Colombia), and which is undoubtedly the same species as the Galapagos insect. From the wide range which it has, it is no doubt known and described.

The specimens above referred to were found by Mr. Darwin in the branches of a dead Mimosa tree in Chatham Island, and that gentleman states in his notes that the whole length of the bough was perforated by them.

* These protuberances are less developed than in the *Apate cornuta*.

Section RHYNCOPHORA.

Family Anthribidæ.

Ormiscus *, nov. gen.

Rostrum very short, transverse, truncated in front; the mandibles rather prominent and sharply pointed.

Head shorter than broad, its vertex on the same plane with the rostrum.

Eyes large, prominent, converging in front, and contracting the forehead to about half the width of the head; emarginated below.

Antennæ springing from a little round cavity immediately beneath the eye; if extended backwards they would reach the posterior margin of the thorax, or extend perhaps slightly beyond that part; the joints most of them slender; the first joint nearly hidden; the second thicker than the following six joints, and nearly globose; the third joint slender and the longest, but shorter than the two following joints taken together; the fourth to the eighth inclusive obconic, becoming successively shorter; the three terminal joints dilated, closely joined, and together forming an ovate club.

Thorax rather broader than long; contracted, and subtruncated in front, broadest near the posterior margin, and convex in the transverse direction; with an obtuse ridge at the side, but confined to the hinder part, and a curved transverse ridge behind; this ridge is very distinct; in the mesial line of the thorax it nearly touches the hinder margin, but from that part it ascends as it runs outwards, so that it is somewhat distant from the posterior angle; the hinder margin straight, and the posterior angles right angles.

Scutellum very small.

Elytra rather broader than the thorax; short, subcylindrical, rounded at the apex, and with the humeral angles obtuse.

Legs moderate; tarsi as long as the tibiæ; the first and fourth joints long and nearly equal; the second and third rather short, the latter distinctly bilobed at the extremity; the lobes equal.

Ormiscus variegatus. Orm. ater flavescenti-tomentosus; capite thoraceque rugosis; elytris æneo-micantibus, indistincte punctato-striatis, pube alba, flava et fusca variegatis; postice macula fusca communi cordiformi; singulo prope medium fascia obliqua ornato; antennis articulis basalibus ad basin, tibiisque flavescentibus; femoribus piceis, ad basin pallidioribus.—Long. corp. 1 lin.

Var. β. Elytris rufescentibus, marginibus maculaque transversa prope medium nigrescentibus.

* Ὁρμίσκος, *a small necklace, a collar.* The little insect here described has a curved ridge crossing the back part of the thorax, a character not peculiar to it, but which is more distinct here than in most others of the *Anthribidæ*.

Amongst the numerous genera of *Anthribidæ* defined by Schönherr, I have found none presenting the combination of characters which are above pointed out. *Ormiscus* approaches most nearly perhaps to *Aræocerus*, but may be distinguished by the different form of the eyes, which have the long diameter considerably greater than the transverse, and are much narrower in front than behind; the position of the antennæ is also different, and the form of the joints, which are shorter, and especially the form of the club, which is considerably shorter, and has not the joints distinctly separated.

The æneous tint of the elytra is only seen in parts where the pubescence has apparently been rubbed off: at the base of each elytron near the scutellum is a slight hump, which, wanting the pubescence, always presents a dark hue; on the outer side of this is an oblong patch of a pale yellowish colour, and this is not due to the colour of the pubescence only, for the elytron itself appears to be pale at this part: in the middle is a broad brownish band, which as it parts from the suture to the outer margin slightly descends: on the outer margin is a broad dusky patch, and there is a brownish heart-shaped spot on the suture, about midway between the central fascia and the apex of the elytra: the tibiæ are somewhat dusky at the apex.

Mr. Darwin found this insect amongst others when sweeping the herbage in the high central parts of Charles' Island, in the month of October.

Family Otiorhynchidæ.

Otiorhynchus cuneiformis. Ot. ater, fusco-cinereo-squamosus, setis brevibus adspersis; antennis pedibusque piceis.

Caput breve subconvexum, fronte longitudinaliter rugosa; oculi fere globosi: rostrum capite vix longius sed angustius, apice modice dilatatum, supra fere planum longitudinaliter rugosum. Antennæ mediocres, funiculo articulis primo et secundo subæqualibus; clava breviter ovata, apice acuminata. Thorax æque longus ac latus, subcylindricus, apice truncatus, angustior, lateribus pone medium parum ampliatis; basi leviter bisinuatus; supra rugosus. Scutellum apice rotundatum. Elytra oblongo-subovata, antice thoracis basi haud latiora, supra convexa, lateribus pone medium ampliata, apicem versus subacuminata, ad apicem rotundata; rude punctato-striata, interstitiis parum elevatis impunctatis, seriatim setosis. Pedes mediocres.—Long. corp. $2\frac{3}{4}$ lin.; lat. $1\frac{1}{4}$ lin.

This insect is so thickly clothed with mud-coloured scales that it is difficult to see the sculpturing. It is considerably smaller than the *Otiorhynchus raucus*, and the elytra being broadest rather behind the middle, the thorax but little rounded at the sides, and narrower in front than behind, where it is equal in width to the base of the elytra, gives to the general outline a wedge-form, or at least an approach. It departs from other species of the genus in having the lateral processes of the rostrum, forming the lower boundary of the groove for the antennæ, rather less prominent, the eyes more convex, and the antennæ shorter. It is not without considerable hesitation that I place this insect in the genus *Otiorhynchus*.

From Charles' Island. Found in sweeping the herbage in the high central parts of the island.

Family Erirhinidæ.

Genus *Anchonus*, Schönh.

Anchonus galapagoensis. Anch. subovatus, niger, opacus; rostro basi constricto, rugoso-punctato; thorace fere cylindrico sed intra apicem distincte constricto, antice truncato, postice sub-bisinuato, rugoso-punctato, setis fuscis adsperso; elytris seriatim punctatis interstitiis tuberculis magnis, oblongis, dense fusco-setosis, obsitis; corpore subtus punctis magnis adspersis; antennis tarsisque piceis.—Long. corp. præter rostrum $2\frac{1}{3}$—$2\frac{1}{2}$ lin.; lat. 1 lin.

From James' Island.

The thorax is narrower than usual in this species, being less dilated in the middle; its sides are nearly parallel, but in front it is rather suddenly constricted, and immediately behind the constricted portion the thorax is sometimes a trifle broader than elsewhere: the punctures in the thorax are very large and coarse, and close together, the interspaces being mere ridges. The elytra are nearly ovate, but the sides in the middle evince an approach to parallelism; they are strongly punctured, and the punctures are arranged in rows, and for the most part distinctly separated from each other; the interspaces between the rows of punctures are impunctate, but present very narrow tubercles, and these are rather widely separated on the fore-part of each elytron, but on the apical portion they are longer and nearer together, and here the interstices are somewhat convex; on the third, fifth and seventh interspace the tubercles are rather more developed than on the intermediate interspaces; these tubercles are provided with largeish semi-erect setiform scales, and these are of a brownish yellow colour; similar scales are scattered in other parts, and sometimes the whole surface of the thorax and elytra is covered with a brownish substance, of the nature of which I cannot satisfy myself.

Section CYCLICA.

Family Halticidæ.

Haltica galapagoensis. Hal. ænea, antennis pedibusque testaceis; corpore oblongo-ovato, valde convexo; thorace postice transversim impresso; elytris punctatis, punctis subseriatim depositis.—Long. corp. $\frac{2}{3}$ lin.

From Charles' Island. Procured by sweeping the herbage on the high central parts of the island in the month of October.

This little insect somewhat resembles the *Haltica* (*Podagrica*) *ærata*, but has the body rather more convex in the transverse direction, the thorax broader, and the antennæ shorter and stouter; when extended backwards they scarcely reach the middle of the elytra. The thorax is transversely grooved behind, as in the genera *Graptodera, Crepidodera*, &c.; but it has not the small posterior longitudinal indentations which we observe at the extremities of the transverse groove in the latter genus, and in the structure of the antennæ and tarsi it differs from both. The tarsi are formed as in *Haltica rustica*, auct. (*Mantura* of Stephens), but the joints of the antennæ are shorter; the basal joint is long and stout; the second and eight following joints scarcely differ in length, but they very indistinctly increase in width towards the apex of the antennæ; the second joint is nearly ovate; the third, fourth, fifth and sixth are of a very short obconic form, and the rest nearly globose, with the exception of the last, which is longer than the preceding, and acuminated at the apex: the tarsi are short; the first joint very large and broad; the second rather less than the third, and nearly triangular; the third cordiform, and the fourth scarcely equal in length to the preceding two joints taken together. The eyes are lateral, moderately prominent. The thorax is narrower than the elytra, broader than long, and very convex in the transverse direction; it is truncated behind, and slightly rounded and produced over the head in front: the posterior angles are very obtuse; the surface impunctate: on the hinder part is a very distinct transverse impression which does not extend quite to the sides. The elytra are of an oblong-ovate form, and distinctly punctured above; the punctures show a tendency to arrange themselves in lines: each elytron is obtusely rounded at the apex. The upper surface of the insect is glossy and of a greenish brass colour: the legs and antennæ are testaceous, but the three or four terminal joints of the latter are somewhat dusky.

Of the various genera and subgenera of *Halticidæ* which have been characterized, I know none in which it can be placed; its nearest affinities appear to me to be with *Mantura*; but the antennæ are less incrassated at the apex, and on the other hand, as I have before stated, the basal joints are shorter and stouter: it moreover has a transverse groove to the thorax not found in that genus, and wants the longitudinal impressions on the hinder part, which all the species of *Mantura* which have come under my notice present.

Section TRIMERA.

Family Coccinellidæ.

Scymnus Galapagoensis. Scym. ater, pubescens; capite piceo; thorace utrinque flavo; elytris pallide testaceis, indistinctissime punctulatis; sutura, margine anteriore, fascia valde flexuosa, maculisque duabus subapicalibus, nigris; antennis pedibusque flavis.—Long. corp. $\frac{2}{3}$ lin.

From James' Island.

This species is about equal in size to the *Sc. minimus*; its form is rather more elongated and less convex than in that insect. The suture of the elytra is black; the black forms a broad mark at the base, but becomes very narrow towards the tip of the elytra; the outer margin of each elytron is narrowly edged with black, but on the anterior third the dark colour is suddenly expanded, and forms a broadish mark which extends to the humeral angle, and there meets a broad transverse black mark which crosses the base of the elytra: about the middle of the elytron is a narrow black fascia, which as it parts from the suture descends, about the middle is suddenly bent upwards so as to become longitudinal, and then again descends obliquely outwards and nearly reaches the outer margin: behind this central band is an oblique black spot.

VI.—*On the Organization of the* Lucinæ *and of* Corbis. By M. A. Valenciennes*.

Those anatomists who have been engaged in the study of the Acephalous Mollusca, that numerous class of animals related to the oysters, mussels, &c., regard as one of the constant characters of these creatures, that the respiratory organ fixed on each side of the body under the folds of the mantle is composed of two pairs of branchial leaflets, *i. e.* that under the common covering of the body there are four branchiæ arranged symmetrically on each side of the visceral mass.

These branchiæ are in some pectinated, or composed of small, straight and triangular laminæ arranged close together; the oysters, scallops, and the *Spondyli* present examples of this general structure, which calls to mind that of the branchiæ of almost all the osseous fish. In other Acephalous Mollusca the pectinated lamellæ are connected by numerous transversal ridges which impart more consistence to the branchial leaflet and render it more dense; the *Anodonta*, so common in all our fresh waters, offer, with a large number of other Acephala, examples of this structure; a confirmation which is seldom met with in fish, for *Xiphias* is the only one in which I have observed this arrangement.

* From the Comptes Rendus, June 9th, 1845.

However, whatever be the organization of the branchiæ of Mollusca, it is admitted and established by malacologists, that all the Acephala have four branchial leaflets. This general rule has hitherto been based on the study of several hundred animals of this class.

Between the leaflets and near one of the extremities, called the anterior one, is the mouth, a round aperture terminating immediately in the œsophagus, without any hard organ for the mastication, and without any external lingual tubercle; it is surrounded by small folds which bear the name of lips, and which are frequently ornamented with appendages or plaited filaments, varying somewhat according to the genera. Beyond the lips and on each side of the body there are two small triangular processes traversed by numerous ridges, which give to these organs an appearance of branchial lamellæ; they are called the labial palpi.

I have called attention to these external appearances of the Acephalous Mollusca to render more intelligible what I am about to describe. I have now to communicate to the Academy an observation opposed to the general rule of the four branchial laminæ. The family of the *Lucinæ* is composed of mollusca which have only a single branchial leaflet on each side of the visceral mass and of the foot. This single branchia resembles that of the *Anodonta*; it is large, thick, and formed of pectinated and anastomosing lamellæ. I first noticed this singular fact on *Lucina jamaicensis*. Surprised at this peculiarity, which I found to be constant in all the individuals in the collection of the Muséum d'Histoire Naturelle, I was immediately induced to ascertain whether this difference occurred in other species of *Lucina* or in animals allied to them. I observed the same conformation in a mollusk which had for a long time been placed among the Venuses, which Lamarck and his followers arranged in the genus *Cytherea*, but which I have been led to place near to *Lucina* from the insertion and nature of the ligament of the two valves; I mean the *Venus tigerina* of Linnæus. My previsions have therefore been verified in this respect, for the far more important character of the unity of the branchial leaflet leaves not the least doubt respecting the affinity of the two mollusca, which moreover resemble each other in several other details of their organization, although the shells differ widely with the exception of the ligament.

A third species well-known to conchologists, *Lucina columbella*, Lam., from the seas of Senegal, has likewise but one single branchial leaflet on each side of the foot. And lastly, a small species very abundant on all the sandy coasts of the Mediterranean, *Lucina lactea*, Lam., which Poli formed into a new genus under the name of *Loripes*, has also only one branchial lamina.

But this is not all. In the Polynesian Archipelagos an acephalous mollusk occurs, whose elegant shell, for a long time rare and consequently sought for in collections, is well-known. Linnæus called it *Venus Corbis*; Lamarck arranged it among the *Lucinæ*. Cuvier founded a genus with this species which presents indeed very striking characters; he left it near *Lucina*, as Lamarck had previously done. I have been so fortunate as to meet with an animal of this species in a state of excellent preservation among the collections made at the Friendly Islands by M. Quoy, and which that zoologist has not had time to study; at least he has not spoken of it in the account of the voyage of the Astrolabe. This mollusk has likewise only a single branchia on each side of the visceral mass, and I have confirmed this same conformation on a second individual brought from the Feejee Islands. However, the structure of its non-perforated foot distinguishes it from the animals of *Lucina*.

From a sole comparison of the shells, it was thought that the *Ungulinæ* offered some relations with the *Lucinæ*. We are acquainted with the mollusk of this genus from the excellent anatomical descriptions made and published by M. Duvernoy. As this anatomist found four branchial laminæ, it is impossible any longer to admit of an approximation between the *Ungulinæ* and the *Lucinæ*. My investigations confirm the relations pointed out between the *Ungulinæ* and *Mytilacea*.

It results, therefore, from the observation made by me, that the *Lucinæ* and *Corbis* differ from all the Acephalous Mollusca by a very prominent character, viz. that they possess only a single branchia on each side of the foot and viscera.

Since I have confirmed this fact on animals inhabiting the Mediterranean, the coasts of Africa, the Antilles, as well as the seas of Brazil and of the Indies, we are led to admit it as a general fact in the animals of this family; it cannot be regarded as a simple exception, which might have been the case had it been observed only on a single individual or on a single species of *Lucina*.

This great exception is not the only one which the *Lucinæ* present: the aperture of the mouth is very small, surrounded by two weak and thin folds of the skin, which require the greatest attention to be seen; they are the rudiments of lips.

But what is most remarkable is, that the labial palpi are all four wanting. There may possibly be traces of them in the animal of *Corbis*.

Poli has given a very excellent figure of his *Loripes*, or of *Lucina lactea*. It will be seen from it that he was entirely preoccupied in his investigation with the singularity of the foot of the animal, for he has represented the branchiæ situated to the right and left of the viscera, without noticing the very remarkable exception in the number of the laminæ. As M. Cuvier has only mentioned *Loripes* in order to verify the observations of the Neapolitan anatomist respecting the foot of this mollusk, it may be conceived why he has not pointed out the absence of one pair of branchiæ. I must however add, that the *Lucina lactea*, examined by these expert zoologists, is a very minute mollusk of one to two centimetres in diameter, while I have been able to examine *Lucinæ* from five to six centimetres in diameter; the observation was therefore easy to make; and when once I had ascertained the possibility of the existence of one single branchial lamina in *Lucina jamaicensis* and *L. tigerina*, I could readily detect the same organization in the smallest individuals of *Lucina lactea* from the Mediterranean.

The conformation of the foot of these mollusks, which had attracted the attention of Poli, is very remarkable; but this anatomist has not given a very complete description of it, which it nevertheless deserves. This foot is a fleshy cylinder folded back on itself so as to be hidden between the plates of the mantle of the mollusk, for it is frequently twice as long as the diameter of the animal. When not contracted it is much longer. It is remarkable that it is hollow throughout its entire length, and that this tube opens directly and widely into the spaces of the visceral cavity. I have verified this fact by following the canal in its entire length either by cutting it open or by injection, when the spaces of the visceral mass became filled, and I also thought I could perceive traces of injected vessels. This result will not appear surprising if we call to mind the observations which M. Milne Edwards and I have communicated to the Academy on the circulation in Mollusca, and on the large communications existing between the visceral cavity and the sanguiniferous vessels of the Acephala. But there is a new fact here deserving of especial attention, from its importance for the physiology of Mollusca; it is, that the inner cavities containing the blood are placed by means of the canal of the foot in *Lucina* in free communication with the surrounding element. The heart and the other viscera which I was able to observe of these animals, preserved in spirit, did not appear to offer anything remarkable.

[It is to be regretted that M. Valenciennes has not accompanied his notice of the single gill on each side of the *Lucina* with some account of its structure: from the statement that it is *large, thick,* and *formed of pectinated and anastomosing lamellæ*, it may agree essentially with the apparently single gill in the genera *Pholadomya* and *Anatina*, described by Prof. Owen in his 'Lectures on the Invertebrata,' 1843, p. 283, where the exception to the ordinary structure and number of the gills in the Lamellibranchiate Acephala is distinctly pointed out as follows:—

"The two branchial lamellæ of one side are usually connected with those of the opposite side by their posterior extremities only; but sometimes the union is more extensive. In a few genera, as *Anatina* and *Pholadomya, the two lamellæ of the same side are so united as to appear like a single gill.* In the *Pholadomya* it forms a thick oblong mass, finely plicated transversely, attenuated at both extremities, slightly bifid at the posterior one. A line traverses longitudinally the middle of the external surface, which has no other trace of division. The branchiæ on each side adhere to the mantle by the whole of their dorsal margin, and are united together where they extend beyond the visceral mass, being separated, by the interposition of that mass, along their anterior two-thirds. A narrow groove extends along the free anterior *margins of each gill.* When the inner side *of this apparently simple gill* is examined, it is seen to be divided into three longitudinal channels, by two ridges, containing the vascular trunks and nerves of the gills. A style passed from the excretory siphon, behind the conjoined extremities of the branchiæ, enters the dorsal channel, from which the excretory respiratory currents are discharged: the middle channel is characterized by an orifice which conducts into the cavity of the gill, where the ova are hatched: the third channel forms the inner or *mesial surface of the gill, which is not otherwise divided.*" —Ed. *Ann. Nat. Hist.*]

BIBLIOGRAPHICAL NOTICES.

The Genera of Birds. By G. R. Gray, F.L.S., illustrated by D. W. Mitchell, B.A., F.L.S. Imperial 4to. Parts 1—14.

It is now nearly twenty years since any naturalist has attempted to give a complete synopsis of the *species* of birds. The accessions to our knowledge during the interval have been very great, and the progress which has been made in elucidating the characters and improving the classification of the species previously known, is no less remarkable. The facts thus elicited were however scattered through rare and costly publications, many of which, especially the voluminous Transactions of foreign Societies, are almost inaccessible to the working naturalist, who will therefore hail with gratitude the work before us, which supplies him with a ready index to the whole subject of ornithology. Mr. Gray's position in the British Museum has given him peculiar facilities for perfecting his laborious undertaking, which requires a constant and ready access to books and specimens. The classification which he has adopted is for the most part consistent with natural affinities, though some of the groups, *Pachycephalinæ* for instance, consist of rather incongruous materials. Really natural groups are generally confined within certain geographical limits, and when we see an assemblage either of species or of genera from remote parts of the world brought together to form a superior group, there is often reason to suspect that their supposed affinities are apparent rather than real.

The definition of families and genera is one of the most difficult duties of the naturalist, and he is often unable so to generalize the characters of groups as to satisfy the logician. We frequently see a species connected by the closest affinity to others, yet differing from them in the very points in which the latter mutually agree, so that it is impossible to draw up a definition which shall embrace the whole, without qualifying it with such terms as "generally," "more or less," "except," &c. Mr. Gray has overcome these difficulties by care and judgement, and has given us very full generalizations of generic characters, though these would have been more useful if the *diagnostic* portion of them were printed in a different type, or otherwise separated from the general mass. Another important feature in the work is the condensation of superfluous genera, which are daily manufactured by scores on trivial or imaginary characters, and which Mr. Gray has used a sound discretion in reducing within reasonable limits.

In regard to species, the author has only been able to give a full list of them under each genus, accompanied by their chief synonyms and references to the principal works where they are figured or described. To have annexed their specific characters would have extended the work fourfold and consumed years of valuable time. The localities might however have been mentioned with advantage, and the specific characters of the new species which are occasionally introduced ought to have been added. In other respects the student is guided at once to the best sources of information, while the rigid impartiality with which the rule of priority is enforced supplies him with a nomenclature which seems likely to be permanent.

In the illustrative plates the essential characters of every genus are admirably displayed, and in each subfamily a coloured plate of some new or unfigured species is introduced. This portion of the work is beautifully executed by Mr. Mitchell, who has entered fully into the spirit of that improved style of delineation first introduced into ornithology by Mr. and Mrs. Gould's unrivalled pencils. Mr. Mitchell has been the first to apply the art of *lithotint* to the illustration of zoological subjects, and in representing that wonderfully organized structure, the plumage of birds, we are inclined to prefer it to any other method, as attaining the happy medium between the hardness of line-engraving and the indistinctness of common lithography. Indeed in respect both of drawing and colouring, it would be scarcely possible to produce more perfect copies of nature than some of these plates exhibit. The only defect which we have noticed is the occasionally too abrupt transition of the leg into the body in some of the figures, that of *Esacus* and *Syrrhaptes* for instance.

It will be evident to the practical zoologist that this beautiful and elaborate work will tend greatly to advance our knowledge of ornithology, and that no public or private museum can be scientifically arranged without its aid.

Descriptiones Animalium quæ in itinere ad Maris Australis terras per annos 1772–74 *suscepto collegit* J. R. Forster, *nunc demum editæ curante* H. Lichtenstein. 8vo. Berlin, 1844. Pp. 424.

Professor Lichtenstein has conferred a boon on literature and science by rescuing from oblivion these original observations of a profound and learned naturalist. John Reinhold Forster is well-known as the companion of Cook in his second voyage round the world, but by various mischances these memoranda of the valuable additions which he made to natural history have remained in MS. for *seventy* *years*, and only obscure and imperfect notices of his zoological discoveries have hitherto seen the light. The drawings of animals made by his son George have met with nearly the same neglect as the text to which they refer; having remained unpublished to the present time in the archives of the British Museum. Schneider indeed, in his edition of Bloch's Fishes, introduced some of the materials of Forster's MSS., and Latham founded many of his species of birds on the specimens and drawings brought home by the two Forsters. The descriptions of Latham were however generally vague and insufficient, so that it is often difficult to determine the precise species or even genus to which they refer, and the exact descriptions and measurements now furnished us by this work of Forster's will therefore be of the utmost use in identifying many obscure species, especially those of the little-known islands of the Pacific. It is indeed much to be regretted that the work before us was not published at the time that it was written, as it would then have supplied the compilations of Gmelin and Latham with materials of the highest value, while Forster would have had the credit due to his labours, and the scientific names which he proposed would have been generally adopted. But by publishing the work at the present time, nearly all Forster's specific names have lost their right of priority and must take their rank as synonyms. Yet in spite of this inconvenience, the work comes "better late than never," it will remain a monument of Forster's accuracy of observation and high attainments as a naturalist; and though the majority of the animals described were previously known from other works, yet some, especially of the Invertebrata, appear to be now first described, while the most important additional light is thrown upon others.

This volume is in fact the *Zoological Appendix* to 'Cook's Second Voyage,' and is also a valuable accompaniment to the 'Observations made during a Voyage round the World,' which Forster published in 1778, and to the 'Journal of the Voyage' which his son edited. Some portions of it are in the form of a diary, narrating the events of the expedition, but the greater part is occupied with minute descriptions of the animals collected or observed. Professor Lichtenstein deserves great praise for the strictness with which he has adhered to Forster's text, and for his valuable notes on the synonymy of the species described. In the latter department he has been aided by Erichson, who has identified many of the insects described by Forster.

We may hope that this publication may draw attention to the drawings of the younger Forster, now in the British Museum. It is much to be wished that a selection of such of these drawings as are of the greatest interest to science were engraved and published. Their importance is shown by the fact that foreign zoologists have on several occasions made pilgrimages to London to inspect these designs, and have quoted them as the authorities on which specific distinctions have been founded. The first step towards this object would be to publish an exact catalogue of Forster's drawings, distinguishing under each design the name which has been given to the species by Schneider, Latham, Forster, and the modern zoologists respectively.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

January 14, 1845.—William Yarrell, Esq., in the Chair.

Mr. Gould exhibited to the Meeting a number of Birds from China, being the first collection forwarded from Amoy to this country.

He described the following new species :—

Corvus pastinator. *Cor. plumis ptilose saturatè purpurascente-nigris; caudâ virescenti; scapulariis tectricibusque caudæ maculâ semilunari nigrâ ad apices ornatis; rostro tarsisque nigris.*

The entire plumage deep shining purplish black or plum-colour, glossed with a greenish hue on the tail-feathers; the scapularies and upper tail-coverts with an obscure crescent-shaped mark of black at the tip; bill and feet shining black.

Total length 18 inches; bill, $2\frac{3}{8}$; wing, 12; tail, 7; tarsi, $2\frac{1}{8}$; middle toe and claw, $2\frac{1}{8}$.

Hab. Chusan.

Remark.—This species is closely allied to the Rook of Europe, but differs from it in the hue of the plumage, which is of a beautiful purple or plum-colour where the European bird is green; the bill is also straighter and the face much less denuded, the fleshy base of the nostrils being the only part destitute of feathers; the feet and claws are also larger.

Mergus orientalis. *Mer.* (Fœm.) *capite cristâ colloque rubiginoso-rubris; mento albo; corpore superiore, caudâ, alis, lateribusque griseis; primariis ferrugineo-nigris; secundariis albis; corpore inferiore pallide cervino; tectricibus caudæ albidis.*

Female.—Head, neck and crest dark rust-red; chin white; all the upper surface, wings, tail and flanks grey; primaries brownish black; secondaries pure white; under surface cream-colour, fading into white on the under tail-coverts.

Total length 23 inches; bill, $2\frac{1}{2}$; wing, $9\frac{3}{4}$; tail, 5; tarsi, 2.

Hab. Amoy.

Remark.—Nearly allied to the Goosander of Europe, but smaller in size and more delicate in colour than that bird. I believe a male of this bird is in the British Museum; the female is in my own collection, and is the only one I have seen. The specimen in the Museum assimilates as closely to the male of the European bird as the one here described does to the female.

Pica serica. *P. capite, collo, pectore et tectricibus caudæ saturatè nigris; tectricibus alarum cinereo-cæruleis, ventre et scapulariis albis; caudâ metallicè nigro-viridi; rostro et pedibus nigris.*

Head, throat, chest, upper part of the back, upper and under tail-coverts deep black; secondaries and greater wing-coverts shining steel-blue; spurious wing and edges of the base of the outer webs of the primaries shining deep green; inner webs of the primaries white; the tips of the primaries and the margins of the inner webs for a short distance from the tip black; scapularies and belly pure white; tail greenish black, with bronze reflexions; bill and feet black.

Total length about 19 inches; bill, 2; wing, 8; tail about 12; tarsi, $2\frac{1}{4}$.

Hab. Amoy.

Closely allied to the common Magpie, but differs in the wings being blue instead of green, in the rather less extent of the white, and in having a longer bill and much longer tarsi.

Mr. Gould also exhibited to the Meeting a small species of Mammal, which he characterized as

Dromicia concinna. *Drom. maculâ nigrâ ante oculos; corpore supernè et parte exteriore crurum pallidè brunneis; crurum parte interiore et corpore subtùs distinctè albis.*

Before the eye a mark of black; all the upper surface, the outer side of the limbs and the tail, pale sandy brown; all the under surface and the inner side of the limbs white; the two colours distinctly separated, or not blending into each other.

Length of the head and body, $3\frac{3}{4}$ inches; of the tail, $3\frac{1}{4}$; of the ear, $\frac{1}{2}$.

Hab. Western Australia.

Very nearly allied to the *Dromicia* of Van Diemen's Land, but distinguished from that animal by its much smaller size, by the distinct separation of the colours of the upper and under surface, and by the absence of any enlargement at the base of the tail.

Also a new Grallatorial bird, which he named

Fulica australis. *Ful. capite colloque nigris; supernè griseonigro, subtùs fuliginoso; iridibus rubris; rostro cinereo-cæruleo; vertice viridi-albo; tarsis pedibusque griseis.*

Head and neck black; all the upper surface greyish black; under surface sooty black; irides bright red; bill light bluish grey; crown of the head greenish white; legs and feet French grey.

Total length 14 inches; bill, $1\frac{1}{4}$; wing, 8; tail, $2\frac{1}{4}$; tarsi, $2\frac{1}{4}$.

Hab. Western Australia.

"Descriptions of species of Bats collected in the Philippine Islands, and presented to the Society by H. Cuming, Esq." By G. R. Waterhouse, Esq.

The following descriptions and notices, added to those given in the 'Annals,' vol. xiii. p. 302, include all the species of the order Cheiroptera collected by Mr. Cuming in the Philippine Islands; and it is necessary to state, with regard to the descriptions alluded to, that they are all drawn up from specimens preserved in spirit; and although every care has been taken to ascertain the true colouring of the fur as nearly as possible by repeated examinations of the specimens, mounted as they were in clear spirits of wine, the colours may not prove to be exactly as I have supposed.

The following table displays some of the more prominent characters of the species of *Vespertilio* (generally so difficult to determine) about to be described:—

A. Wing-membrane extending to the distal end of tibia.
  a. Ears moderate, or rather small, rounded; tragus rather short, rounded at the apex; heel-cartilage short.
    a. 1. Nostrils separated by a moderately wide space, and opening sublaterally .... 1. *Vesp. tristis.*
    a. 2. Nostrils with a narrow space between them (a distinct notch, however, in that space), and opening almost in front .... 2. *Vesp. Eschscholtzii.*

  b. Ears large and pointed; tragus long, narrow and pointed; heel-cartilage long.
    b. 1. Hind-foot very large .... 3. *Vesp. macrotarsus.*
    b. 2. Hind-foot small .... 4. *Vesp. pellucidus.*

B. Wing-membrane extending to base of toes.
  a. Ears short, rounded at apex; tragus short, subpointed .... 5. *Vesp. Meyeni.*
  b. Ears large, pointed; tragus long, attenuated and pointed .... 6. *Vesp. rufo-pictus.*

Vespertilio tristis. *Vesp. vellere molli, nigricanti-fuliginoso; auribus mediocribus, rotundatis; tragis mediocribus arcuatis, apice rotundatis; rostro brevi obtuso; alis angustis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	2	5
——— *caudæ*	2	5
——— *antibrachii*	2	1
——— *auris*	0	$3\frac{2}{3}$
Alarum amplitudo	13	0

The fur is dense in this species, but not long; dense fur extends on to the head, and leaves but a small portion of the muzzle, which is covered with shorter hair: the general colour is sooty black, and the hairs appear to be uniform to the root; those on the belly are slightly tinted with greyish at the point. The incisor teeth are $\frac{2-2}{6}$. The forehead is much arched; the muzzle short and obtusely rounded, very broad and hairy; the lower lip has a narrow transverse naked area at the tip; the nostrils are sublateral, moderately separated, and there is a slight depression between them. The ears are moderate, rounded, but with the upper, or anterior, margin nearly straight; the tragus is curved, and rather obtusely rounded at the point, about $2\frac{1}{2}$ lines in length, and $1\frac{3}{4}$ line in width. The wings are rather narrow, and have the membranes black; they extend to the heel of the hind-foot, which has the metatarsus narrow and long, the distance from the heel to the base of the toes exceeding the toes in length; the toes are shortish and equal, the nails are also short and but little curved; the heel-cartilage is short, bent back, and not easily brought in a right angle with the tibia, as in many of the species of the present genus. The hind-legs are rather long;

the interfemoral membrane ample, naked above and below, excepting quite at the base; the tail is enclosed to the point in this membrane; the thumb is moderate.

Vespertilio Eschscholtzii. *Vesp. vellere longo fusco-nigricante, corpore subtùs pilis apicibus cinerascentibus; artubus fuscis; auribus brevibus; tragis angustis, ad apicem rotundatis, anticè emarginatis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	2	0
——— *caudæ*........................	2	0
——— *antibrachii*....................	1	9
——— *auris*	0	$3\frac{1}{2}$
Alarum amplitudo	12	0

Incisor teeth $\frac{2-2}{6}$; the outermost incisor of the upper jaw is smaller than the inner one. The forehead is much arched, and separated, as it were, from the muzzle by a deep transverse depression; on each side of the head is a naked groove, which runs over the eye. The muzzle is short and rounded, naked at the tip only, the other parts moderately well clothed with hairs: the nostrils open almost in front, and are more than usually approximated; their upper boundary is prominent, and there is a deep groove between them. On the inner side of the upper lip are two small fleshy folds, and some compressed tubercles situated toward the angle of the mouth; the lower lip has a narrow triangular naked area at the tip. The ears are short, broad and rounded, but have the upper margin subtruncated; on the inner side are two transverse ridges; the lower part of the ear is extended forwards to the angle of the mouth. The tragus is narrow, curved, rounded at the point, indistinctly emarginated on the outer side, and about $2\frac{2}{3}$ lines in length. The wings are rather narrow, and extend along the hind-leg to the distal end of the tibia only. The hind-legs are moderate; the metatarsus narrow and long, the distance from the heel to the base of the toes exceeding the toes in length; the toes are rather short and nearly equal. The interfemoral membrane is ample, naked, excepting at the base; the heel-cartilage is short; the tail enclosed in the interfemoral membrane to the point; the thumb is very small.

Of the species described in this paper, *Vespertilio Eschscholtzii* approaches most nearly to the *V. tristis*; it is much smaller, however, than that animal, has the thumb smaller in proportion, and its colouring is less dark. Among the species of M. Temminck's Monograph our *V. tristis* most nearly resembles, in the form of its head and ears, the *V. blepotis* (pl. 53. fig. 2.); the *V. Eschscholtzii* (of which Mr. Cuming brought home several specimens) is at least one-third smaller.

Vespertilio macrotarsus. *Vesp. suprà cinereus, subtùs albicans; auribus longis, angustis, ad apicem acutis, posticè ferè rectis; trago elongato, attenuato, acuto; alis amplis fuscis, ad basin pallidioribus.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	2	3
——— ——— ad basin auris	0	5
——— *caudæ*	1	10
——— *antibrachii*....................	1	$9\frac{1}{3}$
——— *pollicis*	0	$3\frac{3}{4}$
——— *auris*	0	$6\frac{1}{2}$
——— pedis postici a calce ad apicem digiti	0	$6\frac{1}{2}$
Alarum amplitudo	11	0

The fur on the back is apparently dusky grey next the skin, and pale ashy grey externally, and on the under parts the hairs are grey at the base and whitish at the point. The incisors are $\frac{2-2}{6}$; the pair of incisors on either side of upper jaw nearly equal. The forehead is convex, and separated from the muzzle by a transverse depression: the muzzle somewhat produced and pointed, the mesial portion above and in front naked, the naked portion above extending about two lines from the tip, and separated from the somewhat swollen cheeks by a longitudinal groove on each side: between the nostrils, which are widely separated and pierced almost laterally, is a shallow groove. The lips have small scattered hairs, excepting at the tip, where they are naked; on the chin is a naked wart somewhat removed from the apex. The ears are largeish and rather narrow, pointed, and have the hinder margin nearly straight. The tragus is narrowish, attenuated, and pointed at the apex. The wings are ample, and the membranes encroach on the back so as to reduce the portion covered with fur to a narrow strip of about half an inch in width; they extend along the hind-leg to the heel only; the thumb is comparatively long; the hind-foot very large, and having the toes equal, excepting the outer one (according to the natural position of the foot, but the toe corresponding to the inner toe in most other animals), which is rather shorter. The interfemoral membrane is moderately ample, and does not extend quite to the tip of the tail, a portion of about one line in length being free. The heel-cartilage is very long.

In the large size of the hind-foot the present species approaches the *V. Hasseletii* of Temminck's Monograph, but it does not appear that that species has the wings encroaching on the back as in *V. macrotarsus*; the ears are much larger, the thumb also larger, tail longer, &c. The proportions, as compared with those of M. Temminck's *V. macrodactylus* and *V. brachypterus*, differ considerably, though both these species have the hind-foot large; the larger ears, longer thumb, and more ample wing will serve to distinguish it.

Vespertilio pellucidus. *Vesp. vellere longo, pallidè rufo, corpore subtùs cinerascenti-albo; alis fuscis, pellucidis; auribus magnis, apice acutis, posticè emarginatis; trago elongato, attenuato; rostro producto, depresso, subacuto.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	1	8
——— *caudæ*	1	$9\frac{1}{2}$

	unc.	lin.
Longitudo *antibrachii*	1	3
——— *auris*	0	7
Alarum amplitudo	9	6

The fur in this animal is long, of a delicate pale rufous on the upper parts of the body, but slightly tinted with grey next the skin; the under parts are ashy white. The incisor teeth are as usual $\frac{2-2}{6}$; the two innermost of the upper jaw are widely separated, long-pointed, and resemble canine teeth; the outer pair are very small. The forehead is considerably arched; the muzzle produced, pointed and depressed, and has a slight concavity above; the nostrils are widely separated, pierced laterally, and have a slight depression between them; the tip of the muzzle is naked. The lower lip has a small, smooth, naked space at the tip. The ears are of a very pale brown colour, large, transparent, pointed, and strongly emarginated behind; the tragus is very long and slender (its length being about $4\frac{2}{3}$ lines, and width at the base less than 1 line), and decreases gradually in width from the base to the point; close to its root, externally, is a slightly prominent angle. The wings are large and supported by very delicate and slender bones, very transparent, and extend slightly on to the toe of the hind-foot. The hind-legs are long and slender; the foot small; the metatarsus shorter than the toes, which are slender and very nearly equal, if we except the one to which the wing is slightly attached, which is distinctly shorter than the rest. The interfemoral membrane is ample, and presents a few scattered hairs: the heel-cartilage long. The tail is long, and enclosed in the membrane to the point; the fourth vertebra from the base has much flesh about it, which forms a small lump,—perhaps this is accidental. The thumb is slender, but rather long.

This species is remarkable for having long and extremely slender limbs, and for the transparency of its flying-membranes. I could read this writing through the wing-membranes, moistened as they were with the spirit, at a distance of more than a quarter of an inch.

Vespertilio Meyeni. *Vesp. intensè rufescenti-fuscus, pilis ad basin albescentibus; corpore subtùs cinereo lavato; brachiis rufescentibus; rostro brevi, obtuso; auribus subtriangulis, ad apicem rotundatis, posticè emarginatis; tragis arcuatis, angustis, ad apicem subacutis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	1	7
——— *caudæ*	0	11
——— *antibrachii*	1	1
——— *auris*	0	$2\frac{3}{4}$
Alarum amplitudo	6	6

This species has the usual number of incisors $\left(\frac{2-2}{6}\right)$; the innermost pair of the upper jaw are larger than the external pair, and bifid at the apex. The forehead is moderately arched; the muzzle is broad and but sparingly clothed with hairs, swollen at the sides;

two longitudinal grooves mark the usual external boundaries of the nasal bones; and these grooves, at first shallow, become deeper behind, where they are curved outwards towards the eyes, over which is a small fleshy tubercle; the upper part of the nose (between the two grooves mentioned) is almost naked, but a few minute scattered hairs are observed at the tip, and even in front, and along the edge of the upper lip. The lower lip presents a very small triangular naked patch at the tip. The nostrils are rather widely separated, and open obliquely outwards. The ears are short, subtriangular, have the extreme point rounded, and the posterior border slightly emarginated; on the inner side are three or four transverse rugæ. The tragus is narrow, subpointed, and has a notch in the middle of the external margin. The wings are somewhat narrow, and have the membranes of a very dark brown colour, the limbs being of a dusky purplish red tint; the membrane of the wing extends to the base of the toes. The thumb is small; the hind-legs shortish; the metatarsus short, being about equal in length to the toes, which are very nearly equal, the outer one being but a trifle shorter than the others. The interfemoral membrane is by no means ample, brown above and very pale beneath, where pale scattered hairs are observable, especially near the tail; above, this membrane appears to be naked, excepting at the base. The heel-cartilage is moderate, and on the lower or outer side of this cartilage is an obtusely-angular piece of membrane, about 2 lines in length and 1 line in breadth. The tail has the extreme point free.

I have attached to this and one of the foregoing species the names of two able naturalists who have contributed to our knowledge of the zoological productions of the Philippine Islands.

The *V. Meyeni* apparently approaches most nearly to the *V. tralatitius* of Temminck's Monograph, but has the muzzle broader and more rounded, the ears less pointed, the tail, antibrachium and tibiæ shorter, the latter considerably so; the foot is also shorter and broader than represented in M. Temminck's figure of that species. The colouring (so far as one may judge from specimens preserved in spirit) also differs.

VESPERTILIO RUFO-PICTUS. *Vesp. suprà ochraceis, pilis ad basin cinereis; corpore subtùs flavescenti-albo; alis nigrescentibus, areâ magnâ ad basin, brachiis, membranâque interfemorali rufis; auribus longis, angustis, acutis, posticè distinctè emarginatis; tragis attenuatis, acutis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	2	3
——— *caudæ*	1	11
——— *antibrachii*	1	11
——— *auris*	0	$5\frac{3}{4}$
Alarum amplitudo	13	6

Fur moderate; on the upper parts of the body pale grey at the root, and of a delicate yellow colour externally; on the under parts of the body yellowish white, scarcely tinted with grey at the root. The wing-membranes are black, excepting in the region of the bones of the fingers and a large area at the base, at which parts they are of a bright red colour; a straight line drawn obliquely across the wing from the thumb to the heel would mark the boundary of the red basal portion. The small strip of membrane above the arm is red, clouded with black. The limbs and interfemoral membrane are also red, and the naked tip to the muzzle, as well as the ears, are very pale flesh-colour. The hinder toes are dusky at the tip.

The forehead is but little arched; the muzzle is produced, but somewhat rounded at the tip, which is the only part which is naked, and even here a few minute scattered hairs are observable in the middle. Above the nose are two longitudinal grooves. The lower lip has a semicircular naked space at the tip, and a tubercle is observed between this point and the throat. The nostrils are lateral, and the space between them is slightly depressed. The ears are long, rather narrow and pointed, and distinctly emarginated behind. The tragus is about $4\frac{1}{4}$ lines long, narrow, attenuated and pointed. The wings are very ample and extend to the base of the toes. The thumb is long; the hind-legs moderately long; the metatarsus shorter than the toes (claws not included), and these are very nearly equal. The interfemoral membrane is moderately ample, well-clothed with hair at the base, and a few longish scattered hairs are observable on other parts, especially on the upper surface. The heel-cartilage is long, extending to within about four and a half lines of the tail.

This species very much resembles the *Vespertilio pictus* of Pallas, but is much larger, and differs in the form and proportions of its ears.

Taphozous philippinensis. *Taph. vellere brevi fuscescente vel castaneo, corpore subtùs pallidiore; pilis ad basin albescentibus; auribus mediocribus.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	3	$1\frac{1}{2}$
———— *caudæ*	0	8
———— ab apice rostri ad basin auris	0	5
———— *auris*	0	6
———— *antibrachii*	2	7
———— *tibiæ*	0	11
Alarum amplitudo	13	6

This species approaches most nearly to the *Taphozous saccolaimus*, but differs in being considerably smaller, in having the muzzle shorter and more pointed, the ears larger, and the feet considerably smaller; the colouring moreover is different. It agrees with *T. longimanus* in having no throat-pouch or nakedness at that part, but differs in its proportions, &c.

The fur is short and by no means dense, nearly white next the skin both on the upper and under parts of the body; on the upper parts the hairs have the visible portion tipped with reddish brown or chestnut colour, sometimes brown. The under parts are always of a paler hue than the upper, and sometimes almost white, merely suffused with pale chestnut-brown: on the throat this colour is usually more intense. The wing-membranes are brown, sometimes dusky; the interfemoral membrane assumes a paler hue beneath.

The head, viewed from above, presents a triangular figure, of which the tip of the muzzle forms the apex, and is somewhat acute; the nose is slightly prominent; the nostrils terminal, and but slightly separated; the upper lip terminates in a point; the under lip is somewhat swollen at the extremity, and a largeish transverse swelling or tubercle is observed below the chin. The ears have the anterior part running on to the forehead, but separated by a space of about two lines, which space is occupied by the deep frontal pit; they are of moderate size, perhaps might be called rather large; the lateral and anterior margins meet so as to form nearly a right angle; on the anterior margin, which is thickened, is a series of pointed tubercles; the lateral or outer margin is very slightly emarginated, and on the inner side numerous transverse small folds or ridges are perceptible; the point of the ear is narrow, but rounded. The tragus is scarcely 2 lines in length, and about $2\frac{1}{2}$ lines in width, rounded at the apex and contracted at the base. The tail is enclosed in the interfemoral membrane rather less than one-third of its length. The interfemoral membrane is about eleven lines in antero-posterior extent, naked beneath, slightly hairy above to the base of the free portion of the tail, which has a few long scattered hairs. The feet are almost naked, having only a few scattered hairs. The limbs are of a pale dirty flesh-colour.

The teeth most nearly resemble those of skull fig. 11. pl. 60. of Temminck's Monograph, but the incisors are more expanded at the apex than represented in that figure, and very deeply notched. The formulæ are the same, viz. incisors, $\frac{0}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}$, the first false molar of the upper jaw is small and almost hidden by the gum; the second distinct; both first and second false molars of lower jaw are distinct; the latter is most elevated, but the foremost is the largest. The palate has numerous well-developed transverse ridges, seven in number, if we commence from between the canines, in front of which are two others less distinct; the third, which is between the false molars, is most developed. The tongue is thick, but pointed at the apex, and presents a triangular transverse section, extending in its ordinary position to the incisor teeth, which on the inner side are covered by the gum up to their points.

Besides these, and the Philippine Island Bats noticed or described in the 'Annals,' vol. xiii. p. 302, I have to add, as also forming part of Mr. Cuming's collection, a species of *Nycticejus* which agrees most closely with the *N. borbonicus*; this and the *Taphozous philippinensis* appear to be extremely abundant in the Philippine Islands; and lastly, a species of *Dysopes*, which I feel very little doubt is the *D. tenuis* of Horsfield; it agrees most closely with the detailed description and figure given by Temminck.

January 28.—William Horton Lloyd, Esq., in the Chair.

"Description of three new species of Shells belonging to the genus *Artemis*," by Sylvanus Hanley, Esq.

Artemis simplex. *Art. testâ orbiculari-subtrigonâ, solidâ, sub-*

inæquilaterali, nitidâ, eburneâ, ventricosâ, concentricè et subimbricatim sulcatâ; sulcis haud confertis; margine ventrali arcuato; dorsali utrinque declivi, anticè retuso, posticè arcuato; utrâque extremitate rotundatâ; lunulâ haud magnâ, impressâ; areâ dorsali posticâ nullâ. Long. 1·63; lat. 1·55 poll.

Index Testaceologicus, sup. t. 15. f. 41.

Hab. Panama, St. Elena. Mus. Cuming, Hanley.

The general outline, owing to the abruptness of its slopes, closely resembles that of *excisa*; but in that species the sulci (or rather costellæ) are elevated, the hinder dorsal area is excavated, and the lunule is large and ill-defined. The colour is ivory-white, with usually a zone or two of very pale blue; and, contrary to the other two species, the greatest length is from the beaks to the lower or ventral margin.

Artemis subquadrata. *Art. testâ suborbiculari, subquadratâ, compressâ, subpellucidâ, valdè inæquilaterali, intus extusque albidâ, concentricè substriatâ; margine ventrali posticè arcuato, anticè convexo et sursùm acclivi; dorsali anticè convexo haudque declivi, posticè subrecto et declivi; extremitate posticâ latissimâ, anticâ angustâ; lunulâ magnâ, subobsoletâ.* Long. 1·62; lat. 1·75 poll.

Ind. Test., sup. t. 15. f. 39.

Hab. St. Elena, West Columbia. Mus. Cuming, Hanley.

The peculiar breadth of the posterior side, whose upper or dorsal angle is horizontal, or even ascending, the freedom from incurvation and abrupt slope of the front dorsal line, and the scarcely defined lunule, concur to render this rare shell strikingly different from any known species in this genus.

Artemis sculpta. *Art. testâ orbiculari-subquadratâ, magis minusve ventricosâ, solidiusculâ, inæquilaterali, subnitidâ, sordidè albidâ aut albido-lutescente (nonnunquam pallidè livido-fuscescente alboque marmoratâ), concentricè sulcatâ; striis radiantibus, sulcos confertissimos anticè (plerumque etiam posticè) decussantibus; sulcis medio subimbricatis, ad utramque extremitatem lamellosis; margine ventrali subarcuato; dorsali posticè convexiusculo vixque declivi, anticè retuso et paulò declivi; lunulâ impressâ, ovato-cordatâ; areâ dorsali posticâ nullâ; natibus haud prominentibus.* Long. 1·80; lat. 2 poll.

Ind. Test., sup. t. 15. f. 42.

Hab. Australia? Mus. Hanley, &c.

The radiating lines are not always perceptible on the posterior side of the adult, and the concentric sulci in that case appear fimbriated. It is allied to *subrosea* of Gray.

February 11.—William Yarrell, Esq., in the Chair.

A specimen of *Cancer norvegicus*, taken by a fishing-boat at the "Silver Pits," eighty miles eastward of Scarborough, was presented by Mr. Ingarfield.

A communication was read from James Stark, M.D., F.R.S.E., in which he advocates the hypothesis that the *Tetrao medius* is neither a hybrid nor a distinct species, but merely an immature male of the *Tetrao Urogallus* or Capercailzie, founding his opinion on the appearance of the *Tetrao medius* immediately after the re-introduction of the Capercailzie into Scotland by the Earl of Breadalbane, and on the fact, that no two species of a genus, however similar they may be in appearance, pair voluntarily while in a state of nature.

February 25.—R. C. Griffith, Esq., in the Chair.

"Descriptions of six new species of *Donax*, in the collection of Hugh Cuming, Esq. (Corr. Memb.)," by Sylvanus Hanley, Esq.

Donax ticaonicus. *Don. testâ cuneiformi, convexâ, nitidissimâ, solidâ, obliquâ, lævigatâ, maximè inæquilaterali, albidâ, aut livido-purpurascente, concolore, epidermide flavescente indutâ; margine ventrali integro, magis minusve convexo; dorsali, anticè declivi et subrecto aut subretuso, posticè subrecto et subitò declivi; extremitate lateris antici producti, attenuatâ, rotundatâ; latere postico brevissimo, truncato et infernè obtusè angulato; pube concentricè et profundè rugosâ; natibus acutis, prominentibus; superficie internâ aut violaceâ aut albidâ violaceâ posticè fucatâ; dente laterali antico remoto, postico approximato.* Long. 1·; lat. 1·50 poll.

Hab. Ticao, Philippines (Cuming).

Remarkable for its obliquity and the abrupt truncation of the posterior side.

Donax culter. *Don. testâ elongatâ, angustâ, convexâ, satis inæquilaterali, nitidâ, striulis exilibus confertim radiatâ, variis coloribus pictâ (plerumque purpureâ, sed etiam flavâ lineis purpureo-brunneis radiatâ, albidâ radiis violaceis aut lividis, aurantiâ et roseâ, sæpè radiis albidis ornatâ); margine ventrali crenulato, anticè subrecto, posticè convexo; dorsali anticè recto et vix paululùm declivi, posticè convexo satisque declivi; latere antico producto, ad extremitatem obtusè rotundato; postico rotundato-cuneiformi; lunulâ ligamentoque angustis; pube striis simplicibus radiatâ; costâ umbonali obtusissimâ; dentibus lateralibus haud remotis.*

Var. *a.* *Testâ subinæquilaterali; margine ventrali medio subposticè retuso; dente laterali antico, plerumque magis approximato.*

Var. *b.* *Testâ minus elongatâ et magis inæquilaterali; margine ventrali rarò retuso; dente laterali antico plerumque magis remoto.*

Long. 0·50; lat. 1·50.

Hab. Var. *a.* Matzellan, Gulf of California (Cuming).

Var. *b.* Acapulco (Cuming).

Rather a common shell, and closely allied to *pulchella.*

Donax asper. *Don. testâ trigonâ, ventricosâ, solidâ, subinæquilaterali, albidâ aut carneâ, anticè nitidiusculâ et radiatim striatâ, posticè impolitâ et radiatim costellatâ; striis exilibus et simplicibus; costellis parvis, decussatis, aut subsquamosis aut subgranosis, supra costam umbonalem angulatam confertis; margine ventrali crenato, arcuato; dorsali antico, valdè declivi, subrecto; postico retuso, inermi, subitòque declivi: extremitate lateris antici longioris, rotundatâ, posticâ angulatâ; natibus valdè prominentibus et maximè* *incurvatis; pube planâ; dentibus lateralibus approximatis.* Long. 1·30; lat. 1·60 pol.

Hab. Tumbez, Peru (Cuming).

Closely resembling *dentiferus*, but not provided with the characteristic tooth, much stronger and more triangular, and with its ventral edge more arcuated, and its front extremity more attenuated. The front dorsal edge appears retuse (which it is not in reality), from the lateral projection of the swollen beaks. The lower margin is stained with violet anteriorly.

Donax Navicula. *Don. testâ elongato-trigonâ, crassâ, subventricosâ, nitidâ, subinæquilaterali, sublævigatâ (striis radiantibus tantum in medio perspicuis), albâ, epidermide flavâ indutâ, propè marginem dorsalem utrinque brunneo-purpurascente strigatâ; margine ventrali in medio ventricoso, intus crenato; dorsali anticè subrecto et subdeclivi, posticè incurvato et declivi; areâ posticâ lævi, subconcavâ; latere antico longiore, angustato, ad extremitatem rotundato; postico cuneiformi, ad extremitatem obtuso; ligamento minimo; costâ umbonali obtusâ; superficie internâ albidâ, utrinque supernè purpureâ; dentibus lateralibus maximè approximatis.* Long. 0·40; lat. 0·90 poll.

Hab. Gulf of Nicoya, Central America (Cuming).

Allied to *californiensis*, but more triangular.

Donax gracilis. *Don. testâ elongatâ, angustâ, nitidâ, valdè inæquilaterali, compressâ, sublævigatâ, albidâ aut pallidè violaceo-rufescente, epidermide lutescente indutâ; margine ventrali convexo aut subarcuato, haud flexuoso, intus crenulato; dorsali magis minusve livido, utrinque subrecto, anticè vix paululùm declivi, posticè valdè declivi; latere antico producto, attenuato, ad extremitatem rotundato, postico acuminato-cuneiformi; ligamento minimo; areâ posticâ lævi, obtusissimâ; costâ umbonali obtusâ; superficie internâ purpurascente; dentibus lateralibus perspicuis, approximatis.*

Var. *b. Testâ albidâ, radiis paucis livido-rufescentibus ornatâ.*

Var. *c. Testâ rufescente aut lividâ.*

Long. 0·40; lat. 1 poll.

Hab. Bay of Guayaquil. Var. *b.* Chiriqui. Var. *c.* Bay of Caraccas (Cuming).

Allied to *Owenii*, but with the margin crenulated.

Donax sordidus. *Don. testâ abbreviato-cuneiformi, convexâ, nitidiusculâ, solidâ, valdè inæquilaterali, striis exilibus simplicibus confertim radiatâ, sordidè albidâ; lineis elevatis obliquis subconcentricis, partem superiorem et lævigatam testæ posticè asperantibus; margine ventrali crenulato, medio arcuato; dorsali antico, declivi et subrecto; postico subrecto et valdè declivi; latere antico attenuato; postico brevi et infernè (in adultis etiam supernè) obtusè angulato; pube fortiter et confertim rugis subdecussatis concentricè exaratâ; costâ umbonali subangulatâ; superficie internâ albidâ, purpureo infectâ; dentibus lateralibus approximatis, antico permagno.* Long. 0·70; lat. 1 poll.

Hab. Cape of Good Hope. Mus. Brit., Cuming.

Intermediate between *striata* and *semisulcata*. The raised oblique lines which roughen the posterior side near the beaks where the striæ have become entirely obsolete, are a striking character in this rare species.

Mr. Fraser exhibited to the Meeting and characterized three new species of Birds from the Society's collection, viz :—

Palæornis modestus. *Pal. ptilose viridis; genis pallidè cervinis; vittâ a naribus ad oculos viridescenti-nigrâ; mandibulis nigris.*
Hab. —— ?

This bird is nearly allied to the *P. pondicerianus*, but differs in the colour of the cheeks, breast and mandibles; it differs also from *P. malaccensis* in the paler colour of the cheeks, and that colour not extending further back than the ears, in the colour of the beak, &c.; it may also be readily distinguished from Mr. Hodgson's Nepaul species by the colouring of the cheeks.

Lorius superbus. *Lor. capite et tectricibus majoribus inferioribus alarum nigris; genis, lateribus, pectore et uropygio rubris; nuchâ, ventre, femore, et tectricibus caudæ inferioribus cæruleis; scapulis, tectricibus alarum inferioribus minoribus, et dimidio terminali caudæ cæruleis; alis externis viridibus.*
Hab. —— ?

This bird is about the size and is closely allied to the *Lorius Philippensis*, Briss., but differs in having the shoulders and smaller under wing-coverts blue, the larger ones black (in this respect it somewhat resembles the *Lorius domicellus*, Auct.); in the absence of the red band immediately below the black crown; and in having an entire red band from shoulder to shoulder, whereas in *L. Philippensis* it is only partial.

Larus Bridgesii. *Lar. ptilose griseus; capite et mento pallidè cinereis; primariis et secundariis nigris, apicibus secundariarum albis, fasciam albam trans alas formantibus; quibusdam primariis apicibus albidis; vittâ nigrâ lat.* 1 *poll. prope apices remigum; rostro pedibusque nigris.*

	poll.
Tot. long.	18
Alæ	11
Cauda	$5\frac{1}{2}$
Rictus	$2\frac{1}{2}$
Tarsi	2
Digitus medius	$1\frac{3}{4}$

From Valparaiso, Chile. Collected by Mr. Thomas Bridges, Corr. Memb.

This apparently new species of Gull is closely allied to the *Larus fuliginosus*, Gould, but differs in the beak being much more slender, in the general colour being lighter, in the head and chin being nearly white, in having a white band across the wings, and the black band across the tail being more decided.

March 11.—Rev. John Barlow, M.A., F.R.S., Sec. R.I., in the Chair.

A paper by Sylvanus Hanley, Esq., was read, containing descriptions of two new species of *Donax* :—

Donax assimilis. *Don. testâ cuneiformi, magis minusve crassâ, anticè compressâ, posticè ventricosâ, valdè inæquilaterali, lividâ, albo-violascente, aurantiâ aut flavidâ, zonis saturatioribus aut violaceis plerumque pictâ, radiatim striatâ; striis haud confertis, anticè simplicibus, posticè elevatis et decussatis; margine ventrali crenulato, haud arcuato, anticè sursum acclinato; dorsali, anticè subdeclivi subrecto aut convexiusculo, posticè subrecto et valdè declivi; latere antico producto, ad extremitatem rotundato et attenuato; postico perbrevi et infernè angulato; costâ umbonali subangulatâ; pube decussatâ, et costellâ ad extremitatem dentiferâ, sæpè radiatâ; ligamento prominente et satis magno; superficie internâ in adultis, prope marginem violaceâ; dente laterali antico haud remoto, postico subapproximato.* Long. 1; lat. 1·55 poll.

Hab. Panama. Mus. Cuming, Hanley, &c.

Very variable in colouring, often with a short purple perpendicular ray upon the umbones; sometimes with three or four pale rays on a darker ground, but usually uniform and only marked when aged, with the rib-like stria projecting at the margin like a tooth. This latter character and the identity of its sculpture render the species liable to be confused with *dentiferus*, but the greater tenuity and less elongated shape of that shell is preserved even in the younger specimens.

Donax lubricus. *Don. testâ cuneiformi, compressâ, solidiusculâ, valdè inæquilaterali, nitidissimâ, lividâ aut albo-violascente, anticè lævigatâ, posticè striis radiantibus ornatâ; margine ventrali exiliter crenulato, convexo aut convexiusculo; dorsali, utrinque subrecto, anticè declivi, posticè valdè declivi; latere antico attenuato, ad extremitatem rotundato; postico perbrevi et infernè obtusè angulato; vulvâ rugis confertis concentricis, striisque exilibus radiantibus, eleganter decussatâ; costâ umbonali subobtusâ; natibus acutis; dentibus lateralibus obsoletis.* Long. 0·6; lat. 0·8 poll.

Hab. ——? Mus. Cuming.

Peculiar for uniting a smooth surface to a crenulated margin.

March 25.—William Horton Lloyd, Esq., in the Chair.

Mr. Gould exhibited to the Meeting a new species of *Trogon*, from South America, and seven new Birds from Australia, which he characterized as follows:—

Trogon puella. *Trog. loris, plumis auricularibus et gulâ fusconigris; capite, corpore superiore, et pectore aureo-viridibus; alis nigris; tectricibus alarum maculis minimis albis ornatis; corpore inferiore vividè coccineo, separato a viridi pectore fasciâ semilunari albâ; tribus remigibus exterioribus nigris vittis albis angustis frequentibus ornatis; femoribus nigris.*

Lores, ear-coverts and throat dull black; head, all the upper surface and chest golden green; wings black; the coverts very minutely freckled with white, and the primaries with a very narrow line of white along the basal portion of their outer webs; all the under surface scarlet, separated from the green of the chest by a semilunar mark of white; two middle tail-feathers golden green; the two next on each side golden green on their outer webs and black on their inner, the whole six tipped with black; the three outer feathers on each side black, crossed by numerous narrow bars of, and narrowly tipped with, white; thighs black; bill orange; irides red; feet dark grey.

Total length, 10 inches; bill, 1; wing, $5\frac{1}{2}$; tail, $5\frac{3}{4}$; tarsi, $\frac{1}{2}$.

Hab. Escuintla, South America.

Remark.—Nearly allied to *Trogon collaris*, Vieill.

Cuculus optatus. *Cuc. corpore superiore cæruleo-griseo; pogoniis internis primariarum fasciis latis albis ornatis; remigibus saturatè violaceo-brunneis; apicibus subalbidis, serie macularum oblongarum albarum alternatim ordinatâ; corpore subtùs albo, fasciis nigris.*

The whole of the upper surface slaty grey; inner webs of the primaries broadly barred with white; tail-feathers dark violet-brown, with a row of oblong spots of white placed alternately on either side of the stem, and slightly tipped with white; the lateral feathers have also a row of white spots on the margin of their inner webs; chin and breast light grey; all the under surface buffy white, crossed by bands of black; irides, bill and feet orange.

Total length, 13 inches; bill, $1\frac{1}{4}$; wing, $7\frac{3}{4}$; tail, $6\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Port Essington, Australia.

Remark.—Closely allied to the Common Cuckoo of Europe.

Cuculus insperatus. *Cuc. capite, gulâ, et corpore superiore cæruleo-griseis; alis, dorsoque nitidè viridescentibus; caudâ brunneo-viridi singulâ plumâ apice albo, et marginibus pogoniorum interiorum ordine macularum albarum triangularium ornatis; parte subscapulari tectricibus caudæ inferioribus, crissoque rufis; corpore subtùs rufo-tincto-griseo.*

Head, throat and all the upper surface dark slate-grey; back and wings glossed with green; tail glossy brownish green, each feather tipped with white, and with a row of triangular-shaped white marks on the margins of the inner webs; primaries and secondaries with a patch of white on their inner webs near the base; edge of the shoulder white; under surface of the shoulder, vent and under tail-coverts rufous; the remainder of the under surface grey, washed with rufous; bill black; feet olive.

Total length, $9\frac{1}{4}$ inches; bill, 1; wing, $6\frac{1}{2}$; tail, 5; tarsi, $\frac{5}{8}$.

Hab. New South Wales.

Remark.—Nearly allied to *C. cineraceus* of Vigors and Horsfield.

Cuculus dumetorum. *Cuc. capite, uropygio, colloque saturatè cæruleo-griseis; alis, caudâ dorsoque metallicè brunneis; apicibus remigum leviter albis; pogoniis interioribus serie macularum triangularium parvarum ornatis; pectore griseo, rufo-tincto.*

Head, neck and rump dark slate-grey; back, wings and tail bronzy brown; tail-feathers slightly tipped with white and with a row of small triangular-shaped spots on the margins of their inner webs; breast grey, washed with rufous; under surface of the shoulder, flanks, vent and under tail-coverts deep rufous; irides brown.

Total length, $8\frac{1}{2}$ inches; bill, $\frac{7}{8}$; wing, 5; tail, $4\frac{1}{2}$; tarsi, $\frac{1}{2}$.

Hab. Port Essington, Australia.

Remark.—Nearly allied to *Cuculus insperatus*.

Sphenœacus gramineus. *Sphen. vittâ supra oculos albâ; corpore supernè brunneo; mediâ plumarum saturatè brunneâ; subtùs griseo; lateribus crissoque cervinis; mediâ parte singulæ plumæ pectoris lineâ minimâ saturatè brunneâ ornatâ.*

Stripe over the eye white; all the upper surface brown, the centres of the feathers being dark brown; secondaries brownish black, margined with buff; tail pale reddish brown, with dark brown shafts; under surface grey, passing into buff on the flanks and vent; each feather of the breast with a very minute line of dark brown down the centre; bill and tarsi fleshy brown.

Total length, $5\frac{1}{4}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{1}{4}$; tail, $2\frac{5}{8}$; tarsi, $\frac{3}{4}$.

Hab. Van Diemen's Land and the southern coast of Australia.

Pachycephala glaucura. *Pach. capite, loris, spatio infra oculos, et latâ maculâ semilunari trans pectus saturatè nigris; gulâ, intra maculam nigram, albâ; nuchâ posteriore, lineâ angustâ apud latera pectoris pone semilunam nigram, et corpore inferiore flavis; caudâ griseâ; tectricibus caudæ inferioribus albis vel subflavis.*

Head, lores, space beneath the eye and a broad crescent-shaped mark from the latter across the breast deep black; throat within the black, white; back of the neck, a narrow line down each side of the chest, behind the black crescent, and the under surface yellow; back and wing-coverts yellowish olive; wings dark slate-colour, margined with grey; tail entirely grey; under tail-coverts white, or very slightly washed with yellow; irides reddish brown; bill black; feet dark brown.

Total length, 7 inches; bill, $\frac{5}{8}$; wing, 4; tail, $3\frac{5}{8}$; tarsi, 1.

Hab. Van Diemen's Land.

Nearly allied to *Pachycephala gutturalis*, but distinguished by a shorter bill and by the colouring of the tail, which is entirely grey.

Cysticola campestris. *Cyst. capite ferrugineo-rubro, dorso tectricibusque alarum brunneo-griseis; singulis plumis corporis superioris fasciâ longitudinali saturatè brunneâ ornatis; caudâ rufo-brunneâ, plumis duabus mediis latâ maculâ nigrâ juxta apices; corpore subtùs pallidè cervino.*

Head rusty red; back and wing-coverts brownish grey, all the feathers of the upper surface with a broad stripe of dark brown down the centre; wings blackish brown, the primaries margined externally with rusty red, and the secondaries edged all round with brownish grey; tail reddish brown, all but the two centre feathers with a large spot of black near the tip; all the under surface pale buff.

Total length, $5\frac{3}{4}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{3}{8}$; tail, $2\frac{3}{4}$; tarsi, $\frac{3}{4}$.

Hab. Australia.

Remark.—For the loan of this new species I am indebted to the kindness of H. E. Strickland, Esq.

Calamoherpe longirostris. *Cal. vittâ pallidâ, supra oculos cervinâ; corpore supernè rufo, subtùs saturatè cervino; mento albido.*

Faint line over the eye fawn-colour; all the upper surface reddish brown, becoming more rufous on the upper tail-coverts; primaries and tail dark brown, fringed with rufous; chin whitish; all the under surface deep fawn-colour; irides yellowish brown.

Total length, $6\frac{1}{2}$ inches; bill, $\frac{15}{16}$; wing, 3; tail, 3; tarsi, 1.

Hab. Western Australia.

MICROSCOPICAL SOCIETY.

June 18, 1845.—Thomas Bell, Esq., F.R.S., President, in the Chair.

A paper by George Shadbolt, jun., Esq., "On a British species of *Ixodes* found upon Cattle," was read.

The insects forming the subject of the present paper were found on some cows belonging to a farmer residing at Chingford, Essex, on the borders of Epping Forest. They are known to the country people by the name of the "Tick," but they are aware that they differ from the insects of that name which infest sheep and goats. They are found upon cattle, attacking all parts indiscriminately, and causing much irritation and annoyance to them. They have been found in the number of several hundreds on a single cow, and have also been known to attack even human subjects, but this is not common, and although it is probable that they infest other animals, the author has seen them only on cows. They do not appear to breed on the animals infested, but are produced in the forest into which the cattle are sent to graze, and which appear to become infested with them by their crawling up their legs while feeding. After having attached themselves by means of a very curious apparatus with which they are furnished, they gorge themselves with blood, and the abdomen increases in size from about the $\frac{1}{10}$th of an inch until they become as large as a small bean; when fully gorged they fall off, and the author was not able to ascertain their further progress. The form of this insect is oval: it has eight legs, in which particular it differs from the Brazilian species described by Mr. Busk in a former paper read to the Society, these last having but six. These legs are attached to the anterior half of the trunk, and consist of seven joints, the tarsi being terminated by a species of webbed foot, capable of being folded together and furnished with two recurved claws. The oral apparatus by which it attaches itself is exceedingly interesting; it consists of two palpi serving as a kind of sheath to the other parts when inactive, two jointed mandibles, and a barbed or hooked labium. Specimens of this and other species were afterwards exhibited.

Also a paper by H. Deane, Esq., "On the Existence of Fossil *Xanthidia* in the Chalk," was read.

After mentioning that the occurrence of *Xanthidia* in a fossil state had not hitherto been observed in any other situation than in the flint-nodules of the chalk, and consequently that great doubt existed whether these fossils were really independent animal existences or only parts of some other creature, Mr. Deane stated that there is a grayish kind of chalk having no flints, but containing quantities of nodules of iron pyrites, which juts into the sea between Dover and Folkstone, forming the beach for some distance. Upon exposing a portion of this to the action of hydrochloric acid, and examining microscopically the insoluble sediment, bodies similar to, if not identical with, the *Xanthidia* in flints were exposed to view; several species were clearly to be recognised, together with casts of *Polythalamia* and other bodies frequently found in flints.

ENTOMOLOGICAL SOCIETY.

July 3rd, 1843.—George Newport, Esq., President, in the Chair.

Mr. Samuel Stevens brought for exhibition a box of insects from Dorking, in which were specimens of *Claviger foveolatus* taken from the nest of *Formica flava*; also *Molorchus minor*, *Micronyx Jungermanniæ*, *Tychius lineatulus*, &c.; also a box from Charlton and Plumstead, in which were *Acalles Ptinoides*, *A. roboris*, *Pœcilus lepidus*, &c.; also the following moths from the Hammersmith marshes: *Leucania straminea*, reared from the larvæ exhibited at the last meeting, *Leucania obsoleta*, *Sensia sericea*, *Nudaria senex*, *Chilo phragmitellus* and *gigantellus*, the latter being most probably the female of the preceding insect.

Mr. Walton exhibited specimens of *Erirhinus Chamomillæ*, and Mr. Rich, a female *Goliathus*, apparently identical with *G. regius*, Klug.

A paper was read by Mr. Westwood on the Indian genera *Trigonophorus* and *Rhomborhina*, published in vol. iv. part 1. of the Transactions.

August 7th.—George Newport, Esq., President, in the Chair.

Mr. Westwood exhibited a male specimen of *Tengyra Sanvitali*, taken during the last month by sweeping in hedge-rows near Ascot heath.

Mr. Saunders exhibited a specimen of the Australian genus *Cilibe*, which had been captured alive in a garden near London. Also some pupæ of a small *Homopterous* insect which had proved very injurious in the oak plantations throughout extensive districts in Scotland, by raising blisters upon the leaves. Also specimens of a small *Dipterous* insect (*Phytomyza lateralis*), which attacks the petals of the pansy by puncturing them, as was stated, with the ovipositor, and then sucking out the colouring matter with the haustellum.

Mr. Marshall exhibited a remarkable specimen of *Hipparchia Galathea* of a white colour with the ordinary markings obliterated, and Mr. Evans a specimen of *Lamia Textor*, taken near Canterbury in July.

The following memoirs were read:—

On the Insects residing in Bramble-sticks. By Mr. F. Smith. (Published in the first part of the fourth volume of the Transactions of the Society.)

Description of a new species of *Ceria*. By Mr. W. W. Saunders. (Published in the first part of the fourth volume of the Transactions of the Society.)

On some new exotic species of *Aphodiidæ*. By Mr. Westwood.

September 4th.—Edward Doubleday, Esq., V.P., in the Chair.

Dr. Becker of Wiesbaden exhibited a new species of *Papilio* from South America, and also a specimen of the very rare *P. Protodamas.*

Mr. S. Stevens exhibited specimens of *Sibinia arenaria, Mononychus Pseudacori, Cicindela germanica, Micronyx pygmæa,* &c., recently captured in the Isle of Wight; also of *Apion Schönherri, Choragus Sheppardi, Mecinus circulatus,* and various *Lepidoptera,* the latter captured by daubing sugar upon the trunks of trees in the neighbourhood of Arundel.

Mr. F. Smith exhibited specimens of *Platypeza subfasciata*? (a *Dipterous* insect varying greatly in the two sexes,) reared from fungi from Birch wood; also *Pissodes Pini* from Weybridge.

Mr. Evans exhibited specimens illustrating the natural history of *Mamestra Brassicæ* and *Euthalia impluviata*; also a specimen of *Margaritia diversalis,* taken by himself either in Yorkshire or at Darenth wood in June last.

The following papers were read:—

Notice of a Gynandromorphous specimen of *Smerinthus Populi.* By George A. Thrupp, Esq.

Description of an ancient Irish Amulet made in the form of and used as a charm against the Murrian Caterpillar. Communicated by W. F. Evans, Esq.

Descriptions of some new species of Exotic Spiders, and two species of *Pœciloptera.* By A. White, Esq., by whom some additional observations were made on the study of arachnology, and upon the structure of the nests of two British species of spiders. He likewise read an extract from Abbott's MSS. in the British Museum, on the habits of one of the fossorial *Hymenoptera* which collects spiders for the provisioning of its nest.

MISCELLANEOUS.

Observations on the group Schizopetaleæ *of the family of* Cruciferæ. By J. Marius Barneoud*.

In 1822 Mr. Francis Place, on his return from a voyage to Chili, introduced into England a charming plant having four elegantly pinnate petals, and furnished with an embryo with four yellowish cotyledons rolled in a spiral. These extraordinary characters did not prevent Sir William Hooker from placing this plant in the family of the *Cruciferæ*; he formed of it the genus *Schizopetalon,* of which he published an excellent description and a very detailed figure in the 'Exotic Flora,' vol. i. p. 74, by the name of *Schizopetalon Walcheri.* A new coloured figure, but without analysis, appeared somewhat later in the 'Botanical Magazine,' tab. 2379.

Mr. Robert Brown, on his part, had adopted in the 'Botanical Register,' no. 752, precisely the determination and classification of Sir W. Hooker. Nevertheless these two botanists, struck with the remarkable forms which the embryo of this genus presented, had not neglected to state, that it ought to serve as type of a new tribe of *Cruciferæ*; they differed solely on one point: Mr. R. Brown con-

* From the Annales des Sciences Naturelles for March 1845.

sidered the embryo as consisting of four entirely distinct cotyledons; Sir W. Hooker, on the contrary, stated that there were only two semicylindrical cotyledons, each one divided into two very deep lobes. But this interesting question, from the simply descriptive nature of this note, will be examined subsequently in a more general manner; at all events, up to the present day the *Schizopetalon Walcheri* continued the sole representative of a very curious group of plants well deserving the attention of botanists.

Aug. Pyrame DeCandolle, after having established in his beautiful memoir on the *Cruciferæ* the bases of an embryonal classification, subsequently applied them in his 'Prodromus,' and adopted them more or less successfully to the new species; but he had the prudent reserve to place the *Schizopetalon Walcheri* at the extremity of the series and among the genera *Incertæ sedis*. Moreover the species, then somewhat rare, was not well known to him, and he did well to follow in this case the wise principles laid down by Jussieu. The rich collections of plants brought from Chili by our indefatigable traveller Claude Gay have furnished us with numerous materials on the subject; and since the true position of *Schizopetalon* can no longer be called in question, we shall be able to show, that although science owes its most beautiful and most profound investigations on the *Cruciferæ* to the genius of DeCandolle, there may nevertheless be objected to his embryonal classification, its frequently artificial side, owing to the starting from one single organ. Nature appears to have created the group of the *Schizopetaleæ* to prove how little stable are frequently the majority of those sections or subdivisions of family which are not founded upon a totality of characters of affinity, as the true natural method requires.

In the herbarium from Chili we find six species of *Schizopetalon*, of which five are new. If we study these plants with care before dissecting the seed, we are led to arrange them all in the same genus; all have a perfect similitude in the various organs of the flower, the same aspect, and nearly the same habit; in a word, we find an almost uniform plan of generic structure. The anatomy of the seed then demonstrates a considerable difference between several of the species. We find, on the one hand, very minute globular seeds presenting an embryo with four linear and spiral cotyledons, with curved radicle, evidently belonging to the *Spirolobeæ* of DeCandolle; and on the other, oval seeds larger than the preceding, their embryo with two incumbent spathulate cotyledons, and with an almost straight dorsal radicle, evidently belonging to the section *Notorhizeæ*. This is the most striking character of the new genus *Perreymondia* *.

Now it is quite plain that it is impossible to separate, without violating the laws of natural affinity, in a methodical distribution of the Cruciferous plants, these two genera (*Schizopetalon* and *Perreymondia*), so nearly related, and solely distinct as respects the embryo, as it would be necessary to do according to the classification of DeCandolle.

The anatomical structure of the seed of the *Schizopetaleæ* is com-

* In honour of Perreymond, a distinguished botanist of Provence.

posed—1. of an extremely thin, transparent, cellular external envelope, coated with papillæ; 2. of a brown, somewhat thick, central coating; and 3. of an internal membrane surrounding the embryo, and performing the functions of a kind of perisperm. Iodide of potassium shows the presence of numerous grains of starch in it.

The following is a brief monographic sketch of this tribe of the *Cruciferæ* hitherto so little known:—

Schizopetaleæ, R. Br., Botan. Reg. No. 752.

Petala pinnatifida, longe unguiculata æstivatione involuta. Stamina 6 tetradynama subæqualia. Glandulæ 4 hypogynæ. Siliqua longa, polysperma. Semina globosa vel ovata subalbuminosa. Embryonis cotyledones 4 spirales, vel 2 crasso-spathulatæ. *Folia eleganter pinnatifida vel dentata. Pili omnes ramosi. Flores albi.*—Herbæ andicolæ vel maritimæ in regno Chilensi.

Schizopetalon, Hooker, Exot. Flor. i. p. 74.

Calyx 4-phyllus, apice clausus, erectus. *Petala* 4 pinnatifida longe unguiculata. *Stamina* 6 subæqualia. *Siliqua* pilosa. *Stigma* basi hastatum subsessile. *Semina* globosa, minima, papilloso-rugulosa. *Embryonis* cotyledones 4, lineares, æquales, spiraliter convolutæ. *Radicula* curvata.

1. *Schizopetalon Walcheri*, Hook. in Bot. Mag. tab. 2379.
2. *Schizopetalon maritimum* (nobis). Caule subsimplici, foliis angustis pinnatifidis pilosis, spica laxissima, siliqua nervosa glabriuscula, embryone albo. ⊙

Perreymondia, nov. gen.

Calycis foliola 4, æqualia, erecta, obtusa, clausa. *Corolla* petala 4, hypogyna, longe unguiculata, lamina ovata, eleganter pinnatifida, laciniis linearibus obtusis æstivatione involutis. *Stamina* 6, hypogyna, tetradynama *Filamenta* libera, edentula. *Antheræ* sagittato-lineares. *Glandulæ* hypogynæ 4, lineares, erectæ, obtusæ, petalis suboppositæ. *Ovarium* 2-loculare, pubescens. *Stylus* brevis vel nullus. *Stigma* hastatum, apice subacuminatum. *Siliqua* bivalvis, dehiscens, et sæpe ad maturitatem pendula, polysperma, anguste linearis, et pilis ramosis vestita. *Septum* membranaceum stomatibus destitutum. *Semina* ovata, fulva, subrugulosa, subalbuminosa. *Embryonis* albi cotyledones 2, incumbentes, spathulatæ, apice crassæ. *Radicula* dorsalis recta.—*In regno Chilensi. Flores albi.*

1. *Perreymondia dentata* (nobis). Pubescens; caule macilento, foliis oblongis inæqualiter dentatis; spica pauciflora, laxissima; florum pedicellis pilosis. ⊙
2. *Perreymondia rupestris* (nobis). Canescens; caule folioso, ramoso, foliis cano-pinnatifidis, carnosulis; spica laxa; floribus pilosis; siliqua vermiculata, tomentosa. ⊙
3. *Perreymondia multifida* (nobis). Caule ramoso hispidulo, foliis angustis inciso-subbipinnatifidis albicantibus; floribus pilosis; siliqua gracili; stigmate subsessili. ⊙
4. *Perreymondia Brongniartii* (nobis). Caule erecto, ramosissimo, patulo, foliis dentato-pinnatifidis, canescentibus, crassiusculis; spica longa multiflora; siliqua vermiculata; stigmate sessili. ⊙

On the Microscopic Constituents of the Ash of Fossil Coal. By Professor Ehrenberg.

At the meeting of the Berlin Academy of the 25th of October, Prof. Ehrenberg communicated an observation of Dr. Franz Schulz of Eldena, which the latter had addressed to M. v. Humboldt in a letter, in which he describes his method of separating the silica contained in coal so chemically pure as to enable us to recognise the microscopical siliceous organisms. "The usual method of burning the coal," Dr. Schulz states, "is attended with an unavoidable vitrification of the mineral constituents, even when conducted in the slowest and most cautious manner, owing to which their cellular structure is lost. After many fruitless experiments I succeeded in hitting upon a method of incineration, which leaves the silica contained in the coal perfectly unaltered. Very instructive preparations are readily obtained (from the already known structural relations of siliceous earth in plants) on moistening grass-halms, ears of grain, *Equisetum*, Spanish cane, &c., with nitric acid, and afterwards burning them on platinum foil. The nitric acid not only facilitates the combustion of the organic substance, but also prevents the potash combined with the vegetable acid from being converted into carbonate of potash before the silica has been heated to such a degree as to be less liable to be acted upon. The greater degree of heat required for the perfect combustion of the coal no longer destroys the cellular form of the silica after nitric acid has prevented the production of carbonate of potash on the first application of heat. An excess of nitric acid has the effect of destroying the connexion of the siliceous cells and acts too powerfully upon them, and should therefore be avoided.

"Encouraged by the success of these experiments, I turned my attention to coal, it being exceedingly desirable to be enabled to detect remains of organic structure in it. The large quantity of siliceous earth contained in all varieties of coal led me to infer that a judicious method of incineration would be attended with good results; your excellency will be enabled to judge from the preparation attached in how far I have succeeded. A piece of coal of about two square inches was broken into twelve pieces of nearly the same size, and then treated with nitric acid in a platinum vessel. The nitric acid being evaporated at a moderate heat, I ignited the residue until no further empyreumatic vapours were given off, treated the residue again with nitric acid and repeated the ignition. Thus prepared, the coal was placed in a platinum crucible with a lid perforated in the centre, and air was blown from a gasometer through the aperture in the lid, whilst the crucible was kept at a red heat over a spirit-lamp, so that the coal was necessarily slowly consumed. The ash thus obtained had not coked, but formed a brownish powder. Some white splinters occur among this, which appear on microscopical examination to be aggregated siliceous cells arranged in regular succession, of the structure of the prosenchymatous cells of wood."

Prof. Ehrenberg added, that the importance of a method for obtaining the organized siliceous parts from the lower strata of the earth with their forms preserved for microscopical observation is manifest, and requires no recommendation, tò judge from the results which have already ensued. His own efforts with respect to coal had never been attended with success, and he therefore considers this method as a most useful and important discovery. He further stated that the clearness of the specimens (which were, it was to be regretted, not numerous) communicated by M. Schulz had astonished him, and, as might have been expected, had immediately been attended with a result. Prof. Ehrenberg had during many years brought before the Academy descriptions of the parts of plants (containing silica) which are found in marshy soils of all zones and in the infusorial deposits, and had likewise alluded to their origin from recent plants. This group, called *Phytolitharia*, had been as it were classified by him into eleven genera. Of these eleven genera only one is found in several forms in the purified siliceous ash of the coal forwarded by M. Schulz, namely the genus *Lithostylidium*, which contains regular siliceous nuclei of cells of plants. *Lithodontia*, or marginal teeth of grasses, *Lithodermatia*, or epidermis of plants (*Equisetacea, Arundinacea*), could not be distinctly recognised, although the presence of the latter may be presumed. Other negative results were also particularly remarkable, namely the absence of all *Lithasterisci*, *Lithosphæræ*, *Spongolites*, &c. &c., otherwise so frequent. Finally, no trace of infusoria possessing a siliceous shell was found, notwithstanding the most careful investigation.

He concluded by expressing a conviction that a rapid development of our knowledge on this subject would, now that a method had been discovered, undoubtedly take place, and a wish that this may be the commencement of its study.

On the Tendrils of the Cucurbitaceæ. By M. J. Payer.

In organographical researches it is sometimes necessary to examine comparatively the same organ, not merely in plants of the same family, but likewise in the same plant at various periods of its existence, and, if necessary, to have recourse to anatomy. It is from having neglected these two modes of investigation that all botanists who have studied the nature of the tendrils of the *Cucurbitaceæ* have either been completely mistaken, or have perceived the truth but in a very indistinct manner, and without being able to demonstrate it.

There are many plants in which fibro-vascular bundles are detached at three different points of the circumference of the cylinder constituting the medullary sheath, generally at one and the same height and at a little distance from the origin of a leaf: these bundles traverse the herbaceous envelope and pass into the pulvinus (*coussinet*) of that leaf. There, sometimes all three enter the petiole, sometimes only one of them,—the central one, the two lateral ones continuing the nervation of the two lateral stipules. Now, if the lower leaves of the cultivated melon be examined, no tendril will be found to exist at their side*; it will be seen that the three fibro-

* This fact may be generalized, for it results from a large number of observations which I have made, that plants with tendrils, of whatever kind, never present tendrils at their lower extremity.

vascular bundles which separate from the medullary sheath ascend all three into the petiole, and that the bud formed at their axil, and *always placed between the intermediary bundle and the stem*, is decidedly at the middle of the base of the leaf. If, on the contrary, the stem-leaves which have a lateral tendril are considered, we observe that of the three fibro-vascular bundles, only two, the central and one of the lateral ones, enter the petiole, and that the other penetrates into the tendril. In this case, the bud, from its constant position between the intermediary bundle and the stem, is no longer, like this intermediary bundle, at the centre of the base of the petiole, but on the side, and appears to be almost between the leaf and the tendril. Lastly, we frequently meet in botanical gardens with the upper leaves each accompanied by two lateral tendrils. The anatomy then indicates that a single bundle, the central one, traverses the petiole, and that the two lateral ones pass each one into a tendril. With respect to the bud, it necessarily is situated between the middle of the base of the petiole and the stem.—*Ann. des Sci. Nat.*, March.

METEOROLOGICAL OBSERVATIONS FOR MAY 1845.

Chiswick.—May 1, 2. Very fine. 3. Fine, with clouds. 4. Cloudy and cool. 5. Fine: dense clouds: clear. 6. Cloudy: rain. 7. Cloudy: showers. 8. Rain. 9. Cloudy: clear. 10. Foggy: cloudy: clear at night. 11. Cloudy. 12. Rain: showery. 13. Cloudy and fine. 14. Fine. 15. Overcast: fine. 16. Cloudy. 17. Overcast: slight frost at night. 18. Cloudy: showery. 19. Cloudy and cold. 20. Cloudy: rain. 21. Heavy rain. 22. Cloudy: very clear. 23. Overcast: fine: heavy rain. 24. Hazy clouds: heavy rain at night. 25. Rain. 26. Overcast: heavy rain. 27. Very fine. 28. Hazy and damp. 29. Thick haze: rain. 30. Fine. 31. Very fine: cloudless: overcast at night.—Mean temperature of the month $5^{\circ}\cdot3$ below the average.

Boston.—May 1. Fine. 2. Fine: thunder and lightning P.M., with rain. 3. Cloudy: thunder and lightning P.M., with rain. 4. Fine: rain early A.M. 5. Fine: rain early A.M.: rain P.M. 6. Rain. 7. Cloudy: rain early A.M.: rain P.M. 8. Fine: rain A.M. 9. Cloudy: rain early A.M. 10. Rain. 11. Cloudy. 12. Fine: rain A.M. and P.M. 13. Fine: rain P.M. 14, 15. Fine. 16. Cloudy. 17. Cloudy: rain A.M. 18. Windy. 19. Fine: rain early A.M. 20. Fine: rain P.M. 21. Cloudy. 22. Fine. 23. Cloudy: rain P.M. 24, 25. Cloudy: rain early A.M. 26. Cloudy: rain early A.M.: rain P.M. 27. Fine. 28. Fine: rain early A.M.: rain P.M. 29. Cloudy: rain P.M. 30, 31. Fine.

Sandwick Manse, Orkney.—May 1. Drops: showers. 2. Showers. 3. Showers: sleet. 4. Bright: showers. 5—7. Clear. 8. Rain: showers. 9, 10. Showers. 11. Bright: cloudy. 12, 13. Clear. 14. Drops: clear. 15. Fog: drizzle. 16. Showers: drizzle. 17. Bright: clear. 18. Cloudy: clear. 19. Clear. 20. Cloudy. 21. Bright: cloudy. 22, 23. Cloudy: damp. 24, 25. Cloudy. 26. Bright: cloudy. 27. Cloudy. 28, 29. Bright: clear. 30. Cloudy: fine. 31. Bright: fine.

Applegarth Manse, Dumfries-shire.—May 1. Heavy showers. 2, 3. Heavy showers, with hail. 4. Sunshine and showers. 5. Fine. 6. Moist: light drops. 7—9. Slight showers. 10. Fine. 11. Rain P.M.: hoar-frost A.M. 12. Showers. 13. Fair and fine. 14. Rain nearly all day. 15—17. Fair: fine: bracing air. 18. Fair, but threatening. 19. Fair, but threatening: fine. 20, 21. Fair, but threatening: droughty. 22—24. Fair, but threatening. 25. Fair, but threatening: few drops of rain. 26. Fair, but threatening: very droughty. 27—30. Fair, but threatening. 31. Fine: warm.

Meteorological Observations made 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.			
	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.			Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. May.	Max.	Min.		9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9¾ a.m.	8¾ p.m.								
1.	29·905	29·829	29·27	29·42	29·40	29·23	29·20	65	48	60	57½	49	52	48	w.	w.	ssw.	sw.	·01	......	......	......
2.	29·957	29·821	29·22	29·48	29·66	29·34	29·52	64	36	57	55½	46½	49	44	sw.	calm	w.	w.	......	......	......	......
3.	29·989	29·878	29·40	29·60	29·66	29·50	29·61	59	37	50	55½	45	48	42½	w.	calm	w.	w.	·01	·05	......	·21
4.	29·895	29·791	29·34	29·66	29·78	29·76	29·86	60	36	49	56	39	48½	43	nw.	calm	w.	nnw.	......	·22	......	......
5.	29·885	29·822	29·40	29·78	29·80	29·94	29·94	58	27	50·5	55	34	46	40½	nw.	calm	nne.	se.	·03	·03	......	·22
● 6.	29·836	29·681	29·30	29·72	29·77	29·94	30·08	55	37	47	53	36½	47½	42	w.	calm	ne.	ne.	·48	·09	......	......
7.	29·649	29·589	29·24	29·75	29·58	29·98	29·84	50	37	46	49	41½	48½	44	nw.	calm	n.	nne.	·20	·11	......	......
8.	29·457	29·407	29·00	29·45	29·40	29·62	29·62	52	34	50	52	39½	45	43	sw.	calm	ne.sw.	e.	·01	·35	0·31	·10
9.	29·490	29·483	29·08	29·41	29·41	29·69	29·70	59	33	48	55	37	47	43	sw.	calm	e.	e.	......	·04	......	·09
10.	29·597	29·457	29·08	29·45	29·60	29·67	29·73	58	36	49	55	39	47	44	n.	calm	ne.	e.	·04	·09	......	·10
11.	29·849	29·805	29·40	29·69	29·60	29·68	29·50	58	42	50	59	34	50	46	n.	calm	s.	sse.	·08	·01	......	......
12.	29·859	29·737	29·24	29·59	29·80	29·66	29·89	58	42	54	57½	42	49	46	n.	calm	n.	nnw.	·09	......	......	·08
13.	30·171	29·943	29·58	30·00	30·18	30·13	30·26	61	44	53·5	59½	42	49½	45½	ne.	n.	n.	s.	·03	·20	......	......
☽ 14.	30·302	30·247	29·80	30·27	30·20	30·24	30·23	61	36	55	55½	39	49½	48	n.	nw.	w.	wnw.	......	·04	......	......
15.	30·278	30·274	29·72	30·21	30·22	30·24	30·26	63	48	56·5	65	47½	50	48	n.	calm	w.	wnw.	......	......	......	......
16.	30·288	30·234	29·77	30·22	30·13	30·17	30·10	63	45	55	64	48	49½	46½	n.	calm	w.	nw.	......	......	0·30	·06
17.	30·138	30·115	29·53	30·05	30·08	30·16	30·15	57	31	52·5	61	50	48	46	n.	calm	w.	nw.	·06	......	......	·10
18.	30·056	29·851	29·54	29·97	29·82	30·05	29·96	59	42	54·5	64½	41½	48½	46	w.	n.	nw.	n.	·07	·06	......	......
19.	29·814	29·806	29·30	29·80	29·85	29·98	30·03	59	38	51	60	48	47	46	n.	n.	ne.	ne.	......	·04	......	......
20.	29·849	29·841	29·34	29·89	29·80	30·05	30·01	59	41	54	57½	43½	47	46	n.	n.	ene.	nne.	·27	......	......	......
○ 21.	29·764	29·554	29·34	29·79	29·78	30·03	30·00	56	42	48·5	61	44½	50	48	nw.	calm	ne.	ne.	·26	·09	......	......
22.	29·789	29·694	29·29	29·80	29·81	30·00	30·00	59	41	56	59	46	50	45	n.	ne.	ne.	n.	·02	......	......	......
23.	29·834	29·798	29·35	29·85	29·84	30·00	30·00	60	44	51·5	64	44½	47	46½	nw.	n.	ne.	ne.	·16	......	......	·06
24.	29·822	29·803	29·25	29·88	29·83	30·09	30·06	61	45	53	56	44½	49½	46½	w.	calm	ne.	ne.	·54	·46	0·00	......
25.	29·788	29·685	29·36	29·81	29·78	30·02	29·99	57	46	50	55½	44½	48½	46	e.	calm	ne.	ne.	·10	·02	......	......
26.	29·685	29·610	29·15	29·68	29·61	29·98	29·98	59	36	54	52½	43½	50	46½	s.	calm	nne.	ne.	·27	·53	......	......
27.	29·778	29·758	29·33	29·78	29·95	30·11	30·19	67	48	60	54	45½	49	45	ne.	s.	ne.	ne.	·08	·08	......	......
☾ 28.	29·790	29·772	29·40	30·00	29·95	30·23	30·20	67	49	57	57	43½	49	46	ne.	e.	ne.	ne.	·01	·02	......	......
29.	29·692	29·682	29·35	29·89	29·84	30·14	30·14	55	48	50	58	42½	52	46	ne.	e.	ne.	ne.	·07	·80	......	......
30.	30·045	30·751	29·35	29·91	30·00	30·14	30·14	64	39	58	62	45	52	46	n.	ne.	ene.	......	......	·04	0·02	......
31.	30·181	30·166	29·64	30·08	30·00	30·14	30·07	69	43	55	63½	44	49½	45½	sw.	calm	se.	......	......	......	......	......
Mean.	29·885	29·836	29·36	29·802	29·813	29·932	29·943	59·74	40·35	52·7	57·7	2·9	48·80	45·32					2·89	3·37	0·63	1·02

THE ANNALS

AND

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VII.—*Notes of a Microscopical Examination of the Chalk and Flint of the South-east of England; with remarks on the Animalculites of certain Tertiary and Modern Deposits.* By Gideon Algernon Mantell, Esq., LL.D., F.R.S.*

The founders of this Society could scarcely have imagined that the structure and economy of those minute forms of animal existence which are invisible to the unassisted eye, would become a legitimate subject of geological investigation; and that the durable coverings or cases of these miniatures of life would be found preserved in a fossil state, and in such inconceivable numbers, as to constitute not only a large proportion of many rocks, but the entire mass of certain deposits of great thickness and extent: still less could they have surmised that the soft perishable bodies of animalcules of this kind would be preserved by mineralization, and be found entombed, like flies in amber, in the flint nodules of which our roads are so largely constructed.

When the attention of geologists was first directed, a few years since, to this most interesting department of palæontology, by the surprising discoveries and startling deductions of that eminent philosopher, M. Ehrenberg, several observers in this country entered upon the investigation with much alacrity, to satisfy themselves of the correctness of the marvellous statements of the Prussian naturalist; but this inexhaustible and most inviting field of inquiry has not been followed up with the zeal and assiduity which might have been anticipated, from the facility of the examination, and the important results which could not fail to be obtained by any competent and patient observer.

With the exception of the able "Memoir on the Siliceous Bodies of the Chalk, Greensands and Oolites," by Mr. Bowerbank, and which is published in the sixth vol. of the Geological Transactions,—a memoir to which I shall hereafter have occasion to refer,—no express communication on this subject has, I believe,

* Read before the Geological Society of London, May 14th, 1845.

been laid before this Society. My friend the Rev. J. B. Reade (of Stone, Bucks), a gentleman well-known as an eminent observer, was the first to investigate the flints of the English chalk in search of those curious bodies termed *Xanthidia*; several species of which were discovered by him, and are figured and described in the ninth number of the 'Annals of Natural History.' Mr. H. Hopley White subsequently pursued the inquiry, and contributed a notice on flint *Xanthidia* to the first vol. of the 'Microscopical Journal,' illustrated with figures of several new forms.

Many interesting remarks on the microscopical examination of flint and chalk by Mr. Reade are inserted in the fourth edition of my 'Wonders of Geology,' as well as in my recent work, 'The Medals of Creation'; which also contains an account of some discoveries by my assistant Mr. Hamlin Lee, and by my son*.

I propose on the present occasion, to lay before the Society the general results of a microscopical examination of numerous specimens of chalk and flint, from the south-east of England, with the hope of exciting those who have more leisure and greater ability than myself, to pursue the inquiry, and not from an undue estimate of the importance of the facts embodied in this communication.

With a view to conciseness, it will be convenient to arrange my observations under three heads, viz.—

I. On the organic composition of the white chalk.

II. On the organic structure and minute fossil bodies of chalk flints.

III. On the animalculites of the tertiary strata of England; and on the occurrence in the British seas of living genera and species of infusoria, identical with many that occur fossil in the miocene deposits of Virginia.

I. *On the White Chalk.*—Mr. Lonsdale long since demonstrated that the white chalk of England was largely constituted of minute shells, corals, and foraminifera, which bodies might be readily detected by brushing the chalk in water and collecting the sediment; but it was not at that time suspected that almost the whole of the residue of the detritus was composed of distinct organisms, so minute as to require the highest magnifying powers, and a peculiar mode of manipulation, to develope and define. Ehrenberg, who has determined several hundred species of animalculites from the chalk, states that some layers of that limestone are so rich in fossil remains, that a cubic inch is made up of at least one million of recognizable forms. In his memoir "On numerous Animals in the Chalk Formation which are still to be found in a living state," are particularized all the

* See 'Medals of Creation,' vol. i. chap. vii.

species and genera detected in the chalk from various parts of Europe, Asia, and America*. It will suffice for my present purpose to enumerate a few of these fossil organisms, premising that the term *Polythalamia,* or polythalamian animalcules, designates the calcareous-shelled foraminifera, as for example, *Rotalia, Textilaria, Nodosaria,* &c., and that of *Infusoria,* the siliceous-shelled animalcules, as *Xanthidia, Coscinodisci,* &c.; while the name *Animalculites,* is a convenient general designation for the fossil remains of both divisions of these microscopic forms of animal organization.

Infusoria of the Chalk.—M. Ehrenberg describes one species of *Eunotia* and two of *Fragillaria* from Gravesend; and from the chalk marls of Sicily several species of *Actinocyclus, Coscinodiscus,* and *Gaillonella,* which are also found alive in the sea at Cuxhaven. The most remarkable forms are certain species of *Dictyocha,* a genus formerly supposed to be extinct, which abound in the white marls of the chalk of Cattanisetta, and have lately been found living in the Baltic †.

Another interesting animalculite is the *Peridinium pyrophorum,* which occurs in the flint of Delitzsch, and has recently been detected living and luminous in the Baltic.

Numerous species of all the above genera abound also in the tertiary strata, and were formerly supposed to be absent in the secondary formations; and with the exception of a few kinds to be noticed hereafter, my own researches and those of several competent observers have not revealed any traces of these organisms in the English chalk; we have never found *Eunotiæ* or *Fragillariæ* in that of Gravesend. Of the microscopic calcareous-shelled animalcules, the chalk contains species, said by Ehrenberg to be identical with living, of the genera *Globigerina, Rosalina, Cristatella, Textilaria, Rotalia* and *Nodosaria*; and so far as my observations extend, species of these genera form the greater part of the cretaceous animalculites of England. But although it is easy to demonstrate the abundant occurrence of these forms in some masses of chalk, yet in many of the strata it is scarcely possible to detect any well-defined specimens; and I confess, that frequent disappointment in my search for these bodies, had made me somewhat sceptical of receiving at their full value, the glow-

* See a translation of this memoir, with plates, in Taylor's 'Scientific Memoirs,' vol. iii. Art. 13. Also a masterly abstract of Ehrenberg's observations "On the Composition of Chalk Rocks and Marls by invisible organic bodies," by Mr. Weaver in the 'Annals of Nat. Hist.' for June and July 1841.

† The *Dictyochæ* are polygastric animalcules of the family *Bacillaria,* which are invariably coloured by green granules, and have a slow creeping motion.

ing descriptions of the Prussian philosopher. A short time since, however, I discovered some layers of chalk which are wholly composed of polythalamia, principally of the genera *Rotalia* and *Textilaria*; and it may perhaps be interesting to other observers if I mention the circumstances which led me to institute a microscopical examination of these deposits.

Every one knows that in our white chalk corals are but sparingly distributed, and that the species hitherto determined are comparatively few. Those enumerated in Mr. Morris's 'Catalogue of British Fossils' amount to between twenty and thirty species, and belong to sixteen or seventeen genera. The cretaceous deposits of Maestricht and Faxoe present in this respect a striking contrast with those of England. There are however a few localities in which certain layers of the chalk abound in small, delicate, calcareous polypidoms; and of late years many beautiful specimens of the genera *Idmonea, Ceriopora, Pustulopora, Retepora,* &c. have been obtained from the neighbourhood of Dover. For the most part the specimens are small, but occasionally some occur of considerable size, as in the fine example on the table (presented to me by Mrs. Smith of Tunbridge Wells), which consists of hundreds of branches of *Pustulopora* and *Idmonea,* intertwined into a mass more than two inches in thickness. When clearing this beautiful fossil, the extremely friable nature of the chalk, and the sensation of a peculiar asperity to the touch, which experience had taught me was commonly characteristic of the presence of minute fossil bodies, induced me to submit a few grains to a microscopical survey; and the entire block of chalk in which the coral is imbedded, proved to be almost wholly constituted of *Rotaliæ* and *Textilariæ,* associated with spines of sponges and of other Amorphozoa, and a few discs apparently of *Pyxidicula*: the residue consists of the detritus of similar organisms and of polyparia. I have distributed samples of this coralline chalk among my friends, and the result of their exploration is in accordance with my own.

The incoherent character of the Dover coralline chalk, results therefore from its organic composition, and the absence of any cementing material. For in other cretaceous strata where an infiltration of calc-spar has consolidated the rock, the chalk possesses great compactness and durability, and the organisms may be seen in polished slices, and sometimes in relief on the surface. That the white chalk was originally everywhere of the same organic constitution there can be no reasonable doubt; and it is remarkable how universal was the distribution of certain species throughout the cretaceous ocean. The *Rotalia globulosa, Rot. perforata,* and *Textilaria globulosa,* have been found in every chalk district in Europe; and I have the same species, through the kindness of Dr. Bailey of West Point, New York, from various parts of Asia and America.

I will now venture to digress for a brief space to inquire whether the original organic incoherent condition of the chalk, as shown by the above investigations, may not offer a satisfactory explanation of the formation of the grooves and furrows on the surface of chalk rocks, and of the vertical funnels or sand-pipes with which in certain districts the cretaceous strata are traversed; and of the origin of the beds of loose, but not water-worn, flint nodules, which are so constantly met with lying on the surface of the rock, and immediately beneath the turf of the downs, and with scarcely any intermixture of transported materials; phænomena, that have very recently been brought under the notice of this Society. From what has been advanced, it is manifest that the chalk when first deposited at the bottom of the ocean must have been in the state of a fine white detritus or mud, resembling in appearance and in chemical and organic composition, the chalk now in progress of formation along the coasts of the Bermuda Islands; some layers of which are as rich in animalculites as any of the American tertiary formations. The veins and beds of flint, probably originated from the periodical introduction of thermal waters highly charged with silica, into the calcareous sediment: and the subsequent conversion of the incoherent detritus into compact white chalk, must have resulted in part from pressure, and from the infiltration of crystallized carbonate of lime; a process which at the present moment is in constant action on the shores of the Bermudas, and whose effects are seen in the specimens on the table, in which the sediment thrown down by the sea is shown in various states, from that of a white pulverulent earth, to the compact limestone with which the forts and bridges of those islands are constructed.

It may, therefore, with great probability be assumed, that at the period when the cretaceous strata of the south-east of England were exposed to those elevatory movements which ultimately raised them, together with the Wealden deposits on which they repose, above the level of the sea, the lowermost beds of chalk were already consolidated; but the uppermost and latest deposits were in the state of the soft Bermuda earth. Upon the emergence of the chalk above the sea, those last formed and consequently least coherent beds, would be the first exposed to the destructive effects of the waves; and if the elevation were gradual, successive strata would be subjected to the same agency, until the chalk-hills were lifted up above the operation of these denuding causes. The drainage of the elevated portions of the soft calcareous rock would then commence, and give rise to numerous streams and rills, by which the surface would be worn into furrows and channels; and funnels (sand-pipes) would be formed by the gyratory action of eddies, or whirlpools, induced by opposing currents; effects in every respect analogous to those observable on the mud-banks of a delta, during the recession of the tide. The beds of loose, unrolled, and but slightly abraded flints, the smooth rounded contour of the gently swelling hills and undulated coombs and valleys of chalk districts, appear to me to be the natural consequences of the phænomena here contemplated.

II. *Chalk Flints.*—I now proceed to the consideration of the organic structures, and microscopical fossil bodies, observable in chalk flints. It was a current opinion with Parkinson, Townsend, M. Guettard, and other early observers, that the external forms of a large proportion of the flint nodules had been derived from various kinds of sponges and alcyonia, which, while growing in their native sea, or floating in its waters, had become enveloped and saturated by the fluid silex; and it was also inferred that these organisms had served as points of attraction for the siliceous matter, and were in a great measure the cause of the irregular nodular character, and mode of distribution, of the flints of the cretaceous formation. The occurrence of minute shells, corals, and other organic remains in the flints, was adduced as additional confirmation of this opinion; since a similar entanglement of foreign bodies in the hollows and meshes of recent sponges is constantly observable. My much-valued friend the late Mr. Parkinson, investigated this subject with his wonted ability and caution, and many interesting observations on fossil sponges, illustrated by excellent figures, will be found in the second volume of the 'Organic Remains of a Former World.' That various kinds of *Porifera* or *Amorphozoa* have formed the nuclei of immense numbers of the flint nodules, will be readily admitted by all who have paid but a moderate share of attention to the subject; and the prevalence of spicula of sponges in chalk and flint, proves the abundance of these organisms in the cretaceous seas. The microscopical examination of flint corroborates this inference, for the brown reticulated *tissue,* so general in siliceous nodules, is unquestionably referable to certain kinds of sponges. This fact Mr. Bowerbank has satisfactorily established in the valuable memoir previously cited; a memoir which presents so admirable an illustration of the nature of the spongeous structure observable in chalk flints, and in the agates of Oberstein, and in the green jasper of India, and such clear and ample directions for the successful investigation of these organic remains, as to render but few remarks on the subject necessary. I will only state that my own observations confirm those recorded by Mr. Bowerbank in every essential particular; namely, in the frequency of the reticulated spongeous tissue, and of spicula, in our flints; in the presence of polythalamia and infusoria, particularly of *Xanthidia*, in the canals of sponges, and their frequent suspension throughout the mass of a siliceous nodule; as if the spongeous tissue had retained its form sufficiently long to allow of the silicification of the animalcules, and had subsequently perished. At the same time I must express my conviction, that the facts he so faithfully portrays do not warrant the hypothesis that all the nodules, veins, dikes, and sheets of flint, are to be ascribed to the silicification of sponges; neither can I admit that the cavities of the shells of echinoderms and mollusks, now found filled with flint, were previously occupied by sponges. The theory of M. Ehrenberg, that the compact nodules of flint are the consolidated pulverulent siliceous particles of infusoria, I conceive to be equally untenable. Nor do the facts hitherto brought before us seem to warrant the inference, that the abundance of siliceous spicula in any of the porifera rendered those bodies more favourable for silicification; on the contrary, the soft gelatinous animal matter, as Mr. Bowerbank has suggested, does appear to have exerted such an influence by some species of elective affinity or attraction: hence the frequent silicification of the bodies of mollusks, while the shell retains its calcareous character, as in the specimen of an oyster figured in the 'Medals of Creation,' p. 363.

In many of the silicified fossils of the chalk, the mineralization is simply that of incrustation and infiltration; such is the state of numerous sponges, which are, as it were, invested by the flint, and have their pores and tubes filled with the same substance; but the spongeous tissue is in the condition of a brown friable earthy substance. In other examples the sponge has been incrusted by a mass of liquid silex, and its tissue has subsequently perished; in this manner have been formed those hollow nodules, which, on being broken, present a large cavity containing only a little white powder, or some loose fragments of silicified sponge; while in other specimens the cavity is lined with quartz and chalcedony, probably introduced by subsequent infiltration through the nodule. It frequently happens that the zoophyte is only partially invested with silex, while the other portion is imbedded in the chalk, and is a friable calcareous substance. The *Choanites* and *Ventriculites* are often found in this condition, and hence the protean forms assumed by the flints that have been moulded in the cavities of these organisms. These specimens appear to demonstrate that the organic bodies became permeated with flint, only when they happened to be exposed to the current or stream of liquid silex, which penetrated such portions of structures, or entered the cavities of such shells, and echinoderms, as were lying at the bottom of the ocean over which it flowed, or were immersed in the calcareous detritus into which the stream was injected. And there are innumerable nodules of flint which exhibit no trace of spongeous structure; as well as veins, dikes, and sheets of tabular flint, that may be regarded as pure, and free from organic remains, excepting such as must necessarily have become entangled and imbedded in a stream of mineral matter flowing over a sea-bottom.

The shells of mollusks, and the crustaceous cases of echinoderms, do not occur silicified in the white chalk, but their cavities are very commonly filled with flint, and these casts are well known as among the most common fossils of the ploughed lands of chalk districts. The phosphate of lime, like the carbonate, seems to have been unfavourable for the phænomenon of silicification. I have seen but two examples of bone imbedded in flint, and in one of these the silex has merely incrusted the bone; in the other, a caudal vertebra of the *Mososaurus* from Brighton, the mineral has partially invested the bone and permeated the cells, but the calcareous tissue remains unchanged. A coprolite of *Macropoma*, partially surrounded by flint, retains its calcareous character; and the teeth of fishes, although sometimes enveloped in flint, are not silicified. I had teeth of the *Hypsodon*, and Mr. Charlesworth has a portion of a jaw with teeth of the *Mososaurus* from the chalk, in which the pulp-cavities are filled with flint, which must have permeated the parietes of the teeth, and yet the calcigerous tubes remain unchanged, and are not filled with silex; here probably the contents of the pulp-cavity influenced the pseudomorphism, as in the case of the oyster.

But in other fossils the mineralization pervades the entire organism, and has been effected by replacement. The original substance has been removed, and the silex substituted in its place; such is the common petrifaction of wood, and of most examples of the softer zoophytes. The *Choanites*, which, from their perfect silicification, are in such request at Brighton for brooches and other ornamental purposes, afford a good illustration of this process.

This complete transmutation of organic structures into flint, quartz, or chalcedony, is very common in other divisions of the chalk formation. In the well-known fossils of the Devonshire whetstone, the shells are almost invariably converted into flint or jasper.

An able American mineralogist, Mr. Dana, suggests* that the reason why silica is so common a material in the constitution of fossilized wood and shells, as well as in pseudomorphic crystals, consists in the ready solution of silex in water at high temperatures under pressure whenever an alkali is present, (as is seen at

* See American Journal of Science for January 1845.

the present time in many volcanic regions,) and its ready deposition again when the waters cool. A solution of silica, whether resulting from the deposition of felspar at the ordinary temperature, or whether proceeding from submarine volcanic action, will in either case contain other substances. The alkali of the felspar, potash, or soda, passes off with the liberated silica; and in the latter case, the heated waters, if marine, will include both soda and magnesian salts. Mr. Dana goes on to show that a mere heated solution of silica in water, under great pressure, is sufficient to explain the phænomenon of silicification of organic structures. Thus in the strata of white chalk, in which the shells of mollusca are not silicified, but remain calcareous, the streams of water holding silex in solution, were probably of a lower temperature than in the case of the Devonshire silicified shells, the pseudomorphism of which may have been effected by a very hot solution of silica. "For a crystal of calc-spar in such a fluid, being exposed to solution from the action of the heated water alone, the silica deposits itself gradually on a reduction of temperature, and takes the place of the lime, atom by atom, as soon as set free. Every silicified fossil is an example of this pseudomorphous process; but there seems to be no union of the silica with the liberated lime, since silicate of lime occurs extremely seldom, if at all, either in the fossils themselves or in the surrounding rock. There appears to be something in the chemical or electro-chemical forces excited among the molecules by the process of solution, which leads the molecules of any body that may be passing at the time from a liquid state to take the place successively of each molecule that is removed; and thus it is that the form of the original structure, to the minutest character, is so exactly assumed by the substituting mineral. Fluor spar, and even heavy spar or barytes, although stated to be insoluble, have evidently undergone solution in heated waters, and thus been deposited in cavities and veins of sedimentary limestones that show no trace of the effects of a higher temperature; for they are not fused, nor even rendered crystalline. The agency of hot waters and vapours in producing changes in rocks and in organic remains has perhaps scarcely received sufficient attention. When we consider the number of hot springs on the surface of the earth in regions of modern volcanic action, as well as in others not of this nature; when we remember the many eruptions of hot water even from subaërial volcanoes; and when further we have before our eyes the wide-spread effects of volcanic action beneath the sea,—can we refuse to the agency of heat thus conveyed by vapours and flowing mineral waters, a large share of the various metamorphic changes in the mineral kingdom; especially if we take into view the condition of a vast submarine volcanic region in full action, with its floods of melted rocks, its opened fissures, and its fountains of boiling waters and jets of heated vapours?" For a full explanation of these views I refer to the original paper of Mr. Dana in the 'American Journal of Science' for January 1845. The elaborate work of Dr. Blum on the Pseudomorphous Minerals may also be studied with advantage*.

I return from this digression to the consideration of the minute fossils which are of most frequent occurrence in our flints. The polythalamian forms are chiefly referable to the genera *Rotalia*, *Rotalina* and *Textilaria*; there are also some kinds of the compound foraminifera, but these are comparatively rare, and I have not yet examined them with sufficient attention. In some slices of flint prepared by Mr. Darker from the Paramoudra of Ireland, polythalamia are very numerous. The shells or cases invariably appear to be silicified, and the cells of the *dead* shells to be filled with flint. By *dead* shells I mean those in which the animal was dead, and its soft parts removed and the shell empty, before its immersion in the silex; for I can now bring unequivocal evidence to prove, that in many examples the animal itself must have occupied its shell, and all its soft parts been entire, at the moment when it became enveloped by the siliceous fluid. A specimen figured in the 'Medals of Creation' first directed my attention to this interesting fact; and several specimens both of *Rotaliæ* and *Textilariæ* have since been discovered, which confirm the opinion I then ventured to suggest.

In illustration of this highly interesting fact, I select on the present occasion an atom of flint (scarcely larger than a pin's head) discovered by Mr. Lee, in which are imbedded two *Rotaliæ*, having the cells filled with a rich amber-coloured substance, that under a high power presents a granular structure analogous to that of the body of the recent *Rotaliæ*. In these fossils the soft parts appear to be in the state of *molluskite*, or they may have undergone silicification; the mineral being coloured by the animal matter. To persons unaccustomed to the microscopical exploration of objects of this nature, these specimens may seem to be merely casts of the interior of the shell; but to the eye well-instructed in the character of such remains, they will at once be seen to be entirely dissimilar. I would content myself with referring to the 'Medals of Creation,' in proof of the above inferences, did I not know that many of the Fellows of this learned

* The experiments of Mr. Jeffrys, published in the Report of the British Association for 1840, confirm these opinions, and prove that simply by the agency of heated water and vapour, silex will be dissolved, and be precipitated upon the cooling of the liquid or vapour. In one of these experiments several pounds of silica were deposited on substances placed within reach of the current of vapour.

Society do not read works of so unpretending a character, and may consider this statement as startling and unsatisfactory; I therefore claim the indulgence of entering upon a few details to render the above remarks more intelligible.

It must be borne in mind that the case or shell of the *Rotalia*, although presenting the general form, and the internal chambered structure, of the shell of the *Nautilus*, is essentially different; for the whole of the external case is perforated with numerous holes or foramina (hence the name *Foraminifera*), designed for the passage of delicate processes called *pseudopodia*, which are organs of motion; and the cells or chambers are dissimilar in form, and still more so in their office, from those of the Cephalopoda. For while in the *Nautilus* the animal occupies only the outer chamber, and all the posterior compartments are successively-quitted empty dwellings, in the *Rotalia* the body distinctly fills up all the single cells. According to Ehrenberg, the first four cells in the living animal are occupied by colourless matter; the hinder ones are filled with less transparent parts, consisting of two differently coloured organs. One of these is the very thick alimentary canal, which forms, like the whole body, a jointed chain expanded in each chamber of the shell, and connected by a narrow isthmus (the sipho ?) with the adjoining anterior and posterior ones.

M. Ehrenberg dissolved the shell of a living polythalamian, nearly allied to the *Rotalia* (the *Nonionina germanica*), by immersion in weak hydrochloric acid, and thus exposed the alimentary canal, which was then seen to be a simple organ distended in the compartments of the body, consequently itself articulated with a single anterior aperture; and various siliceous infusoria were distinctly perceived in the digestive tube, having been swallowed by the animal. Beside the alimentary canal, a yellowish brown or amber-coloured granular mass was perceptible in each of the cells, up to the last of the spirals, the first excepted.

It was the striking resemblance between the specimen first submitted to my notice, and the figure of the *Nonionina* deprived of its shell, as given by Ehrenberg, that led me to suspect the true nature of the fossils under review; and the exquisite example which will be placed under the microscope for the inspection of those present, appears to me to leave no doubt of the correctness of that opinion. In the same chip of flint there is another and larger Rotalia, in which the body of the animal also is preserved. And now that we are accustomed to the microscopical appearance of these organisms, we find that the pale yellowish brown, or amber colour, of many semidiaphanous flints is derived from the soft parts of *Rotaliæ, Textilariæ,* and other polythalamian animalcules; in like manner, as I showed in a paper read before this Society (but not published), the dark veins and markings in the pillars of Purbeck marble in the Temple Church, are attributable to the remains of the soft bodies of the freshwater shells of which that limestone is composed, in the state of *molluskite*.

I have stated my conviction that the experienced microscopical observer will not hesitate to agree with me in the opinion, that in the fossils before us we have the mineralized soft bodies of polythalamia; and I have obtained, through the kindness of Mr. Williamson of Manchester, a recent object for comparison, which is perfectly analogous, not to say identical, with the best-preserved flint specimen. It is the body of a Rotalia from which the shell is removed, and is associated with other polythalamia, &c.; it was obtained with numerous other interesting recent organisms in sediment from the Levant.

Infusoria in Flint:—*Xanthidia*.—Our flints contain abundance of several kinds of infusoria; as for example, various species of the genera *Pyxidicula*, *Peridinium* and *Xanthidium*. I shall restrict my remarks to the last-named animalculites, which, from their elegant forms and good state of preservation, are highly interesting to microscopic observers. The *Xanthidia* are minute, globular or spherical bodies (from $\frac{1}{300}$th to $\frac{1}{500}$th of an inch in diameter), beset with tubular processes, which terminate either in fimbriated or acuminated extremities. They are stated by Ehrenberg to be siliceous, and to be analogous, and some of the species identical, with living forms which abound in boggy pools and ponds. Several of the recent kinds occur in the ponds on Clapham Common, Hampstead Heath, and other places around London. These organisms are however considered by the most eminent botanists not to belong to the animal kingdom, but to be vegetable structures, related to the *Desmidiaceæ*; and are defined as plants having "fronds simple, constricted in the middle; segments slightly compressed, turgid, reniform or orbicular and entire; their surfaces more or less furnished with simple or branched elongated spines, either scattered over the surface or confined to the margin, where they are placed in two rows, one on each side the marginal line*." Ehrenberg, on the other hand, describes the *Xanthidia* as animals having spontaneous motion and increasing by self-division. But I must not dwell on this important and difficult question; the arguments on both sides are concisely stated in 'Annals of Nat. Hist.' March 1845, p. 188, to which I would refer those who are interested in the subject. I do not presume to think that my opinion on this problem is of any value; but waving the question of the animal or vegetable

* See Mr. Ralfs's paper on the *Desmidiaceæ*, Ann. Nat. Hist. Jan. 1845.

nature of these bodies, I may be permitted to state, that a careful examination of both recent and fossil *Xanthidia* leads me to doubt whether there is any analogy whatever between the organisms in our flints and their supposed living types. The fossil forms have the body more decidedly spherical or globular, their spines more strictly tubular and differently arranged; and they never exhibit that reniform or constricted character so constant in the recent *Xanthidia,* nor do they present any indication of spontaneous fissuration. The fossils are supposed by Ehrenberg to have been originally siliceous like the shields of other infusoria, but I know not that any proof has been obtained of this inference. On the contrary, so many examples occur in which the tubular arms are bent, contorted, and contracted and shrivelled in the middle, as to convey the idea of a flexible, rather than of a brittle, unyielding substance. A crushed or torn specimen very lately found by my son, exhibits an appearance much at variance with the supposition that the original was composed of silex or of any other material that had a conchoidal fracture. If the *Xanthidia* were originally siliceous, there is no reason why they should not be detected in the chalk itself, since bodies equally minute are readily discoverable*. If to these arguments be added the *à-priori* objection as to the probability that inhabitants of fresh water, of boggy pools and ponds, should be found swarming in the sponges and other marine structures of the cretaceous ocean, I think in the present state of our knowledge it will be proper, notwithstanding the high authority from which we must differ, to consider the so-called *Xanthidia* of the chalk as distinct from the recent organisms after which they have been named; in fact, as a genus of marine infusoria, should they not hereafter prove to be the gemmules of polyparia or the spores of marine plants.

I will conclude this imperfect notice of the flint animalculites, by stating that several kinds of disciform bodies of great beauty have recently been detected by Mr. Lee; these appear to be transverse sections of different species of the foraminifera termed *Nodosaria,* or of some allied genus.

III. *Tertiary Animalculites.*—I now arrive at the last division of the present inquiry, which will comprise a few remarks on the occurrence of animalculites in the tertiary strata of Great Britain; and of living species and genera of infusoria in the British seas, analogous to those of the miocene deposits of North America.

The organic constitution of the tertiary marls of Virginia, and the nature of the fossils of which they are composed, are too well

* Since the above remarks were written, numerous *Xanthidia* have been detected in chalk from Dover by Mr. Henry Deane of Clapham; but the appearance of these specimens, when cleared from the chalk and mounted in Canada balsam, seems to support the opinion that the originals were flexible and not siliceous.

known to require particular description. They are almost entirely made up of the aggregated siliceous cases or skeletons of infusorial animalcules; the prevailing forms belonging to the genera *Coscinodiscus* (sieve-like disc), *Actinocyclus* (wheel-like disc), *Dictyocha, Gaillonella, Pyxidicula,* and numerous kinds of the family of *Bacillaria.* Figures and descriptions of many of these fossils by Dr. Bailey will be found in several of the late numbers of the 'American Journal of Science.' The most remarkable of the siliceous shields are the orbicular cases of the *Coscinodisci,* which, when entire, consist of a pair of discs, connected at the periphery by a broad band or ring. The delicate and elegant markings with which the surfaces of these shields are elaborately sculptured, render them objects of great beauty and interest. An assemblage of these tertiary animalculites presents so striking a contrast to any I have seen from the chalk of England, Asia, or America, that I am very desirous M. Ehrenberg's statement as to their prevalence in cretaceous strata should be verified by further investigations; and the more so, as Dr. Bailey mentions that Ehrenberg referred certain unquestionably miocene American deposits to the chalk, because they yielded animalculites resembling some he had obtained from European strata supposed to belong to the Chalk formation.

I have sought in vain among the tertiary strata of England for infusorial deposits analogous to those of America. Polythalamia frequently occur in the London clay (as was first made known by Mr. Wetherell in a valuable paper published in our Transactions); and within the last few weeks several kinds of foraminifera have been obtained from clay brought up in sinking a well at Clapham, at the depth of 120 feet. But no one has discovered in our tertiary formations a bed, or even seam of earth, composed of fossil infusoria. In fact, so far as my information extends, our only rich deposits of this kind are of very recent origin. Near the banks of the river Bann, in the county of Down, Ireland, there is a layer of infusorial earth a foot thick, underlying a bed of peat. Specimens of this earth, with which I have been favoured by the Countess of Caledon, accompanied with drawings by her ladyship of the prevailing organisms, show that the bed consists of an aggregation of the siliceous shields or cases of numerous kinds of *Bacillaria,* but no traces of *Coscinodisci* or other usual American tertiary species occur; this arises probably from the Irish deposit being of fluviatile origin*.

* It may be added, that the property of polishing metal, which deposits of this kind are so well known in Germany to possess, has been discovered by the Irish; and as this earth occurs on the estate of Lord Roden at Tulleymore, it is locally known as Lord Roden's plate-powder.

Some white earth recently sent from New Zealand as magnesia, proves to be a fluviatile infusorial deposit like that of Ireland.

But if I have hitherto been unsuccessful in the microscopical exploration of our tertiary strata, an unexpected assemblage of the American miocene forms has been found in the digestive organs of certain living mollusca. Mr. Lee's discovery of recent *Coscinodisci* in the barnacle (announced in the 'Medals of Creation') has been followed up by his detection of numerous species and genera of infusoria in the stomach of the common scallop (*Pecten maximus**). These recent animalcules present almost all the genera and some of the species that prevail in the tertiary marls of Virginia; in particular two very striking and abundant fossils of the Richmond earth, the elegant *Coscinodiscus radiatus* and the *Dictyocha fibula*. So close is the analogy, not only of the individual shields, but even of their collocation, that it would be difficult for an experienced observer to distinguish slides mounted with the respective organisms, although the one group is from deposits of unfathomable antiquity, and the other from the British seas.

I have already stated that the modern calcareous deposits of the Bermuda Islands contain layers of infusorial earth; these are made up of organisms resembling those of America and the recent species found in the scallop.

One more fact in connexion with this subject remains to be mentioned. Along the shore of the Sussex coast to the east of Brighton, a bed of sand and calcareous mud, the detritus of the neighbouring cliffs, is in the progress of formation; and in this sedimentary deposit my son, Reginald Neville Mantell, has discovered shells of recent *Rotaliæ, Nodosariæ,* and other polythalamia, associated with the siliceous shields of *Coscinodisci, Dictyochæ,* and other infusoria, and with *fossil Rotaliæ and Textilariæ from the chalk*. Here then at the present moment a deposit is in progress, whose organic contents consist of an assemblage of the living species of the animalcules of the present sea with the fossil forms of the ancient chalk ocean; in like manner in the bed of the Nile, the polythalamia of the Nummulite rock are being imbedded with the existing mollusca of that river: collocations of this nature may perhaps exercise the ingenuity of the geologists of future times, and give rise to speculations of as little value as some of those with which I have ventured to trespass on the indulgence of the Society.

In conclusion I would remark, that the preceding observations are the result of the examination of organisms within the reach of the best microscopes which modern art has produced; yet there can be no doubt, that if the powers of our instruments could be increased, fossil structures yet more minute and far

* See Annals of Nat. Hist. April 1845.

more abundant would be detected. And if the naturalist be allowed to assume, that in the existing creation, "within and beneath all that minuteness which the aided eye of man is able to explore, there may be a world of invisible beings; and that could we draw aside the mysterious curtain which shrouds them from our senses, we should behold a theatre of as many wonders as astronomy can unfold,—a universe within the compass of a point so small as to elude all the powers of the microscope,"—surely the geologist may be permitted to conclude, that a large proportion of the sedimentary strata, which at present appears to consist of amorphous particles of lime, of flint, and of iron, may be the aggregated skeletons of beings yet more infinitesimal than those which have formed the subject of the present communication.

19 Chester Square, Pimlico, May 1815.

VIII.—*On the Occurrence of an Intestinal Worm in an Acaleph.* By M. Sars*.

[With a Plate.]

In Wiegmann's Archiv,' vol. ii. p. 322, 1841 (Annals, vol. iii. p.148), it is stated that a parasitical worm resembling a *Filaria* had been discovered by Prof. E. Forbes in a species of *Cydippe*, and subsequently (vol. ii. p. 370, 1842), that this parasite, which attaches itself by means of four suckers to the walls of the stomach or vessels, had been described by Messrs. Forbes and Goodsir under the name of *Tetrastoma Playfairii*. The reporter adds, that further observation would be of interest, as hitherto no intestinal worms had been met with in the *Medusæ*.

The reporter had forgotten that the discovery of an intestinal worm in an Acaleph had been published by me already in the year 1837. (See Ann. des Sci. Nat. 1837, vol. vii. p. 247.)

It is not to claim any priority as to this discovery, which is a matter of perfect indifference to science, that I return to this subject, but merely to communicate the following short notices written down in 1835, which I have hitherto kept back on account of their imperfect state, in the hope, unfortunately hitherto delusive, of completing them by further observations.

It was on a gigantic individual of my *Mnemia norwegica*, five inches in length, which I caught on the 4th of November 1835, near the island Floröe, that I observed, within the transparent clear body, from ten to twelve longish opake white bodies of about a line in length, which proved, on closer examination, to be intes-

* Translated from Wiegmann's Archiv, 1845, part 1.

tinal worms. They were affixed to the internal wall of the stomach of the Acaleph by one of their extremities, and moved but slightly and very slowly the rest of their bodies. Carefully detached from their place of adhesion they became more lively, and crept about a glass plate, alternately lengthening and shortening their body (Pl. IV. fig. 1'. of the natural size). The form of the body is consequently very variable, being sometimes much elongated, sometimes ribbon-shaped (fig. 1 to 3); sometimes shorter and broader anteriorly, or in the centre (fig. 4), but posteriorly (*b*) always acute; further somewhat flattened, so that the two sides (fig. 1) are broader than the other two (fig. 2). Not a trace of articulation is visible on the smooth, soft body, which even in the perfectly contracted state, in which it almost acquires the form of a pitcher, indicates no perceptible transverse folds.

The anterior extremity of the body (*a*) is circular, and surrounded by four suckers, (*cc*) of oval form, and whose longitudinal axis coincides with the axis of the animal: each of them is divided interiorly by a septum into two spaces or cavities, the hindermost of which is largest, the front one being a little smaller and narrower. By means of these organs the worm attaches itself to the walls of the ventral cavity of the Acaleph. From between these suckers projects the conical anterior extremity of the body, at the apex of which is observed a small circular aperture, which is probably the mouth. When the worm crawls, the anterior extremity is sometimes projected (figs. 1. and 4), sometimes retracted within the suckers (figs. 2, 3.); this always takes place alternately, the entire body expanding and contracting, in which manner the animal each time advances a little distance.

The worm observed by me may probably be identical with that which the British naturalists have described as a new genus with the name *Tetrastoma*. I have for the time placed it in the genus *Scolex*, O. F. Müller, with the specific name *Acalepharum*.

EXPLANATION OF PLATE IV. FIGS. 1 TO 6.

Fig. 1'. Two individuals, natural size; all the other figures are more or less magnified.
Fig. 1. An individual seen from the broad side, with the anterior extremity projected.
Fig. 2. The same from one of the narrow sides with retracted anterior extremity.
Fig. 3. The same slightly, and *fig.* 4. greatly contracted.
Fig. 5. The anterior portion of the body with the suckers highly magnified.
Fig. 6. An individual pressed flat under the compressorium.

In all these figures, *a* designates the anterior extremity of the body; *b*, the posterior; *c c*, the suckers.

IX.—*A List of the scarcer amongst the Lichens which are found in the neighbourhood of Oswestry and Ludlow, with occasional observations upon some of them.* By the Rev. T. SALWEY*.

As a study of the Lichens is confessedly one of the greatest difficulties the botanist has to contend with, and as Sowerby's 'English Botany' and the 'Lichenographia Britannica' (so far as this last extends), the principal works in our language which give any detailed description of them, are in the hands of few, I have thought that observations upon some of the least common of such Lichens as are found in this part of England may be acceptable to those who are entering upon the study of them.

Having already made some remarks upon the Welsh Lichens in the 'Annals and Magazine of Nat. History,' vol. xiii. pp. 25, 260, I have enumerated in the present list such only as I have met with out of the Principality, and these more particularly such as are found in the neighbourhood of Oswestry and Ludlow, so that the following may be regarded almost as a list amongst the scarcer of the Lichens of Shropshire, the great majority of the habitats being such as are confined to this county. The descriptions of the several species in the 'English Flora' are much too concise to enable the student, without occasional help from some experienced botanist, to make them out. Dr. Taylor in the 'Flora Hibernica' has given much more ample details of such as he describes, and has added several new species, some of which are still to be discovered on this side of the Channel, but his work necessarily embraces such only as are found in Ireland. It is much to be regretted that we have as yet no monograph of the Lichens, and till some one competent to undertake so arduous a task shall have supplied this desideratum, any occasional observations upon them may perhaps meet with acceptance at the hands of those who are desirous of studying this branch of botany.

It is only as a help to such, and not under the presumption that I am capable of throwing much light upon the subject, that I have ventured to send to the Botanical Society of Edinburgh the following list of Lichens, with such observations upon some of them as a long acquaintance with, rather than an accurate knowledge of them, has led me to form. If my observations should be the means of removing any difficulties in the way of a single inquirer into this branch of botany, my end will be fully answered.

Oswestry, March 28, 1845.

Bæomyces anomalus. Craigforda and Pentregaer in the parish of Oswestry.

* Read before the Botanical Society of Edinburgh, June 12, 1845.

I retain this name in deference to the authority of my friend Dr. Taylor, though I confess I am more inclined to consider it as a *Lecidea.* Whatever generic name it may properly claim, it certainly ought to retain the specific one of *anomalus*; for a plant which has been described by Acharius as a *Lecanora*, by Hooker as a *Verrucaria*, and by Taylor as a *Bæomyces*, evidently occupies so doubtful a place, that its position can scarcely be considered as thoroughly established. It is not an uncommon lichen on the Cambrian rocks. The rock at Craigforda indeed on which it grows is an indurated sandstone; but at Pentregaer it grows on the rocks of the Silurian system. It varies very much in the colour of the thallus from a dull or yellowish white to a smoky brown. The apothecia are immersed in the crust, and do not appear to me to possess a sufficient stipes to enable it to rank with *Bæomyces*.

Calicium stigonellum (*sessile*, Persoon, M. and N. 858). Upon old oaks at Llanforda, scarce, but profusely upon a single oak in Middleton-lane, just beyond the Llys House.

This plant and the following one, the *turbinatum*, have been frequently confounded, though no two plants can be more distinct. The present is a plant of unfrequent occurrence, growing either upon the crust of the *Porina pertusa*, or else upon the rugged bark of old oaks. On the oak-tree in Middleton-lane it is much more developed than when growing on the *Porina pertusa*. The apothecia are perfectly sessile, and when cut exhibit rather a thick, white layer immediately underneath the disc, connected at the edges with a lower one of much less thickness, and containing between these two a black powdery mass. The disc is covered with a gray bloom, and has a border of a darker colour, giving it the appearance of a *Lecidea*.

C. turbinatum (*gelatinatus*, With.; *Sphæria sphincterica*, Sow. Fung. 286, M. and N. 366). This is a very common plant, growing on the crust of the *Porina pertusa*. The apothecia in this are polished and pear-shaped, with a depression at the top and a little dot in the centre of the depression, giving it the appearance of a *Verrucaria* or a *Sphæria*. I had suspected that it ought to be removed again to the genus *Sphæria* where Sowerby had placed it, but upon requesting my friend Mr. Berkeley to examine it, he confirms the authority of Fries in still retaining it as a *Calicium*.

C. ferrugineum. Old park pales at the Moor Park and Hay Park near Ludlow; not of very common occurrence.

C. chrysocephalum. Park pales at Downton Castle in Herefordshire, near the bridge above the Hay Mill. This is one of the scarcest of this genus: the bright vivid hue of the crust will not fail however to arrest the practised eye of the lichenist, should he come within its reach, so that he will not be likely to overlook it.

C. phæocephalum. Pales of Hay Park near Ludlow. This is a very distinct species, and cannot possibly be confounded with any other. The "tumid, crowded and leaf-like appearance of the crust," so well described in the 'Lichenographia Britannica,' gives it indeed very much the appearance of a minute *Bæomyces*, or a diminutive resemblance of *Cenomyce cæspititia*. The pilidia however are truly those of a *Calicium*; and the dull brownish green hue of the capitulum, surrounded, as it frequently is, by the bright yellow ring of the sporules bursting from the edge of the disc, give the plant a very distinct and peculiar appearance. It is of very unfrequent occurrence.

Calicium sphærocephalum. Probably common upon the old decaying timber of barns, &c., but overlooked from its minuteness, the crust appearing to be scarcely more than a stain upon the wood of a bluish gray colour, in which the young apothecia before they are fully developed appear to the naked eye like immersed black dots.

C. furfuraceum. Dry banks about Oswestry; on the bank between the pool and the common at the Lodge near Ludlow.

This is not a plant of general occurrence. The bright pale lemon colour of the whole plant readily points it out. It is quite dissimilar in habit and place of growth from the rest of the *Calicia*, and has been removed by Dr. Taylor to *Bæomyces*.

Opegrapha saxatilis. Sandstone rocks, Craigforda.

O. dendritica. On the smooth bark of trees, but not common.

Verrucaria gemmifera. Craigforda.

This plant arrests the eye by presenting the appearance of a verdigris or bluish gray stain upon the rock: the apothecia are very minute.

V. gemmata. Upon the bark of old ash-trees, Pentregaer, &c.

This is the largest of the *Verrucariæ*, and not uncommon upon the bark of old ash-trees, where the size of the apothecia contrasting with the white ground of the bark, give it a conspicuous appearance.

V. rupestris. Common upon the limestone rocks at Oswestry, upon the Moelydd, and at Pentregaer.

V. immersa. In the same habitats as the former and at Craigforda, but less common. The smaller size both of the apothecia and of the cavities in which they are immersed, its *gray* crust as opposed to the *white* one of *rupestris*, and a certain peculiar *neatness* in the appearance of the whole plant, distinguish it from the former.

V. lævata. Upon stones in the Morda Brook under Craigforda.

V. epipolæa. Limestone rocks on the Moelydd and at Pentregaer.

This is a very handsome and conspicuous species; the crust is often suffused with a pale rose-colour, which, contrasting with the bluish colour of the apothecia, gives this plant a very beautiful appearance.

V. acrotella. Craig-y-Rhu: scarce.

V. epigæa. Hay Coppice, Herefordshire. Perhaps not uncommon in a barren state, when it may be overlooked as a young state of some *Conferva* or *Vaucheria*.

V. Hookeri. Mynydd-y-Myfyr: very scarce.

Endocarpon miniatum. Limestone rocks, Oswestry; Wickliff rocks, Ludlow, and Downton Castle.

E. Hedwigii. On the top of the wall opposite the house at the Moor Park near Ludlow, and other similar situations.

E. læte-virens. In fruit on Mynydd-y-Myfyr in the parish of

Oswestry. Common on the Welsh mountains, but scarce with us. The apothecia are immersed, but protrude in an oblique direction from the thallus ; small, and of a dull opake black colour.

Endocarpon rufo-virescens. Craigforda and Mynydd-y-Myfyr. Common in Wales, but of more rare occurrence with us.

Lepraria chlorina. Craig-y-Rhu.

L. Iolithus. Craig-y-Rhu.

Variolaria globulifera. Upon old ash-trees at Craig-y-Rhu.

V. conspurcata. Limestone rocks, Pentregaer.

Lecidea fusco-atra. Craigforda and Pentregaer. This minute *Lecidea*, with its finely radiating thallus, presents a beautiful appearance on the surface of quartz or chert.

L. fumosa. Moelydd and Craig-y-Rhu. The crust forms brown smoky patches upon the rocks. It is probably not uncommon.

L. petræa. In great abundance and perfection upon the mudstones of the Silurian system about Ludlow, and common also about Oswestry. My reason for noticing this common lichen is because there is some resemblance to the naked eye between this and *lapicida*, and experienced botanists have I believe proposed to unite them ; but the crust of *lapicida* is smoother, more polished, harder, and more cream-coloured. The apothecia too are more sunk in the crust in *lapicida*. In *petræa* they are often surrounded by a whitish border formed of the crust, giving the plant the appearance of a *Lecanora* ; in a more advanced stage they have an urceolate appearance, the border being raised and inflexed ; and the under side of this being white, the plant still retains somewhat of the appearance of a *Lecanora*. The concentric arrangement of the apothecia is usually very strongly marked, so that the name of Davies and Dickson (*concentrica*) ought I think to be restored to it instead of that of *petræa*, to which it has no more title than many others which are equally confined to rocks, and which, in fact, expresses nothing peculiar to the plant itself. The *petræa* grows upon soft rocks. I only know *lapicida* as growing upon the hard slaty rocks of the Cambrian system, where it is by no means a common lichen.

L. prominula. A minute and obscure lichen, varying however much in the size of its apothecia. The var. *lygæa* of Ach. has been sent to me by Mr. Leighton from Haughmond Hill.

L. anomala. Acharius characterizes this species as "polymorpha, nam apothecia, quoad formam et colorem eximiè variant ;" we have what I believe to be one of the varieties of this polymorphous species growing upon some elm-trees at the Lodge near Ludlow. The crust is very thin, smooth, polished, and of a pale whitish colour. The apothecia conspicuous, variable in size, and of a brownish black colour.

L. elæochroma and *parasema.* These lichens have been well distinguished in the work of Mougeot and Nestler, 'Stirpes Cryptogamæ Vogeso-Rheuanæ,' and by Dr. Taylor in the 'Fl. Hib.' The crust of *parasema* is frequently almost white ; the apothecia scattered irregularly about the disc, and larger than in *elæochroma*. In this last the crust is always greenish and granulated, the apothecia smaller, and usually crowded together in a circular group in the centre of the thallus. The *elæochroma* is by far the most common species; the *parasema* indeed is of rather rare occurrence.

Lecidea dubia. Upon barns at Overton and Maryknowle, and at Little Leinthall near Ludlow. It is not a common lichen with us.

L. Griffithsii. Upon old oaks in the Hay Coppice, Herefordshire. We have what is perhaps a variety of this growing upon the scales of some old spruce fir-trees at the Lodge near Ludlow. The apothecia are larger and more convex than in the usual state of *Griffithsii*, and more variable in colour, varying from a pale fawn to a deep claret colour. Mr. Borrer, to whom I sent a specimen, said it much resembled one he had received from Acharius as his *Lecanora hypopta*.

L. aromatica. Upon the mortar in an old wall in Llanforda-lane: scarce.

This plant has been considered as a state of *cæruleo-nigricans* or *vesicularis*. If it be so, I see no reason why it should not grow to the same size, and assume the same habit in every respect as *vesicularis*. The *vesicularis* grows with us on limestone; the *aromatica* on mortar: what should prevent the latter, if the same plant as the former, from attaining the same size as the former, seeing they both have a calcareous base?

L. sanguinaria. Upon the pales of the Hay Park, Herefordshire, and upon the pales below the Ambry at Croft Castle, Herefordshire.

L. muscorum. Pentregaer.

L. scabrosa. An obscure lichen, and probably not uncommon. Upon a wall in Weston-lane, Oswestry, and at Craig-y-Rhu.

L. Lightfootii. Birch-trees, Llanforda: scarce.

L. incompta. Upon an old wych-elm at the Hayes near Oswestry, and upon an old maple-tree upon the High Vawr. An inconspicuous lichen and of rare occurrence.

L. quernea. Old oaks, Oswestry, and at the Lodge near Ludlow, and in the Hay Coppice. A very handsome lichen when in perfection.

L. æruginosa. Old gates and posts, Oswestry: not common.

L. quadricolor. Craigforda and Mynydd-y-Myfyr. These and the Cyrn Moelfre in the adjoining parish of Llansilin are the only habitats I have for this plant.

L. Pineti. Wood above the house at Llanforda, on the scales of fir-trees. This is a very rare lichen with us, the habitat here given being the only one I know. It grows principally on the base of the stem just above the roots. The pale yellow apothecia present to the naked eye nothing but minute specks on the thin green crust of the thallus.

L. cornea. Upon oak-trees in the Hay Coppice, Herefordshire, and about the Lodge near Ludlow.

L. marmorea. This occurs with us upon the roots of old thorn-trees growing in the crevices of the rock, as well as upon the rock itself. It seems to be almost wholly without crust, the shields thus presenting the appearance of minute *Pezizæ*. Fries, who makes this plant his *Gyalecta cupularis*, makes the *Gyalecta Wahlenbergiana* of Ach. 'Syn.' his var. β. of this plant. Now, if what I regard as the *Gyalecta Wahlenbergiana* of Ach. be indeed that plant, I cannot but confess my surprise at its being united with *marmorea*. The two plants appear to me "toto cœlo distinctæ." I first discovered the *Gyalecta Wahlenbergiana* about twenty years ago upon the rocks at Craig-y-Rhu in this parish, but the habitat there is now lost. I did not find it again till the year 1840 upon the Wickliff Rocks at Ludlow, where it still grows, investing decayed mosses. This plant forms a continuous crust of a pale yellowish colour, and of a substance somewhat between leprous and waxy. The apothecia, which are numerous, appear to be of exactly the same substance as the crust, and are of an urceolate form, having the disc either of a pale yellow, or in some instances of a diluted greenish colour. The border, which is inflexed, is granulated. The apothecia are far more fragile and tender than in *marmorea*. The plant resembles much, upon a very minute scale, the beginning of a honeycomb. Wahlenberg's description of his plant, "substantia mollis et subgelatinosa," and its habitat, "in locis obscuris supra muscos putridos," agree accurately with our plant, which indeed I can have no doubt is the same as his, and I cannot reconcile myself to its being united with *marmorea*.

Lecidea lutea. Upon a single tree at Llanforda, now cut down.

L. polytropa. Mynydd-y-Myfyr. This is the only English habitat I at present know for this plant.

L. lucida. Upon sandstone walls about Oswestry, in fruit, but seldom found in this state.

L. desertorum. Dr. Taylor, to whom I sent this plant, seems inclined to refer it to *cæruleo-nigricans*. Mr. Borrer regards it as the *desertorum* of Acharius. I cannot but regard it as distinct both from *cæruleo-nigricans* and from *Lecidea coronata*, and also from *quadricolor*, with which Ach. unites it. It grows upon the limestone rocks here with *cæruleo-nigricans*, but is much scarcer. It differs from this in having the crust more continuous, and in the scales of this being far smaller and flatter, and having to the naked eye somewhat of a filmy appearance. The shields also have not the bluish colour of those of *cæruleo-nigricans*, nor are they smooth like these, but are of a deep black colour, and appear rough under the lens. In *quadricolor* again the shields are always some shade either of brown, yellow, or red, and the crust not scaly, but granulated. The *quadricolor* too grows upon the earth in heathy situations; the *desertorum* upon limestone. In *coronata* again the crust is a congeries of minute bluish granules which form also the border of the apothecia, which are of a reddish brown colour. Fries makes *quadricolor* and *desertorum* the varieties α. and β. of his *Lecidea decolorans*.

L. canescens. In fruit upon an old oak at Whittington: common upon old oaks, but usually barren.

L. cæruleo-nigricans. Limestone rocks at Pentregaer, Craig-y-Rhu, and on the Moelydd.

L. scalaris. Pales of the Hay Park near Ludlow: scarce.

Lecanora periclea. This is an obscure and by no means a common lichen. It grows with us occasionally upon old oak- and ash-trees; upon an ash-tree in a field south of Treflach-lane, about a quarter of a mile from Croeswilin.

L. squamulosa. On the Moelydd, and upon the rocks at Pentregaer.

L. glaucocarpa. Craig-y-Rhu, but barren. The crust of this plant consists of a number of thick, smooth, hard scales, here and there collected together, but more usually scattered, wavy, and rounded in the centre; in colour varying from a glaucous to a dark brown in an old state, and the younger ones white at the edges. It grows upon the perpendicular face of a limestone rock.

L. rubra. This is a very beautiful lichen and of rare occurrence. The only two habitats I know for it are upon the walls of Wigmore Castle in Herefordshire, and at Craig-y-Rhu in the parish of Oswestry. In both habitats the plant grows upon patches of decayed *Hypna* hanging loose from the stone.

L. hæmatomma. Craigforda, Craig-y-Rhu, &c.

Parmelia glomulifera. Upon a wych-elm at Llanforda. There is only a single plant of this upon the tree in question, and it is at present the only English habitat I know for it. I have watched this plant for upwards of twenty years, and cannot perceive that it has either increased or decreased. It has glomeruli, but no apothecia; many of the *Parmeliæ* certainly seem to propagate themselves by buds or gonidia without apothecia. The shields of *scortea* and of *lanuginosa* are I believe yet a desideratum in English botany, and those of *proboscidea, perlata, Borreri* and others are very rare, even where the plant itself is not uncommon. I cannot but suspect from the above instance, that the apothecium is at all events the only mode by which this particular species is propagated. Dr. Taylor considers the glomeruli of the present plant as the only distinction between this and *herbacea*. I confess I cannot be of this opinion. Even Fries, so prone as he is to diminish species, though he removes both of these to the genus *Sticta*, and in which I think they may well be placed, still keeps them distinct. Dr. Taylor also considers that they would rank as well with the *Stictæ* as with the *Parmeliæ*. Both of them grow in great profusion in the wooded parts of Wales, often upon the same trees; but whether in a wet or dry state, they equally strike the eye as being distinct; but most so in a dry state, the smoky white colour of the thallus of the *glomulifera* contrasting with the brownish green of that of *herbacea*. It is also thicker and more leathery, and not so much wrinkled.

P. herbacea. Upon an old wych-elm on Bringewood Hill, opposite Downton Castle, in Herefordshire.

P. caperata. Craigforda and other places about Oswestry, but not common, and usually barren.

P. conspersa. Craigforda: not common. The var. *stenophylla* of Ach. grows upon the sandstone rocks there.

P. Borreri. Woodhill and Porkington, but with us always barren; this plant is scarce with us.

Parmelia aquila. Upon the north side of a small mass of sandstone rock on the southern slope of Mynydd-y-Myfyr. This may almost be called a maritime plant, being so commonly and abundantly found on maritime rocks, and scarcely met with elsewhere. The late Sir J. E. Smith told me however that he had met with this plant at Stonehenge, which is about thirty miles from the sea, in a direct line; we are about forty-five. In the great storm however of January 6th, a few years ago, our windows even at this distance from the sea were copiously incrusted with sea-salt, so that the seeds of a maritime lichen would be readily carried to us. The plants in question do not spread upon the adjoining stones, and which is perhaps singular, they occupy the face of the rock *from* the sea; upon the coast, as far as I have observed, they always face the sea.

P. aleurites. Not uncommon upon old pales: Hay Park near Ludlow, and Oteley Park near Ellesmere.

P. ambigua. In similar situations to the last, but very scarce in fruit; upon an old gate at Pentregaer.

P. physodes. Very finely in fruit upon the pales of the Hay Park and about the Moor Park near Ludlow.

P. plumbea. Upon ash-trees at Craig-y-Rhu, but barren.

P. crassa. Limestone rocks, Oswestry.

P. hypnorum (*Lecanora*). Hay Coppice, Herefordshire: scarce.

P. erosa. Upon the elm-trees in the walks at Ludlow Castle on the west side.

P. cæsia. Not uncommon, but usually barren. I have found it in fruit on the Moelydd.

Sticta scrobiculata. Hay Coppice, about the roots of old oaks in fruit.

S. limbata. Hay Coppice, on hazels.

S. pulmonaria. Ditto, and at Oswestry: not uncommon.

S. sylvatica. A single plant only of this has grown for many years upon a mass of rock in the Hay Coppice.

Collema fragrans. On trees at Llanforda and Pentregaer, but not common. It clothed nearly the whole inside of an old pollard-ash (now cut down), one half of which had been torn away, and the other half exposed to the weather. I could never detect any peculiar scent about it to entitle it to its specific name.

C. ceranoides. Upon a wall near the garden at Llanforda.

C. multipartitum. This is a beautiful plant, radiating from a centre upon flat masses of the limestone rock, the rounded appearance of the narrow segments of the thallus giving it an appearance as if made of minute cord; the centre soon decays, so that what is usually found of the plant are simply detached broad arcs of a circle. It grows both on the Moelydd and at Pentregaer.

C. marginale. Pentregaer.

C. tunæforme. Ditto: scarce. Mr. Borrer considers this to be the same as *dermatinum*.

C. granulatum.
C. dermatinum. } Pentregaer.
C. sinuatum.

Collema velutinum, Ach. Upon ash-trees at Craig-y-Rhu. Dr. Taylor refers this to *nigrum*.

Solorina saccata. Wickliff Rocks, Ludlow: scarce.

Peltidea venosa. Ditto. Ditto.

P. scutata. On trees at Pentregaer, in fruit.

P. horizontalis. Wickliff Rocks, Ludlow, Craigforda, &c.

P. aphthosa. Craigforda, and woods at Downton Castle, Herefordshire.

P. spuria. Dry banks at Oswestry, but very scarce. I do not regard this as the same with *venosa*. If not a distinct species, I should consider it with Fries a state of *canina*. Though about the same size as *venosa*, the *spuria* is distinguished from it by not having the thick dark-coloured veins underneath which that plant has, and by the apothecia being smaller and narrower. In *venosa* they are of a roundish shape and flat, something like those of *horizontalis*, but of a dark colour like those of *scutata*. There is a *Peltidea* I have occasionally met with, which I believe is regarded, if it has been noticed at all, as the young state of *canina*; it is however of much less frequent occurrence than the *canina*, whilst the great difference in habit and appearance inclines me to believe it to be a distinct one. It is of an extremely thin and delicate texture, of a light bluish colour, and grows in an imbricated manner, forming cushion-shaped plants upon dry bare banks. The segments of the thallus are circular and inflexed, and the surface is copiously sprinkled by white soft sorediæ. It has much the habit and appearance of *Sticta limbata*. Though I would not undertake to affirm that it is not the young state of *canina*, I am inclined to think it is not. I am satisfied that a most patient and long-continued examination of particular plants in the same locality is required to enable us to clear up many difficulties which make the study of the Lichens so perplexing.

P. polydactyla. This is not so common as either *rufescens* or *canina*. I never saw it growing in such perfection as upon some heaps of burnt turf upon a common which had been left for two or three years before they were spread. I mention this because lichens are generally considered to be, and certainly are usually, of very slow growth, and yet here, where the turf on which they were growing had undergone the action of fire, the plants were of a larger size than usual, grew in the greatest profusion, and were copiously fringed with apothecia. Now even admitting that the original vegetation upon these heaps had not been destroyed by the fire, but that the plants in question escaped, still their unusual growth and luxuriance were unquestionably influenced by the alteration the soil had undergone. It has been suppposed however that lichens derive their nourishment only through the media of air and light: "Typicus lichenum omnium proventus est in aëre et luce," says Fries. I cannot but think however that in the instance now mentioned, the rapid growth and luxuriance of the plants must have arisen from their deriving some nourishment through their roots, if the fibres attaching the thallus to the soil may be so considered. I have seen frequently an analogous case in the *Hepaticæ*, the old beds where charcoal has been burnt in our woods being often carpeted over for many square feet with a luxuriant growth of *Marchantia polymorpha*. In both these instances, the carbonized soil has unquestionably exerted an influence upon the development of the plants. Liebig, in his 'Organic Chemistry,' p. 62, remarks upon the effects of charcoal in promoting the vegetation of plants, and attributes the effect to the charcoal supplying the *roots* of plants with an atmosphere of constantly renewed carbonic acid and air. I cannot but think that the two instances I have now adduced tend to show that it was through the fibres underneath the thallus that the carbonic acid reached the plants in question and affected their growth, and therefore that these fibres do in some degree supply the place of roots in conveying nourishment from the soil.

Nephroma resupinata. Upon rocks in woody situations: Craigforda, Craig-y-Rhu, &c.

N. parilis. In one instance in fruit at Craig-y-Rhu.

Gyrophora polyphylla. Mynydd-y-Myfyr: very scarce with us and in a dwarfish state.

Umbilicaria pustulata. Nesscliff, growing very finely upon the red sandstone rocks at that place.

Cetraria sepincola. Upon some old park pales at Oteley Park near the water.

C. glauca. Craigforda.

Borrera furfuracea. Mynydd-y-Myfyr, and pales of the Hay Park, Herefordshire, near Ludlow.

Ramalina pollinaria. Dorrington: not uncommon upon old barn doors; grows also upon some elm-trees at the Lodge near Ludlow.

Alectoria jubuta. Not common with us.

Cornicularia aculeata. Craigforda.

Isidium coccodes. Old oaks, Oswestry.

I. microsticticum. Rocks, Pentregaer.

I. corallinum. Craigforda, &c.

Sphærophoron coralloides and *compressum*. Ditto, and Mynydd-y-Myfyr.

Stereocaulon denudatum. Clee Hill and Mynydd-y-Myfyr, &c.

S. nanum. Upon walls at Sweeney.

Cenomyce cæspititia. Craigforda: scarce. I have received it also from Mr. Leighton, I think from Haughmond Hill.

C. sparassa. Hay Coppice, Herefordshire.

C. deformis. Ditto.

C. bellidiflora. A barren state of this grows at Craigforda.

Pycnothelia papillaria. Barren: Craigforda. This is very scarce with us. I never met with it in such perfection as upon the common immediately above the house at Llandrindod Wells in Radnorshire.

Addendum to the List of Welsh Lichens.

Parmelia stygia. Llandegley Rocks, Radnorshire, upon the end of the range next to the village, and upon the side facing the east, Sept. 1844.

X.—*Reply to some Observations of* Prof. WAGNER *on the genus* Mylodon. By Prof. OWEN, F.R.S.

To the Editors of the Annals of Natural History.

GENTLEMEN,

IN the very excellent report on Mammalogy, in 1842, by Prof. A. Wagner, which forms part of the first valuable volume just published by the Ray Society, there occur two criticisms, to which satisfactory replies were given soon after they appeared, but which, being reproduced in an English translation, without comment, might mislead the zoological student on the points to which those criticisms refer.

The first (p. 60) relates to the genus *Mylodon*, and Prof. Wagner cites the late lamented and talented naturalist Dr. Harlan as having "proposed, in 1835, the name *Aulaxodon* or *Pleurodon* for *Mylodon*;" adding, "the latter of these two is evidently better than *Mylodon*, which signifies nothing else than grinder." I have shown in a letter, which the editors of the 'American Journal of Science' did me the honour to insert in the 44th vol. (January—March 1843) of their most useful periodical, that the fossil remains to which Dr. Harlan proposed to attach the names *Aulaxodon* or *Pleurodon* belong to an entirely distinct genus from the *Mylodon*, and that Dr. Harlan himself recognised the distinction, when remains of a true *Mylodon* were first presented to him, and accordingly proposed, in ignorance of my previous determination of the genus, to call the extinct animal to which those remains belonged '*Orycterotherium missouriense*.'

This species, also noticed as new in Prof. Wagner's Report (p. 60), is synonymous with my *Mylodon Harlani*, first described in the 'Fossil Mammalia of the Voyage of the Beagle,' 4to, part 3, 1839, and afterwards with further details derived from examination of the very Missouri specimens on which Harlan had founded his genus '*Orycterotherium*' in my memoir on the *Mylodon robustus* (4to, 1842).

With regard to Harlan's *Aulaxodon* or *Pleurodon*, that genus is much more closely allied to *Megalonyx*, if it be really distinct from Cuvier's genus.

And now a word for *Mylodon* as a name, admitting the genus to be a reality in nature. It is true that *μύλη, mola, ὀδοὺς, dens*, implies merely a beast having molar teeth only, and no canines or incisors; and that this character is equally applicable to other genera of Megatherioids. But the same objection might be urged against *Megalonyx* (*μέγας, magnus, ὄνυξ, unguis*), the species of which genus had not longer or larger claws than those of *Mylodon* or *Megatherium*. All the Megatherioids were remarkable for the enormous bulk and strength of their hind legs, and *Sce-*

lidotherium (*σκελὶς, femur, θηρίον, bellua,*) manifests but a slight exaggeration of this character in its fossil thigh-bones. Nor can any of the known Megatherioids be termed other than great beasts, although the *Megatherium* proper best merits that denomination. In selecting, therefore, the term *Mylodon* for an additional genus to this extinct race, I had in view a principle of the nomenclature of the Megatherioid genera by which all the characteristic peculiarities of the family are readily fixed in the memory.

The second remark on which I beg to advert bears upon an anatomical point, but one which I believe to be of high importance. Dr. Wagner (p. 38), referring to Prof. Mayer's valuable remarks on the Anatomy of the Marsupialia, specifies those of the brain, in which, in opposition to Owen, he recognises convolutions and a 'corpus callosum,' p. 38. I need only refer to my paper in the 'Philos. Transactions,' 1837, where the cerebral convolutions in the kangaroo and wombat are specially described, in order to demonstrate the want of a concomitant development of the 'corpus callosum' in those animals.

The great transverse band or commissure which unites the two hemispheres, spanning from one to the other *above the lateral ventricles*,—which is plainly visible, as such, in the lowest Rodent or other Placental Mammal, with the smoothest, and, to outward appearance, simplest brain,—this great commissure or corpus callosum, I again affirm, after reiterated dissections, to be absent in all the known genera of Marsupials. If the narrow transverse band, which unites together the hippocampi majores, at the front part of the fornix, be regarded, as I originally stated it might be, a rudiment of the 'corpus callosum,' the comparative anatomist is at liberty to apply that name to it. But, in point of fact, a great hiatus exists between the condition of the cerebral commissures in the Implacental and that condition which we find in the lowest of the Placental Mammalia. The transitional structures by which M. de Blainville traces a progressive deterioration of the commissural apparatus from Bats and Rodents to Marsupials I have not yet met with, and they seem to have equally escaped the observation of the able editors (Fréd. Cuvier and Laurillard) of the posthumous edition of Cuvier's 'Leçons d'Anat. Comparée,' 8vo, tom. iii. 1845, who have subjoined the following note to the text of the great master :—"Le corps calleux semblerait être en rapport de développement avec le corps strié, si l'on constatait dans d'autres animaux ce que montre déjà le cerveau du *dauphin*, qui a des hémisphères volumineux, un corps calleux proportionnellement petit et peu épais, et un corps strié très médiocre. Mais il y a, dans les Marsupiaux, une disposition remarquable de l'appareil de commissure formé par la voûte (fornix) et le corps calleux (corpus callosum). Cet appareil y est réduit à ce point, que l'on a pu dire avec quelque vérité que le corps calleux n'existe pas." The editors then give a detailed account of a dissection of the brain of a kangaroo, confirmatory in all respects of my own, and they rightly remark : " Cette disparition presque totale du corps calleux ne se lie pas à un développement moindre du cerveau. Les hémisphères sont, avec la masse totale de l'encéphale, dans leurs rapports ordinaires, et rien au premier aspect ne ferait soupçonner la disposition de la voûte." They add, probably in reference to Prof. Mayer's statement : " L'observation de M. Owen sur cette disposition du cerveau des Marsupiaux a été repoussée à tort comme erronée. Il ne nie pas l'existence du corps calleux dans les Marsupiaux : il déclare formellement qu'on peut voir, si on le veut, dans ce qui reste de la commissure, le rudiment d'un corps calleux ; mais il relève avec raison l'absence dans les Marsupiaux d'un corps calleux comparable à celui des autres Mammifères."—*Loc. cit.* pp. 101, 102.

The interest which you have always shown in the maintenance as well as the discovery of truths in natural history, has induced me to beg permission to trespass thus far on your valuable space.

I have the honour to be, Gentlemen,

Your obedient servant,

London, July 18th, 1845. RICHARD OWEN.

XI.—*List of Birds found in the vicinity of Tunis and Biserta, from observations made during a month's visit from April* 21*st to May* 21*st* 1845. By H. M. DRUMMOND, 42nd R. H.

THE following list of a few of the birds frequenting the N. coast of Africa, as well as a former one of the birds of Crete (vide Ann. Nat. Hist. vol. xii. p. 423), I have been enabled to draw up through the kindness of Capt. Graves, H.M.S. Beacon, in inviting me to accompany him to the above-mentioned places, to whom also I am greatly indebted for the facilities he afforded me in accompanying the boats on an expedition up the lakes of Biserta. This list however is necessarily imperfect, owing to the shortness of my visit, as well as from the passage of the migratory birds being nearly terminated at the time of my arrival. The whole of these birds are found in the vicinity of the Biserta lakes, with the exception of the *Pterocles arenarius, P. setarius,* and *Otis houbara.*

The lakes of Biserta are about 40 miles to the westward of Tunis ; it was said that they are much more extensive than is really the case, and also that a communication for shipping could easily be opened, rendering the lower lake one of the finest harbours in the Mediterranean. That however is out of the question, the channel being so shallow and filled up with sand, that it would be a Herculean task to clear it out, and when done, probably the very first north-easter would fill it up again. The lake, the entrance of which is about a mile from the sea, is a beautiful sheet of water about 20 miles in circumference, and from 3 to 7 fathoms deep. It swarms with various kinds of fish; an extensive weir reaches across the mouth, and the fisheries are very valuable. Benayed, a wealthy Moor, who is the present proprietor, assured us that he pays an annual rent to the Bey of Tunis of nearly 3300*l.* sterling. The surrounding country is most beautiful; it abounds with game, chiefly boars, partridges, hares and wildfowl, and is clothed down to the water's edge with olive-trees and corn-fields. This is I believe the richest district in the regency; I could have fancied myself in one of the most beautiful parts of England, and the climate is delightful. The upper lake is freshwater, and nearly as large as the salt one, but only 6 or 7 feet deep. On the upper part is a deep and extensive marsh, out of which Gibel Tschar rises almost perpendicularly to the height of 2000 feet and upwards. This lake also swarms with fish, chiefly large barbel of 10 lbs. weight, gray mullet (*Mugil Chilo*, Cuv.), basse (*Labrax Lupus*, Cuv.), spotted shad (*Alosa Finta*) and eels. The lakes are connected by a river winding through a rich plain about two miles in extent, more or less cultivated according to the encroachments made by the floods in winter. From the great variety of country, consisting of hill, plain, and undulating ground, olive-groves, thick brushwood, corn-fields, marsh, and rich pastures, it is a very general resort of the feathered tribes, as will be seen from the following list.

Vultur fulvus.
Cathartes percnopterus. } Seen in great numbers on Gibel Tschar, at the head of the upper lake of Biserta: they probably breed there.

Falco tinnunculus. A few seen: breed on the cliffs at Cape Carthage.

F. tinnunculoïdes.
F. rufipes. } These birds do not appear to remain, as only a few were seen on my first arrival.

*F. Bonelli**.

*F. brachydactylus**.

F. haliaëtus. Common on the lakes of Tunis and Biserta at the fisheries.

F. albicilla. A few seen in the marshes round the lakes of Biserta.

*F. ater**.

F. cyaneus. One or two only.

F. rufus. Found in the marshes: not very common.

* These birds I understand are not uncommon, none however were seen, but having obtained some well-preserved skins of all three species that were shot near Tunis last winter, it is perhaps as well to mention them.

Strix noctua. This is the same species given in a former list of the birds of Corfu under the denomination of *S. passerina* : they are common in the olive-groves about Biserta, and on the approach of any one seem easily disturbed, as I constantly saw them flitting from tree to tree ; probably this may be only during the passage.

S. brachyotus. A few seen at the ruins of Carthage 21st of May, none afterwards.

Corvus Corax. A pair only of these birds were seen : they breed on the cliffs at Cape Carthage.

Coracias garrula. } Common, though none of the nests of these
Oriolus Galbula. } birds were found ; they probably breed in this part of the country, as they were always seen in pairs.

Sturnus unicolor. This is the common starling of the country, and seems (at least at this season of the year) quite to have supplanted the *S. vulgaris*, which I understand is also found, but probably only in the winter ; their habits as also their song, or rather the chattering and long plaintive whistle of the cock-bird, are precisely the same ; they are very common, especially in the neighbourhood of Biserta ; they build on houses as well as in trees, and are also found in small flocks on the muddy parts of the shores of the lakes, in company with stints and ring dottrels, feeding on the larvæ of small marine insects.

Lanius excubitor. One was shot near Tunis ; it is I suspect very rare, as I have only known of one instance of its being shot at Malta, and have never met with it in the Ionian Islands or Levant.

L. minor. Only one seen, probably owing to the passage being nearly over.

L. cucullatus. I obtained a beautiful specimen of this rare bird (at least in Europe) through the kindness of Sir Thomas Reade, H.B.M. Consul General ; it was shot last December along with several others ; they are never seen near the coast, but chiefly frequent the thick brushwood on the sides of the mountains, about twenty miles in the interior, where they are not uncommon.

L. Collurio *. One individual only : probably rare, as they have never been found in Malta, and are very rare in Corfu.

L. rutilus. Most numerous, the olive-groves round Tunis and Biserta being literally filled with them : breed there.

Muscicapa grisola. Very common : breeds.

M. albicollis. Common.

M. luctuosa. One or two only.

Turdus Merula. Very common at Biserta, making the woods resound with their melody.

T. cyaneus. Only one seen.

Sylvia turdoïdes. A few seen in the marshes at Biserta.

S. palustris. A few seen in the olive-groves.

* It is singular that these birds, which I have found most numerous in the spring and summer months in Switzerland, and also in some parts of England, where they are not uncommon, should be so rare along the shores of the Mediterranean. Query, as they have not been noticed during the autumn passage, where do they go in winter?

Sylvia Phragmitis. } Both these species are very common in the
S. arundinacea. } vicinity of Carthage, frequenting the high standing corn, where they breed.

S. Luscinia. A few met with in the thickets along the shores of the upper or freshwater lake.

S. orphea. Common: breed.

S. rubiginosa. Most numerous, especially at Biserta, frequenting the olive-groves.

S. atricapilla. Only one or two seen; probably do not remain.

S. melanocephala. Common: breed.

S. cinerea. Common: breed.

S. conspicillata. A pair only of these birds seen 21st April.

S. Phœnicurus. Ditto.

S. hippolais. } One or two seen about the end of April.
S. trochilus. }

Saxicola Œnanthe. A few seen at Biserta 1st of May, none afterwards.

S. stapazina *. }
S. aurita. } A few seen.
S. rubetra. }

S. rubicola. Very numerous: breed.

Motacilla cinereo-capilla. Very common, frequenting the pastures.

Anthus arboreus. } Not uncommon.
A. pratensis. }

Alauda arvensis. } Very common, especially the latter: breed.
A. cristata. }

A. brachydactyla. Very common: found in small flocks on the dry sandy grounds near the Goletta of Tunis.

A. Calandra. Very common about the freshwater lake at Biserta, also in the immediate vicinity of Tunis: breed.

Parus cæruleus †. Common: breed.

Emberiza Miliaria. Very numerous: breed.

E. Hortulana. Not very common: these birds are kept in cages at Tunis, being much prized for their song, and one that sings well will fetch as high a price as sixty piastres; the Tunis piastre is equal to eightpence.

Fringilla Chloris. Common: breeds.

F. hispaniolensis. This is the common house-sparrow of Barbary; it is very numerous, and though frequenting the towns and villages, I also found it in large flocks in the country many miles from any habitation. I was unable to ascertain whether it also builds in trees, or whether these large flocks so late in the season might have been occasioned by their being on their passage to Europe; they were en-

* From my own observations I have been unable to decide whether the *stapazina* and *aurita* are the same species; probably they are; but it is remarkable that out of numbers examined and shot at the same season of the year, none should be found in an intermediate state.

† It is curious that the *Parus major* should not have been found, as they generally frequent the same localities.

tirely composed of old birds. The eggs of these birds vary like those of the *F. domestica*, which they closely resemble.

Fringilla Cœlebs.
F. cannabina.
F. Montium.
F. citrinella.
F. Carduelis.
Common about Biserta; probably breed there, as they were seen as late as the middle of May.

Cuculus canorus. Common about Biserta.

Upupa Epops. Very common: probably breed: seen as late as the 21st of May.

Merops Apiaster. Very common during the passage: the first of these birds made their appearance this season the 27th of April, none seen after the 15th of May. I could not ascertain if any remain.

Alcedo Ispida. Only one seen at the Goletta 21st of April. I understand they are common in winter.

Hirundo rustica.
H. urbica.
H. riparia.
Most numerous, especially *H. rustica*: I saw no signs of their building.

Cypselus alpinus. Only two seen, on the tops of Gibel Tschar.

C. murarius. Very numerous.

Caprimulgus europæus. A few seen as late as the 10th of May.

Columba Livia. Very common: breed in the old wells about the ruins of Carthage.

C. Turtur. Very common: breed in the olive-groves.

Pterocles arenarius.
P. setarius.
Very common about ten miles from Tunis and throughout the interior: sedentary.

Perdix petrosa. Most numerous, especially at the upper lake of Biserta and throughout the interior; rare in the immediate vicinity of Tunis. A young covey was found as early as the 22nd of May: sedentary.

P. Coturnix. Most numerous, especially about the ruins of Carthage during its passage, which I understand commences about the beginning or middle of March, and lasts until the end of May: a very few only remain.

Hemipodius lunatus. Occasionally found near Tunis and Biserta. Sir Thomas Reade assures me that these birds do not migrate.

Glareola torquata. The first of these birds made their appearance the 24th of April, and after that were most numerous, especially on the muddy flats between the lakes of Biserta, where they were so tame that they would unwillingly take wing though approached within a few feet, and would almost immediately settle again.

Otis houbara.* These birds are never found near the coast, but as they are not unfrequently met with in the interior, it is perhaps as well to mention them. They are very wary and difficult of approach, frequenting the dry arid plains, and are only taken by means of hawking, of which amusement the Arabs are excessively fond. Sedi Mohammed, the Bey of the Camp, keeps a number of falcons trained for the purpose.

* I could obtain no account of the *Otis tarda* ever having been met with in this regency, though it is I believe common in other parts of Barbary.

Otis Tetrax. The Pollo di Cartagini, or Carthage fowl, the name it is generally known by at Tunis; it is held in great estimation for the table, and is consequently rare in the immediate vicinity. I however met with a few, chiefly in the high corn-fields, where at this season they probably have their nests: from the quick vibratory motion of their wings, the flight is so peculiar that they are not easy to be mistaken; they appear when flying almost white.

Œdicnemus crepitans. Common: breed in the fallows.

Himantopus melanopterus. A few seen in the marshes at the head of the freshwater lake at Biserta: probably breed there, as they were seen in pairs.

Charadrius Hiaticula.
C. minor. } Common along the shores of the salt lake.

C. cantianus. I never found these birds mixing with the other kinds of dottrels and sandpipers, but they were generally seen scattered about the dry sandy grounds near the Goletta, or in some neighbouring fallow, where on the approach of any one they run most swiftly in preference to taking wing; indeed they are so much the colour of the ground they frequent, that they are not easily detected: though I did not find their eggs, yet I have no doubt they breed there.

Vanellus melanogaster. A few seen on the shores of the saltwater lake.

Strepsilas collaris. Common on the shores of the saltwater lake.

Grus cinerea. These birds were not seen, but Sir Thomas Reade informs me that they are not uncommon in the winter months round the lake of Tunis, and are probably found at Biserta.

G. Virgo. Is also occasionally seen in winter at Tunis, during the breeding-season; they are very common on some of the islands along the coast, especially at Lampidosa.

Ciconia alba.* A few seen at Biserta, in the marshes *only*.

Ardea cinerea.* Very common.

A. purpurea.* Only one seen.

A. Garzetta.* Very common, especially on the banks of the river that connects the fresh with the salt lake at Biserta.

A. Verany.* A few of these very rare birds I found at the fisheries at Biserta; they seem more addicted to perching than others of the tribe, as when disturbed they would immediately fly for refuge to some tree, where, standing with outstretched neck on the highest part, it is difficult to get near them: though frequenting localities where fish abounded, and which one would suppose to be their natural food, yet on examination I never in any one instance found a vestige of fish in the stomach, but invariably found it to contain the remains of the blind-worm (*Anguis fragilis*); one I found entire and about 8 inches long, also locusts and small beetles.

A. ralloïdes.* Common along the banks of the river between the lakes.

* It is remarkable, that though most of these birds were common about Biserta, none of them should have been found on the borders of the Tunis lake.

Ardea minuta.* Very common in the deep marshes.

Nycticorax ardeola.* Common at the fisheries at Biserta, and generally seen sitting on the reed-fences of which the weirs are composed.

Phœnicopterus antiquorum. Very common on the lake of Tunis, which they seem to monopolize; a few also were seen at Biserta; they are excessively shy and difficult of approach; they do not breed here, but probably go over to Cagliari in Sardinia, as they leave about the beginning of June, at which season they are occasionally met with in Malta, and return in September. I was informed by Sir Thomas Reade that a smaller species inhabits the lake, and though I certainly saw some of a smaller size, yet being unable to procure one, I could not ascertain whether these may be the young or a distinct species.

Recurvirostra Avocetta. One seen on the salt lake at Biserta, which I fortunately procured: these birds I consider to be very rare, for though I have been several years in the Mediterranean, this and another shot at Corfu in April 1841 are the only two of the species I ever obtained.

Ibis falcinellus.
Numenius arquatus. } A few seen at Biserta.

Totanus fuscus. Common at Biserta: these birds were in the summer plumage, and differed widely from those shot in winter at Corfu; the legs of the present ones were black, with a very slight tinge of orange about the knees.

T. ochropus.
T. glareola. } A few seen at Biserta.

T. hypoleucos. Common.

T. glottis. A few seen at Biserta.

Scolopax rusticola.
S. Gallinago.
S. Gallinula. } Not found at this season, but are numerous about Biserta in winter.

Rallus aquaticus. Only one seen.

Gallinula Porzana.
G. pusilla.
G. chloropus. } Only one or two seen in the marshes at Biserta.

Fulica atra. Very numerous on the salt lake: breed in the marshes.

Podiceps cristatus.
P. cornutus.
P. auritus. } Several seen on the salt lake.

Sterna Hirundo.
S. nigra.
S. minuta. } Very common about Biserta.

S. leucoptera. A few seen on the river between the lakes.

Larus argentatus. Common: breed.

L. melanocephalus. Large flocks of these birds were seen in the Bay of Tunis 21st of April; none afterwards.

Puffinus cinereus. Very numerous all along the coast: breed.

* See note, preceding page.

Puffinus anglorum. A few seen.

Thalassidroma pelagica. Very common: breed.

Cygnus musicus. A few seen in the lakes of Biserta, and one in the lake of Tunis.

Anas Boschas. Common: breed in the marshes round Biserta.

A. marmorata. I only saw two small flocks of five or six each flying up the river between the lakes; one of these very rare birds I was fortunate enough to procure; it proved to be a female.

A. Fuligula. Very numerous: seen on the salt lake *only* in large flocks of two or three hundred; it is singular that they should be in flocks so late in the season.

Pelecanus onocrotalus. A few seen on the salt lake.

Carbo Cormoranus. Very numerous on both lakes.

XII.—*On the British* Diatomaceæ. By John Ralfs, Esq., M.R.C.S., Penzance*.

[With a Plate.]

Homœocladia, *Ag.*

Frond membranaceous, tubular, filiform, transversely wrinkled, branched in an umbellate manner; frustules linear.

1. *H. anglica,* Ag. Fronds umbellate at the base, above elongated and either simple or dichotomous; frustules linear, many times longer than broad, with striated lateral surfaces. Ag. Consp. Diatom. p. 25; Harv. Br. Alg. p. 208; Kütz. Die Kieselschaligen Bacillaria oder Diatomeen, p. 110. tab. 30. fig. 82. *Oscillatoria chthonoplastes,* Harv. in Hook. Br. Fl. vol. ii. p. 373. *Microcoleus marinus,* Harv. Br. Alg. p. 168.

On marine rocks, Ilfracombe, and Petitor near Torquay, September and October.

Since my former note on this plant (Ann. Nat. Hist. vol. xi. p. 77) I have examined specimens in a fresh state, and find its structure agrees so closely with Agardh's description of *H. Martiana,* that the difference appears to be but slight. It is brownish when recent and becomes of an opake olive-brown when dry, and often acquires a metallic lustre, particularly in the Torquay specimens. It arises from a comparatively thick scutate base, but soon divides in an umbellate manner into many branches, each of which is again similarly divided. In this second division the branches, which vary in number from three to five, are elongated, and are either simple or once dichotomous, or occasionally trichotomous. The extremities are often clavate, but not unfrequently slightly attenuated. The frond, which is from one to two inches high, is terete, erect, tubular, with numerous transverse but irregular wrinkles, which produce a crenated appearance of the margin.

* Read before the Botanical Society of Edinburgh.

The frustules are numerous, and either scattered or collected in bundles, between which the frond is somewhat contracted. The extremities of the frond finally become ruptured and suffer the frustules to escape.

The frustules are remarkable for their length, being many times longer than broad; they are siliceous, simple or binate, linear, not unlike those of *Frustulia Ulna*, but their ends are rounded. The lateral surfaces in form resemble the front, but are marked with numerous transverse striæ.

The endochrome is interrupted at regular intervals by hyaline globules producing a variegated appearance.

Plate III. fig. 1. *Homœocladia anglica*: *a*, natural size; *b*, portion of a filament magnified; *c*, front view of frustule; *d*, lateral view of empty frustule.

Berkeleya, *Grev.*

Frustules linear, included within tubular submembranaceous filaments which are free at one extremity, but have the other immersed in a gelatinous tubercle.

This genus differs from *Homœocladia* and *Schizonema* in having the base of the filaments immersed in a tubercle.

1. *B. fragilis*, Grev. Filaments subsimple, minute; frustules numerous, crowded, lanceolate or linear-lanceolate, eight to twelve times as long as broad. Grev. Crypt. Fl. tab. 294; Grev. in Hook. Br. Fl. vol. ii. p. 416; Ag. Consp. Diatom. p. 24; Harv. Br. Alg. p. 209; Kütz. *l. c.* p. 109.

Parasitical on *Zostera marina* and the smaller marine algæ, also on rocks in the sea; November.

Southampton, *Miss Hill*; Mount's Bay, *J. R.*; Ireland, *Mr. M'Calla*, according to a specimen from Dr. Scouler.

When recent this plant is dark olive-brown with a slight lustre; when dried it becomes greener, and is generally glossy.

The filaments are very short, seldom exceeding a quarter of an inch in length, and pale at their immersed base. They issue from the tubercle in a penicillate or radiate manner, and though usually simple are occasionally dichotomous at their origin.

The tubercle is colourless and large in proportion to the size of the plant. It is more diffuse in those growing upon rocks than in parasitic ones, sometimes indeed to so great a degree as to lose the appearance of a tubercle. It is always gelatinous, is easily broken, and if put into fresh water very soon becomes partially dissolved, and thus allows the separation of the filaments.

Under the microscope the filaments are hyaline and slightly crenate at the margin; the frustules are simple or binate, numerous, crowded, often confined to the middle of the filament, elongated (eight to twelve times longer than broad), not striated; the front view is narrow linear-lanceolate with truncate ends, and the lateral surfaces, which are about the same breadth, are lanceolate with subacute extremities.

The colouring matter occupies only the central third of the frustule, and consequently the ends are hyaline.

PLATE III. fig. 2. *Berkeleya fragilis*: *a*, front view; *b*, lateral view.

ENCYONEMA, *Kütz.*

Frustules cymbiform, siliceous, arranged in longitudinal series within submembranaceous, tubular filaments.

The filaments are tubular, submembranaceous, and under the microscope colourless. The lateral surfaces of the frustules being convex are observed in the front view, in which also the frustules are quadrilateral with two puncta at each end. These puncta are less easily discerned in the dorsal view as the dorsum is longitudinally convex. The lateral view is semi-elliptic with numerous transverse striæ, which are interrupted as in *Cocconema* by a longitudinal pellucid line.

This genus differs from *Schizonema* and other frondose genera of *Diatomaceæ* in the form of its frustules, as a single frustule resembles one of *Cymbella* or *Cocconema*; therefore, notwithstanding the similarity of habit, it belongs to a different series.

It is far more probable that some bodies of a totally different kind will be at first sight classed with *Encyonema*. These, which are really congeries of the ova of certain insects, were once described by Agardh as Algæ under the name of *Gloionema*. A little attention however will secure the observer from this mistake, for although cymbiform and arranged in longitudinal series, the eggs are neither siliceous nor striated.

1. *E. prostratum*, Berk. Kütz. Die Kieselschaligen Bacillaria oder Diatomeen, p. 82. t. 25. f. 7. *E. paradoxum*, Kütz. Synop. Diatom. in Linnæa 1833, p. 589. f. 73; Die Kies. t. 22. f. 1. *Monema prostratum*, Berk. Br. Alg. p. 15. t. 4. f. 3. (1832)! *Schizonema prostratum*, Grev. in Hook. Br. Fl. vol. ii. p. 414; Harv. Br. Alg. p. 214. *Gloionema paradoxum*, Ehr. Inf. p. 237 (not of Agardh nor Kützing); Portlock in Microscop. Journ. vol. ii. p. 6. pl. 3. fig. 1.

In freshwater rivulets, outlets of ponds, &c. near King's Cliffe, Northamptonshire, *Rev. M. J. Berkeley*; Farnham, Surrey, *Mr. W. Reeves*; Brambletye, Sussex, and "abundant in the rivulet which parts Kent and Sussex between Bodiham and Sandhurst," *Mr. Jenner*; near Bristol, *Mr. Thwaites*. Ilfracombe, Devonshire, *J. R.*; "Lough Erne, Ireland, *Capt. Portlock*."

This plant forms small tufts, which not unfrequently are so crowded as to constitute considerable patches. When recent it is dark brown, but dried it assumes a dull green colour. It is soft, but not gelatinous, and adheres only imperfectly to paper or glass.

The filaments are short, straight or flexuose, simple or slightly branched, slender, subequal, quite colourless under the microscope. Generally the frustules form a single series and have their convex margin alternately in opposite directions; occasionally a frustule is placed transversely, and in the broader filaments there are two, or even as many as three or four longitudinal series of frustules.

The frustules are in the front view about three times as long as broad, and slightly rounded at the ends; their convex lateral surfaces are visible at the sides.

The lateral view is broader than the front and semi-elliptic. The inferior margin is mostly prominent at the centre. The ends, which are rounded and separated from the body by a slight constriction are usually similar, but in the Ilfracombe specimens one of them is often produced into a short beak. A pellucid line passes from one to the other and divides the striæ into two unequal series. There is a dilatation at each extremity of this line, and at the centre a larger one, towards which, as in *Gomphonema* and *Cocconema*, the striæ slightly converge.

In the recent frustule the endochrome is tawny with a paler transverse band in the centre.

Kützing in his last work describes two species of *Encyonema**. Judging from his characters and figures, I doubt whether they are sufficiently distinct, as I find that the form of the frustules varies even in the same specimen.

I have examined an original specimen of Mr. Berkeley's *Monema prostratum*. The frustules in the lateral view are generally less constricted at the ends than in my other specimens, but they vary in this respect as well as in size.

Gloionema paradoxum, Ag., which at first sight bears some resemblance to this plant, has been shown by the Rev. M. J. Berkeley to be an animal production †.

Plate III. fig. 3. *Encyonema prostratum*: *a*, front view of frustule; *b*, lateral view, Sussex specimen; *d*, front, and *c*, lateral view of empty frustules from an Ilfracombe specimen; *e*, lateral view of frustules deprived of their colouring matter from an original specimen of *Monema prostratum*.

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* "*E. paradoxum*, tubulis sparsis, solitariis; cymbellis a latere secundario acuminatis cornutis striatis. *E. paradoxum*, Kütz. Syn. 1833. *Gloionema paradoxum*, Ehr. Inf. *Isthmia catenata*, Menegh."

"*E. prostratum*, stratum gelatinosum formans, tubulis maxime intricatis; cymbellis minoribus, obtusiusculis non cornutis, striatis. *Monema prostratum*, Berk. *Encyonema paradoxum*, Menegh."

† Annals of Nat. Hist. vol. vii. p. 449.

XIII.—*Botanical Notices from Spain.* By Moritz Willkomm*.

[Continued from vol. xv. p. 419.]

No. IV. Granada, August 12, 1844.

Wearied with the view of the endless plains of the Mancha, which present only an aspect of corn-fields and brown arid heath, here and there broken by a copse of the *Quercus Ilex* or *Pinus Pinea*, I was not a little delighted, when on the morning of the 10th of July I descried the blue mountain-ranges of the Sierra Morena, the frontier of the long-desired Andalusia. This long and wide chain of mountains, which rises in gentle gradations to a height scarcely exceeding 6000 feet, is at this point almost wholly covered with copses of oak. The rivulets, which are particularly numerous on the south side, permeating the valleys, and emptying their waters into the Guadalquivir, give birth to a richer vegetation than I had hitherto observed in the Spanish mountains, and were chiefly inclosed with flowering oleanders, ash-trees and elms, interspersed with the vine, which grows almost wild here, as in the lowest part of the Sierra Nevada, and hangs in picturesque festoons from the tops of the trees down to the ground. After traversing the celebrated Pass of Spiñasperros, and crossing many wide mountain-ridges, we arrive at the ancient Swabian colonies of S[ta] Helena and Carolina; and the environs of these beautiful localities, especially of Carolina, show the traveller, by their fertility, that he has reached the happy land of Andalusia. Hedges of *Agave americana* and *Opuntia vulgaris*, which surround the interminable fields of wheat, maize, hemp, beans, garbanzos (*Cicer arietinum*, L.), tomato (*Lycopersicon esculentum*, Mill.), pimento (*Capsicum annuum*, L.), plantations of mulberry-, olive-, almond- and vine-trees, which extend to the banks of the Guadalquivir, recall to mind the fruitful plains of Valencia. The extensive and very barren Sierra de Jaen separates the wide valley of the Guadalquivir from the noble Vega of Granada,—the former so celebrated in history, which extends at the foot of the Sierra Nevada, rising like an immense wall with snow-capped summits to more than 11,000 feet in height, and bounded on the west by the Sierra Tejeda and Sierra de Alhama. Although, in the country around Granada, neither the date- and dwarf-palm, nor the orange-hedges of Valencia are found, yet the vegetation bears a far more southern character. I had nowhere before seen in Spain such a luxuriant and almost tropical vegetation, not excepting even Aranjuez, where it is evident that the cultivating hand of man has produced by artificial irrigation that rich growth of trees and plants of all kinds which convert this spot into a charming oasis in the deserts of New Castille.

On one of the peninsular tracts of land formed by the small but celebrated rivers of the Jenil and Darro lies the ancient royal city of Granada, at the foot of the proud Alhambra, whose Moorish towers crown the last offshoot of the rocky wall which divides the valleys

* Translated from the Botanische Zeitung, Nov. 29 and Dec. 6, 1844.

of the Jenil and Darro, and forms an offshoot of the Sierra Nevada. The south side of this rock, which consists of disintegrated limestone, as well as the other hills, is covered with thick bushes of *Opuntia vulgaris*, which are now in flower, and whose fruit yield a favourite food to the lower classes. Interspersed are everywhere seen the *Agave americana*, which is here quite wild and very generally now in bloom. For instance, I have seen in the environs of the Capella San Miguel, on the southern slope of the valley of the Darro, more than twenty specimens together in a small space, whose flowering stems reached a height of 12 to 20 feet. Both plants ascend in the warm valleys of the Sierra Nevada, for instance in that of the Jenil, to a height of 3000 feet. Copses of elms, impenetrable hedges of *Rubus fruticosus* *, *Bupleurum fruticosum*, L., *Coriaria myrtifolia*, L., interspersed with *Lonicera etrusca*, Santi, *Clematis cirrhosa*, DeC., *Cl. Flammula*, L., and other climbers, clothe the northern slopes of the valleys ; whilst the arid, sunny hills, destitute of all shrubby vegetation, are covered with a number of *Labiatæ* (several *Thymi* and *Teucria*, especially *T. Polium*, L., *Ballota hirsuta*, Bth., *Origanum virens*, Lk. and Hoffmsegg.), accompanied by several species of *Ononis*, *Rubiaceæ* and *Compositæ*, as an *Andryala*, *Delphinium peregrinum*, L., *Ruta montana*, Clus., *R. angustifolia*, L., *Antirrhinum molle*, L., &c. On shady walls—frequent for instance on the walls of the Alhambra as well as on the aqueducts—grows the *Tra-*

* This *Rubus*, the only species which I have hitherto met with in Spain, but which seems to be everywhere frequent, belongs to the *Rubus digitatifoliis*, in the Div. II.** *R. candicantes* of Reichenbach's 'Flora,' and is very different to the *R. fruticosus*, L., which belongs to the Div. I., as well as to the species in Div. II. Boissier enumerates it in his Voyage, under No. 601, as *R. fruticosus*, L., without adding any remark. I regard it as new, and propose to call it *R. hispanicus*.

R. hispanicus, turionum fol. omnibus quinato-digitatis, foliolis oblongo-lanceolatis, caulis floriferi fol. ternatis, foliolis oblongis aut ellipticis, lateralibus sæpe bilobis, corymbo composito erecto multifloro, floribus amplis roseis, calyce fructifero reflexo, mora mediocri atra nitida ex acinis parvis numerosis composita, dulcissima. Frutex 12-pedalis et ultra, turionibus longissimis decurvatis 5-angularibus subtomentosis infra purpurascentibus superne læte-virescentibus, fol. omnibus supra obscure virentibus subtus albo-tomentosis, aculeis conformibus recurvis numerosis, calyce pedunculisque divergentibus cano-tomentosis, laciniis calycis ovatis ,petalis calyce duplo longioribus obovatis roseis. Differt a *R. fruticoso*, L., foliolis tomentosis oblongis nec glabris cordato-ovatis, corymbo composito nec simplici, turionibus tomentosis decurvatis nec glabris erectis, petalis roseis nec albis ; a *R. discolore*, Whe., cui maxime affinis, foliolis turionum oblongo-lanceolatis nec suborbicularibus, aculeis recurvatis nec rectiusculis, mora aterrima nec atro-cærulea.—I have frequently observed this beautiful species (No. 157 of my Spanish Plants), which forms impenetrable and entangled hedges, and bears flowers and fruit in uncommon abundance (the bunches of fruit attain the length of one foot), around Valencia, in the Sierra de Chiva, in Murcia, in the Mancha near Aranjuez, Madrid and Escurial, and in Andalusia, where they grow in the valleys of the Sierra Nevada up to a height of 4500 feet, and are common, especially in the environs of the village of Guejar. In Andalusia this *Rubus* bears the name of 'Sarza mora.'

chelium cæruleum, L., which is also found in the low warm valleys of the Sierra Nevada: from the rocks hang down the thorny branches of *Capparis spinosa*, L., mingled with *Sedum amplexicaule*, Boiss.; and in the moist grassy valleys, in the shade of willows and elms, is frequently found *Dorycnium rectum*, Ser., *Mentha rotundifolia*, L., *Lythrum Salicaria*, L., *Epilobium hirsutum*, L., *Retama sphærocarpa*, Boiss., and *Chamæpeuce hispanica*, DeC., which occurs in the Sierra Nevada up to a height of 4500 feet.

As soon as I had made all arrangements requisite to prolong my stay in the Sierra Nevada, whose lofty mountains attracted me irresistibly, I quitted Granada; and accompanied by a merry Andalusian, who acted at once as servant, guide and assistant, as well as a capital beast of burden, I set out for the Cortijo de S. Geronimo, which consists of a few scattered dwellings lying about 4500 feet above the sea, the highest inhabited spot on the northern side of the mountain, whose inhabitants still retain a clear recollection of Boissier. The Sierra Nevada is, with the exception of the mountain-ridges which enclose the valleys, almost wholly bare, and is even deficient for the greater part in the 'Monte bajo,' which everywhere covers the Spanish mountains. All the lower portion of the northern slope consists of limestone, in part interrupted by a beautiful marble, which for instance at S. Geronimo and Guejar forms immense rocks. In some places are found traces of coal (for example at the north foot of the Cerro Trevenque) and mines of mica (as on the southern slope of the Dornajo); and on the Cerro Calal, at the village of Guejar, are still found some lead-mines, which are now abandoned. I have however not succeeded in finding any trace of fossils in the whole of this limestone range. These limestone mountains rise to a height of 7000 to 7500 feet, and the highest and most interesting summits are those of the mountains Dornajo, Cerro Tesoro and Cerro Trevenque, in the neighbourhood of S. Geronimo. At S. Geronimo the gneiss formation commences, which in the snow-region passes into the micaceous slate and constitutes the highest chain of the Sierra, whose highest peak is the Cerro Mulehacen (said to be 11,600 feet), Picacho de Veleta (11,200 feet), Cerro Alcasava and Cerro Caballo. The region which is scarcely to be termed that of eternal snow, since every summer it melts, with the exception of some scattered snow-fields (hitherto I have nowhere observed the glaciers of which Boissier speaks), begins at about the height of 8500 to 9000 feet, and is clearly distinguished by its geognostical nature as well as by its highly peculiar vegetation from the lower regions. Traces of iron are here found frequently. The alpine region commences at a height of about 6000 feet, and the mountain region at 3500 feet. The environs of the Cortijo de S. Geronimo, on the southern slope of the magnificent alpine valley through which the rapid Monachil takes its course, form those districts of the entire northern declivity which abound most in water, and consequently in plants. The northern ridge, enclosing the valley known by the name of the Dehesa de S. Geronimo, whose highest slaty ridge rises to 8000 feet, is especially remarkable for its arboraceous luxuriance, being almost wholly covered with copses of various species of oak (especially *Qu. Ilex*, L. and *Qu. Toza*, Bosc.), *Berberis vulgaris*, var. *australis*, *Cratægus granatensis*, Boiss., *Cotoneaster granatensis*, Boiss., &c. Rye and barley are cultivated high up in the alpine region, whilst in the valley and on the southern slope much wheat, maize, *Phaseolus communis* and *Cicer arietinum*, are grown.

In the very first excursion which I made into a side valley of the Dehesa, I found the two celebrated trees discovered by Boissier, *Lonicera arborea* and *Adenocarpus decorticans*, both in fruit. *L. arborea* has a very shrubby growth; but I have observed single trees, from twenty to thirty feet high, which were then mostly crowned by a rounded top of thick foliage. This rare tree, which according to Webb is also found in Asia Minor, has a fissured grayish-brown and almost leathery bark, and leaves of a dark green on the upper side and somewhat shining, and underneath of a sea-green colour. I have not observed any flowers; the berries are oval, and when ripe black. This *Lonicera* is somewhat frequent, both in the valleys of the Dehesa and in the ravines of the south side of the valley, and ascends to 7000 feet,—nearly to the limit of the region of trees. The *Adenocarpus decorticans* is much more frequent, especially in single spots, but it does not grow at a height exceeding 5500 feet. The lowest point at which I have seen it is in the valley of the Jenil, below Guejar, at a height of about 2500 feet. In that valley, where I first found it, I met with only small trees, all growing on the north side, on an arid limestone soil; but it is much more frequent in the copse of *Pinus sylvestris*, which bears the name 'La Cartejuela,' and covers the saddle between the Cerro Tesoro and Trevenque, as well as on the northern slope of the valley, through which the river Maydena flows, where it forms the arboraceous vegetation together with the *Quercus Toza*. This tree, which from its narrow and small leaves appears at a distance to be a *Conifer*, and has quite the habitus of shrubs of the *Juniperus communis*, attains a height of twelve to twenty feet, and a thickness of half a foot. The yellowish-white wood is very tough, and its yellowish-brown bark separates even from the youngest branches, and hangs down from the whole stem in long riband-like bands, whilst the ground all around is covered with pieces of bark shed from the tree. Beside these two trees, which are peculiar to the Sierra, the following also are found:—*Sorbus Aria*, L., which ascends from the rocks at the Monachil to the limit of the region of trees, accompanied by the *Cotoneaster granatensis*, Boissier, which still decorates the highest northern limestone rocks of the Dornajo and Trevenque, and is especially frequent in the wide valley between the Cerro Tesoro and Trevenque; *Acer opulifolium*, Vill. (*A. granatense*, Boissier, El. 39.), on the rocks near the Monachil, frequently in fruit; *Pinus sylvestris*, L., which forms the above-mentioned Cartejuela; *Salix Caprea*, L., only a few specimens in the upper part of the valley; *S. alba*, around the Cortijo, more frequent in the valley of the Jenil; *S. purpurea*, ditto; and *Taxus baccata*, L., on the upper Monachil, rare. The southern declivity lying opposite to the Dehesa, as far as the limestone formation and the mountain region extends, is almost entirely covered with thorny shrubs, of the *Berberis vulgaris*, L., var. *australis*, *Cratægus granatensis*, Boiss., *Prunus Ramburei*, Boiss., *Rhamnus infectorius*, L., and *Cerasus prostrata*, DeC., which forms small and very entangled and stiff shrubs, from half a foot to three foot high, and is found as far as the highest summit of the Dornajo, where, creeping up the loose rocks, it covers them like a kind of moss. In very isolated spots, under the thorny shrub, grows the beautiful *Lonicera splendida*, Boiss., which is distinguished from *L. Caprifolium*, L., and *L. implexa*, Ait. (to which it is nearest allied), partly by the many-flowered racemes, and partly by the white dust on the under side of the evergreen leaves and of the young branches. The berries are oval, large and orange-coloured. *L. etrusca*, Santi, is found in the neighbourhood of brooks, in shady bushes, generally in company with the *Clematis Flammula*, L. On the banks of the Monachil I found frequent the *Rumex pulcher*, L., *Delphinium pentagynum*, Desf., *Thalictrum glaucum*, Desf., *Nepeta granatensis*, Boiss., *Junci*, *Euphorbiæ*, and two *Resedæ*; in the upper part of the valley, *Heracleum granatense*, Boiss., with *Cochlearia glastifolia*, L., and *Aspidium nevadense*, Boiss. The shady clefts of the rocks are decorated with patches of the delicate and fragile *Linaria villosa*, DeC., and *L. verticillata*, Boiss., along with *Hieracium amplexicaule*, L.; whilst on the sunny limestone and marble rocks of the southern declivity are found the pretty *Campanula Lœfflingii*, Brot., in company with *Putoria calabrica*, T., several *Teucria* and others.

Among those portions of the limestone alps which are the most celebrated as producing the rarest plants, the Dornajo and Cerro Trevenque occupy undoubtedly the first place. The latter, above 7000 feet high, presents a huge pyramid of rock, and is seldom ascended by the inhabitants of the mountain on account of its extraordinary steepness. I ascended it on the 7th of August, accompanied by my servant. We first followed the steep bed of a rivulet filled with blocks of marble, which contributes the waters of its little stream to the Monachil, and soon saw ourselves surrounded with some isolated pines, which announced the Cartejuela. In this copsewood, which is scarcely to be called thick, as well as in the ascent, I found frequent the tender *Reutera gracilis*, Boiss., of the habitus of an *Asperula*, as well as the *Pæonia coriacea*, Boiss., which is not rare on the Dehesa, S. Geronimo, and even around the Cortijo. When we had reached the plateau, about 6000 feet, I first ascended the Cerro Tesoro, lying on the right, and of a not much greater elevation, whose entire northern declivity is covered with *Anthyllis erinacea* (common throughout the whole limestone alps) and a thorny *Astragalus*. Besides the *Passerina Tartouraira*, L., which is here very small-leaved, *Anthyllis tejedensis*, Boiss., and *Ononis cephalotus*, Boiss., the vegetation consists of the same plants as I had already found on the Dornajo. The *Odontites longiflora*, Webb, is found, as well as on the Dornajo, from the base to the summit; in the clefts of the rocks grow on both mountains *Potentilla caulescens*, L., forming hard thick beds, in company with *Arenaria Armeriastrum*, Boiss., *Cerastium repens*, L., *Ptilotrichum longicaule*, Boiss., &c. From Cerro Tesoro I descended to the Cartejuela, where there are several springs,—a rare occurrence in these frightfully arid limestone alps. With the exception of a few very scattered specimens of *Vicia lutea*, L., and *Hypericum hyssopifolium*, L., there was scarcely anything of importance to be found; in May the vegetation may be more interesting. In that part which lies at the foot of the Trevenque, whose immense cone rises here proudly, the *Adenocarpus decorticans* is, as I have said, very common; besides this, the *Juniperus Sabina*, L., and *Arctostaphylos Uva-ursi* grow in great abundance, as well as *Bupleurum spinosum*, L. fil., which is found very abundant on many spots of the limestone portion of the Sierra, and grows as low down as 3000 feet and more.

At length we gained the base of the cone of the Cerro Trevenque, the ascent of which I undertook from the east side. This, as well as the western declivity, is almost wholly filled with steep rocks and boulders of limestone, and it was often necessary to dig out steps in the soft limestone sand to get a firm footing. Notwithstanding these circumstances, so unfavourable to vegetation, the rarest plants are found on this very side, as for instance, *Scabiosa pulsatilloides*; Boiss., *Helianthemum pannosum*, Boiss., *Santolina elegans*, Boiss. (the only locality for this plant hitherto known is the Trevenque, and even here it is rare), *Convolvulus nitidus*, Boiss., *Anthyllis tejedensis*, Boiss., *Ononis cephalotes*, Boiss. On the highest summit, from whence there is an indescribably beautiful view over the whole limestone alps, as well as the charming Vega of Granada as far as the Sierra Morena, no plants worthy of mention grow, except the *Cotoneaster granatensis*, Boiss., and some trees of *Pinus sylvestris*. The whole northern declivity is covered with *Arctostaphylos Uva-ursi*.

Excepting these spots, which are distinguished by rare plants, the vegetation of the limestone range is throughout very uniform. As far as the warm region extends, the hills and mountains are covered with the same plants which I have already mentioned in the environs of Granada. The *Berberis vulgaris*, var. *australis*, characterizes the mountain region, and extends into the alpine region, and is everywhere common, especially on arid sunny spots. Besides this, the *Salvia officinalis*, L., together with another species of this genus clothed with a thick white wool, *Santolina rosmarinifolia*, Mill., *Helichryson serotinum*, Boiss., *Daphne Gnidium*, L., *Lavandula lanata*, Boiss., an *Andryala* and a *Thymus* are the principal constituents of this mountain flora. The *Inula montana*?, the beautiful *Echium albicans*, Lag., and others, are limited to some localities. Of *Cryptogamia*, beside some few mosses and liverworts, some *Algæ* and *Aspidium nevadense*, Boiss., there are only lichens, apparently in great quantity, especially of the genera *Parmelia*, *Lecidea* and *Verrucaria*.

No. V. Guejar de la Sierra, September 5.

Since the middle of August I have been staying in this village, which is situated in the valley of the Jenil, about 3000 feet above the level of the sea,—the highest on the north side of the Sierra Nevada. In spite of its lofty position, one might fancy oneself in the neighbourhood of Granada, this village being surrounded by the most luxuriant vegetation of the warm region. Fig- and almond-trees raise their heads in the dells, even in the mountain region, and are almost to be considered wild here, while the slope of the valley lying to the north of the village is partly clothed with luxuriant chestnut trees, succeeded by an extensive wood of *Quercus Ilex*. The whole valley of the Jenil, the chief river of the north, is considerably wider and deeper than that of the Monachil and Dilar, and therefore much warmer. The banks of the river are bordered, from Granada to a league above Guejar, with thick woods of *Salix alba*, L., *Populus nigra* and *alba, Ulmus campestris*, L., and *Celtis australis*, L., which latter tree occurs in countless numbers in the immediate environs of the village. The underwood consists of the already-mentioned *Rubus, Coriaria myrtifolia, Daphne Gnidium* and *Retama sphærocarpa*, while the numerous impenetrable hedges are composed exclusively of *Rubus hispanicus* and *Elæagnus angustifolia*, with a species of *Clematis, Tamus communis*, L., and *Asparagus albus*, L., running over them. *Fœniculum vulgare*, Gærtn., with other *Umbelliferæ*, are plentiful along the river. In some places *Hypericum bœticum*, Boiss., *Chlora perfoliata*, L., &c. *Mentha rotundifolia*, L., is most abundant in moist shady spots, in company with *Euphorbiæ*, species of *Atriplex* and *Chenopodium, Plumbago europæa*, L., *Origanum virens*, Lk. et Hoffmsegg., *Heliotropium europæum*, L., and *Althæa cannabina*, L. On the rugged cliffs of marble I found a *Dianthus* common, with *Bupleurum gibraltaricum*, Lam., and in the shady dells to the northward *Hypericum Caprifolium*, Boiss., *Pyrethrum Parthenium*, L., *Lithospermum officinale*, L., *Epilobium hirsutum*, L. On dry sandy places, in sunny fields and on the road-sides grew *Senecio linifolius*, L., ascending as far as the alpine region, *Picnomon Acarna*, Cass., with other thistles, and in a single place, *Cynara alba*, Boiss. For the rest, the vegetation is exactly the same as in the other parts of the limestone alps.

Very different from the above-described vegetation of the limestone districts of the Sierra Nevada is that of the primary rocks, which begins at a height of about 4000 to 5000 feet. The flora of the lower mountain region agrees tolerably with that of the mountain limestone, but in the upper region and the alpine portion many other plants make their appearance. Among trees and shrubs *Quercus Ilex* and *Quercus Toza* especially prevail, mingled with *Lonicera arborea* and *Cratægus granatensis*, which rise to the highest alpine valleys and are the most beautiful trees here. *Adenocarpus decorticans* also occurs frequently; more rarely, *Cerasus Avium, Pyrus Aria* and *Taxus baccata*. The whole upper mountain and lower alpine region is clothed with *Genista aspalathoides*, DeC., and *Astragalus aristatus*, L'Hérit., with a woody stem often as thick as a man's arm; both ascend to the snow-region, where I have even found the latter in flower. The mountain region is also particularly characterized by *Artemisia campestris*, L., var. *glutinosa*, Ten., which spreads over all the mountains, in many places alternating with *A. camphorata*, L., while *A. Absinthium* is abundant chiefly in the alpine region. In the bogs and springy places of the mountain region, especially in the upper part of the valley of the Jenil, *Helosciadium nodiflorum*, Koch, occurs frequently, and *Anagallis tenella*, L., in company with a *Lythrum* and *Senecio*, *Juncus glaucus*, L., which also fills all the bogs of the limestone formation, and is the commonest species in the Sierra; a few *Carices* are also met with; while on very dry, sunny places, with soil of a stony hardness, particularly in the neighbourhood of the châlets, *Merendera Colchicum*, Ram., are still in flower in countless numbers. The upper alpine and lower snow-region is the richest in rare plants, peculiar to and most plentiful in these mountains. These consist almost solely of micaceous slate, the stratification of which has an inclination of about 20° from south to north. Accordingly the north slope of the chief alpine chain is encompassed by much steeper and sometimes formidable perpendicular cliffs and precipices than the south side, which is almost everywhere covered with loose masses of slate rock. On this side, in the passes between the highest peaks of the mountain-chain, pools or small mountain-lakes are frequently met with, occasionally of unfathomable depth, as for instance the famous Laguna de Vacares: these lakes are more rare on the north side. The main valleys, which extend to the snow-region, terminate in peculiar scattered meadows, watered by many springs and brooks, and sometimes perpetually inundated, and in grassy, often very steep declivities. These peculiar meadows bear the name of Borreguiles, and are particularly distinguished by their vegetation from the rest of the snow-region. Excepting these green meadows the snow-region presents from a distance a forbidding and seemingly quite sterile appearance, for nothing is seen but gray boulders of slate; but between the several masses of this rock grow a number of small alpine plants, often scarcely an inch high, mostly in thick patches. The beautiful *Ptilotrichum spinosum*, Boiss., which ascends from the valleys of the lower alpine region up to the highest summits of the snow-region, is generally diffused and very frequent. Besides this, the following plants occur on almost every part of the summit:—1. In the upper alpine region: *Senecio Tournefortii*, Lap., *β. granatensis*, Boiss., very frequent on moist loose masses of rock ascending into the snow-region; *Thymus angustifolius*, Pers.; *Dianthus brachyanthus*, Boiss. (here and in the snow-region scarcely an inch high, whilst in the limestone alps it reaches a height of from half a foot to one foot); *Plantago serpentina*, Vill.; *Jurinea humilis*, DeC.; *Eryngium Bourgati*, Gou., also in the snow-region; *Armeria allioides*, Boiss., especially on steep rocky declivities; *Hieracium Pilosella*, L., var. *incanum*, Boiss.; *Arenaria tetraquetra*, L., var. *granatensis*, Boiss., in the thickest beds up to the highest summit of the snow-region, mingled here and there with a small form of *A. Armeriastrum*, Boiss.—2. In the lower snow-region, at about 8500 to 9500 feet: *Arenaria tetraquetra*, L., var. *A. pungens*, Clem.; *Ptilotrichum purpureum*, Boiss.; *Ranunculus demissus*, DeC., var. *hispanicus*, Boiss.; *Plantago nivalis*, Boiss., on moist and grassy loose masses of rock, on both sides of the Sierra, exceedingly frequent; *Anthyllis Webbiana*, Hook.; *Pyrethrum radicans*, Lag.; *Lepidium stylatum*, Lag.; *Eryngium glaciale*, Boiss., very frequent up to the highest summits; *Silene Boryi*, Boiss.; *Cerastium ramosissimum*, Boiss.; *Carduus carlinoides*, DeC.; *Herniaria alpina*, L.; *Jasione amethystina*, Lag.; *Armeria australis*, Boiss., a most striking shrubby form, with stiff, almost spinescent branches; *Agrostis nevadensis*, Boiss.—In the upper snow-region, 9500 to 11,000 feet and above: *Viola nevadensis*, Boiss.; *Saxifraga mixta*, Lag.; *Linaria origanifolia*, DeC., γ. *glareosa*, Boiss.; *L. supina*, DeC., var. *nevadensis*, Boiss., rare; *Artemisia granatensis*, Boiss., known and celebrated as a popular medicine under the name of Manzanilla; *Umbilicus sedoides*, DeC.; besides *Eryngium glaciale*, *Ptilotrichum purpureum*, *Pyrethrum radicans*, *Jasione amethystina*, *Sideritis scordioides*, var., and *Agrostis nevadensis*.

Upon the above-mentioned Borreguiles are found in particular the following plants: *Saxifraga stellaris*, L., also frequent near the rivulets of the upper alpine region; *Stellaria cerastioides*, L.; *Campanula Herminii*, Lk. and Hoffmsegg.; *Pedicularis verticillata*, L.; *Euphrasia minima*, Schleich.; *Reseda complicata*, Bory, descending into the alpine valleys; *Ranunculus angustifolius*, var. *uniflorus*, DeC.; *R. acetosellæfolius*, Boiss.; *Veronica alpina*, L.; *Gentiana verna*, L., also frequent on the banks of the alpine lakes; *G. Pneumonanthe*, var. *depressa*, Boiss., especially on the Borreguil de S. Juan; *Pinguicula leptoceras*, Rchb.; *Lotus corniculatus*, var. *glacialis*, Boiss. (very different from the typical form!); *Sempervivum tectorum*, L.?; *Meum athamanticum*, L.; *Epilobium origanifolium*, Lam.

The following plants appear to be more limited to certain localities of the snow-region, but are there frequent: *Saxifraga oppositifolia*, L., which I met with most beautiful on the frightful precipice on the northern declivity of the Mulehacen, called the Val de Casillas; *Butinia bunioides*, Boiss., in rocky clefts near the Laguna de Dilar; *Senecio quinqueradiatus*, Boiss., on the way to the perpendicular groups of rocks called the Pollo de Vacares, and in the Val de Casillas; *Nepeta Nepetella*, L., ditto; *Vicia pyrenaica*, Pourr., very sparingly in the Val de Casillas and in the upper part of the Barranco de Guelnon, &c.

In the highest part of the great valleys stretching into the snow-region the following are very frequent: *Parnassia palustris*, L., in many places very small; *Euphorbia Esula*, L.; *Cirsium acaule*, var. *gregarium*, Boiss.; *Carum verticillatum*, Koch; *Aconitum Lycoctonum*, L., and *A. Napellus*, L. Among the rarest plants of the snow-region are the *Potentilla nevadensis*, Boiss., which I have hitherto found only in small quantities on the Borreguil of S. Juan, and *Linaria glacialis*, Boiss., a small grayish-green and very large-flowered species, of which I have only met with three specimens in the highest snow-region. From the valleys of the upper mountain region,—for example, from the banks of the Monachil at S. Geronimo up to the snow-region,—the *Digitalis purpurea*, L., is found frequent, which at a height of from 8000 to 9000 feet takes a somewhat different habitus, but seems to me not sufficiently to differ from the typical form to be regarded as a distinct species, especially as we find various forms of transition at different heights.

Among the most interesting points of the snow-region and the whole primitive rocks is the Corral de Veleta, a deep and frightful basin situated on the northern declivity of the Picacho de Veleta, whose rocky sides are perpetually filled with snow, and on which are the sources of the principal branch of the Jenil, which flows down hence through the deep Barranco de Guelnon, and afterwards unites with the two other small rivulets proceeding from the Barranco del Real and the Barranco de Vicares. A narrow steep path, partly over loose masses of rock, partly over snow and ice, leads from the lofty precipice, above 10,000 feet in height, down into the rocky basin, whose highest patches of meadow are about 9000 feet high. Around the margin of the Corral de Veleta I found especially beautiful the *Artemisia granatensis, Sempervivum tectorum, Ptilotrichum purpureum,* and *Gentiana verna*: on the descent, the *Brassica Cheiranthus,* Vill., var. *montana,* DeC.; *Ranunculus acetosellæfolius, Lepidium stylatum*: on dripping mossy perpendicular sides of rock, between masses of ice, the *Montia fontana,* L.; *Stellaria cerastioides*; *Veronica alpina*: but on the level meadows, the *Gentiana verna,* with *G. alpina,* L., *Plantago nivalis, Pinguicula leptoceras, Lotus corniculatus,* var. *glacialis, Luzula spicata, Phleum pratense,* &c.

The cryptogamous flora of the primitive rocks is, as respects the ferns and mosses, far richer than that of the limestone alps, but as regards the lichens, poorer. Of ferns I found *Ceterach officinarum,* W., very sparingly; most frequent, especially on the shores of the Laguna de Dilar, a species similar to the *Aspidium falcatum,* in company with *Cystopteris fragilis* and *Cheilanthes odora*; besides these are found *Asplenium Trichomanes, A. Filix fœmina, Aspidium Filix mas* and *A. nevadense.* Of the *Lycopodiaceæ* I have hitherto found no trace in the entire Sierra; on the other hand, the *Equisetum sylvaticum* is frequent on the banks of the Jenil in the upper warm region. The alpine rivulets of the Borreguiles are filled in parts with several liverworts, especially a species belonging to Nees von Esenbeck's genus *Chiloscyphus*; but I have hitherto not seen any in fructification, which is the case also with a large number of mosses. Algæ are rare, and of the Fungi I have hitherto observed only a few *Coniomycetes* on the leaves of the *Quercus Ilex* and the stems of *Reseda complicata,* Bory. Of lichens there are scarcely any, except stone lichens, amongst others especially a reddish-yellow, but little-fructifying *Parmelia,* up to the highest rocks of the Picacho de Veleta, Mulehacen and Cerro Alcasana.

I have now, as far as time permitted, gone through the portion of the northern side of the Sierra Nevada which lies between the rivers Agua blanca, Maydena, Jenil, Monachil and Dilar; and I purpose now to explore the south side of the range, in the district known by the name of the Alpujarras.

PROCEEDINGS OF LEARNED SOCIETIES.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—MEETING HELD AT CAMBRIDGE.

Section of Zoology and Botany.

June 19, 1845.—The Rev. Professor Henslow in the Chair.

The following are abstracts of the principal communications laid before the Section.

The first paper read was a Report by Dr. Richardson "On the Ichthyology of China."

Till within a recent period little was known of Chinese fishes. Linnæus was acquainted with about a score of Japanese fish; and a few were afterwards added to the list by Langsdorff, who accompanied the Russian admiral, Knesenstiern, in his voyage to the Isles of Japan and the South Sea. With these exceptions, the fish of the eastern coasts of Asia, from the sea of Ochotsic down to Cochin China, were till very recently known to European naturalists only from Chinese and Japanese drawings, several collections of which are to be found in the Paris and British libraries. Yet the fish of the coasts of China are abundant, and the fisheries extensive and important. Materials for the description of these fishes were not wanting. Mr. John Reeves had beautiful coloured drawings, mostly of the size of life, made of no fewer than 340 species of fish which are brought to the markets in Canton. Copies of these drawings now exist in the British Museum. Some fishes have been recently sent from Chusan; other Chinese fishes have been described in the account of the voyage of the Sulphur. A collection of 100 fishes made at Canton exists in the museum of the Philosophical Society of Cambridge. From these and other recent sources the present report was drawn up. The author concluded from his researches, that the existence of chains of islands or of continuous coast having an east and west tendency promotes the range of a species or of a group of species. Thus, to take the intertropical zone of the ocean, we find very many fish common to the Red Sea, the coasts of Madagascar, the Mauritius, the Indian Ocean, the southern parts of China, the Philippines, the whole Malay Archipelago, the north coasts of Australia, and the entire range of Polynesia, including the Sandwich Islands. In the generic forms of its freshwater fish, China agrees closely with the peninsula of India. If we could suppose the extensive belt above alluded to, enclosing more than two-thirds of the circumference of the globe, to be suddenly elevated, we should find the remains of fish scattered over it to be everywhere very nearly alike; the species having a local distribution being comparatively few and unimportant. These spoils of fish would of course, in accordance with the observation of Prof. E. Forbes, be associated with very various assemblages of mollusks and other marine animals, according to the depth at which the deposit took place. This was an important fact for the science of geology.

"On a new genus of *Mollusca Nudibranchiata.*" By Messrs. Alder and Hancock.

This new genus is founded on the *Tritonia arborescens* of authors and its allies, which are distinguished from the true *Tritoniæ* (*T. Hombergii*, &c.) by the form of their tentacula, and the free, arborescent nature of their branchiæ. These characters alone induced the authors to consider them generically distinct before they had an opportunity of examining their internal structure, in which such important differences in the digestive organs were exhibited as to show that this new genus, for which the name of *Dendronotus* is proposed, should be removed from the family *Doridæ* to that of *Eolidæ*, to be placed first in order, as the connecting link between these two families.

"On the Cilia and Ciliary Currents of the Oyster." By the Rev. J. B. Reade.

The author stated that in a microscopic investigation of infusoria which had for some years occupied his attention, he had been led particularly to notice the beautiful contrivance by which many species, when not exerting their powers of locomotion, are supplied with food. When they are examined under the microscope by such an arrangement of transmitted light as makes the infusoria luminous points on a perfectly dark field, it is immediately seen that the action of the cilia attached to their tentacula produces a strong current in the water, and hereby a countless number of minute living organisms is brought within the influence of the cilia, and a sufficient supply is selected for food. Thus with respect to infusoria it is a known fact, that the absence of the prehensile organs possessed by larger creatures is compensated by this delicate but efficient ciliary apparatus. It is also a fact equally well known, that the lips of the oyster which surround the orifice of the alimentary canal are in the same manner fringed with cilia; and that these cilia of the oyster, as of infusoria, equally cause currents in the water. But it has never been suggested and proved by any naturalist, that the proper office of the cilia of oysters is to bring to these acephalous mollusks that food which they have no power to follow or to seize. Such however, without doubt, is the case; and accordingly an examination of the contents of the stomachs of oysters discovers to us their infusorial food; and after undergoing the process of digestion in the stomach, the siliceous shields of these infusoria, deprived of their organic and carbonaceous integuments, are ejected as effete matter. In a paper communicated last year to the Microscopical Society of London, on animals of the chalk still found in a living state in the stomachs of oysters, these infusoria were described and enumerated. The apparent identity existing between these recent living infusoria and the fossil makes the inquiry of considerable interest to the geologist; for the addition of this connecting link to the chain of organized beings extends a continuous line of the same organic structure from the secondary formation to the tertiary, and seems to preclude the supposition of Prof. Phillips, that below the tertiary formation are no recent species. Whether or not this conclusion be admitted, it is a fact, ascertained by pursuing this inquiry, that the oysters and other bivalves, which are innumerable in the Kimmeridge clay, lived, like recent oysters, upon infusoria; and consequently the conclusion is unavoidable, that the Kimmeridge clay, like the chalk, contains a considerable per-centage of these minute and indestructible bodies which the microscope discovers in it, and is not the mere comminuted detritus of more ancient and unorganized materials. With these facts established, we may still further conclude from analogy, that a similar ciliary apparatus and similar infusorial food were common to the still earlier bivalves in the seas of the transition formation; and we may then ask,—what right have we, in the absence of a careful microscopic examination of still earlier rocks, to deny the possibility of any portion of their mass being due to the agency of siliceous infusoria?

June 20.—The Rev. L. Jenyns read a paper "On the Turf of the Cambridgeshire Fens."

This turf was not formed by sphagnum, as most peat, but from various species of aquatic plants which had been accumulated for a long period of years above the remains of forest trees which lie buried at the bottom of the moor. There are two distinct kinds of turf, the *upper* and the *lower*. The former is the more compact and heavy of the two; the latter consists entirely of the bark, wood and branches of the submerged trees. The turf is not now rapidly formed, on account of the improved system of drainage. Formerly it was supposed to grow about twenty inches in sixteen years.

Sir R. Schomburgk read a description of the Murichi, or Ita Palm of Guiana. This tree grows from the Llanos of Cumana to the western tributaries of the Rio Negro and the mouth of the Amazon, or over an area of 550,000 square miles. It was called by Father Gumilla the *arbol de la vida*, or tree of life, on account of its various uses. It is of the greatest importance to the inhabitants of the country in which it grows. The trunk and its leaves are used for various household purposes. The sap is a saccharine fluid, much drunk by the natives. The flowers afford a sweet fermentable liquid, resembling champagne. The pith of its trunk affords a kind of sago. Even in its decay this palm is of use, and affords a delicacy to the Indians, which likewise many colonists do not refuse, namely, the larva of a large beetle. The *Curculio palmarum* is found in large numbers in the pith when the trunk is near its decay, and which, when boiled or roasted, resembles in taste the marrow of a beef bone. Its average height is about fifty feet, and it has been observed growing at a height of 3000 to 4000 feet above the level of the sea.

Prof. Allman laid before the Section a monstrosity occurring in *Saxifraga Geum*. The three external verticels of the flowers were normal, but between the stamens and pistil there was developed a series of adventitious carpels crowded upon the margin of a cup-like production which surrounds the lower half of the pistil. These adventitious carpels were characterized by their backs being turned towards the axis of the flower. The carpels bear ovules on their margins, which acquired a very considerable degree of development, becoming completely anatropous, like those in the normal ovary. Dr. Allman explained this monstrosity by supposing the existence of a series of secondary axes, which are given off in a whorl between the stamens and the primary axis of the flower. These axes terminate in imperfect flowers, of which the additional carpels are the only remains.

Prof. Henslow exhibited a specimen of *Papaver orientale,* in which the filaments of the stamens were converted into bodies bearing ovules.

Prof. E. Forbes read a paper on the Endemic Distribution of Plants.

The hypothesis of the descent of all the individuals of a species either from a first pair or from a single individual, and the consequent theory of specific centres being assumed, the isolation of assemblages of individuals from their centres, and the existence of *endemic* or very local plants, remain to be accounted for. Natural transport, the agency of the sea, rivers and winds, and carriage by animals, or through the agency of man, are insufficient means in the majority of cases. It is usual to say, that the presence of many plants is determined by soil or climate, as the case may be; but if such plants be found in areas disconnected from their centres by considerable intervals, some other cause than the mere influence of soil or climate must be sought to account for their presence. This cause the author proposes to seek in an ancient connexion of the outposts or isolated areas with the original centres, and the subsequent isolation of the former through geological changes and events, especially those dependent on the elevation and depression of land. Selecting the flora of the British Islands for a first illustration of this view, Professor Forbes calls attention to the fact, well-known to botanists, of certain species of flowering plants being found indigenous in portions of that area at a great distance from the nearest assemblages of individuals of the same species in countries beyond it. Thus many plants peculiar in the British flora to the west of Ireland have the nearest portion of their specific centres in the north-west of Spain; others, confined with us to the south-west promontory of England, are, beyond our shores, found in the Channel Isles and the opposite coast of France; the vegetation of the south-east of England is that of the opposite part of the continent; and the alpine vegetation of Wales and the Scotch Highlands is intimately related to that of the Norwegian Alps. The great mass of the British flora has its most intimate relations with that of Germany. The vegetation of the British Islands may be said to be composed of five floras: 1st, a west Pyrenean, confined to the west of Ireland, and mostly to the mountains of that district; 2nd, a flora related to that of the south-west of France, extending from the Channel Isles, across Devon and Cornwall, to the south-east and part of the south-west of Ireland; 3rd, a flora common to the north of France and south-east of England, and especially developed in the chalk districts; 4th, an Alpine flora, developed in the mountains of Wales, north of England and Scotland; and 5th, a Germanic flora, extending over the greater part of Great Britain and Ireland, mingling with the other floras, and diminishing, though slightly, as we proceed westwards, indicating its easterly origin and relation to the characteristic flora of northern Germany. Interspersed among the members of the last-named flora, are very few specific centres peculiar to the British Isles. The author numbers in ascending order these floras, according to their magnitude as to species, and also, in his opinion, according to their relative age and period of introduction into the area of the British Islands. His conclusions on this point are the following:

1. The oldest of the floras now composing the vegetation of the British Isles is that of the mountains of the west of Ireland. Though an alpine flora, it is southernmost in character, and is quite distinct as a system from the floras of the Scottish and Welsh Alps. Its very southern character, its limitation, and its extreme isolation are evidences of its antiquity, pointing to a period when a great mountain barrier extended across the Atlantic from Ireland to Spain.

2. The distribution of the second flora, next in point of probable date, depended on the extension of a barrier, the traces of which still remain, from the west of France to the south-east of Britain, and thence to Ireland.

3. The distribution of the third flora depended on the connexion of the coast of France and England towards the eastern part of the Channel. Of the former existence of this union no geologist doubts.

4. The distribution of the fourth, or alpine flora of Scotland and Wales, was effected during the glacial period, when the mountain summits of Britain were low islands, or members of chains of islands, extending to the area of Norway through a glacial sea, and clothed with an arctic vegetation, which, in the gradual upheaval of those islands and consequent change of climate, became limited to the summits of the new-formed and still existing mountains.

5. The distribution of the fifth, or Germanic flora, depended on the upheaval of the bed of the glacial sea, and the consequent connexion of Ireland with England, and of England with Germany, by great plains, the fragments of which still exist, and upon which lived the great elk and other quadrupeds now extinct.

The breaking up or submergence of the first barrier led to the destruction of the second; that of the second to that of the third; but the well-marked epoch of migration of the Germanic flora indicates the subsequent formation of the Straits of Dover and of the Irish Sea, as now existing.

To determine the probable geological epoch of the first or west-Irish flora,—a fragment perhaps with that of north-western Spain, of a vegetation of the true Atlantic,—we must seek among fossil plants for a furthermost starting-point. This we get in the flora of the London clay or eocene, which is tropical in character, and far anterior to the oldest of the existing floras. The geographical relations of the miocene sea, indicated by the fossils of the crag, give an after-date certainly to the second and third of the above floras, if not to the first. The epoch of the red or middle crag was probably coeval with the second flora; that of the mammaliferous crag with the third. The date of the fourth is too evident to be questioned; and the author regards the glacial region in which it flourished as a local climate, of which no true traces, as far as animal life is concerned, exist southwards of his second and third barriers. This was the newer pliocene epoch. The period of the fifth flora was that of the post-tertiary, when the present aspect of things was organized.

Adopting such a view of the relations of these floras in time, the greatest difficulties in the way of changes of the earth's surface and destruction of barriers—deep sea being found where land (probably high land) was—are removed when we find that those greater changes must have happened during the epoch immediately subsequent to the miocene period; for we have undoubted evidence that elsewhere, during that epoch, the miocene sea-bed was raised 6000 feet in the chain of Taurus, and the barriers forming the westward boundary of the Asiatic eocene lakes so completely annihilated, that a sea several hundred fathoms deep now takes their probable place. The changes required for the events which the author would connect with the peculiar distribution of the British flora are not greater than these.

Prof. Forbes maintains that the peculiar distribution of endemic animals, especially that of the terrestrial mollusca, bears him out in these views. He proposes to pursue the subject in detail, with reference both to animal and vegetable life, in connexion with the researches of the geological survey.

June 21.—" Report on the Microscopic Structure of Shells." By W. B. Carpenter, M.D.

This report formed the continuation of last year's on the minute structure of the skeletons of Bivalves and Echinodermata. Dr. Carpenter stated that he had lately examined a recent *Terebratula* preserved in spirits, and ascertained that the perforations in the shell, before described, were filled up in the living animal by membranous cæca, containing cells, forming, as he considered, a glandular apparatus, though its connexion he had not yet been able to trace. He then described the structure of those bivalve mollusks in which the mantle is more or less closed as being generally less characteristic than that of the families already described, their texture being apparently more homogeneous, and the membranous residuum left by the action of acid being less distinct. Frequently, however, traces of a cellular origin were to be seen in shells whose general texture was most homogeneous; sometimes it was seen in the shell, and not in the decalcified membrane, and frequently in the membrane when no traces of it were visible in sections of the shell. Hence Dr. Carpenter felt himself justified in regarding all shells as originating in the secreting action of the cells forming the superficial layer of the mantle; these cells remaining persistent and separate in some cases, whilst in others they coalesced. The peculiar tenacity of the cellular membrane in *Pinna* and its allies was attributed to the presence of an intercellular horny matter, between the true cell-walls; the same substance being elsewhere thrown out upon the surface of the layer as an epidermis or periostracum. Among the shells under consideration in the present report, those of the family *Myadæ* were particularly distinguished by their evident cellular structure; the genus *Pandora*, formerly referred to as one of the most aberrant and exceptional in the structure of its shell, was now shown to be connected with the surrounding families by *Mya*, *Thracia*, *Anatina*, and other genera of *Myadæ*, whose characters were of an intermediate nature. In the class Echinodermata, Dr. Carpenter extended and confirmed the results he had before given respecting the minute structure of their skeletons, which preserve a remarkable conformity throughout the group, extending to the small calcareous plates met with in the *Holothuridæ*. Dr. Carpenter had also ascertained that the same minute structure existed in the Nummulite with the small existing foraminifera described by Ehrenberg; but that the supposed Nummulites brought by Mr. Pratt from Bayonne presented several forms of structure entirely distinct from that of the true Nummulite.

"On the Sounds produced by one of the *Notonectidæ* under Water." By Mr. Ball.

He stated, that the fact having been mentioned to him some two years since, he had not had an opportunity of testing the observation until within the last few days, when a specimen was brought to him in an ordinary jelly-glass; it was, he believed, the *Corrixa affinis*. When suspended in the water, about four inches below the surface, it emitted three short chirrups, and then a long cricket-like sound. It appears the sounds are emitted in the evening and night, and are so loud that they may be heard in an adjoining room, and are continued during the night. Mr. Ball stated that time did not permit him to make any accurate observation; but he thought the matter so curious, that he noticed it with the view of attracting the attention of entomologists, in the hope of obtaining an explanation of the manner in which this noise is produced under water.

"On the Scientific Principles on which Classification in the higher Departments of Zoology should be based." By Mr. Ogilby.

The dental system was, no doubt, a valuable means of diagnosis, and this depended upon the fact that it had a relation to the stomach and other viscera intended for the digestion of food. Just in the same way, the extremities of the mammalia, more particularly the fore-arm, are the exponents of the habits, mental power and œconomy of animals. The fore-arm is the seat of the function of locomotion, of manipulation and touch. According to the real position of an animal in the scale of organization will be the character of its fore-arm. This position was illustrated by examples from the various families of mammalia. He thought, that in our usual systems of zoology a too exclusive regard had been given to the structure and form of the teeth.

Mr. W. Thompson read a letter from Mr. Alder, dated Salcombe, June 17, 1845, in which the writer stated that he had lately obtained in Torbay at least ten, and perhaps twelve new species of *Mollusca nudibranchiata*, to add to the British fauna. They consist of four species of *Doris*, five or six of *Eolis*, and an animal of an entirely new genus, approaching nearest to *Tritonia*. A singular species of mollusk obtained at the same time, resembling in general appearance the genus *Pelta* of Quatrefages, was noticed in detail.

June 23.—" On the Development of Vegetable Cells." By Mr. A. Henfrey.

The conclusions were as follows :—1. That there is no such thing as the interruption of continuity between the liber and alburnum, called the cambium layer. 2. That the potentiality of the black granules described by Schleiden is not proved, and that the utricle first developed from the so-called cytoblast is not the permanent cell, but the primordial utricle of Mohl, the existence of which in growing tissues seems to be universal. 3. That this primordial utricle is not a layer of mucilage, as stated by Nägeli, but a true membrane. The nucleolus, or central spot of Schleiden's cytoblast, is the germinal point, and is situated on the wall of the primordial utricle. When a new cell is to be formed the nucleolus divides into two, and a corresponding construction of the primordial utricle takes place until it separates into two, a layer of permanent cell-wall substance being meanwhile secreted in this fold from the circumference to the centre, till a complete septum is formed. The lateral walls grow by extension, being moulded on the growing primordial utricle within them. In the nascent cell the primordial utricle is filled with granular matter, which during the subsequent growth of the cell remains aggregated round the nucleolus, and thus gives rise to the appearances whence Schleiden derived his theory of development from a cytoblast.

" On the *Phytelephas Macrocarpa* (Vegetable Ivory or Tagua Plant)." By E. Lankester, M.D.

The author brought this plant under the notice of the Section, as he was enabled to present a drawing of a young plant, which was now growing in the garden of Messrs. Loddiges of Hackney. A fruit also of this plant existed in the British Museum, of which a drawing was exhibited. A remarkable point in the œconomy of this plant was, that the horny albumen of the seed appeared to undergo no change during the process of germination. In the plant at Loddiges', which was now five years old, the seed still remained on the surface of the soil, apparently as hard as ever. In germination the young embryo was carried down by a rhizoma an inch or more long into the earth, and commenced growing at that point. Several analyses of the albumen of the seeds had been made by Payen, Connell, and Baumhauer, and, at the author's request, by Dr. Percy of Birmingham.

Prof. Allman gave a description of the fruit of some of the *Hepaticæ*. In the capsules, he pointed out the existence of spiral cells or vessels which he believed had a hygroscopic power, and that it was by their expansion that the capsule burst.

" On Ergot." By Dr. R. Latham.

Dr. Latham stated his conviction, that ergot was on the increase in this country. When he first began to observe it eight years ago, he found it on only a few plants ; he now found it in great quantities. He had collected it altogether from eighteen different species of grasses. It had also increased on the cultivated grain, and he believed that ergot was, at this moment, increasing absolutely and indefinitely. A friend of his attributed its increase to the use of animal manure, and stated that he had always found the ergot most abundant in the grasses of churchyards.

June 24.—"On the Germination of Plants." By Dr. Lankester.

The author took the following view of the phænomena:—That the only essential process in germination is the growth of the young plant, or embryo. The process of development of the embryo, from primitive cytoblasts developing its tissues, is precisely the same as that of every other part of the plant, and from an identity of structure an identity of function might be inferred. But the ordinary theory of germination gave a different function to the tissues of the embryo. The author regarded the absorption of oxygen, the disengagement of carbonic acid gas and ammonia, as the consequence of the decomposition of the starch and proteine contained in the albumen or perisperm of the seed; and that the growing cells of the embryo appropriated the carbonic acid, ammonia and water, just in the same way as all other cells in the vegetable kingdom.

Mr. Westwood made some remarks on the Honey-Bee.—After shortly noticing the general œconomy of the hive-bee as to the production of queens and the swarming of casts, he contended, from the analogy between the circumstances connected with the latter event and those which accompany the swarming of ants, gnats, white ants, mayflies, &c.,—1st, that the swarming of insects has for its principal object the union of the sexes; 2nd, that from analogy with other insects subject to swarming, it is to be inferred that that species does not differ in this respect from other swarming species; and, 3rd, that it is the newly-hatched, and not the old queen which leads off the swarm.

June 25.—"Notes on the Irish Species of Robertsonian Saxifrages." By Mr. Andrews.

The author having studied the Irish Saxifrages, and compared them with those of the Pyrenees, had come to a different conclusion from Mr. Babington, and believed that there were only two true species in Ireland, the *Saxifraga umbrosa* and the *S. Geum*. The other species described by Mr. Babington in his 'Manual,' he regarded as varieties of one or other of these forms.

ROYAL SOCIETY.

June 19, 1845.—"The Blood-Corpuscle considered in its different phases of development in the Animal Series." By Thomas Wharton Jones, Esq., F.R.S., Lecturer on Anatomy, Physiology and Pathology, at the Charing Cross Hospital.

This paper is divided into three parts: the first relating to the blood-corpuscles of the Vertebrata; the second to those of the Invertebrata; and the last to a comparison between the two. He first describes the microscopic appearances of these corpuscles in different classes of vertebrate animals, beginning with the skate and the frog, and proceeding to birds and mammifera; first in their early embryonic state, and next in the subsequent periods of their growth. He finds in oviparous vertebrata generally, four principal forms of corpuscles." These he distinguishes as the phases, first of the *granule blood-cell*, which he describes as a cell filled with granules, disclosing by the solvent action of dilute acetic acid on these granules a vesicular, or as the author terms it, a "*cellæform*" nucleus. These granule cells appear under two stages of development, namely, the coarsely granulous stage and the finely granulous stage. The second phase is that of the *nucleolated blood-cell*, oval in shape, containing a vesicular (or "cellæform") nucleus, and red-coloured matter. These cells likewise appear under two stages of development; colourless in the first and coloured in the second, in which last stage it constitutes the *red corpuscle*. In the early mammiferous embryo, he finds, in addition to the former, a third phase, that of *free vesicular nucleus*, exhibiting, like the nucleolated cell, the colourless and the coloured stages.

On examining the corpuscles of the lymph of vertebrate animals, the author finds them in all the classes to be identical in structure with their blood-corpuscles, and differing only in the inferior degree of coloration attending their last stage. In the oviparous classes, he observes that the nucleolated are more numerous than the granule cells, while in the mammifera the latter are predominant, which is the reverse of the proportion in which they exist in the blood of these animals. He finds that some of the nucleolated cells of the contents of the thoracic duct exhibit a marked degree of coloration, and have an oval shape; thus offering a resemblance with the blood of the early embryonic state.

The blood-corpuscles of all the invertebrate animals in which the author examined them, present the same phases of granule and nucleolated cells as in the higher classes, excepting that in the last stage of the latter phase the coloration is very slight, but the vesicular nucleus is frequently distinctly coloured. As in the higher classes, corpuscles exist in different states of transition from the granular to the nucleolated form of cell. In some of the invertebrata, corpuscles are found which appear to be the nuclei of some of the nucleolated cells become free; and these the author considers to be abortions, rather than examples, of cells having attained their third phase of free cells. Corpuscles are also met with in these animals, in greater or less abundance, belonging to the lowest forms of organic elements, namely, elementary granules.

The comparison which the author institutes between the blood-corpuscles of the vertebrate and invertebrate divisions of the animal kingdom, tends to show that they in all cases pass through similar phases of development, except with respect to the last, or coloured stage of the nucleolated cell, which they do not attain in the lower classes of animals. He finds that the blood-corpuscles of the crab, according to an analysis made by Professor Graham, contain a sensible quantity of iron, perhaps as much as red corpuscles. He considers the corpuscles of the blood of the invertebrata, inasfar as relates to the absence of nucleolated cells, as resembling those of the lymph of vertebrate animals.

"Observations on the Growth and Development of the Epidermis." By Erasmus Wilson, Esq., F.R.S., Lecturer on Anatomy and Physiology in the Middlesex Hospital.

The author adduces evidence derived from his microscopic observations, in confirmation of the commonly received doctrine respecting the origin of the cells of the epidermis and epithelium generally, from the materials furnished by the liquor sanguinis or plasma of the blood; which fluid, passing by endosmosis through the walls of the capillary vessels and peripheral boundary of the surface, developes granules by a vital process, analogous to coagulation. On a careful examination of the inner surface of the epidermis with the aid of the microscope, he finds it to be composed of four kinds of elements, arranged in such a manner as to constitute an irregular plane, similar to a tesselated or mosaic pavement. These elements are,—1. *Granules,* which the author terms *primitive*, of a globular form, solid and apparently homogeneous, and measuring about 1-20,000th part of an inch in diameter. 2. *Aggregated granules,* having about double the diameter of the former and apparently composed of as many of these as can be aggregated together without leaving an unoccupied space in the centre of the mass. 3. *Nucleated granules* measuring in diameter from the 6000th to the 4000th part of an inch, each being composed of an aggregated granule as a nucleus, enveloped by a single layer of aggregated granules, giving to the whole mass an oval or circular, and at the same time flattened shape. Their constituent granules have acquired, during this aggregation, greater density, and are separated from each other by distinct interstitial spaces filled with a transparent homogeneous substance. 4. *Nucleolo-nucleolated* cells pervading the deep stratum of the epidermis, and of which the longer diameter measures from the 3000th to the 2500th part of an inch. These cells, which constitute the principal portion, and may be regarded as the chief constituent of the epidermis, are formed from the nucleolated granules, on the exterior of which there is superposed a transparent layer, bounded by a well-defined outline, by the dark interstitial substance of the wall of the cell; the nucleolated granule being the nucleus, and the aggregated granule the nucleolus of these primitive cells of the epidermis. The author is of opinion that the nuclei, up to a certain point, grow with the cells, by the separation of the original granules from the deposition between them of interstitial matter, and also by the cleavage of the latter and the consequent multiplication of the granules. This peripheral growth of the cells is totally different from the mode of growth described by Schwann, and explains the disappearance of the nucleus in the scales of the epidermis. The observations of the author lead him to believe that the same process of development and of growth is followed in the epithelium as in the epidermis; and he offers evidence, showing that similar arrangements take place in the cells of melanosis, in the pigment cells of the choroid membrane of the eye, and in those of the skin of the negro.

"On the Temperature of Man." By John Davy, M.D., F.R.S. L. & E.

Having in a former paper shown that, contrary to a commonly received opinion, the temperature of the human body, as measured by a thermometer placed under the tongue, is not a constant one, the author has resumed the inquiry, and gives, in the present paper, the results of numerous observations made with a particular instrument constructed for the purpose, admitting of minute accuracy (each degree of the scale being divided into ten parts), and when used with the precautions pointed out, affording satisfactory indications of the many problems which may be proposed relative to the temperature of man, &c., confining himself to a small number, and offering the information he brings forward only as a preliminary contribution in aid of their solution.

The paper is divided into seven sections.

The first treats of variations of temperature during the twenty-four hours. The author finds from his observations, that the temperature is highest in the morning, on rising after sleep; that it continues high, but fluctuating, till the evening; and that it is lowest about midnight, ranging on an average from 98·7 to 97·9.

The second, of variations during the different seasons. These, he finds, bear some relation to the temperature of the air, but less than might be expected; which he attributes to the majority of the observations having been made within doors, under circumstances peculiarly favourable to uniformity.

The third, of the influence of active exercise on the temperature. The effect of this, when not carried to the length of exhausting fatigue, he finds to be elevating; and that the augmentation is, within a certain limit, proportional to the degree of muscular exertion.

The fourth, of passive, such as carriage exercise. The effect of this in a cool air, contrary to that of quick walking or riding, would appear to be lowering.

The fifth, of abstinence from all exercise in a cold atmosphere. This he finds to be depressing in a still greater degree; sitting in a cold church has occasioned a reduction of temperature from 1° to 2°, the air of the church being from 42° to 32°.

The sixth, of sustained attention or exertion of mind. This would appear to have the effect of raising the temperature, but in a much less degree than bodily exercise.

The seventh, of taking food. It would appear that a light meal, such as breakfast, alters very little the temperature, whilst a heavy meal, such as dinner with wine, tends to lower it.

The conclusion drawn by the author from his observations, considered in their greatest generality, is, that the temperature of man is constantly fluctuating within a certain limit, regularly during the twenty-four hours; and irregularly according to the operation of certain disturbing circumstances.

Should multiplied observations give similar results, he infers that they will admit of many applications, both as regards the regulation of clothing, the warming of apartments, and it may be the prevention and cure of diseases,—conducive alike to increase of comforts and health.

Tables are appended containing a series of observations extending through eight months, in which not only the temperature of the body is noticed, but also the frequency of the pulse and of respiration, and the temperature of the air.

GEOLOGICAL SOCIETY.

Feb. 26, 1845.—A paper was read by Mr. Lyell, "On the Miocene Tertiary Strata of Maryland and Virginia, and North and South Carolina."

These rocks of the middle tertiary period are chiefly exhibited between the hill country and the Atlantic, and form a band of low and nearly level country, almost 150 miles wide, and not 100 feet high. They are assumed to belong to this period, because they are seen resting on the eocene deposits, and exhibit about the same proportion of recent species. The United States miocene beds consist chiefly of incoherent sand and clay, and the sandy beds, otherwise barren, have often been fertilized by the use of shell marl. In the suburbs of Richmond, Virginia, there is however a remarkable bed of siliceous sand, derived from the cases of infusorial animalcules. The paper was accompanied by comparative tables and lists of the fossils.

A paper, also by Mr. Lyell, "On the White Limestone and other Eocene Tertiary Formations of Virginia, South Carolina and Georgia."

The eocene beds extend chiefly to the south of the miocenes described in the foregoing paper, and are very widely spread in the Southern States on the shores of the Atlantic. The mineral character of the beds in the north is so like that of the cretaceous series, that were it not for the fossils, they might readily be mistaken; but towards the south a new mineral type is put on, and the rocks consist of highly calcareous white marl and white limestone. In point of fact, there seems to be as great a chasm between the cretaceous rocks and the tertiaries in America as in Europe.

A second part of Mr. Lyell's paper gave an account of a series of rocks, called in America the Burr-stone, a siliceous rock, containing fossil sponges, and belonging, it would seem, to the upper division of the eocene period.

March 12.—A communication was read by Prof. Sedgwick, "On the Comparative Classification of the Fossiliferous Slates of North Wales, with the corresponding deposits of Cumberland, Westmoreland and Lancashire."

The object of the author in this memoir was to give a general account of the Silurian rocks of the lake district of the North of England, comparing them with those of North Wales, so far as he had hitherto investigated the subject. In both there appears to be a series extending through the various members of the Silurian rocks. In the lake district, the Lower Silurian rocks are imperfectly seen, and are not more than 300 or 400 feet thick, the Ash Gill beds being the highest; but the Upper Silurians are admirably shown, and contain characteristic fossils. Of these latter, the Coniston limestone and the Coniston flags form an important group as much as 1200 or 1400 feet thick, and correspond with the Denbigh flags of North Wales and the Wenlock shale and limestone of the Silurian system. The Ireleth slate and grits succeed and occupy a considerable space, and must be of very great thickness. These higher beds in Cumberland abound with *Terebratula Navicula*, but above them are remarkable bands with *Asterias*, while the upper portion is full of fossils, the prevailing type of which is Upper Ludlow.

April 2.—A paper was read by Mr. Austen, "On an Aërolite said to have fallen near Lymington, Hants."

A paper was also read by Capt. Bayfield, R.N., "On the Junction of the Transition and Primary Rocks of Canada and Labrador."

April 16.—A paper was read by Mr. Macintosh, "On the Supposed Evidence of the former existence of Glaciers in North Wales."

Mr. Macintosh combated the opinion of Dr. Buckland as to the origin of scratches and grooves on various rocks, referring these appearances, in many cases, to structural phænomena.

April 30.—A paper was read by Mr. Murchison, "On the Palæozoic Deposits of Scandinavia and the Baltic provinces of Russia, and their relations to *Azoic* or more ancient crystalline rocks, with an account of some great features of dislocation and metamorphism along their northern frontiers."

In this paper Mr. Murchison gave a general outline of the result of his recent examination of Northern Europe, and the conclusions to which he has arrived, chiefly with reference to the classification of a large tract of country before undescribed on a large and comprehensive scale.

May 14.—An extract was first read from a letter by Dr. A. Gesner, "On the Gypsiferous Red Sandstone of Nova Scotia."

A paper was read by Mr. Austen, "On the Coal Beds of Lower Normandy."

The chief object of the author was to describe the actual geological position of these small basins, and suggest that they might rather be of the Permian than the true Carboniferous period.

Dr. Mantell read a paper, entitled "Notes of a Microscopical Examination of the Chalk and Flint of the South-east of England, with remarks on the Animalcules of certain Tertiary and Modern Deposits."

This paper is given entire in our present Number, p. 73.

A paper was read by Mr. Bowerbank, "On some specimens of Pterodactyl recently found in the Lower Chalk of Kent."

May 28.—A communication was read, "On the Geology of Lycia." By Prof. E. Forbes and Lieut. Spratt, R.N.

The authors stated, that the rock forming the greater part of Lycia consists of the *scaglia*, or Apennine limestone, a series not very distinctly defined, and that near the river Xanthus another rock of greenish sandstone, whose age was not determined, rested conformably on the scaglia. In other places true tertiary beds, both marine and freshwater, overlie the scaglia; and of these the marine are the most ancient, and, from the fossils which occur in the different beds, they are found to be all of the same age. The authors then described the districts in which the tertiary marine beds appear, some of them being from 2000 to 3000 feet, and others at a still greater elevation above the sea-level. The freshwater tertiaries of Lycia are much more extensive than the marine beds, and extend over the district at heights of 200 or 300 feet above the plain. They consist of marls, capped by flat tables of conglomerate limestone. The relative age of these tertiary beds is determined by the presence of both marine and freshwater strata in the two great valleys of the Xanthus, the former being identified with the Bordeaux miocenes, and the latter therefore being much newer than the eocene freshwater tertiaries of Smyrna. A considerable mass of travertine is found in the great plains of Pamphylia, and it forms cliffs of considerable height, through which the rivers pour. Certain recent changes of level were also noticed, which had attracted the attention of Sir C. Fellows. In conclusion, the authors consider that the scaglia, the formation of most ancient date, was deposited as fine sediment in a deep sea, and was in progress during the whole of the secondary, including the cretaceous, epoch; the evidence of this consisting in the remarkable mixture of fossils observable in Mount Lebanon and elsewhere, and the great thickness, the extent, and the conformable superposition of the different beds. The sandy beds resting on the scaglia seem to have been more recent than the miocene marine strata, the presence of which marks a great change in elevation. This change was more than paralleled by a converse one of depression, producing lakes in which the freshwater tertiary beds were deposited, and which have been since drained by changes in level still going on.

A short notice was read, being the translation of a memoir by the Baron Leopold von Buch, "On a new family of Crinoidal Animals, called *Cystideæ*."

The stony cases of these animals differ from Encrinites chiefly in the absence of arms and the presence of ovarial apertures in the plates. They are found abundantly in the lower beds of the Silurian series, chiefly in Scandinavia.

A paper was read, "On the Relation of the New Red Sandstone to the Carboniferous Strata in Lancashire and Cheshire." By E. W. Binney, Esq.

The author endeavoured to show that the Lancashire coal-field, although of great thickness, does not exhibit a passage upwards into the new red sandstone, but that it is a more perfect series than that in the west of Yorkshire and Derbyshire. He also supposes that the coal-measures are generally thrown down by the various faults, the dislocation being of some extent; that these measures continue unaltered beneath the upper beds; and finally, that the lower portions of the new red sandstone are but imperfectly exhibited in the coal-field in question.

ASIATIC SOCIETY.

June 21.—Sir G. T. Staunton, Bart., M.P., in the chair.

Mr. A. Bettington, of the Bombay Civil Service, read a paper "On certain Fossils procured by himself on the Island of Perim, in the

Gulf of Cambay; more particularly on a Gigantic Ruminant, having some affinities to the Sivatherium and the Giraffe." After adverting to former notices of fossils obtained on this island, the writer described its situation in the midst of the gulf-stream of Cambay, which separates it from the main land, and deposits large quantities of alluvium brought down by the rivers emptying themselves into it. These rivers, in the present day, in the freshes, transport into the Gulf large trees, and the bodies of oxen, deer, bears, and other animals; and in the great floods of past ages are considered to have brought down and deposited, as now discovered, the remains of ruminants and Pachydermata, some extinct and unheard-of, others having, in the present day, their living congeners in the Indian rivers. The bed from which the writer obtained the fossil specimens exhibited is below the usual water-mark, and inaccessible except at the ebb of spring-tides. A portion only of those obtained were brought to England, the remainder were left in India. The most remarkable of those in this country was a large skull, which is now, by competent judges, pronounced to be the first specimen of a new genus. The mass of conglomerate which contained it weighed about 170 lbs., and the separation of the skull from near 100 lbs. of matrix occupied Mr. Bettington many weeks. The skull, on the whole, is well-preserved, though a portion has suffered from the action of water. The lines of teeth on the two sides of the palate are unconformable; and it has been conjectured that the head must at this part have suffered from violence, but there is no appearance of fracture. For the purposes of comparison, Mr. Bettington had made a close measurement of every part of the Perim fossil, of the Sivatherium, and of the skull of the adult giraffe in the British Museum; from all which it appeared that the Perim fossil is the smaller. The teeth are similar in number and character to those of the Sivatherium, and are somewhat smaller, as the comparative size of the heads would lead us to expect A marked distinction between the two is found in the excess in width of the cranium at the vertex, being in the Sivatherium twenty-two inches, and in the Perim fossil little more than eleven inches, in which character the latter approaches nearer to the giraffe. But the greatest point of difference is in the form and position of the horns. In the Sivatherium the horns bear somewhat the same relation to each other as in the four-horned antelope; whereas, in the fossil under consideration, the anterior horns rise from a confluent base measuring twenty-five inches, the horns above the line of division measuring eighteen inches. This formation the writer considers to be without precedent in the animal kingdom, fossil or recent. The general character, cancellar structure, and extensive development of the protuberance at the lower edge of the transverse ridge of the occiput, compel the conviction that it was a posterior horn, "reflected" as in the common Indian buffalo, and must have produced an appearance truly monstrous. The whole formation indicates great force and power. Among the other fossils, there were some identical with those of the Sevalik hills, and others peculiar, as yet, to Perim. Among the latter was a new Crocodilean. There were specimens of three species of mastodon, gariols and rhinoceros, and the heads, horns and teeth of stags, antelopes, oxen, &c. The writer concluded with the observation that there was still a rich field of research remaining at this deposit, and that he had sent to India, not only for some of the specimens before referred to, but was also making arrangements for prosecuting further research.

Dr. Mantell remarked, that the specimens afforded additional confirmation of the fact, first pointed out by Capt. Cautley and Dr. Falconer, that in the tertiary formations of India were collocated the remains of several species of reptiles and mammalia, with those of extinct species and genera belonging to the most ancient European deposits of the same geological group (the *eocene*); as, for example, the teeth and bones of the Cheiropotamus, and other pachyderms of the Paris basin, with those of the existing gariol of India. Dr. Mantell then offered some observations on the analogy which the specimens from Perim, as well as those from Ava and from the Sevalik hills, presented in their mineralogical condition, and the mechanical action to which they had been subjected, with those more ancient fossil bones and teeth that abound in the Wealden deposits of the south-east of England, particularly with those obtained from the conglomerate and grits of Tilgate Forest. The Indian and the British fossils are alike mineralized by iron, and have an investment of indurated ferruginous sand, interspersed with quartz, pebbles and rolled fragments of other rocks; and the bones are, for the most part, mutilated and much water-worn, proving that previously to their mineralization they had been exposed to abrasion from streams and rivers, and were transported from a great distance by currents. Dr. Mantell dwelt on the discrepancy between the faunas of the two epochs, although that of the Wealden was as decidedly of a tropical character as that of the tertiary strata of India; but in the latter large mammalia prevailed, while in the far more ancient secondary formation of England mammalia were absent, and the place of the gigantic ruminants and pachyderms was occupied by herbivorous reptiles of appalling magnitude.

BOTANICAL SOCIETY OF EDINBURGH.

May 8, 1845.—Dr. Seller, V.P., in the Chair.

A collection of British specimens was announced from the London Botanical Society; and fresh specimens of a *Primula*, regarded as the *P. elatior* of Jacquin, from Dr. Dewar, Dunfermline, were placed on the table.

The following papers were read:—

1. "On some species of *Cuscuta*." By Charles C. Babington, M.A., F.L.S. &c., Cambridge. (Ann. Nat. Hist. p. 1 of the present volume.

2. "On the genus *Diodium*, Breb." By John Ralfs, M.R.C.S. &c., Penzance.

June 12.—Dr. Douglas Maclagan, President, in the chair.

The following communications were read:—

1. "List of the rarer Lichens found in the neighbourhood of

Oswestry and Ludlow, with occasional observations." By the Rev. T. Salwey. (See p. 90 of the present Number.)

2. Dr. Seller read part of a paper, entitled " Observations on some Plants obtained from the shores of Davis's Straits."

3. " On *Datura tatula*, as a Specific for Relief of Asthma." By Mrs. H. N. Ferguson of Biel. In this communication (which is an extract from a letter), the *Datura tatula* is described as most efficacious in relieving asthmatical complaints, while the *D. Stramonium*, the species commonly used, was found quite inert.

The following directions regarding the preparation of the plant may be deemed useful :—" The proper time for taking up the roots is towards the end of October, when the seed-pods are ripe ; the plants should be drawn from the ground, and the roots cut off, with an inch or two of the stalk. They should then be freed from soil, and dried in the shade. When required for use, the root should be torn into small shreds, and put into a clean tobacco-pipe. The smoke causes no nausea, so that the most delicate lady may use it."

July 10.—Dr. Douglas Maclagan, President, in the chair.

The Curator reported that several valuable additions had been made to the Society's collections during the present season, both in the Foreign and British departments, and that the library had received valuable additions through the liberality of members and correspondents. During the past year the Assistant-Curator has been chiefly engaged in adding to and arranging the Society's herbarium, and he has to acknowledge the valuable assistance rendered by Mr. C. C. Babington of Cambridge, in reducing to order the extensive collection of European plants. A very valuable and instructive series of these has been selected for the Society, the remainder being set aside for distribution among the members. Much of the Assistant-Curator's time has also been employed in the distribution of the Society's duplicates, especially to foreign members. This work is now nearly completed. A large collection of British plants which have been accumulating for several years is now being arranged, and specimens for the Society selected, in order to fill up the different sections marked out in Mr. Brand's plan for arranging that part of the herbarium. A detailed account of the donations to the herbarium and library will be published in the annual report.

The following communications were read :—

1. Dr. Seller read the remainder of his paper, entitled " Observations on some Plants from the shores of Davis's Straits."

2. " On two species of *Desmidieæ*." By Mr. J. Ralfs.

Mr. James M'Nab exhibited a Pelargonium bearing two distinct varieties of flowers which were strikingly dissimilar, and were growing on separate branches, no artificial means having been employed in their production.

Dr. Neill exhibited a specimen of the Tussac grass, received from the Falkland Islands.

MISCELLANEOUS.

RANUNCULUS LENORMANDI, F. W. SCHULTZ.

In my 'Manual' I have noticed a plant as a variety (β. *grandiflorus*) of *R. hederaceus*, which it seems quite certain is the above species, described by Schultz in the 'Flora,' vol. xx. p. 726, and again in the same journal, vol. xxiv. p. 171, and recently figured by Cosson and Germain in the first portion of their beautiful 'Atlas de la Flore des Environs de Paris.' It differs from *R. hederaceus* by each lobe of its leaves having two or three notches, its carpels obovate and tipped with a terminal style, petals broader and longer, stipules very broad and scarcely at all adnate to the petioles. It is a considerably larger plant than *R. hederaceus*, and has probably been overlooked in England as either that species in a vigorous state or perhaps as a state of *R. aquatilis*, from which the want of capillarily-divided leaves and the absence of setæ on the receptacle distinguish it.—C. C. B.

Eng. Bot. S. t. 2930.

CAREX MONTANA, LINN.

Mr. William Mitten, of Hurstpierpoint, has had the good fortune to find this plant in a field in Sussex, near to Tonbridge Wells. It much resembles *C. pilulifera*, a specimen of which is I believe preserved in the Linnæan herbarium in mistake for *C. montana*; but the true plant of Linnæus has been accurately determined in Sweden. *C. montana* differs from *C. pilulifera* by having ovate fertile spikes, much blunter or retuse and darker glumes, oblong-obovate hairy fruit, and an oblong nut.—C. C. B.

MIGRATIONS OF SALMON.

About a year and a half ago, Lord Glenlyon, with the praiseworthy motive of deciding the long-agitated question as to whether the salmon, after returning to the ocean from its spawning-ground, again resought the same river on another return of the season, caused a number of *kelts*, or foul fish, to be caught and marked, by attaching a label, by a ring, to what is called the *dead* fin of each. Last summer a number of these were captured on various stations in the Tay, but, so far as we have heard, none in the Earn; on Tuesday last another was caught at the Rashbush, a fishing-ground below Inchyra. This fish was in excellent condition, and weighed 21 lbs. The label bore as follows:—"Lord Glenlyon, Dunkeld, No. 129."—*Perth Advertiser*.

ON THE SPORES OF SOME ALGÆ. BY M. GUSTAVE THURET.

M. Unger has published a very interesting investigation of the *Achlya prolifera**. The researches which I have made on this singular Alga, whilst confirming most of the observations of M. Unger, have presented to me some new facts, which I shall describe elsewhere. I shall content myself here with rectifying an error into

* Ann. des Sc. Nat., 3rd Series, 1844, vol. ii. p. 5. pl. 1.

which the German naturalist has fallen on the subject of the organization of the spores. M. Unger regards them as clothed with a ciliated membrane, similar to that which he was the first to observe on the spores of the *Vaucheria*. I am convinced, on the contrary, by repeated observations, that they are furnished with two long cilia inserted on the rostrum; an analogous arrangement to that which I have figured in the spores of the *Conferva glomerata* and *crispata**.

During the excursion which I made with M. Decaisne on the coasts of the British Channel, we had frequent opportunity of studying the spores of *Ectocarpus siliculosus*, of *Ulva lactuca*, and of *Enteromorpha compressa*. In the *Ectocarpus* we found two cilia inserted on a colourless rostrum. In *Ulva* and *Enteromorpha* the spores have four cilia. I found this same number in soft-water Algæ, the *Conferva zonata*, whose spores are similar to those of the *Chætophora* and *Draparnauldia*. They present a very visible red point, which I have even perceived sometimes on spores still enclosed in the tube of the plant. I may remark that the *Conferva zonata* is, moreover, a very distinct Alga from the true *Confervæ*. These latter appear to me to form a clearly limited genus, all the species of which have the tube finely striped with longitudinal striæ, for instance *Conferva glomerata*, *crispata*, *rupestris*, &c. These longitudinal striæ are themselves intersected by extremely fine transversal striæ, which appear to me to have hitherto escaped all microscopic observers.—*Ann. des Sci. Nat.*, Mai 1845.

On the Extinct Mammals of Australia, with Additional Observations on the genus Dinornis *of New Zealand.* By Prof. Owen.

In a previous report Prof. Owen had demonstrated the former existence in Australia of two genera of Marsupial animals, rivalling in size the rhinoceros and hippopotamus of the old continent. Since the reading of his first report, Prof. Owen had received three molar teeth belonging to the upper jaw of the Diprotodon; the crown of each tooth was divided into two principal transverse ridges, like those of the lower jaw, and the enamel presented the wrinkled and punctate surface peculiar to the genus. With these was found a large scalpriform incisor, whose bevelled cutting edge showed that it worked upon a similar tooth in the lower jaw. The Diprotodon, therefore, had molars like the kangaroo; but, instead of the two large incisors in the lower jaw being opposed to six smaller in the upper, as in the kangaroo, it had two large incisors above as well as below, agreeing in form and structure, and relative size, with those of the Wombat. Prof. Owen considered himself justified in concluding that the Diprotodon combined the characters of Phascolomys with those of Macropus, exhibiting both upon a gigantic scale, and constituting one of those links in the chain of being which the course

* Recherches sur les Organes Locomoteurs des Spores des Algues (Ann. des Sc. Nat., 2nd Series, 1843, vol. xix. p. 266. pl. 10.). In that memoir I have erroneously designated the *Conferva crispata* by the name of *C. rivularis*.

of time has broken and destroyed. Prof. Owen also stated that a large collection of bones of the Dinornis had been obtained from a new locality by Mr. Percy Earle. This collection contains four of the species of Dinornis already described, including the three most remarkable for gigantic stature. One of these, with a stature nearly equalling the ostrich, presents in all the bones of its leg double the thickness in proportion to their length, and must have been the strongest and most robust bird in proportion to its size that ever existed. Of the gigantic species, vertebræ, ribs, and an almost entire sternum, most resembling that of the Apteryx, have been obtained. The Rev. Mr. Williams has also transmitted the cranial portion of a skull related in size to the *Dinornis struthoïdes*, manifesting many peculiarities and a striking resemblance to the same part in the Dodo and Apteryx.—*Proc. Brit. Assoc. Cambridge.*

METEOROLOGICAL OBSERVATIONS FOR JUNE 1845.

Chiswick.—June 1. Overcast and fine. 2. Very fine: sultry. 3. Sultry: rain at night. 4. Showery. 5. Slight rain: cloudy: boisterous at night. 6. Cloudy and windy. 7. Very fine: showery, and boisterous at night. 8. Boisterous: clear and fine. 9. Very fine. 10—12. Very fine: sultry: clear and fine at nights. 13. Foggy: sultry. 14, 15. Very hot and sultry. 16. Overcast. 17. Sultry. 18. Rain: clear at night. 19. Hazy: very fine. 20. Cloudless: very fine. 21—23. Very fine. 24. Uniformly overcast: heavy rain: clear. 25. Cold and dry: cloudy: rain. 26. Cloudy: fine. 27. Rain. 28. Overcast: heavy showers: clear. 29. Very fine. 30. Slight rain: very fine.—Mean temperature of the month $1\frac{1}{2}°$ above the average.

Boston.—June 1. Rain: rain early A.M.: rain A.M. 2. Fine. 3. Fine: 2 o'clock P.M. thermometer 72°: rain P.M. 4. Fine: thunder and lightning, with rain P.M. 5. Cloudy: rain early A.M. 6. Windy. 7. Fine: rain P.M. 8. Cloudy. 9. Fine. 10. Fine: 3 o'clock P.M. thermometer 74°. 11. Fine: 1 o'clock P.M. thermometer 75°. 12. Fine: 4 o'clock P.M. thermometer 76°. 13. Fine: 1 o'clock P.M. thermometer 78°. 14. Fine: 12 o'clock noon thermometer 78°. 15. Cloudy. 16. Cloudy: 1 o'clock P.M. thermometer 78°. 17. Fine. 18. Cloudy: rain early A.M: rain A.M. and P.M. 19. Fine. 20. Cloudy. 21. Fine. 22. Cloudy. 23. Fine. 24. Fine: rain, with thunder and lightning P.M. 25. Cloudy. 26. Fine. 27. Cloudy: rain A.M. and P.M. 28. Cloudy: rain A.M.: thunder and lightning 1 P.M. 29. Fine. 30. Fine: rain early A.M.—N.B. The warmest June since June 1826.

Sandwick Manse, Orkney.—June 1. Cloudy. 2. Cloudy: clear. 3. Bright: cloudy. 4. Showers. 5. Bright: showers. 6. Bright: drops. 7. Clear: fine. 8. Drops: rain: clear. 9. Drops: cloudy. 10. Bright: damp. 11, 12. Bright: cloudy. 13. Bright: clear. 14. Damp: cloudy: fine. 15. Cloudy: rain. 16. Fog. 17. Bright: damp. 18. Rain: damp. 19. Bright: clear. 20. Bright: damp. 21. Cloudy. 22. Showers: cloudy. 23. Bright: cloudy. 24. Damp: fine. 25. Bright: showers: cloudy. 26. Rain: damp. 27. Showers. 28. Cloudy: showers. 29. Showers: clear. 30. Cloudy: clear.

Applegarth Manse, Dumfries-shire.—June 1. Fine soft rain. 2. Very fine: fair. 3. Fine rain. 4. Showers all day. 5. Rain continued. 6. Rain. 7. Soft showers. 8. Heavy rain A.M.: fair P.M. 9. Showers. 10. Fair and growing. 11—14. Very fine summer day. 15. Very fine summer day: thunder: a few drops of rain. 16. Showery all day. 17. Slight showers. 18. Slight showers P.M. 19, 20. Fair and fine. 21. Fair and fine: a few drops: rain. 22. Fair and fine: very dry. 23. Fine: one slight shower. 24. Rain, very heavy. 25. Showers. 26. Fair and fine. 27. Rain: wind: thunder. 28. Fair and clear. 29. Fair A.M.: shower P.M. 30. Showers.

Mean temperature of the month .... 56°·55
Mean temperature of June 1844 .... 55 ·10

Meteorological Observations made 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.			
	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. June.	Max.	Min.		9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9½ a.m.	8½ p.m.								
1.	30·133	30·042	29·54	29·94	29·84	29·90	29·81	72	43	56	57	46½	62	52	sw.	calm	s.	sw.	......	·11	......	......
2.	29·951	29·761	29·37	29·75	29·62	29·64	29·51	81	46	63	60	52	59	54	s.	w.	s.	s.	......	·04	......	......
3.	29·620	29·367	28·93	29·40	29·02	29·25	29·14	81	44	68	60	50	59	50	sw.	calm	s.	......	·06	......	......	......
4.	29·607	29·516	28·79	29·15	29·29	29·08	29·17	70	49	59	57	44	50	49	sw.	w.	sw.	wsw.	·05	·04	......	·62
● 5.	29·597	29·543	28·94	29·23	29·07	29·32	29·17	68	55	58	59½	48½	55	53	sw.	sw.	sw.	se.	·08	·12	......	......
6.	29·800	29·575	28·83	29·03	29·38	29·10	29·23	67	50	62·5	58	52	54½	57	sw.	w.	sw.	ssw.	......	......	......	·14
7.	29·864	29·736	29·30	29·61	29·52	29·54	29·72	67	47	65	62	49½	57½	53	s.	w.	ne.	s.	·25	......	......	......
8.	30·200	29·807	29·13	29·49	29·89	29·74	29·82	68	41	56	61	49½	56	48	sw.	w.	wnw.	w.	......	·24	1·50	......
9.	30·365	30·335	29·66	30·09	30·01	29·94	30·00	72	40	62	57	47	53	50	sw.	w.	sw.	wsw.	......	......	......	·48
10.	30·365	30·269	29·68	30·19	30·18	30·19	30·11	76	46	67	64	53	54	52	e.	calm	sw.	se.	......	......	......	......
11.	30·235	30·151	29·50	30·14	30·14	30·06	30·13	78	50	73	70	54	58	55	ne.	calm	sw.	sw.	......	......	......	......
12.	30·165	30·141	29·46	30·10	30·10	30·10	30·03	85	54	70	75	52	63½	57	e.	calm	sw.	sw.	......	......	......	......
☽ 13.	30·157	30·106	29·49	30·15	30·13	30·09	30·20	84	57	71·5	75½	52½	54	50	ne.	calm	sw.	w.	......	......	......	......
14.	30·120	30·050	29·45	30·09	30·02	30·21	30·15	82	53	76	75½	53	60	53	e.	e.	s & se.	w.	......	......	......	......
15.	30·038	29·905	29·46	29·95	29·82	30·03	29·89	84	60	67	69	59½	55	52	se.	calm	s.	e.	......	......	......	......
16.	29·844	29·794	29·22	29·73	29·69	29·83	29·78	75	50	67	62	58	53½	52½	s.	calm	sse.	ese.	......	......	0·13	·12
17.	29·814	29·771	29·19	29·74	29·74	29·86	29·88	80	59	75·5	63	53½	55	52	ne.	calm	se.	e.	·19	......	......	......
18.	29·857	29·739	29·16	29·71	29·65	29·80	29·76	70	44	64	63½	54	58	54	ne.	calm	wnw.	nw.	·05	·12	......	·22
○ 19.	30·039	29·944	29·39	29·79	29·95	29·80	30·00	78	48	65	61	50	54	52	s.	w.	wnw.	wnw.	......	·41	......	......
20.	30·117	30·083	29·58	30·05	30·03	30·06	29·95	74	50	60	68	50	54½	53	ne.	calm	w.	sw.	......	......	......	......
21.	30·082	29·991	29·59	30·00	29·97	29·97	30·00	80	51	65	67	53½	52	51	e.	calm	w.	w.	......	......	......	·05
22.	30·014	29·935	29·44	29·97	29·94	29·93	29·92	73	48	64	62½	48	52	51	ne.	calm	wnw.	sw.	......	......	......	......
23.	30·126	30·094	29·60	30·00	29·97	30·00	30·00	73	51	62	63	47	52½	51	sw.	nw.	wnw.	sw.	......	......	......	·07
24.	30·034	29·797	29·47	29·77	29·60	29·80	29·66	74	52	67	56	48½	57	51	sw.	nw.	wnw.	w.	·21	......	0·15	·09
25.	29·808	29·798	29·26	29·58	29·64	29·66	29·65	74	52	56·5	62	48	54	50	sw.	w.	w.	w.	·09	·20	......	......
☾ 26.	29·856	29·776	29·30	29·69	29·73	29·74	29·80	74	49	61	61½	43½	48	48	w.	w.	nw.	nw.	......	......	......	·30
27.	29·760	29·462	29·29	29·60	29·27	29·74	29·69	66	56	57	60½	41½	50	49	sw.	calm	e.	ne.	·15	......	......	·17
28.	29·751	29·230	28·75	29·18	29·51	29·64	29·62	69	43	61	58	47	51½	45½	w.	calm	n.	n.	·16	·33	......	·07
29.	29·937	29·897	29·39	29·68	29·63	29·58	29·71	72	51	63	60	45	49½	50	w.	calm	w&se.	w.	·04	·39	......	......
30.	29·856	29·838	29·33	29·58	29·59	29·68	29·65	70	53	64	62	51	54	49	w.	w.	sw.	e.	·03	·04	1·70	·07
Mean.	29·970	29·848	29·31	29·746	29·731	29·776	29·771	74·56	49·73	64·2	63·0	50·0	54·86	51·46					1·36	2·04	3·48	2·40

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XIV.—*On the Anatomy of* Actæon, *with remarks on the Order* Phlebenterata *of M. de Quatrefages.* By Geo. J. Allman, M.B., F.R.C.S., M.R.I.A., Professor of Botany in Trinity College, Dublin, late Demonstrator of Anatomy T.C.D.*

[With three Plates.]

In the seventh volume of the 'Linnæan Transactions' is a memoir by Colonel Montagu, in which is described, under the name of *Aplysia viridis*, a small gasteropod discovered by this naturalist on the coast of Devonshire. The *Aplysia viridis* of Montagu was afterwards separated by Oken from the true Aplysias, and made to constitute a distinct genus under the name of *Actæon*. A mollusk evidently referable to the same genus is named *Aplysiopterus neapolitanus* by Delle Chiaje, who describes and figures it in his great work on the Invertebrate animals of the kingdom of Naples. The Italian naturalist gives some details of its anatomy, but his account is manifestly full of errors, and he seems to mistake the ramified apparatus in connexion with the stomach for a vascular system. A mollusk also apparently referable to Oken's genus *Actæon* is described in the 'Faune d'Europe Septentrionale' of Risso, under the name of *Elysia timida*; and more recently M. de Quatrefages (Ann. des Sci. Nat. March 1844) has published a very elaborate description of the genus, in which he advances some new and startling views to which he had been previously led by the examination of *Eolidina*, a small nudibranch, apparently an *Eolis*, but for the reception of which this naturalist believes it necessary to construct a new genus. The claims of M. de Quatrefages' opinions to reception by naturalists will be considered in the present paper.

The following anatomical details have been drawn up from careful dissections of *Actæon viridis*, and as no figure which we have seen represents with sufficient accuracy the external characters of this little mollusk, we have thought it necessary to give among the illustrations of the present memoir a drawing made with great care from the living animal.

* Read before the Meeting of the British Association at York, Sept. 1844.

Actæon, Oken, *Aplysia,* Mont., *Aplysiopterus,* Delle Chiaje, *Elysia,* Risso.

Body subcylindrical, with two foliaceous *lateral expansions* which are produced beyond the posterior extremity of the body, where they unite with one another along the mesial line. *Tentacula* two, auriform, not retractile. *Anus* lateral, placed at the right side.

A. viridis (Pl. V. figs. 1, 2, 3.).—The largest specimens of *A. viridis* measured about nine lines in length; the general colour of the body and foliaceous expansions is a dull green; the latter are margined with purple and dotted on both sides with small green, blue, and rose-coloured points of a brilliant metallic lustre, and arranged in groups without any definite order; similar dots are also found upon the upper surface of the body; a nearly colourless line extends from the posterior extremity of the body to the termination of the branchial expansions. The tentacula are of a dull purple, and the eyes are placed in the centre of a nearly colourless areola. The upper lip is dark purple.

This little mollusk was obtained abundantly by means of a small dredge among *Zostera marina* in the harbours of Glandore, Castletownsend and Crook Haven, co. Cork, in the months of August and September 1844.

When confined in a glass of sea-water it would creep upon the sides of the vessel, adhering not only by the under surface of the body, but by that of the lateral expansions along the whole length of their junction in the mesial line; external however to a narrow space corresponding to their line of junction, the expansions were entirely free, and possessed no power of attachment. Our little mollusk would also take delight in suspending itself in a horizontal position with its back downwards, from the surface of the water. It would sometimes separate its lateral expansions till they became placed nearly in the same plane, and again elevating them vertically, would bring their opposed surfaces nearly into contact.

Anatomy.

Digestive system.—From a simple unarmed orifice in the anterior extremity of the body, a short but rather wide canal, Pl. VI. *c*, with membranous walls leads beneath a slightly bifid lip (Pl. V. fig. 3.) to an irregularly spherical body, Pl. VI. *a*, which consists of thick walls inclosing a central cavity. In this body is contained a tongue of very singular structure, Pl. VI. *b* and Pl. VII. fig. 5. It consists of a chain of hard transparent spines, and is curved so as nearly to return into itself, thus forming a loop, whose long diameter will be parallel to the axis of the buccal mass. M. de Quatrefages has given a correct figure of the organ as detached from the animal, but has overlooked a most singular appendage with which it is furnished. This appendage is a pyriform sac, Pl. VII. fig. 5 *a*, which communicates by means of a canal with the left extremity of the tongue.

The sac is filled with spines, precisely similar to those of which the tongue is composed. They seem to be perfectly formed, and are placed without any apparent order in the sac. It is difficult to assign to this sac any other function than that of secreting the tongue-spines; and we can easily conceive that as the tongue is worn away at one extremity, additions are as constantly made to it from the contents of the sac at the other. The lingual sac is applied against the outer side of the buccal mass, being wholly external to this body.

The tongue terminates at the right side in a small unarmed prolongation, Pl. VII. fig. 5 *b*, which curves forwards along the convexity of the loop.

From the posterior part of the buccal mass a slightly sinuous *œsophagus*, Pl. VI. *d*, runs backwards and terminates in an oval, longitudinally striate stomach, *e*, from which a short intestine, *f*, runs transversely to the right side in order to terminate near the anterior margin of the lateral expansion. The direction of the intestine thus places the true position of the anus beyond all doubt, though so accurately is the external orifice kept closed, that it has hitherto escaped my attempts at detection.

The stomach and intestine are clothed internally with a ciliated epithelium, by which their contents are kept in a constant state of agitation.

In connexion with the alimentary canal just traced are several accessory organs which require special mention. Four glands analogous to salivary may be detected. Of these, two, Pl. VI. *g g*, are connected with the anterior extremity of the buccal mass, and appear to consist each of a cluster of small vesicles, which pour their contents into the commencement of the alimentary tract. The posterior pair of salivary glands, *h h*, consists each of a simple tube of great delicacy, which commences in the buccal mass just anterior to the origin of the œsophagus, and then becoming attached to the œsophagus runs over the supra-œsophageal ganglia, and soon exhibits a series of little cæcal offsets forming small sacs appended to the tube for the remainder of its course, Pl. VII. fig. 6. The gland thus constituted runs back through the body of the animal, extending for a considerable distance behind the stomach.

The salivary glands in *Actæon* are highly interesting from their simplicity of constitution, and afford a fine illustration of the reduction of glandular structure to one of its least complex expressions.

At a short distance from the termination of the œsophagus there opens into this tube a small sac of a pyriform figure, Pl. VI. *i*;

but whether this is destined to receive from the œsophagus a portion of the alimentary matter, thus performing the office of a *crop*, or whether its function is that of simply discharging into the alimentary tract some peculiar product of secretion, I have been unable to determine.

But perhaps the most remarkable of all the organs accessory to digestion is the singular *ramified system* which constitutes so large a portion of the viscera of *Actæon*, and which M. de Quatrefages, conceiving it to be of high importance, has assumed, along with certain other peculiarities of structure which he supposes invariably to accompany it, as entitling him to unite into a new order a certain number of Gasteropodous Mollusca, distinguishing them under the name of *Phlebenterata*.

The system under consideration consists in our mollusk of two tubes which open, close to one another, into the stomach, at its cardiac extremity. Near to its termination in the stomach each tube divides into two branches, one, Pl. VI. *k k*, passing forwards towards the head, the other, *l l*, running backwards into the lateral expansions. Each of these branches then undergoes minute subdivision, the ramifications extending forwards nearly to the anterior margin of the head, and backwards to the posterior extremity of the lateral expansions. The ultimate ramuli terminate each in a *cul-de-sac*, *m m m*, and Pl. VII. fig. 4, filled with a green or brownish substance, in which the microscope enables us to detect oleaginous globules floating through a fluid of aqueous consistence.

It is to this curious system, visible through the semitransparent integuments, that the prevailing colour of the species must be attributed; its nature and function, and its claim to constitute a character of ordinal importance, will be presently considered.

Vascular and Respiratory systems.—The best way of detecting the vascular system of *Actæon* is to view the mollusk as an opake object by means of a single lens and without compression, when a delicate ramification of vessels will be seen creeping over the upper surface of the foliaceous expansions, Pl. V. fig. 4. Those vessels which spread themselves over the posterior part of the expansions terminate in two trunks, *a a*, one for each lateral half, which running nearly parallel to the mesial line and at a short distance from it, at either side appear to end in a circular canal, *b*, into which the vessels from the anterior part of the expansions also open. This circular vessel cannot be satisfactorily seen without actual dissection; it is placed immediately beneath the integuments of the back and over the posterior part of the body, and embraces an organ, *c*, of an irregularly semicircular figure, into whose structure strong fibres may be seen to enter with a reticulated arrangement. Beyond this point my researches have failed to trace the anatomy of the apparatus under consideration. We can however have no difficulty in recognising in the system now described a heart and vessels. That the vascular ramification observed upon the upper surface of the foliaceous expansions is a system of *branchial vessels,* there can indeed be no doubt, and the expansions themselves must therefore be considered as true *aërating organs.* It will at once be seen too, that the *ventricle* must be sought for in the reticulated organ just described, though, from the difficulty of the investigation, I have been unsuccessful in my attempts to discover its direct connexion with the vessels. The circular vessel also must be considered as performing the functions of an *auricle,* and it is indeed by no means improbable that what appears under the microscope as simply a circular canal surrounding the ventricle, is really the projecting margin of a delicate transparent auricle, whose central portion is rendered invisible by the stronger and more opake ventricle.

The general opacity of the tissues in *Actæon,* the extreme tenuity of the walls of the vessels, and the transparency of the fluid which these contain, render the investigation of the circulatory apparatus a subject of great difficulty. If too much reliance be placed on the compressor, it will certainly escape detection; and I have no doubt that the abuse of this instrument will account for the fact of M. de Quatrefages having denied the existence in *Actæon* of a vascular system, as well as for many other errors into which this naturalist has fallen.

Nervous system: Sensation.—Soon after the œsophagus leaves the buccal mass it passes through a system of seven ganglia, Pl. VI. *n,* and Pl. VII. fig. 1, of which six are arranged in three symmetrical pairs, and one is azygous.

Of these ganglia, the two largest, Pl. VII. fig. 1 *a a,* are placed upon the upper surface of the œsophagus, being in contact with each other internally. The ganglia of the second pair, *b b,* are placed immediately below the first, upon the sides of the œsophagus, being thus separated to allow of the passage of this tube. The third pair, *c c,* seems like a protuberance upon the under side of each of the ganglia last mentioned, and the azygous ganglion, *d,* occupies an inferior and median position, completing the sub-œsophageal portion of this ganglionic collar. The different parts of this system of œsophageal ganglia are maintained in union by three commissures. One commissure, *e e,* springs from each of the large ganglia on the upper surface of the œsophagus, and then running down along the side of this tube, terminates in the azygous ganglion; while the third commissure, *f,* runs transversely beneath the œsophagus, uniting the two ganglia of the second pair. The œsophagus thus passes between the great supra-œsophageal ganglia above, and the transverse commissure below. Two small spherical bodies, Pl. VI. *o,* most probably pharyngeal ganglia, are placed upon the œsophagus just as this organ emerges from the buccal mass; but the means by which they are connected with the other parts of the nervous system, I have not succeeded in detecting.

The great supra-œsophageal pair seems to be chiefly destined for the organs of sense. The optic nerves, Pl. VI. *p*, arise from this pair, and large nerves, *q r*, are sent off from it to the tentacula and lips and the parts immediately surrounding the mouth. Some nerves going to the generative organs would also seem traceable to the same source, while the digestive and other systems would appear to derive their nerves, *s*, from the remainder of the œsophageal mass.

Vision.—The organs of vision are placed at a short distance behind the tentacula, and to the naked eye present the appearance of minute black points; with the assistance of the microscope, the following parts may without difficulty be detected in them. The first thing which strikes us is a pigmental body, Pl. VII. fig. 2 *a*, of a somewhat pyriform figure, furnished posteriorly with a prolongation, at one side of which the optic nerve, *b*, may be seen entering. Whether this body contains a cavity with a retinal expansion I cannot assert as the result of observation, though all analogy would lead us to suppose such to be the case.

The pigment is of a deep black colour, and is doubtless intended to effect the absorption of all rays of light which may happen to fall on it. A crystalline lens, *c*, of a nearly spherical figure and powerfully refractive, is imbedded in the anterior extremity of the pigmental body, and surrounding the whole apparatus is a transparent capsule, *d*, perforated posteriorly by the optic nerve, and apparently performing the function of a cornea anteriorly.

Hearing.—The organs detected by Siebold in several mollusca, and supposed by this anatomist to be destined for the function of hearing, are demonstrable without much difficulty in *Actæon*. They look like appendages to the cerebral system, and present the appearance of nearly spherical bodies, Pl. VII. fig. 1 *g g*, with a transparent refractive nucleus, and supported upon a club-shaped peduncle. They would seem to consist of two spheres concentric with the nucleus, which become apparent when a short exposure has caused some degree of collapse in the bodies from a slight evaporation of their contents. The nucleus, which corresponds with the otolites observed by Siebold, is single, and did not present the peculiar oscillatory motion manifested by the otolites of other mollusca. The peduncles arise between the first and second pair of ganglia, but with which of these they are more intimately connected I have not been able to satisfy myself.

Touch.—Though the sense of touch is without doubt universally diffused over the soft and constantly lubricated skin of the mollusk, yet it would appear that the tentacula are specially appropriated to its exercise. These organs consist in auriform expansions rolled into a cylindrical tube, Pl. V. figs. 1 and 2, but capable of being to a certain extent opened out at the will of the animal. They are incapable of undergoing any true retraction, but may be slightly shortened and thickened, in which condition they present a number of transverse rugæ. They are supplied with large nerves from the supra-œsophageal ganglia. No fact has thrown any light upon the question whether another sense besides that of touch has also its seat in these organs.

The entire surface of the skin is copiously lubricated with a thick mucous secretion, which is poured out in large quantity when the animal is irritated. The source of this fluid would seem to be in certain pyriform bodies, Pl. VII. fig. 3, which are found in considerable numbers beneath the integument. Each terminates in a sinuous duct, which after running for some distance beneath the skin, opens, most probably, upon the surface. These organs are described and figured by Quatrefages, but the French naturalist is in error when he speaks of them as the source of the beautiful metallic tints with which the surface of our mollusk is adorned. These tints are due to a pigment inclosed in distinct cells, arranged in irregular groups beneath the epidermis, considerably smaller than the bodies just described, and evidently without any duct or external communication whatever. I am unable to bring forward any observations of interest relative to the senses of taste and smell in *Actæon*.

Generative system: Embryology.—The reproductive system of *Actæon* is one of great complexity, and one in which there must be great difficulty in assigning to each part its proper function. *Actæon* is hermaphrodite. A pyriform body, Pl. VI. *t*, placed anteriorly and at the right side, would seem to be the male intromittent organ. This body is furnished with a tubular perforation which occupies the axis, and leads from the apex into an oval cavity, *v*, situated in the base. From this cavity a sinuous tube, or *vas deferens*, *w*, may be traced backwards, which, after a course of considerable length, communicates with an oval body, *x*, to be presently described, and then pursuing its course backwards may be seen to bifurcate, one branch passing to the right and the other to the left. Beyond this point I have in vain attempted to trace the course of the tube. Its whole internal surface is thickly clothed with cilia, whose presence is rendered manifest by the constant rotatory motion imparted to the granular fluid with which the tube is filled.

Occupying a median position in the posterior part of the body is an oval sac, *y*, near whose anterior extremity two tubes may be seen to enter close to one another. One of these tubes, z, runs a little forwards, then bends backwards and bifurcates, the divisions again bifurcating dichotomously: its ultimate distribution, however, I have not succeeded in tracing. The other tube, β, runs forwards to the oval body, x, just alluded to, into which it opens. This body is evidently furnished with a cavity; its anterior half is of a peculiar complex structure, perhaps glandular, and destined for the elaboration of some definite secretion. From its anterior extremity a tube may be traced forwards till lost beneath the edge of a large, irregularly-shaped, somewhat plicated body, γ. In this body the tube would seem to terminate, though here I cannot speak with certainty. The sac, y, contains a yellowish semifluid secretion, which can be forced by the action of the compressor forwards into the oval body, x, and backwards through the bifurcating tube, z. With the plicated body, γ, which I would feel inclined to look upon as a testis, a pyriform sac, δ, is connected; this sac contains a substance of a semifluid consistence, and is furnished with a long neck, which can be traced into the plicated body; but whether it terminates here or is continued to some external outlet, I have been unable to satisfy myself.

Occupying the great lateral expansions, and placed immediately beneath the ramified organ already described in connexion with the digestive system, is a curious and very complicated body, $\zeta\zeta\zeta$. This body, which is perhaps an ovary, is double, being formed of two perfectly similar portions, one of which is placed in each branchial expansion, and consists of a delicate tube dichotomously ramified, and furnished along its entire length with closely-set sacciform appendages, Pl. VII. fig. 8 *a*. These contain a granular substance, but whether they communicate with the interior of the tube is not very manifest. Besides these appendages, numerous spherical capsules, Pl. VI. θ θ, and Pl. VII. fig. 8 *b*, may be seen arranged at tolerably regular intervals along the tube, and apparently communicating by means of a short neck with its interior. These capsules inclose a number of oval bodies, Pl. VII. fig. 8 *c c*, and fig. 7, in each of which is a granular mass surrounding a very distinct nucleus, which is placed towards one extremity, and is itself furnished with a secondary nucleus. The connexion between this curious system and the other parts of the reproductive apparatus has escaped my attempts at detection: neither can I speak positively as to the exact position of the external orifices of generation.

Embryology.—Some days after the capture of our little mollusk, I was much gratified at finding that it had deposited its spawn upon the sides of the glass jar in which it was confined. The spawn was laid in little spiral discs, Pl. VII. fig. 9, of four or five lines in diameter, and I at once recognised it as similar to what I had observed in considerable abundance upon the leaves of *Zostera marina* in the locality where the *Actæon* was captured. It consisted of numerous ova enveloped in a gelatinous covering, and deposited in the form of a ribbon rolled into a plane spiral. In about six days after the deposition of the spawn the eggs were hatched, and the young Actæons, Pl. VII. figs. 10, 11, 12, escaped, not in any respect resembling the parent, but of a totally different type of organization,—very similar to what has of late years been observed in the young of *Doris*, *Aplysia*, and some other Gasteropoda.

The embryo-*Actæon* is inclosed in a nautiloid shell, and furnished anteriorly with two oval discs, figs. 10, 11 *a a*, ciliated along the margin, and capable of being approximated till the upper surfaces are brought into contact, fig. 11, and again separated till they lie nearly in the same plane, fig. 12. The discs are continued anteriorly into a sort of foot, figs. 10, 11 *b*, also ciliated on the margin and provided with an operculum, figs. 11, 12 *c*, which is drawn after the little animal when it retires into the recesses of its shell, and thus completely protects it from all intrusion from without, fig. 12.

Near the place where the foot joins the discs are two ocelliform spots, figs. 10, 11, 12 *d*, doubtless visual organs, though Van Beneden considers what are evidently the same organs in the embryo of *Aplysia*, as the rudimental œsophageal ganglia. That the organs under consideration are not ganglia, would alone appear from their high refractive power.

I could not succeed in detecting a mouth, though a tube, fig. 11 *e*, which I believe to be an œsophagus, may with some care be traced from the root of the discs backwards, till it dilates into an oval cavity or stomach, *f*, part of which is concealed beneath a granular mass, *g*, which occupies the posterior convolutions of the shell.

Near the origin of the œsophagus are two spherical bodies, *h*; these I believe to be the true rudiments of œsophageal ganglia.

Two fibres, fig. 11 *i i*, may be seen to run from the root of the discs backwards, and would seem to have some attachment to the interior of the shell; they bifurcate near their termination. It is difficult to say whether they be nervous filaments connected with the œsophageal ganglia, or muscular fibres destined for the retraction of the embryo.

The little embryo is eminently natatory, swimming about with wonderful activity by means of its curious ciliated discs, and by its varied and elegant gyrations, constituting an object of great beauty and interest.

General Observations.

Such are the facts which, from a most careful examination of a great number of specimens, I believe myself justified in considering as demonstrated. I took much pains in again and again verifying their correctness; and as most of them have not as yet been recorded, while many are in direct variance with recently published statements, I lose no time in making them public. This I am the more desirous of doing, from the fact of the anatomy of our little mollusk having within the last year been assumed by an acute and indefatigable French zoologist as characteristic of a new order of Gasteropoda which he has thought fit to construct, but which appears to me to be constituted upon grounds totally insufficient, in some respects the result of imperfect observation, and in others of conclusions which the observations, supposing them to be correct, will in no degree warrant.

In the 'Ann. des Sci. Nat.' 2nde série, tom. xix., is a memoir by M. de Quatrefages on the anatomy of a small Nudibranchiate Gasteropod, which this naturalist conceives himself justified in separating, under the name of *Eolidina,* from all previously characterized genera of Nudibranchs. In this memoir M. de Quatrefages maintains, that in the anatomy of *Eolidina* there are peculiarities of such importance as to afford grounds for the establishment of a new order among the Gasteropodous Mollusca.

M. Milne Edwards had previously directed the attention of zoologists to a remarkable character of the stomach in the Eolidian Nudibranchs, demonstrating the existence in *Calliopæa* of an extensive system of ramified canals connected with this organ.

Upon this fact M. de Quatrefages seizes with avidity: he maintains that the gastric ramifications perform the office of branchial vessels; that they are therefore subservient to respiration as well as to digestion; and finding them also in his *Eolidina,* he connects them with other peculiarities which he asserts to have discovered in this mollusk, raises them to a rank of ordinal importance, gives them the name of *phlebenteric* system, and then surprises zoologists with the somewhat startling announcement of the existence of a new order among the Gasteropodous Mollusca.

The doctrines which the examination of M. de Quatrefages' *Eolidina* had thus led him to adopt, are carried out to their full extent in a subsequent memoir (Ann. des Sci. Nat. March 1844), in which, after the examination of *Actæon* and of five new genera of his own characterizing (*Zephyrina, Actæonia, Amphorina, Pelta* and *Chalidis*), he maintains the complete establishment of his new order, and enters into the details of its zoological affinities.

The general characters upon which the French naturalist maintains the distinctness of his new order of Gasteropods, are the disappearance in whole or in part of the circulatory system, and the transference of the respiratory function from special organs to the digestive system or common integument,—peculiarities which he asserts draw with them a general degradation of the organism, approximating it to the Acalephæ, and thus establishing a group of animals which depart from the type of their class, and are among the Gasteropods what the Entomostraca are among the Crustacea.

The memoirs of M. de Quatrefages are certainly characterized by great ingenuity and will well repay perusal. They have however, I fear, thrown themselves open to justly severe criticism, and by advancing statements of great zoological importance upon what must be admitted to be imperfect and too manifestly prejudiced observations, would, if not corrected, exercise a most injurious influence upon a science so strictly inductive as zoology. Of the various animals dissected by M. de Quatrefages in the construction of his *Phlebenterate* group, *Actæon* is the only one which I have had an opportunity of examining. The result of the examination of this one however is so totally at variance with the anatomy of the same animal as recorded by the French zoologist, that though we can hardly be justified in asserting from this, that his observations on the others are equally erroneous, we must yet surely hesitate before we adopt conclusions of such great importance in zoology as those to which M. de Quatrefages has arrived.

On comparing the description and figures of *Actæon,* as given by M. de Quatrefages in the memoir to which allusion has just been made, with the structure which my own observation of this animal had revealed to me, I was struck with a discrepancy, for which I must confess I found it difficult to account by reference to any of the ordinary and unavoidable errors to which the observation of these minute animals is necessarily liable.

Among the most important points in which the observations just recorded differ from those of M. de Quatrefages, may be mentioned the detection of a distinct heart and vessels, organs whose existence is denied by the French naturalist, and of a *lateral* termination to the intestine, which is described in the foreign memoir as opening dorsally and medially. The form and disposition of the gastric ramifications do not at all correspond with M. de Quatrefages' description; the terminal *culs-de-sac* of this system are arranged very differently from the disposition which he assigns to them, and the ramifications of opposite sides do not communicate. There is certainly no such organ in the posterior extremity of the branchial appendages as M. de Quatrefages describes under the name of cloaca*. The length of the œsophagus and the form of the stomach are altogether at variance with his description. The œsophageal collar consists of seven, not four, ganglia; and if to these points of discrepancy we add some others mentioned in the present paper, and call to mind that he has totally overlooked the salivary apparatus and made no mention of the highly-developed generative system, we cannot but conclude that the establishment of a new order of animals on observations so imperfect is unwarrantable and rash.

But suppose the observations of the French zoologist not altogether so erroneous as is here maintained, is he yet justified in the step which he has taken? We assuredly think not.

Let us consider for a moment whether the singular ramified system connected with the stomach in *Actæon* and other allied genera is really of that vast importance in a zoological point of view with which M. de Quatrefages would invest it. If the system in question be merely a ramification of the stomach, we can certainly see in it a disposition by which the surface of the gastric cavity is greatly increased; but this disposition, exercising no marked influence over the organism, cannot be supposed to demand any important modifications in the other organs, and surely offers no solid grounds for believing that its office is to expose the products of digestion to the influence of the aërated medium. In truth it is ill-adapted to this function, separating its contents from the surrounding fluid, not only by its own walls but by the intervention of a portion of the cavity in which it floats, and by the whole thickness of the integumentary structures.

But it may be asked, what office is it possible to assign to the system now under consideration, if it be not that of respiration? I believe that the ramified apparatus in *Actæon* and the *Eolididæ* is truly a hepatic system, and affords an interesting example of the reduction of a gland to one of its simplest conditions†.

We have in these gastric ramifications one or more offsets from the lining membrane of the alimentary canal greatly extended

* We can in no way explain what M. de Quatrefages intended by the organ which he describes as a cloaca, unless we suppose that he really meant the oval sac (*y*, Pl. VI.) in the posterior part of the body, which we have described in connexion with the generative system, and which by some strange confusion he has transferred to the posterior extremity of the branchial expansions.

† Since the opinions here expressed were laid before the Association, there has been placed in my hands a number of the 'Comptes Rendus,' containing a paper by M. Souleyet on the *Phlebenterata* (Annals, xiv. p. 342), in which I find that the author's observations on this subject are entirely in accordance with my own.

and terminating in *culs-de-sac*, where doubtless resides the function of elaborating the biliary secretion. We have just such an appearance as a careful preparation of glandular structure would present with all its component ducts and terminal *culs-de-sac* accurately disentangled; we have in fact in the *Phlebenteric* system of M. de Quatrefages nothing more or less than an unraveled liver.

This view of the subject would appear to be admitted to a certain extent even by M. de Quatrefages himself, who describes the blind terminations of the branches as surrounded with a layer of a peculiar substance which he believes to be the liver. Of the connexion of this substance with the gastric ramifications I cannot speak, as in *Actæon* I could find nothing of the kind. As M. de Quatrefages however has not succeeded in isolating it from the *culs-de-sac*, his statement amounts to an admission that on these terminations of the branches devolves the function of secreting the bile*.

To the view now taken it may be objected, that the biliary ducts ought to open into the intestine *behind* the stomach. Instances however of the bile being poured into the stomach itself are by no means without example among the Gasteropoda, and in some cases, as in *Scyllæa* and *Onchidium*, this secretion is discharged into the œsophagus. The remarkable *partition* of the liver in *Onchidium* moreover is an evident approach to the condition assumed by this organ in the mollusca now under consideration. Another objection to the hepatic character of the gastric ramifications may be urged from the curious discovery by Messrs. Alder and Hancock, that in *Eolis* the extremities of the ramuli are not really cæca, but open externally through the terminations of the branchial papillæ. This however cannot be considered as a valid objection. It is true that the termination of the ducts in *culs-de-sac* has been described as a universal condition of glandular structure, but it has been by no means proved that a perforate state of the terminations of these tubes is inconsistent with the performance of the secreting function. The purpose served by this curious condition of the organ in *Eolis* it is not very easy to explain. I cannot however avoid looking upon the perforations in the extremities of the branchial papillæ as analogous to the orifice placed at the base of the branchial plume

* I have just seen an excellent paper on the anatomy of *Eolis* by Messrs. Hancock and Embleton (Annals, xv. pp. 1, 77), in which these gentlemen describe the terminations of the gastric ramifications in *Eolis* as lined by glandular structure, which in most species exhibits a complex follicular disposition. The cæca in *Actæon* are certainly much more simple, nor do they seem to be furnished with any distinct glandular lining.

in *Doris* where it gives exit to a part of the hepatic secretion,—an office which it is by no means unlikely the branchial apertures in *Eolis* are also destined to fulfil.

M. de Quatrefages maintains, that throughout the whole of his *Mollusca Phlebenterata*, with the exception of *Eolidina*, there is a total absence of a heart and vessels. In *Eolidina* he allows the existence of a heart and arteries, but denies that of a venous system. We have already seen that so far as *Actæon* is concerned, the French anatomist is quite in error, and we have no doubt that future researches will still further prove the untenableness of his positions. When we consider the extreme tenuity of the venous tubes in these animals, and the colourless nature of their contents, we can surely place but little reliance on any statements which deny their existence solely from the fact of their having escaped detection.

But after all, is a diffused condition of the venous fluid of such great importance in determining the position of a molluscous animal in the zoological scale? Setting aside the *Ascidiæ*, a group universally allowed to manifest a degradation of structure, we know that in *Aplysia* a diffusion of this very kind begins to show itself in the remarkably imperfect condition of the venous trunks in this genus, and yet M. de Quatrefages himself would hardly be rash enough to degrade from its co-ordinate Gasteropods this highly organized mollusk.

It remains for us now to consider the zoological relations of *Actæon* and its true position among the Mollusca. We have seen that Montagu originally described this mollusk under the name of *Aplysia*, and all zoologists since his time have, with the exception of M. de Quatrefages, agreed in placing it in the vicinity of the *Aplysiæ*. Sander Rang, it is true, in his 'Manuel des Mollusques,' expresses in a note his opinion that the position of *Actæon* is in the neighbourhood of *Placobranchus*, a genus established by Van Hasselt for a mollusk discovered by him on the coast of Java; in the text however he follows the opinion of other zoologists, making *Actæon* a genus in his family of *Aplysiens*.

It is without doubt to M. de Quatrefages that we are indebted for having first decidedly removed *Actæon* from the Tectibranchiate Mollusca, and placed it in the vicinity of *Eolis* and its allies,—a position which is assuredly its true one, being fully borne out, not only by its internal structure but by its external conformation, however at variance this last may at first appear with the legitimacy of the position now assigned to it.

The lateral expansions of *Actæon* are truly analogous to the branchial papillæ of *Eolis*, their real homology being easily found in the united branchiæ of an Eolidian mollusk; and if to this we add the gastric or hepatic ramifications, and consider the general character of the anatomy as detailed in the present paper, we can have no hesitation in making *Actæon* a genus of NUDIBRANCHIATE MOLLUSCA. As to the close affinity of *Actæon* to *Placobranchus,* I fully agree in the opinion of M. Sander Rang, expressed in the note just alluded to. Indeed I believe the relation between these mollusca to be closer than has been yet suspected, though, from the imperfect state of our knowledge of *Placobranchus,* it would be at present premature to urge with confidence any further opinion upon this subject.

While I have thus strongly objected to the establishment of a new order for the reception of the Eolidian Nudibranchs, I yet believe that strict zoology peremptorily demands the formation among the Nudibranchs of a distinct group for these mollusca, by which they may be kept apart from other Nudibranchs with which many zoological writers have too closely united them. Indeed the light which has of late years been thrown upon the anatomy of the Mollusca Nudibranchiata places us in a position for recognising those relations by which a natural subordinate grouping of the order may be effected. A dismemberment founded upon the differences of organization of the Mollusca Nudibranchiata had been to a certain extent carried out by M. de Blainville in the establishment of his groups *Polybranchiata* and *Cyclobranchiata,* the former corresponding to the family *Tritoniadæ* of subsequent zoologists, and the latter to that of *Dorididæ.* De Blainville divides the *Polybranchiata* into two minor groups, *Tetracerata* and *Dicerata,* both natural, the former including *Eolis, Glaucus,* &c., and the latter *Tritonia, Scyllæa* and *Thetis.*

With the position here assigned to *Tritonia, Scyllæa* and *Thetis,* though the group is in itself natural, I cannot concur, as I believe these mollusca much further removed from *Eolis* and its allies than from *Doris.*

Sander Rang (Man. des Mol.) rejects De Blainville's groups *Polybranchiata* and *Cyclobranchiata,* and primarily divides the entire order into five families: 1. les *Ptérosomes,* established for the reception of a single genus *Pterosoma,* discovered by Lesson in the equatorial seas; 2. les *Glauques* = *Polybranchiata Tetracerata,* Blainv.; 3. les *Tritonies* = *Polybranchiata Dicerata,* Blainv.; 4. les *Doris* = *Cyclobranchiata,* Blainv.; 5. les *Placobranches,* established for the *Placobranchus* of Van Hasselt.

Pterosoma, upon which Rang founds his first family, is certainly a very doubtful Nudibranch, and I believe admitted into this order upon very uncertain grounds. Lesson, its discoverer, described it (Mém. de la Soc. d'Hist. Nat.) as a *Nucleobranch* nearly allied to *Firola,* and there is at least as much reason for considering it in this point of view as for assigning it a place among the Nudibranchs. Rejecting therefore *Pterosoma* from the Nudibranchs as a mollusk as yet too imperfectly understood, the remaining four families are judiciously constructed, based as they are upon true differences of organization, and consisting of really natural groups.

In the beautiful work of Messrs. Alder and Hancock on the British Nudibranchiate Mollusca, the first part of which, just published by the Ray Society, I have had an opportunity of seeing since the present paper was placed in the printer's hands, these gentlemen distribute the British genera under the three families, *Dorididæ, Tritoniadæ* and *Eolididæ.* They make moreover a most important revision of the old genus *Tritonia,* separating from it the *Tritonia arborescens* of previous authors, which they find, notwithstanding its divided branchiæ and general Tritonia-like appearance, to possess a true Eolidian structure, and which they accordingly locate in the family of the *Eolididæ* as a distinct genus under the name of *Dendronotus.*

In order however that *Actæon* may also find a place among the Mollusca Nudibranchiata, an additional family must be formed for its reception. The family which it is thus found necessary to constitute will perhaps correspond with the *Placobranches* of Sander Rang, though, from our entire ignorance of the structure of *Placobranchus,* it is impossible to form a decided opinion as to the identity of the two families.

Having thus established four families among the Mollusca Nudibranchiata, the next question which suggests itself is, whether these families, when arranged in strict zoological co-ordination, are separated from one another by equal intervals? The answer must here be at once given in the negative, the *Dorididæ* being much more nearly allied to the *Tritoniadæ* than these are to any of the remaining families of the order. This circumstance therefore demands the division of the entire order into two great primary sections, by which means a natural grouping of the families themselves may be effected, and their true relations to each other be rendered apparent.

The grounds upon which this primary division of the Nudibranchiata is based, will be found in the singular system of hepatic ramifications, to which attention has already been so frequently directed, and which, though far from being of that importance with which it has been invested by M. de Quatrefages, is yet a decided indication of the existence of two subordinate groups in the order Nudibranchiata.

In accordance therefore with this arrangement, the Nudibranchiate Mollusca will stand as follows :—

ORDER.	SECTION.	FAMILY.	GENUS.
NUDIBRANCHIATA.	Liver compact	Branchiæ in the mesial line, placed in a circle more or less complete around the anus. DORIDIDÆ.	Doris, Polycera, &c.
		Branchiæ arranged along the sides, or scattered. TRITONIADÆ.	Tritonia, Scyllæa, Thetis.
	Liver disintegrated...	Branchiæ papillose, or branched or muricated. EOLIDIDÆ.	Eolis, Alderia, Dendronotus*, Glaucus, &c.
		Branchiæ foliaceous. ACTÆONIDÆ.	Actæon, Placobranchus?

EXPLANATION OF THE PLATES.

PLATE V.

Fig. 1. *Actæon viridis,* viewed from above.
Fig. 2. The same, viewed in profile.
Fig. 3. The head seen from below.
Fig. 4. Vascular system : *a a,* trunks which receive the blood from the posterior parts of the branchial expansions ; *b,* circular vessel into which the trunks *a a* open, and which also receives the blood from the anterior part of the branchial expansions ; *c,* the ventricle.

PLATE VI.

Actæon viridis opened from above; that portion of the hepatic ramifications which occupies the right side has been removed in order to simplify the figure, and for the same reason the ovaries? have not been represented on the left: *a*, buccal mass; *b*, tongue; *c*, canal through which the buccal mass opens exteriorly; *d*, œsophagus; *e*, stomach; *f*, intestine; *g g*, anterior pair of salivary glands; *h h*, posterior pair; *i*, pyriform sac opening into œsophagus; *k k*, anterior trunks of hepatic ramifications; *l l*, posterior trunks; *m m m*, *culs-de-sac* in which the hepatic ramifications terminate; *n*, ganglionic collar of œsophagus; *o*, pharyngeal ganglia?; *p*, optic nerve; *q r*, nerves running to tentacula and lips; *s*, nerves supplying the digestive system; *t*, penis; *v*, oval cavity in base of penis; *w*, *vas deferens*;

* I would feel well-inclined to separate *Dendronotus* as the type of a small family distinct from the true *Eolididæ*. With *Dendronotus* I would also join *Doto* (*Melibœa*, Johns.), and then the second section of Nudibranchs would consist of three families, of which the *Dendronotidæ* would be exactly co-extensive with the subfamily *Melibœinæ* of Messrs. Alder and Hancock. With the animal assumed by Rang as the type of his genus *Melibœa*, I am not sufficiently acquainted to decide upon its exact location.

x, oval body with which *vas deferens* communicates; y, sac of unknown function; z, dichotomously divided tube which opens into the sac y; β, tube connecting the sac y with the oval body x; γ, the testis?; δ, pyriform sac connected with γ; $\zeta\,\zeta\,\zeta$, the ovary?; $\theta\,\theta$, capsular bodies connected with ovary.

PLATE VII.

Fig. 1. System of œsophageal ganglia: *a a*, great supra-œsophageal ganglia; *b b*, second pair; *c c*, third pair; *d*, azygous ganglion; *e e*, commissures connecting supra-œsophageal ganglia with azygous ganglion; *f*, commissure which runs beneath the œsophagus and unites the two ganglia of the second pair; *g g*, organs of hearing.
Fig. 2. Organ of vision: *a*, pigmental body; *b*, optic nerve; *c*, crystalline lens; *d*, transparent capsule inclosing pigmental body and lens.
Fig. 3. Subcutaneous mucous glands.
Fig. 4. Terminal *culs-de-sac* of the hepatic system.
Fig. 5. The tongue: *a*, lingual sac; *b*, unarmed prolongation, in which the tongue terminates at the right side.
Fig. 6. Portion of posterior salivary glands.
Fig. 7. One of the oval bodies contained in the ovarian capsules.
Fig. 8. Portion of the ovary with its capsule: *a a a*, sacciform appendages; *b*, capsule; *c*, oval bodies inclosed by the capsule.
Fig. 9. Group of ova as deposited upon the leaves of *Zostera marina*, &c.
Fig. 10, 11, 12. Embryo: *a a*, locomotive discs; *b*, foot; *c*, operculum; *d*, organs of vision; *e*, œsophagus; *f*, stomach; *g*, granular mass, beneath which the posterior part of the alimentary canal is concealed; *h*, rudiments of œsophageal ganglia; *i i*, filaments which pass backwards from the base of the discs.

XV.—*Description of a new genus of Night Lizards from Belize.* By J. E. GRAY, Esq., F.R.S. &c.

To the Editors of the Annals of Natural History.

GENTLEMEN,—This interesting new form of *Gecones*, or Night Lizards, was sent from Belize by Mr. Dyson under the name of "*Gallwaspe*," a name which appears to be generically applied to most Lizards by the English in Tropical America. It is at once distinguished from all the genera of the family before known by the short, blunt, compressed, equal-diametered toes, but more particularly by the very small size of the claws, which are completely hidden between two large, half oblong scales, which have a narrow one between the base of the upper edge.

Genus COLEONYX. Fam. GECOTIDÆ.

Toes rather compressed, equally thick their whole length, blunt at the end; edges simple, rounded; upper surface covered with a single, and the sides with three series of six-sided scales, the under surface with a single series of rather narrow, slightly convex, transverse scales; the end of each toe furnished with large, oblong, convex scales on each side, forming a complete sheath to the small claws, and with an elongate tapering scale covering the suture between these two scales above. Preanal pores distinct, in an angular series; scale granular, with series of larger, round, convex granules. Tail cylindrical, with rings of larger subangular tubercles, swollen near the vent beneath, and with large tubercles on each side.

Coleonyx elegans. Gray; head and nape with concentric black streaks; back and tail with irregular black cross-bands, beneath gray; back with numerous series of roundish tubercles, smaller and more distant on the head and nape, and more crowded on the limbs.

Inhab. Belize. Collection of the British Museum.

XVI.—*The Arctic Expedition under the command of* Sir John Franklin.

We have been favoured with the sight of letters from Mr. H. Goodsir, who is attached to this expedition, and hasten to communicate to our readers an outline of the results already obtained. The zeal and scientific knowledge of our friend Mr. Goodsir have raised high anticipations of the value to natural science of this voyage, and these have, if possible, attained a still greater elevation by what has been already done. It is most satisfactory to learn that the officers of the expedition, and also a considerable number of the men, are most active in rendering every assistance to him in his researches. They have indeed kept him at work almost night and day (if there can be said to be any night in these latitudes), examining, drawing, and describing new or highly interesting animals.

We will now proceed to give a short account of the voyage, as learned from Mr. Goodsir's letters, which are dated from "Disco in Baffin's Bay, July 7, 1845."

The earlier part of the voyage was rather tedious, owing to adverse and stormy winds, so that the ships were driven far to the north-east, near enough on June 11th to have seen the mountains of Iceland, had the state of the atmosphere allowed. On the 22nd they were off Cape Farewell, the southern point of Greenland. Up to this date there were only two days upon which he could make any observations, but the results of these are extremely interesting. On the 10th of June, in lat. 61° 47′, long. 14° 14′, numerous specimens of a species of *Briareus* were obtained, furnishing an important addition to our knowledge of these animals. The presence of "cilia fringing the bifurcated portions of the lateral extremities of its body," decides the position of the genus in nature, and proves that Quoy and Gaimard's idea of its being molluscous is not correct. Its intestinal canal consists of a straight tube with but one oval opening. The rejection of the indigestible portion of its food is effected by dilating the whole body with water and then ejecting it.

At the same time a small species of *Clio*, several *Beroë*, one specimen of a free *Actinia*, and a very beautiful Crustacean, forming a new genus in the family *Pontia* and allied to *Irenæus*, were obtained. The last is characterized by its large size, "the enormous length of the four central tail-filaments; the inner of which are not themselves armed with filaments, all the others being so; each of the antennæ has a joint at the distal part of the first third, thus enabling the animal to bend them and conceal them under its body."

On the second fine day a most interesting Ciliograde was obtained of very peculiar form, and having the ciliated ribs transverse instead of longitudinal; the cilia arising from either edge of the ribs. Mr. Goodsir thinks that its minute structure, which is very complicated, proves its affinity to the *Diphydæ* and also the *Salpæ*. All the *Medusæ* obtained on these two days were Ciliogrades.

On the 23rd of June, having rounded Cape Farewell in a heavy gale of wind on the preceding day, on entering Davis' Straits numerous beautiful *Pteropoda* of the genus *Clio* were obtained in company with *Spiratella*. They were swimming actively in the water and were adorned with the brightest colours; only approaching the surface of the sea on calm evenings. The observations made upon these animals have enabled Mr. Goodsir to confirm the observations of Eschscholtz in most points.

On the 25th numerous *Medusæ* were seen, all of these of the family *Beroidæ* and mostly of the species *B. punctata* of Eschscholtz. On the 27th soundings were obtained in 41 fathoms and a dredge put down, which produced, amongst many other interesting captures, a new species of *Caprella*, *Amphipoda* in great number, several *Asteriadæ*, a *Terebratula* and several other Mollusca, an Isopod forming a new genus allied to *Munna*, a very beautiful Ascidian, four species of fish—*Cyclopterus, Liparis, Ammodytes*, and a beautiful species new to the observer. On the same day a large shoal of the Caing whale (*Phocæna Melas*) passed on their way towards the south.

On the 28th a dredge was sunk to the enormous depth of 300 fathoms, and produced many highly interesting species of Mollusca, Crustacea, *Asteriadæ*, *Spatangi* and Corallines; such as *Fusus, Turritella, Venus, Dentalium*, &c.; and also some large forms of *Isopoda*. As bearing upon the geographical distribution of species, Mr. Goodsir considers the occurrence of *Brissus lyrifer* (Forbes) and *Alauna rostrata* (Goodsir) as of the greatest interest, both of them being natives of the Scottish seas. The remarkable depth also appears to us to give peculiar interest to these researches, as we believe that the deepest dredgings ever previously obtained were those of Prof. E. Forbes in the Levant, the deepest of which was 230 fathoms, itself far beyond any made by other naturalists. Such valuable and laborious researches can only be made when the officers of a ship have such kindly dispositions towards the observer of nature as was the case during Prof. Forbes's voyage, and is now shown by those under the command of Sir J. Franklin.

On the 1st of July two specimens of a small species of *Beroë* were obtained, which greatly illustrated the process of their development. "A thick germinal membrane of a red colour was observed lining the central cavity of the body, in which both male and female cells appeared to be developed. The ova having arrived at some size project so far as to become pedunculated, and so hang from the membrane into the cavity. The male cells are also developed in the same membrane."

Mr. Goodsir is making minute observations upon the ice of the bergs, and as he purposes continuing them throughout the voyage, there can be little doubt of his arriving at valuable conclusions. He observes that it is quite without salt; this was to be expected, when we consider that they are not formed of marine ice, but are parts of glaciers which have become detached and fallen into the sea. "The surface of a mass when melting presents numerous flat concavities, all of them of about the same size and form, and without any interruption, excepting the ridges forming the walls of separation." A loud cracking noise is heard and small particles are occasionally thrown off. The minute structure of the ice consists of three series of cells—two traversing the mass in one direction, and one at right angles to them. Of the former, one series consists of moderately large and quite globular cells of nearly uniform size, each having within it "a small globule of a peculiar fluid;" the oblong, sausage-shaped cells of the other series also contain small globules, but usually several instead of one. The mode of formation of these cells and the nature of the inclosed fluid are subjects to which his attention will be especially turned. The third series consists of very minute cells, arranged in well-defined wavy bands, which run across the lines formed by the other series. These bands are of an opake white colour.

We also find some observations upon the action of floating ice upon the granitic shores of the islands. All the rocks below high water mark and some considerably above it are rounded off into long irregular ridges with intervening hollows by the half-floating masses of ice.

As the ships were to stay at the Whale-fish Islands for a few days, Mr. Goodsir hoped to obtain a complete collection of the animals, plants and minerals existing upon them.

The expedition has now proceeded into the inhospitable icy regions of the north, and we must not expect to receive any further accounts of it until it has either succeeded in making its way into the Pacific Ocean, or having found that to be impossible, is on its return to England. In either case there can be no doubt that much valuable scientific information will be obtained.

XVII.—*Observations on some Plants obtained from the shores of Davis' Straits.* By William Seller, M.D., Fellow of the Royal College of Physicians, Edinburgh*.

A few weeks since, Mr. Sutherland, a student of medicine, who made a voyage last summer to Davis' Straits as medical officer of a whale ship, presented me with some plants gathered on the coasts and dried as he best could without any of the usual botanical conveniences. There are in all about twenty-five species, and a few of them are plants which cannot fail to interest the botanist. All of them were gathered within or close upon the Arctic Circle, on the coasts of Davis' Straits and Baffin's Bay, adjacent to the usual course of whale-fishing vessels, so that, were it deemed desirable, it would be easy, by holding out a little encouragement, to induce some of the many young men who go out annually in the same capacity with Mr. Sutherland to bring home collections of this description.

It is impossible to believe that the variations of species under the opposite circumstances of different regions, as respects soil, situation and climate, do not take place in obedience to fixed general laws. Yet our knowledge on this head at present consists almost exclusively of what may be called unreduced particular observations on certain species; too few to found upon. It may be that such laws prevail, yet lie beyond our reach. If such be the case, the only resource is to make up our minds to sacrifice brevity in regard to species observed to vary, and to practise detailed description of all their varieties. And fortunately, while this method serves as a considerable corrective of the evil in the meantime, it is the only plan, by following out which we can hope to arrive at the general laws of variation, if these be attainable.

When a species is known to be polymorphous, we might, in the meantime, advisably lay aside the ordinary circumscribed

* Read before the Botanical Society of Edinburgh, 12th of June and 10th of July, 1845.

form of definition in regard to it as leading only to error, and, in its stead, adopt detailed descriptions drawn from individuals produced in distant localities offering the widest possible range of circumstances. The obvious objection to such a practice is the room it takes up. In methodical botany, without doubt, brevity is a prominent excellence. But here there can hardly be any real sacrifice of brevity. For the needless multiplication of species is an unavoidable result of our definitions being not universal but local, that is, applicable to some localities only. All who have attended to Arctic botany feel in particular the force of the difficulties referred to.

Sir Wm. Hooker has well remarked on the extreme difficulty which attends the determination of what ought and what ought not to be considered as good species among Arctic plants: "Vegetables," he says, "of our own more southern latitudes often assume in those frigid regions an aspect quite different from what we are accustomed to see them wear; and which, without referring to a very extensive series of specimens, might well be supposed to afford decided marks of specific distinction*." And Wahlenberg, the well-known author of the 'Flora Lapponica,' speaking of the botanist who limits his attention to the characters of species as studied in one district, says, "Fingit sibi characteres sic dictos certos, et putat se eorum criteriis dijudicare posse diversitatem specificam plantarum totius mundi;" adding, after some further observations, "In hac re alii faciant quæ me facere vetant visa repertaque †."

On such views the observations with which I am about to trouble the Society are chiefly founded.

Cruciferæ.—Among the plants in this small collection are some *Cruciferæ*. There are several specimens of *Cochlearia* and a *Draba*. Most of the specimens of *Cochlearia* are so imperfect, that it would be a waste of time to attempt to determine whether they should be referred to the *C. officinalis* or to the *C. anglica*, the latter of which is said to be the most common of the Arctic species. There is however one well-developed specimen in fruit which agrees with the *C. fenestrata* of Mr. Brown, with the exception of having long peduncles, particularly in the lower fruit, in which respect it answers to the *C. lenensis* of DeCandolle. It seems very certain, as Sir Wm. Hooker has remarked, that the fenestra occurs in the fruit-septum of other species of *Cochlearia* besides that which Mr. Brown named *fenestrata*; still, if the fenestra or rima be of rare occurrence in the other species, and if the absence of it be the exception in the *C. fenestrata*, it is a

* Appendix to Parry's Second Voyage, p. 382.

† Flora Lapponica, Ratio operis, p. 9.

useful descriptive character. In our specimen it appears in almost all the siliculæ that have been opened. In DeCandolle's description of the *Cruciferæ*, he mentions, as occasional, the presence of a stria or a rima in the axis of the fruit-septum; and as far as I have observed, the stria, which may be regarded as indicating the tendency to the rima or fenestra, occurs generally in the species of *Cochlearia*. This stria or fenestra in the axis seems to suggest the idea that the dissepiment in the fruit of the *Cruciferæ* is composed of two portions extended from the opposite sides to meet there. And if this be deemed probable, then the conclusion would follow that their seed-vessel is composed, not of two, according to the received view, but of four carpels. As Mr. Brown says he met with one specimen of *C. fenestrata* in which many of the siliculæ were three-valved and three-celled, I was curious to ascertain if any of those in our specimen presented this anomaly, but was disappointed. Mr. Brown does not say how the second dissepiment was placed. It is impossible to suppose that there were two dissepiments parallel to each other. I infer then, particularly as Mr. Brown uses the word "dissepimentum" in the singular number, that the additional septum joined the normal septum in the axis. Mr. Brown's discovery of three-celled pericarps in a cruciferous plant is an encouragement to botanists to search for the farther anomaly of four-celled pericarps among the same; which can hardly fail to occur, if the theory of their fruit being composed of four carpels or carpellary leaves be correct; for on this view it must be by abortion that placentæ and a septum fail to appear opposite to the cleft of the stigma, at the place in the valves occupied by the carina, when that is present in this kind of fruit. Mr. Brown also remarks, in his description of the *C. fenestrata*, that the umbilical cords are joined together at their bases by a narrow membrane. This narrow membrane farther illustrates the structure of the fruit in the *Cruciferæ*. It represents the margin of the interior layer of the carpellary leaf stopping short close to the inner side of the middle rib, which here enters into the replum or frame of the dissepiment, while the dissepiment itself is composed of the outer layer joined with its fellow of the adjacent carpellary leaf and extended to the axis. This accords in so far with DeCandolle's account of the structure of the septum in the *Cruciferæ*, though he describes it in different terms; he says the septum is formed by the reflexion inwards of the epicarps, while the endocarps stop short close to the suture and produce the placentæ. But if there be four such shortened borders of the endocarp, two at each margin of the septum, as in all siliculæ with a double row of seeds in each cell, then there must have been four original carpellary leaves, two entering into each valve, and two into each half of the septum; and the replum or frame of the septum must be double, being composed on each side of the middle ribs of two of these leaves united; and further, each lobe of the stigma must be double, as being a prolongation of this double replum. Again, as the middle ribs of the carpellary leaves which make up each double lobe of the stigma are manifestly to the right and left of the portions of these produced into the dissepiment, the place of the dissepiment itself, though not in appearance, is in reality between these united halves of each lobe of the stigma, or the dissepiment in the *Cruciferæ,* according to this view, is not a false but a true dissepiment, as alternating with the divisions of the stigma; and this must be very apparent if cases occur in which the usual abortions do not take place in the region of the carinæ of the valves.

Our next Cruciferous plant is plainly a *Draba.* It is not easy to say with certainty to what species this plant should be referred. But for the small number of leaves on the stems, it might pass for a variety of the *D. incana.* I set it down as the *D. hirta*; not the *D. hirta* of the 'English Botany,' but the *D. hirta,* var. *a,* of Wahlenberg. The number of leaves on the scape is not so constantly two in our specimens as stated in the description of that species; sometimes there is but one; sometimes even four. The silicles are glabrous, oblique or slightly twisted, the peduncles shorter than the silicles and not absolutely free from pubescence. Some of the root-leaves are slightly toothed, those of the scapes uniformly toothed. DeCandolle remarks on this species, "Planta polymorpha cum sequentibus sæpe confusa et extricatu difficillima."

Caryophylleæ.—Of the *Caryophylleæ* we have the *Lychnis alpina,* the *Cerastium alpinum,* and a single specimen of a small plant with the habit of a *Stellaria.* The plant being far advanced, the form of the petal could not be made out at first, so that it was difficult to say whether it was an *Arenaria* or a *Stellaria.* At our last meeting, when the plant was shown, Mr. M'Nab suggested its being the *Stellaria scapigera.* This I believe it to be, and have since found that the petal is cleft to the base as in that species. Though found on our highland mountains, the *S. scapigera* has not appeared, as far as I have observed, in any of the lists of Arctic plants hitherto published. It does not occur in Wahlenberg's 'Flora Lapponica,' nor even in Hooker's 'Flora Boreali-Americana.' In a small collection of Arctic plants in the Society's museum, a specimen of what appears to be the same plant occurs under the name of *Stellaria Edwardsii.* To this species, however, our plant has but a distant resemblance. In our plant the leaves are connate, which I do not find to be remarked in the descriptions of *Stellaria scapigera*. As the plant in the Society's herbarium was obtained also from the shores of Davis' Straits, we may hope that opportunities will occur of examining the species under more favourable circumstances.

Rosaceæ.—Of the *Rosaceæ*, besides the *Potentilla tormentilla*, there are several specimens of a *Potentilla* which deserves some attention. These specimens are of the same species, though one is much more branched than the others. The lower part of the stem is covered with a dense brown mass, composed of the enlarged stipules of the inferior leaves. In the midst of this covering the stem divides into several branches. These stems or branches in all our specimens are one-flowered and few-leaved, yet each at its base is covered with brown stipular sheaths arising from itself. The radical or lowest leaves are on pretty long petioles arising in the mass of stipular sheaths. These petiolated leaves are ternate, and each leaflet is crenate, having from five to seven convex teeth nearly but not absolutely equal; in the terminal leaflet there are commonly seven such teeth. Both surfaces of the leaflets, particularly the lower, are covered with silky hairs, and hairs of the same description copiously ciliate their margins. They are rather small, each leaflet being about the third part of an inch long and less than a quarter of an inch broad. The few leaves on the flower-bearing stems are also ternate, but smaller and less perfectly developed, the terminal leaflet having no more than three convex teeth; these have no petiole, but in lieu of it a pair of connate stipules. The flower-bearing stems, as well as the petioles of the lower leaves, are hairy, the hairs on the former being shorter. The calycine sepals are ovate, blunt or subrotund, the five exterior rather smaller than the five interior, the inner rather less round than the outer, subequal in both rows; both are hairy and fringed with hairs. The petals are considerably longer than the sepals, large and broad, obcordate or emarginate.

There are not a great many species of *Potentilla* hitherto described with ternate leaves. Of these, the only species to which our plant approaches are the *P. nivea, Vahliana, emarginata* and *nana*. In some respects it agrees with each of these. The flowers are too large for the *P. nivea*, and moreover it differs in its whole aspect from the *P. nivea* at least of the Alps. It agrees better with the *P. Vahliana*, which is held to be the same as the *P. Jamesoniana* from Greenland, described by Dr. Greville. The leaves however in Dr. Greville's figure have hardly the same aspect; in Dr. Greville's plant the lateral leaflets are trifid, in ours usually quinquefid; moreover Dr. Greville describes the leaflets as gashed at the apices, those of our plant are crenate over the whole margin. The description of the *P. emarginata* is rather vague; it seems indeed, as Sir Wm. Hooker* suggests, to be the same as the *P. nana*. Our species on the whole agrees very well with the *P. nana*, though the name does not seem very applicable to it, unless it refer to the large size of the flowers as compared with the moderate height of the plant. Lehmann, as cited by Hooker†, says the *P. nana* is distinguished from all the allied species by the "foliola calycina exteriora subrotunda obtusissima." These leaflets in our specimens are certainly roundish, though it may be doubted if they come completely up to the strong expression just quoted. The remarkable fringing of the leaves with silky hairs, so striking in our specimens, is hardly referred to in the description of *P. nana* or of the allied species.

Sanguisorbeæ.—Here we have the *Alchemilla vulgaris*, a well-developed plant.

Onagrareæ.—Among the plants before us there are two Epilobiums: one a single imperfect specimen, which may probably pass for the *Epilobium angustissimum* of Linnæus, among the habitats of which he gives Greenland; the other the *Epilobium latifolium*, of which there are several excellent specimens; the most beautiful indeed in this small collection.

DeCandolle says, in his definition of the *Epilobium latifolium*, "caule simplici," with a mark of interrogation; Sir Wm. Hooker says, "caule subramoso." In all our specimens there are several stems arising immediately from the root, while there is hardly any branching in each. The leaves are ovate-lanceolate, as stated by all authorities. It is not however commonly noticed that the leaves are distinctly unequal on the opposite sides of the middle rib. Again, they are said by DeCandolle to be "integriusculis," and by Hooker to be "subintegerrimis." On examining the leaves in the specimens before the Society, I find the margins minutely revolute with slight irregularities, which give the appearance of very small straggling teeth. This appearance has possibly given rise to the belief of the leaves not being absolutely entire, as the above expressions imply. In these specimens the leaves are glabrous, which seems to be less usual. The leaves moreover in our specimens are alternate and opposite, as described by Linnæus. The peduncles are axillary, yet sometimes so close as to appear to be ternate or fasciculate. These peduncles, which are as long as the flower, are purple and inflated. The calyx is coloured as in the *E. glandulosum* of Lehmann.

Saxifrageæ.—There are four Saxifrages, the *Saxifraga oppositifolia*, *S. tricuspidata*, *S. cernua* and *S. rivularis*.

* Flora Boreali-Americana, vol. i. p. 194. † *Ib.*

Of the *S. oppositifolia* I have nothing to observe. The specimens of *S. tricuspidata* are several and very well marked. Of the *S. cernua* the specimens are pretty numerous, while very few, as is usual, have flowers. One has a rather large flower with two unblown flowers near it, so as to form an approach to a simple umbel. In another there is a well-blown flower and an unblown small flower near it. The only specimen besides, which has a flower at all, is one-flowered. Sir Wm. Hooker in the 'British Flora' remarks on this species, "frequently there is no flower, and I have never seen more than one upon a stem." Linnæus also describes the *S. cernua* as one-flowered. Wahlenberg however says, "caule subunifloro," and Sir Wm. Hooker in his 'Flora Boreali-Americana' has in the definition "flore sæpe subunifloro." In these specimens the minute rounded bodies or bulbils which stand instead of flowers are easily extracted from the axils of the uppermost leaves. And in all the specimens the root is clothed with amylaceous scales, giving to it at the first inspection no small resemblance to the root of the *S. granulata*. In none of the descriptions that I have consulted is this singularity of the root referred to except by Mr. Don, who speaks of the "radix squamata, squamæ e basibus petiolorum foliorum primordialium enata." And moreover he places this species in his third section of the genus *Saxifraga*, termed Leiogyne, of which he remarks, that "the roots, whether scaly or fibrous, scarcely afford any specific character, as they have all a tendency to become scaly."

Our fourth Saxifrage is the *S. rivularis*. It is wholly in fruit, and is taller and stouter than usual. Wahlenberg says the *S. rivularis* hardly exceeds an inch in height. Hooker describes it as "pigmæa." Don gives two inches as the height of the stems. Our specimens approach to three inches. There can be no doubt however that these are specimens of the *S. rivularis*.

Compositæ.—Of the plants before us, one only belongs to the *Compositæ*. On mentioning at our last meeting that I took this syngenesious plant for a species of *Arnica*, my opinion met with very little countenance. I have since examined the specimens with some care, and I feel satisfied that the plant is an *Arnica*, and that it is the same as what authors have described as one of the Arctic forms of the *Arnica montana*.

As however this Arctic plant differs so much in aspect from the luxuriant plant of more temperate countries, it may be worth while to give the results of that examination. Our specimens have no root-leaves, and Mr. Sutherland assured me that he saw none when he gathered them. On this however I shall not insist. The scape is five or six inches long, hollow, one-flowered. Between one and two inches above the base two opposite leaves or leafy scales arise, in some degree amplexicaul, or even approaching to connate, each almost an inch long, triangular, acute, broadish at the base; above the middle of the scape are produced two other leaves, alternate, of the same form, smaller in size, the lower being rather the larger, distant from each other about the third part of an inch, each being amplexicaul in the same degree as the two opposite leaves beneath. The leaves are ribbed. In one of the specimens these upper leaves are wanting, and in another they are opposite, like those below. The scape has a jointed appearance at the origin of the opposite leaves, and is somewhat inflated just below the flower. It is slightly striated and clothed, as the leaves also are, with soft hairs varying in length. The receptacle is round, slightly convex, distinctly pitted, the apertures minute but deep, of two sizes with a raised narrow margin, which is fringed with an evident pubescence. In the Linnæan definition of the genus *Arnica,* which has been followed by most authorities, the receptacle is represented as naked; but DeCandolle says, "receptaculum fimbrilliferum pilosiusculum," as exhibited in these Arctic specimens. The leaflets of the involucrum are in two rows, eleven in the outer row, eight in the inner; those of the outer row ovate-lanceolate, nearly uniform; those in the inner less regular, some being of the same form and size with the outer leaflets, while others are narrower and even shorter. The outer leaflets are near half an inch long, more hairy on their external surface than the scape, their outer surface and both surfaces of the inner leaflets being less hairy. The leaflets in both rows are deeply concave on their inner aspect, or rather carinate, with a middle rib. The ligulate florets are few compared with the number of tubular florets in the disc. They stand in a single row, and being eight in number, one seems to correspond with each of the inner leaflets of the involucrum. The pits or apertures in the receptacle answering to the insertion of these ligulate florets are wider than those from which the bases of the tubular florets arise, with the exception of two pits near the centre, which have the same diameter as those around its border. The ligulate florets are rather large and conspicuous, being an inch in height from the receptacle; the lamina is broad, marked with several prominent, nearly parallel nerves, which branch off to bound the margins of the terminal teeth. The tubular florets are short, intermixed with the abundant pappus and overtopped by it: these are five-toothed. The style is forked in the florets of both disc and ray, the branches being long and pubescent, a part of DeCandolle's character of the genus *Arnica.* The pappus is scabrous, the achenium hairy.

Ericaceæ.—The *Ledum palustre.*

Monotropeæ.—The *Pyrola rotundifolia.*

Scrophularineæ.—There are several specimens of *Pedicu-*

laris. The form of the petiole and leaves resembling the snout of the saw-fish, marks them out as belonging to *P. hirsuta*.

Polygoneæ.—*Polygonum viviparum* and *Oxyria reniformis*.

Empetreæ.—*Empetrum nigrum*.

Salices.—*Salix Myrtilloides* and two imperfect specimens not yet determined.

Cyperaceæ.—*Eriophorum capitatum* and *E. polystachion*.

I owe an apology to the Society for the length to which these observations have extended,—far beyond the slight notices at first designed; and yet I have been able but very imperfectly to execute the task proposed. But in the progress of this slight attempt I have felt more and more convinced of the advantage to be derived, in abler hands, towards the improvement of practical botany from detailed descriptions of individual plants in the case of species liable to much variation.

XVIII.—*Horæ Zoologicæ*. By Sir W. Jardine, Bart., F.R.S.E. & F.L.S.

[With two Plates.]

No. VI. *Illustrations of Ornithology*.

Artamus mentalis (Plate VIII.).—Of the native country of this *Artamus* we have no information. The specimen from which our illustration was taken forms part of the ornithological collection belonging to the York Philosophical Society, and was noticed there by Mr. Gould as distinct from any of the previously described species. The principal characters that are at first sight apparent, are, the strength and size of the bill, the dark colour of the upper plumage, and the small size of the dark space on the chin compared with the colouring of the same part on *A. leucorhynchus*, where it covers the whole front of the throat and neck.

The bill is dilated and swollen at the base, and appears to have been of the same rich blue colour which prevails in those species which have been described from recently killed birds; towards the tip it shades gradually into black. The head, cheeks, mental patch, back and wings brownish black with an opake grayish shade; tail black, narrowly tipped with white; the throat, breast and under parts, the rump and upper tail-covers, under wing-covers and axillary feathers pure white.

Entire length of the stuffed specimen, $6\frac{8}{10}$ inches; bill to gape, 1; to forehead nearly $\frac{8}{10}$; of the wing to the end of second or longest quill, 5. The accompanying figure is slightly reduced.

Genus Gnathodon, *Jard.*

Gen. Characters.—Bill strong, maxilla hooked, sharp-pointed; mandible cut at the tip into three distinct angular teeth; nostrils basal, linear, pierced in an oval membrane; wings broad, concave; quills acuminated, second, third, fourth nearly equal; bend of the wing with a small tubercle; tarsi short (the tarsi here are imperfect and cannot be defined); feet gressorial; toes unconnected at the base, exterior and interior equal in length; claws slightly curved. Type *G. strigirostris.*

Gnathodon strigirostris, nat. size.

Gnathodon strigirostris (Plate IX.).—We are indebted to Lady Harvey, whose extensive collection of natural history in Edinburgh is always open when science can be promoted, for a specimen of this very remarkable bird. It was purchased at a sale of various Australian productions, and although we cannot fix upon the district or locality whence they were obtained, we have little doubt of the specimen having come to this country with the others.

The size is about that of the common stock dove. The maxilla, strigine-like, hooked and sharp-pointed, has been yellowish orange. The nostrils are externally linear, and are pierced in an oval membrane; the mandible is proportionally strong, and at the tip is cut into three distinct angular teeth, orange-yellow, red at the base. Space between the nostrils and eyes, and a small patch on each side of the throat bare of feathers. The head, neck, upper part of the back, breast and belly are black with green reflections, brightest on the upper back and sides of the breast, and there having each feather tipped with a broad margin of gray conspicuous in some positions, and appearing at times to occupy the whole space. The back, rump, wings except the quills, tail and under tail-covers rich orange-brown; quills and secondaries grayish black. The tarsi and feet have been pink or scarlet.

Entire length of the stuffed specimen from $11\frac{1}{2}$ to 12 inches; bill to gape, 1; to forehead, $\frac{7}{10}$; of wing to the end of third quill, 8.

The first general appearance of this bird is somewhat dove-like, but the very strong hooked bill and remarkable teeth displayed in the mandible are at variance with the most powerfully-billed pigeons, and we can form at present no opinion as to the probable use or adaptation of the latter structure. The position and linear form of the nostril agree with that of *Megapodius* as well as the bare space in front of the eye, and the indication of the want of feathers on the sides of the throat. The form of the wing approaches to that of *Penelope*. The tail of fourteen feathers is square and comparatively short, while the colouring of the plumage reminds us of some of the ground doves. The tarsi are short, and are naked very shortly above the tarsal joint; the outward covering has been destroyed, but in front appears to have consisted of rounded scales. The feet are of moderate size, and the outer and inner toes, quite unconnected at the base, are of equal length.

From a careful consideration of the general characters, we are inclined then to place this singular bird with the *Peneloponinæ* or *Megapodinæ*, probably the latter. We are aware of no existing description, though there is one allusion made to a bird which may eventually turn out to be this. In Mr. Strickland's Report on the Recent Progress and Present State of Ornithology, read before the British Association at York, it is stated, "The recent American voyage of discovery will extend our knowledge of Polynesian zoology, and its researches will be made known by Mr. Titian Peale, who is said to have discovered among other rarities a new bird allied to the dodo, which he proposes to name *Didunculus*;" and we believe "*strigirostris*" has been applied specifically. In that part of these voyages already published there is no zoology given, so that we cannot now ascertain the value of this discovery, and from the specimen before us possessing no characters in common with a struthious bird, we have ventured to characterize it as a new generic form.

July 30, 1845.

XIX.—*Descriptions of new or imperfectly described Diurnal Lepidoptera.* By Edward Doubleday, Esq., Assistant in the Zoological Department of the British Museum, F.L.S. &c.

Fam. PAPILIONIDÆ.

Genus Papilio.

P. Bromius. P. alis omnibus nigris, fascia communi lata punctisque marginali viridibus; subtus fuscis, posticis fascia maculari pallide aurea. Exp. alar. 3 unc. 9 lin. vel 95 millim.

Hab. Ashanti. *P. Bromius*, Cat. of Lep. of Brit. Mus. 147.

Wings above black, traversed by a broad bright green fascia divided by the nervures, commencing in the discoidal cell of the anterior wing, and terminating on the inner margin of the posterior wings, of which it occupies fully two-thirds. This band is nearly straight on its inner side, but externally it is suddenly widened below the radial nervure of the anterior wings, and much dentated on the posterior wings. It is preceded on the costa by a large subquadrate spot of the same colour divided into four by the nervures. At the apex of the anterior wings are two elongate green spots, followed on the outer margin by a series of geminate spots and a simple round one at the anal angle of the same colour. On the posterior wings, towards the outer margin, are three rounded green spots, each followed by a small dot of the same colour (sometimes very indistinct). These are succeeded by three geminate spots; the first rounded, the second elongate, the third rounded, near the anal angle and almost touching the transverse band. Below fuscous, the anterior wings darker at the base; towards the anal angle a marginal series of five or seven small white spots placed in pairs between the nervules, between which and the margin are two or three very minute white dots. Posterior wings with three black striæ in the cell, a macular band of a pale gold colour near the outer margin, and two points of the same colour near the anal angle.

Head and thorax black, spotted with white.

Abdomen fuscous, above with the edges of the segments paler, below with five series of white spots; anal valves rounded.

This species is closely allied to *P. Nireus*, but has the band much wider and somewhat different in its direction, and the anal valves are much rounder. I may here remark that the *P. Nireus* of Cramer, t. 378. f. F. G, from the Cape of Good Hope, is quite a distinct species from the true *Nireus* of the west coast of Africa. The distinctions were clearly pointed out to me by Dr. Boisduval, who had placed the name *Charopus* to it in his cabinet about four years ago. This name having been lately used by Mr. Westwood for a species in my brother's collection, the name cannot be now used for the Cape insect. I therefore propose for it the name of *Lyæus*. It may be known from *P. Nireus* by its generally smaller size, its cilia spotted with white, the apex of the anterior and disc of the posterior wings below clouded with silvery gray, and by the band of the posterior wings not being macular. This band is wanting in the females, the whole of the disc and outer margin of the posterior wings, and the apex of the anterior being clouded with light brown with silvery reflections. Only having seen imperfect specimens, when I drew up the catalogue of the *Papilionidæ* in the collection of the British Museum, I was afraid to separate the Cape specimens, not being then aware that Dr. Boisduval, from the examination of numerous perfect specimens, had become convinced of their being a separate species. To secure the name of *Lycæus*, it may be well to add the following short character:—

P. Lycæus. P. alis omnibus supra nigris, fascia transversa communi, macula costali, nervis divisa, maculisque duabus apicalibus alarum anticarum octoque submarginalibus posticarum viridibus subtus fuscis, nebulis apicis anticarum, discique posticarum argenteo-albidis, fascia submarginali haud maculari, maculisque duabus ad angulum ani pallide aureis: fœmina alis omnibus subtus fuscis, argenteo-brunneo nebulosis, ciliis in utroque sexus albo maculatis. Exp. alar. 3 unc. 7 lin. vel 93 millim.
Hab. Africa Australiori.

P. Aidoneus. P. alis anticis elongatis, fuliginosis, striis nigris; posticis angustis, dentatis, nigris, immaculatis (♂). Exp. alar. 3 unc. 10 lin. vel 95 millim.
Hab. Montibus Himalayis.

Anterior wings elongate, fuliginous; the nervures and nervules, the inner margin, four longitudinal striæ in the discoidal cell and eight between the nervules, black. Posterior wings long, narrow, dentate, the abdominal fold broad; entirely black, with purple and greenish reflections. Below all the wings as above, but paler.

Head rose-coloured, occiput black, forehead with a few black hairs. Antennæ black.

Thorax with the sides below rose-coloured.

Abdomen black above, rose-coloured below; the anal valves very large, rose-coloured.

This interesting species belongs to the same group as *P. Nax* and *Varuna*, close to which should be placed *P. Rhetenor, Protenor*, &c. The anterior wings have the inner margin very short, not being nearly one-half the length of the anterior margin: the posterior resemble in form those of *P. Rhetenor*, but like those of *P. Varuna* have no disco-cellular nervure, the median and subcostal actually anastomosing.

In the collection of H. G. Harrington, Esq.

Fam. APATURIDÆ.

Genus Apatura.

A. Namouna. A. alis omnibus supra fuscis, splendide cæruleo nitente, fascia transversa punctisque marginalibus albis, subtus argenteo-albis fimbria, fasciaque transversa, rufis.

All the wings above fuscous black, with a transverse pure white band slightly bordered with bluish, commencing by three rounded dots at the extremity of the discoidal cell of the anterior wings, afterwards widening and attaining the abdominal margin of the posterior wings; beyond this band are three white dots towards the apex of the anterior wings, and one or two indistinct ones towards their anal angle, and on the posterior a series of seven whitish dots: anal angle rufous. The whole disc and inner margin of the anterior wings, and the whole of the posterior, except the pure white part of the transverse band and the white dots, are in certain lights of the most splendid metallic light blue. Below silvery white with pearly reflections, a faint indication of the band above; the costa of the anterior wings except at the base, the outer margins of all the wings, a transverse band beyond the middle much widened towards the anal angle of the anterior wings, rufous. This band is marked at its widest part by a round black spot, and bordered there externally with two sublunulate black spots and a sagittate one. In addition to this are two small black spots in the discoidal cell followed by two short black perpendicular lines, below this is a black spot and two black lunules, and on the posterior wings a black dot near the anal angle, preceded in the band by a similar one.

Head fuscous; the orbits of the eyes, the palpi below, and four spots on the vertex white. Antennæ fuscous.

Thorax and abdomen fuscous above, paler below; legs silvery white.

In the collection of the British Museum. Presented by W. W. Saunders, Esq.

Fam. ADOLIADÆ.

Genus ADOLIAS, *Boisd.*

A. Euthymius. A. alis omnibus supra læte aurantiacis anticis puncto discoidali, margine externo, strigaque submarginali valde angulata, fuscis; posticis strigis duabus, submarginalibus, lunulatis, nigris (♂). Exp. alar. 3 unc. 7 lin. vel 90 millim.

Hab. Montibus Himalayis.

All the wings bright orange-red above, the anterior with a large spot on the disco-cellular nervure, followed by two small ill-defined ones on the lower discoidal nervule; the outer margin broadly fuscous black, with faint indications of four or five reddish lunules; this black border dilated towards the apex, much dentate internally, preceded by a broad zigzag striga, commencing near the anterior and extending nearly to the inner margin; the median nervules each with a round fuscous spot before their middle. Posterior wings clothed at the base with long hairs; a discoidal spot, two lunulate bands, and the outer margin slightly fuscous.

Below paler, all the wings marked at the base with some indistinct fuscescent spots, beyond which is an undulating striga crossing the middle of the discoidal cell of the anterior wings, and reaching the inner margin of the posterior wings near the middle. Beyond this is a less curved band commencing on the costa beyond the middle and reaching nearly to the anal angle, followed by a space rather paler than the rest of the wings. Beyond the middle are four black dots, the first and fourth largest, the latter pupiled with white. Faint indications of the bands above are visible below.

Head rufous; antennæ brown, darker towards the apex; palpi red.

Thorax and abdomen brick-red.

In the collection of H. G. Harrington, Esq.

Fam. NYMPHALIDÆ.

Genus DIADEMA, *Boisd.*

The genus *Diadema* of Boisduval is a most interesting one, from the resemblance which many of the species bear to those of other families. In general we find a *Papilio* and either an *Euplœa, Danaus* or *Acræa* always of the same country, which they much resemble in form, colour and character of the markings,—in some species so close as to have caused some confusion as to their identity with the older figures. In *D. Bolina* it is only the female which offers this resemblance to species of other groups, and as yet there has not been found representatives for two or three species, but probably some day these will occur.

D. Boisduvalii. D. alis subdiaphanis, anticis fuscescentibus, supra basi margineque interno pallide rufescentibus, maculis basalibus discoidalibusque decem, striolisque marginalibus septem nigris; posticis rufis basi maculis nigris undecim, margine externo nigro, rufo maculato. Exp. alar. 3 unc. 9 lin. vel 95 millim.

Hab. Ashanti. *Diadema* —— ? Cat. of Lep. of Brit. Mus. 97.

Anterior wings semitransparent, fuscescent, the internal margin tinged with red: in the discoidal cell are four rounded black spots, three placed in a triangle towards the base, one near the extremity, a similar spot on the disco-cellular nervule, one on the first median nervule, three at the base between the median and radial nervure, one on the radial a little beyond the middle; nervules fuscous, between them a series of fuscous striæ, on the fourth of which is a rounded whitish spot. Posterior wings rufous, paler towards the inner margin, the base itself black; the discoidal cell with three rounded black spots, the two nearest the base almost confluent; around the cell are six black spots, of which the fourth is very small, the fifth on the disco-cellular nervure. These are followed by two spots near the inner margin; the outer margin has a rather broad black border, undulated internally, marked with seven more or less lunulated red spots.

Below the anterior wings are nearly as above, but are shaded with a rosy red at the base, the posterior are yellowish, the discoidal cell rose-coloured in the middle, the lunules in the marginal band paler, the fourth of the spots round the discoidal cell wanting.

Head black, with six white spots; palpi rufescent; apex black; antennæ black.

Thorax black, spotted with white, two rufescent spots on the disc.

Abdomen black, with a row of brown spots on each side above, a series of paler ones on each side, and also a median series below.

In the collection of the British Museum.

This species closely resembles in its colouring *P. Ridleyanus*, and some of the *Acrææ* near to *A. Zidora*. For the first time I have deviated from a rule I had laid down for myself, never to name an insect after any living entomologist, or even after any entomologist whatever; but having, in accordance with the law of priority, converted into a synonym the name of *Boisduvalii*, given to an *Adolias* by Mr. G. R. Gray, I have as a compensation dedicated this beautiful insect to my excellent friend, whose kindness and liberality to me in placing at my service his books, manuscripts and collections has been beyond all praise.

D. Anthedon, Boisd. MSS. D. alis omnibus nigris, anticis plaga magna, subapicali, alteraque magna marginis interni, maculaque parva disci albis, cæruleo-nitente. Exp. alar. 3 unc. 7 lin. vel 90 millim.

Hab. Africa Occidentali. *Diadema* —— ? Cat. of Lep. of Brit. Mus. 98.

Anterior wings black, a longitudinal spot in the discoidal cell, a broad transverse fascia before the apex, and a large patch occupying nearly the whole inner margin, pearly white shaded with blue. Posterior wings silvery white at the base, the outer margin broadly fuscous, the fuscous colour extending inwards between the nervules. Below the wings nearly as above, but paler towards the apex, three small white spots at the base, another in the discoidal cell, and towards the anal angle a series of small gemmate white dots, preceded by two spots of the same colour; a faint fuscous line in the white fascia near the margin. Posterior wings pearly white, clouded with fuscous towards the outer margin, the nervules and a series of striæ between them fuscous, the margin narrowly fuscous with white lunules. Cilia spotted with white.

Head and thorax black with white dots.

Abdomen fuscous.

In the collection of the British Museum, &c.

This species as closely resembles *A. Hippocoon* and *Eupl. Niavius* as *D. dubia* does *Eupl. Damocles.* I have adopted the name under which it stands in Dr. Boisduval's cabinet.

D. Euryta. D. alis omnibus supra nigro-fuscis, fascia media, communi, transversa, albida, anticis punctis duobus basalibus albis, nigrisque quinque, fascia subapicali alba, posticis subtus basi rufescente, punctis utrinque basalibus, nigris decem (♀). Exp. alar. 3 unc. 3 lin. vel 82 millim.
Hab. Africa Occidentali.

This insect is the true *P. Euryta* of Clerck, t. 31. f. 4, but not the *A. Euryta* of Godart. Perhaps *P. Hirce* of Drury (*Diadema Hirce,* Cat. of Lep. Brit. Mus. 97) is only the male of this species. I have however seen a specimen, apparently a male, more nearly resembling *D. Euryta* in colour in the fine collection of M. Marechal at Paris. I therefore give the characters of *D. Hirce.*

D. Hirce. D. alis anticis rufo-fuscis, basi nigro punctatis supra macula subapicali alteraque marginis interni rufis, posticis rufis basi nigro punctatis, striato fimbriatoque margine externo nigro subtus basi saturatiore.

D. Nyctelius. D. alis anticis supra nigris, apice cæruleo-nitente, margine externo albido striato; posticis albidis, basi, nervulis, margineque externo fuscis. Exp. alar. 3 unc. 3 lin. vel 82 millim.
Hab. Sylhet.

Anterior wings brownish black, the apex broadly shaded with pale blue, the colour varying with the direction of the light: between the nervules is a series of whitish striæ, becoming less elongate towards the anal angle; posterior wings dusky white, fuscous at the base, the outer margin narrowly fuscous, the colour extending inwards between the nervules, which also are fuscous. Below the anterior wings are fuscous, with a marginal series of whitish spots, and two submarginal ones near the anal angle. Posterior wings fuscous; the inner margin and a double series of ill-defined spots towards the outer margin, of which those of the inner series are rounded, of the outer elongate, geminate, whitish.

Head and thorax black with white dots; antennæ with an elongate club, fuscous.

Abdomen fuscous.

In the collection of the British Museum.

This species closely resembles some of the Indian *Euplœæ.*

[To be continued.]

XX.—*On the Development of the Annelides.* By M. Sars*.

[With a Plate.]

Till recently, all that was known respecting the development of the Annelides was based solely upon observations made on the leech; the other Annelides were judged of from this, and their development considered to be extremely simple, *i. e.* that the animals left the egg as perfectly formed as they appear during their whole life. To what very erroneous conclusions we frequently come in this way, and how cautious we ought to be in generalizing, abundant instances prove. So, for instance, not to mention others, it was concluded, from the knowledge of the development of the craw-fish, that all the other Decapods were in this respect similar; and naturalists were thus led to doubt for a long time, to the injury of science, the beautiful discoveries of Thompson.

In the month of February 1840 I discovered, in the examination of a *Polynoë cirrata*, Fab., that the young when they leave the egg have a very different form from that of the adult animal, and that they are deficient in most of the external organs which are so characteristic of these animals; in a word, therefore, that this Annelide is subject to a metamorphosis. I only succeeded in observing the first stage of development, and therefore kept back my observations on this subject, with numerous other imperfect notices, with the hope of being able to complete them in the course of time. However, although I had occasion to repeat the observation in February and March 1841, I could not succeed in tracing the development any further; and it might, perhaps, appear superfluous to publish these observations at present, after Lovèn has communicated to the public his far more complete observations on the metamorphoses in a species of Annelides. I do it however partly to confirm the latter, which no one yet has done, and partly because I am able, which was not the case with Lovèn, to point out a known species in which at a certain period of the year the development may be observed. When the minute circumstances or conditions in the generation are once known, some one will undoubtedly succeed in completing that in which our knowledge of the development of the Annelides is still deficient.

Polynoë cirrata is common on the coast of Norway, and occurs between the roots of *Laminariæ*, under stones, in empty shells and other holes in which it can hide itself. It agrees perfectly, as I have convinced myself by comparison, with the Greenland species characterized by Fabricius under this name, but it never attains on our coast the immense size it does on that of Greenland.

In the months of February and March is the period of propa-

* From Wiegmann's Archiv, 1845, Part I.

gation of this Annelide: in some individuals, the body, which at other times is of a light brownish gray or whitish gray and shining with a blue reflection, is observed to have assumed a pale rose-colour. This arises from a numberless quantity of eggs which fill the common cavity of the body, with the exception of about the first anterior fourth and the feet, and appear everywhere through the skin. When the skin is cut open, the eggs are found to hang together in great masses by means of a connecting tenacious mucus. They are spherical, the yolk finely granular and opake, closely surrounded by the transparent chorion. When the egg is somewhat compressed (Plate IV. fig. 13), it exhibits the large Purkinje's vesicle without any perceptible trace of Wagner's spot. In other individuals the eggs have frequently been secreted at about the same time. They occur on the top of the back of the mother, beneath the branchiæ or so-called dorsal scales, in immense numbers, connected with one another by a tenacious mucus.

The heaps of eggs cover the whole of the hinder half of the back, but more anteriorly only the sides above the base of the feet: no eggs are met with on the seventh to the eighth front rings of the body. It seemed to me as if the eggs passed through a very small aperture just above the feet, as Rathke found to be the case in *Nereis pulsatoria*. They are all of the same size in the same individual (viz. about $\frac{1}{20}$th of a millimeter), and mostly equally developed, and therefore all of one and the same brood. Their colour is still very pale rosy red, or almost reddish white. Here, protected beneath the branchiæ, the eggs remain until the young creep out. In the meantime the yolk, between which and the chorion is a small space filled with limpid albumen, undergoes the usual process of division or furcation. Thus I once observed that the yolk had the appearance of a blackberry (fig. 14), its surface being covered with granules of different sizes, as was proved on submitting them to compression (fig. 15); each contained a bright roundish spot with a distinct outline like a nucleus, and were therefore evidently cells. On the following day, the 4th of March, the surface of the yolk had already become more finely granular, and approached again nearer to an even surface.

The ova subsequently become slightly oval, and the yolk or fœtus into which the entire yolk is converted, without any part whatever separating, is smooth, grayish white, and is more or less narrowly surrounded or inclosed by chorion (fig. 16, 17). A peculiar kind of motion was now perceptible on the separated ova under the microscope, the ova turning round and round. This was effected by the very short fringe, consisting of minute mucous filaments (fig. 16, 17 *a*), which is attached to the one extremity of the ovum, and probably covering the entire egg in the form of a membrane, similar to the so-called *membrana nidulans* of Burdach, connects all the ova as it were by means of a tenacious mucus. This fringe is seen now and then to move slowly, and curve in a worm-like form, drawing the egg with it backwards and forwards. The cause of this motion remains a mystery to me, if it be not owing to the action of the water on the mucous substance of the fringe. The fœtus itself, which gradually acquires a bright grayish green colour, was still without motion in most of the ova; only in a few a circle of extremely minute, projecting and vibrating cilia was perceptible, which surrounds horizontally the centre of the body of the fœtus at an equal distance from the two poles of the ovum.

At last the fœtus is arrived at maturity, and the mother now carries on its back many thousands of young ones (fig. 12 *a a a*), which gradually come forth from the mucus surrounding the eggs, leave their mother and swim freely about in the water, visible to the naked eye as very minute greenish gray points ($\frac{1}{20}$th of a millimeter in size) endowed with a lively motion.

The young, which have just left the shell (fig. 18, 19), are extremely unlike the mother both in form and in structure. They are short, oval, cylindrical, unarticulated, and have, as above mentioned, horizontally round the centre of the body, a circle of tolerably long cilia (*d d*), in other respects however without any external organs. The portion of the body situated anteriorly to the ciliary circle is somewhat narrower than the hinder one, and bears two eyes (*e e*), and should therefore without doubt be considered as the head, the more so as the young one always swims with this extremity in front. The eyes are at some distance from the anterior free extremity (*b*), in the vicinity of the circle of cilia, one on each side and a little towards the back; they are very large in proportion to the body, black, and slightly elongated diagonally, or almost kidney-shaped, with the convexity turned anteriorly; not a trace of tentacula or antennæ is observable about the head.

We just now called the side where the eyes approach nearest together the dorsal side, while the opposite one, which moreover, when the young is regarded from the anterior extremity, is somewhat more projecting (fig. 19 *a*), is proved to be the ventral side, from the fact, that on it, close behind the circle of cilia, there is an aperture (fig. 18 *a*), which I look upon to be the mouth. This mouth-aperture is a diagonal fissure, whose lips are provided with vibratory cilia, which are however much smaller than those of the circle of cilia. There are also some very minute cilia at the most anterior extremity of the head (fig. 18 *b*). The intestine, as far as I could observe from the slight transparency of the body, appears to expand considerably from the very mouth and to form a large sac, the stomach, and then gradually narrowing to proceed towards the hinder part of the body, where probably the anal aperture is situated. I could not distinctly recognise this, but I have observed it very clearly at this place in similar young of another Annelide, which will be noticed subsequently (fig. 21 *f*). The colour is everywhere of a dirty pale green and only slightly transparent. The body is soft, but it rarely exhibits contractions or variations of form; it is only when the young animal is quiet, or has but little water, that contractions are perceptible on its body (and sometimes also of the intestinal canal), from its becoming broader or narrower and curving slightly at some places.

Locomotion, that is to say swimming, is effected by the vibration of the cilia. Only the large cilia of the circle effect the locomotion; the small ones near the mouth and at the front extremity of the head contribute little or nothing to it. The former correspond therefore to the powerful cilia which, in the young of the Nudibranchiæ and many other Gasteropods, effect the swimming, and are subject to the will of the animal; the latter, on the other hand, are not subject to their will, and constitute the so-called ciliary organs.

During the swimming, which is very rapid, uniform, and in all directions, the anterior portion of the head (fig. 18 *b*) is always directed forwards. Frequently these young animals revolve during swimming round their longitudinal axis: their sight is distinctly developed, for they are seen to avoid one another with adroitness, and they always swim towards the light. Although I turned the glass containing an immense number of them in various ways, they immediately swam in great troops to the side turned towards the light.

The time from the laying of the eggs till the extrusion of the young may probably amount to a couple of weeks, for I have found, in the first days of February, the cavities of the body of a *Polynoë* filled with eggs; but from the middle of this month to the middle of March, eggs on the backs in some individuals; and in others at this same period, young just on the point of quitting the backs of their mother (fig. 12 *a a*).

I kept the above-described young of *Polynoë*, which left the egg under my eyes, alive for four weeks in glasses filled with sea-water, during which time they grew it is true somewhat, but exhibited no further changes. In this respect Lovèn was more fortunate, for the young Annelides which he met with swimming freely in the sea were evidently further advanced, and therefore exhibited to him in the space of two days the further development, the tentacula, and the articulations of the body growing under his eyes. I therefore refer to his observations, as probably the further development of our young *Polynoë* takes place in a coincident manner.

The results of the above observations are briefly as follows :—

1. *Polynoë cirrata* propagates in the months of April and March by ova which are secreted from particular apertures on the dorsal side in masses connected together by mucous filaments; they collect on the back and under the branchiæ of the mother, where they remain during their further development and until the exit of the young. The branchiæ have here therefore a similar function as in the freshwater Mollusca (*Unio, Anadonta*), that of protecting the brood.

2. The young when they leave the egg have a very different form from that of the mother and a very imperfect structure. They are short, oval, cylindrical, unarticulated, and so to say, little more than mere head, for this occupies more than half of the entire body, and has two very distinct eyes (the full-grown animal has, as is well known, four). The mouth is a horizontal fissure on the ventral side of the body, and the anus is situated at its posterior extremity. With the exception of a circle of cilia, which surround horizontally the centre of the body and effect locomotion, there exist no other external members, no tentacula or antennæ, no feet with their appendages of cirrhi and bristles, and no branchiæ. All these organs must therefore be developed subsequently, when the true body (abdomen) has grown and become divided into articulations (as the observations of Lovèn show), as well as the two eyes, which are still deficient, while the cilia, as transitory, disappear. In short, we have here all the criteria of a metamorphosis,—different external form, parts which disappear entirely, and numerous organs which are subsequently added.

It is therefore certain that many Annelides undergo a very considerable metamorphosis. In this respect they are related to the other Articulata, and indeed most to the Myriapoda, whose young, according to the observations of Waga and Newport, leave the egg in a very imperfect state and without any articulated members.

As connected with this subject, I must mention the mucous globules which are likewise met with in the months of February and March on our coast, adhering at the depth of some feet to *Zostera marina* and *Fucus vesiculosus*. These globules (fig. 20) are about an inch in diameter, of a beautiful grass-green colour, and consist of an immense number of eggs (*b b*) enveloped in a tenacious mucus which is rolled irregularly like a riband into a knot, the whole of which is coated with a slimy envelope. The eggs are globular, filled with limpid chorion, somewhat albumen, and grass-green yolk, which I observed in all the various forms of the process of division or furcation during its metamorphosis in the fœtus. The young (fig. 21) are, when they have escaped from the egg, short, oval, cylindrical, of a lively grass-green colour, and have the centre of the body surrounded horizontally by a circle of cilia (*d d*), while the head (*b*) is remarkable from two kidney-shaped eyes of a bright red colour, which occupy the same position as in the young *Polynoë*: these young are likewise without any articulated joints. The anus (*f*) is more distinctly visible as a small round aperture at the posterior extremity of the body than in the young *Polynoë*. They swim very quickly about in the water by means of the cilia, and always towards the light. In short, they resemble so closely the young of the *Polynoë*, that there can scarcely be a doubt of their belonging to some Annelide.

As I was unable to ascertain either the species to which these eggs and young belonged or their further development, I must content myself at present with the mere announcement, that some sea-Annelides secrete their ova enveloped in a mucous mass of a certain form, as has long been known of the leech; on the contrary, others deposit free eggs*.

EXPLANATION OF PLATE IV. FIGS. 12 TO 21.

Fig. 12. represents a *Polynoë cirrata*, natural size: a dorsal view. The yellowish gray mass, *a a a*, which covers the back (with the exception of about the anterior fourth and below and between the branchiæ), from which the young are on the point of escaping.

Fig. 13. An egg taken from the cavity of the body, magnified and somewhat compressed, to show Purkinje's vesicle.

Fig. 14. An egg taken from the back, showing the blackberry form of the yolk.

Fig. 15. The same egg very much compressed, exhibiting a bright nucleus in each of the large granules (cells) of the yolk.

Fig. 16, 17. Further developed eggs, whose yolk or fœtus is become smooth and whitish: *a* is the moveable fringe consisting of mucous filaments by which the eggs are connected.

Fig. 18. The young animal just escaped, magnified and seen from the left side: *a*, mouth; *b*, front, and *c*, posterior extremity of the body; *d d*, circle of cilia; *e*, left eye.

Fig. 19. A front view of the same animal: *a*, ventral surface; *dd*, circle of cilia; *e e*, eyes.

Fig. 20. represents the globular masses of eggs of an unknown Annelide of the natural size adhering to a piece of *Zostera marina*, *c c*: *a a*, the surrounding envelope of mucus; *b b*, the eggs.

Fig. 21. One of the young escaped from this mass of eggs: a dorsal view magnified: *b*, anterior; *c*, posterior extremity of the body; *d d*, circle of cilia; *e e*, eyes; *f*, tail.

* For instance, the *Nereides*, as I have observed in *Nereis pelagica* and in a species of the genus *Heteronereis* Oersted. I saw in the month of March an immense number of eggs, which were very minute, globular, and of a beautiful azure-blue colour, deposited one by one by both of these Annelides.

XXI.—*Botanical Notices from Spain.* By Moritz Willkomm*.

[Continued from p. 122.]

No. VI. Granada, November 4th, 1844.

On the 12th of September I quitted the village of Guejar, and on the following day, after traversing a very difficult and somewhat dangerous path over the Puerto de Vacares, I reached the south side of the Sierra Nevada, where I pitched my quarters in the village of Trevelez, lying at an elevation of about 6000 feet, the first and highest inhabited place of the Alpujarras. This village lies immediately at the base of the Mulahacen, in a very rocky valley, watered by the wild river of the Trevelez, which runs parallel to the principal chain of the Sierra, and divides this from the second, much lower and very sterile chain, the Sierra de Contraviesa. Notwithstanding the great height at which this village lies, it is surrounded with the most luxuriant chestnut- and nut-trees, and rye and barley are even grown in the alpine region ; the vine however will no longer flourish here. This very circumstance shows that the position of the region is very different from that of the northern declivity, and moreover its limits are not so sharply marked as on the opposite side.

The southern declivity of the Sierra Nevada presents a perfectly different appearance from that of the northern declivity. Whilst the summits of the principal chain terminate abruptly toward the north, and form immense and frequently inaccessible rocks, these toward the south pass into long, parallel, gradually descending coombes, which on the whole leave but very little undulating country between them. Between these mountain coombes, at a height of from 8000 to 10,000 feet, there lie a number of tarns or small mountain lakes as clear as crystal, from which innumerable rivulets issue into the valleys of Trevelez, the Rio Toqueira and Rio Grande. I have myself seen and visited, between the Cerro Caballo and the Puerto del Lobo,—apparently the two terminations of the mountain range,—fourteen lakes on the south side ; but their shores present no remarkable vegetation ; indeed, in general the vegetation of the whole southern declivity appears to be much less rich than that of the northern, which may be partly explained by the formation of this side, and partly by its exposure to the south. One of the most characteristic plants of the south side of the Sierra Nevada is the *Arenaria pungens*, Clem., which is found throughout the whole alpine and snow region, growing from the valleys up to the mountain region, and forms the flora of the snow region and the highest summits, together with *A. tetraquetra, Artemisia granatensis, Ptilotrichum spinosum, Eryngium glaciale, E. Bourgati*, Gouan., *Sideritis scordioides*, var. *vestita*, Boiss., *Thymus angustifolius*, P., and *Teucrium Polium*, *γ. aureum*. The shores of these lakes are for the most part so thickly covered with *Plantago nivalis*, Boiss., that from a

* Translated from the Botanische Zeitung, May 2, 1845.

distance they appear quite white, and have frequently deceived me. On the margin of the alpine rivulets and on moist alpine meadows grow *Saxifraga stellaris*, L., *Parnassia palustris*, L., *Euphrasia minima*, Schleich., and some liverworts ; in bogs of the mountain region *Juncus bufonius*, *J. glaucus* and a *Senecio*, whilst the fissures of the limestone rocks are filled especially by *Linaria origanifolia* and *Antirrhinum molle*. On the fallow fields around Trevelez I found here and there *Jasione montana*, L., a rare plant in Andalusia, and very frequent *Carlina corymbosa*, which grows high up into the alpine region, as well as *Polygonum Persicaria* and *lapathifolium*. On walls and hedges in the environs of the village grow *Senecio linifolius*, L., very frequent and in full blossom, *Artemisia Absinthium*, L., *Mentha rotundifolia*, *sylvestris* and *Pulegium*, *Brassica adpressa*, Boiss., *Crambe filiformis*, Jacq., *Rumex pulcher*, *Helichrysum serotinum*, Boiss., *Althæa officinalis*, *Rubus hispanicus*, *Pteris aquilina*, *Cystopteris fragilis*, *Asplenium Trichomanes*, *A. Adiantum-nigrum* and *Ceterach officinarum*, all which plants I have for the most part met with on the north side. The Mulahacen yielded a somewhat richer booty ; I began its ascent on the 15th of September, after having in vain attempted to ascend it three weeks before from the north side, when, instead of the Mulahacen, I came upon the Cerro Alcasava, and found my way back only with great danger over the frightful rocks of the northern declivity. The ascent to the highest summit of the Sierra Nevada (according to the measurement of D. Simon de Roxas Clemente equal to 4259½ varas castellanas, or 12,779 feet, which appears to be somewhat exaggerated) is not at all dangerous starting from Trevelez, at least in fine weather, which I was so fortunate as to have. After ascending for six hours, I came at noon to a pretty steep and pathless acclivity, on the highest rocks of the summit, and obtained such a magnificent view over a great portion of Spain, bounded by the sea and the coast of Africa, as is seldom presented. With the exception of some lichens, there is only found between the loose masses of rock of the summit, which consist of mica, containing an endless number of garnets, the *Artemisia granatensis*, with the pretty *Erigeron frigidum*, Boiss., which is distributed over the whole of the upper snow region, but everywhere only sparingly, in company with *Viola nevadensis*, *Galium pyrenaicum* and *Ptilotrichum purpureum*. On the side opposite to the Picacho de Veleta, about 100 feet below the summit, I found about a dozen specimens of *Papaver pyrenaicum*, Gouan., already in fruit, gathered by M. Boissier on the same spot seven years ago, without doubt the rarest plant of the Sierra Nevada, as hitherto no other habitat is known, and even here it occurs very seldom. On the wet alpine meadows on the southern declivity of the Mulahacen and on the margins of the rivulets I found the dwarf *Gentiana Boryi*, Boiss., immersed among mosses, in company with *G. alpina* and *G. Pneumonanthe*, var. *depressa*, Boiss., *Ranunculus angustifolius*, DeC., and *Plantago nivalis*. On a subsequent excursion of two days, which I made on the 16th and 17th of September toward the Puerto del Lobo lying nearly at the east end of the Sierra, I found that the eastern portion of the southern declivity is still poorer in plants than the central part of Trevelez, and gathered only one new plant, viz. the rare *Erodium trichomanæfolium*, L'Hérit., which grows pretty plentifully on boulders of mica on the broad and high coombe between the Puerto de Jeres and Puerto del Lobo, but seldom blossoms.

On the 18th of September I quitted Trevelez, with the hope of obtaining a richer harvest in other parts of the Alpujarras; but in this hope I was soon deceived; for the further I went towards the south, all was parched under the summer sun. Except *Carlina corymbosa, Picnomon Acarna, Chamæpeuce hispanica, Antirrhinum molle, Senecio linifolius, Helichrysum serotinum, Artemisia campestris, Bupleurum spinosum, Althæa cannabina, Centaurea Calcitrapa* and *salmantica*,—plants which are especially common on the limestone formation and which I had already collected,—I observed in the valleys of the limestone mountains between Trevelez, Notaëz, and Orgiva only *Scilla maritima*, L., in blossom, and on the perfectly arid limestone in the neighbourhood of Notaëz, some bushes of the beautiful *Lavatera oblongifolia*, Boiss. Even the environs of the charmingly situated baths of Lanjaron presented, with the exception of some salt-plants growing around the mineral springs, little of interest. There were in blossom *Samolus Valerandi*, L., *Erythræa maritima*?, *Statice globulariæfolia*, Desf., and a *Linum*; whilst on the arid limestone rocks in the neighbourhood of the town grow the sweet-smelling *Balsamita multifida*, Clem. (according to Boissier's 'Voyage' *Tanacetum annuum*, L.?), and in some fissures of the rock, but very rarely and not in blossom, the *Lapiedra Martinezii*, Lag. On perpendicular limestone rocks at Orgiva and between Lanjaron and Granada I for the first time met with the rare *Brassica moricandioides*, Boiss., with thick, round, fleshy, bluish green leaves, with ripe fruit, in company with *Bupleurum gibraltaricum, Lavandula multifida* and a *Satureja*. In order also to ascertain the nature of the vegetation of the coast at this season, I made an excursion on the 20th of September to the town of Motril, distant four leagues from Lanjaron and half a league from the coast, which is reached by the romantic valley of the Rio Grande, which carries off almost all the water from the southern declivity of the Sierra Nevada to the sea. The valleys of the Alpujarras possess quite a different character from those of the north side, for they are all very wide and the beds of the rivers very broad, even and sandy. Their banks, as especially those of the Rio Grande, are clothed with thick and high bushes of *Arundo Donax*, L., which began to unfold its colossal bunch of blossoms, and the beautiful *Saccharum Ravennæ*, L., clothed with its elegant silver panicles; in company with which plants are found in profusion the *Tamarix gallica* and *Nerium Oleander*. Further toward the sea appear the *Salix alba, S. purpurea, Populus nigra, alba* and *canescens* frequent on the banks; *Passerina hirsuta*, L., which blossoms throughout the year; *Scilla maritima* and *Chamærops humilis*, which already from Orgiva and Lanjaron indicated the neighbourhood of the coast and the hot region. On the northern declivity of the last chain of hills between the valley of the Rio Grande and the Plain of Motril, I noticed some gigantic shrubs of *Kentrophyllum arborescens* with stems as thick as an arm, but already completely dried up. It was here that the Andalusian robbers paid me a visit; but fortunately I escaped them by the speed of my horse. The very friendly town of Motril lies at the foot of a limestone chain of hills planted with vines, which surrounds the basis of the Sierra de Lujar, and at the commencement of a wide fruitful plain, quite covered with the most luxuriant fields of cotton, sugar-cane, batates and maize. The coast is quite flat and very sandy; *Pancratium maritimum*, L., blossomed in parts in company with a *Salsola, Kakile maritima*, L., and *Euphorbia Paralias*, L. The last had past flowering, whilst on the banks of the ditches of the above-mentioned plains and on grassy places *Panicum arenarium*, Brot., *Xanthium Strumarium*, L., and *Ricinus communis*, L., and in the cotton plantations *Datura Stramonium*, L., are not rare.

At the end of September I returned to Granada, and in the beginning of October I made the last excursion, of four days, in the Sierra Nevada, from whence I brought away little more than seed. The fresh-fallen snow which already covered the mountain down to the lower alpine region, prevented me from visiting the snow region, as I had intended. A subsequent excursion to the neighbouring Sierra of Alcafar yielded little beside a small form of *Merendera Bulbocodium, Crocus nudiflorus*, Sm., and *Satureja cuneifolia*, Ten. The summer months are not the most favourable months of the year for botanizing in Andalusia, even in the mountains, as I have found by experience; but much the best time is the spring, from March to May, and June and July for the mountains. On the arid hills around Granada, the *Artemisia Barrelieri*, Boiss., which is here very frequent, begins to flower in the end of October; and about the same time I found on moist shady places in the valley of the Darro the beautiful *Sternbergia lutea*, Ker. (*Amaryllis lutea*, L.), which had not hitherto been found in the kingdom of Granada. In the second half of October it rained almost incessantly, which prevented my making any distant excursions, but favoured the development of the Cryptogamous plants; so that I have obtained a tolerable harvest of lichens and liverworts during the latter part of my stay in Granada: of the last species, besides several forms of the *Pellia epiphylla*, I found especially *Marchantia paleacea*, Bertol., everywhere in moist shady places, common on walls and on stony sites and with spore-bearers; on moist masses of rock I also gathered *Targionia* and *Lunularia vulgaris*, Mich., both very beautiful and in rich fructification.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

April 8, 1845.—William Horton Lloyd, Esq., in the Chair.

Abstract of a paper on Nepalese Birds, by Bryan H. Hodgson, Esq., Corr. Memb., late British resident at Nepal:—

Brachypodinæ.

Genus *Stachyris*, mihi (olim *Cilathora*). Types, *S. nigriceps, pyrops* et *chrysæus*, all new.

Bill as long as head, strong and straight, elongate-conic, much compressed; towards base much higher than broad, with its ridge elevated and keeled between the large nareal fosses; rounded forwards, and the tips either straight, entire and depressed, or the upper one suddenly inclined, with remote notch; gape smooth; frontal plumes rigid, and concealing the base of the bill; nares placed at fore end of the fosse, and covered by a salient arched incumbent scale, which closes the aperture forwards; tongue narrow, simple, with bifid jagged tip; wings short, bowed, perfectly rounded; tail moderate, gradated, rather cuneate than fan-shape, and either frayed or subrigid; feet suited to creeping and clinging; tarse elevate and strong, longer than central toe and nail, and nearly or quite smooth; toes short, depressed, unequal, basally connected; hind large, and equal to outer fore toe; nails repent and Parian. Exclusively monticolous and shy of man; not gregarious; feeds on tiny hard insects and the larvæ and pupæ of tree-haunting species—rarely on seeds; exclusively arboreal; builds large globular nests, which are fixed upon and between the crossing twigs of low thick bushes, and lays four or five eggs, of a pale fawn-colour, either unmarked or spotted with brown.

1st species, *S. nigriceps*, mihi.—$5\frac{1}{3}$ inches long; bill to gape, $\frac{11}{16}$; tail, $2\frac{1}{16}$; tarse to sole, $\frac{15}{16}$; central toe and nail, $\frac{11}{16}$; hind toe and nail, $\frac{9}{16}$; closed wing, $2\frac{1}{8}$.

Colour.—Above medial red-brown, deeper and purer on wings and tail; below sordid rusty, brightest forwards; top and sides of head black, picked out with hoary; chin hoary, confined by a black band running from the cap towards the breast; legs fleshy; bill horn-yellow, darkened on ridge; iris pale orange.

2nd species, *S. pyrops*, mihi.—Olive-brown above, sordid rusty below and on the sides of head and neck; beneath and before the eye and under the chin a black spot; bill sordid sanguine, dusky on the ridge; legs horn-colour; eye sanguine. $4\frac{1}{2}$ inches long; bill, $\frac{1}{2}$; tail, 2; tarse, $\frac{3}{4}$; central toe and nail, $\frac{9}{16}$; hind, $\frac{7}{16}$; wing, 2.

3rd species, *S. chrysæus*, mihi.—Above vernal green, deeply tinged with golden; below bright golden; cap with dusky stripes; bill dusky; legs yellow. Length, $4\frac{5}{8}$ inches; bill, $\frac{9}{16}$; tail, 2; wing, $2\frac{1}{8}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{1}{2}$; hind, $\frac{7}{16}$.

Remark.—These singular birds belong I think to Swainson's group of the *Brachypodinæ*, among the creeping genera of that group; but they show some tendency to pass to the Leiotrichanians, by means of *Pteruthius* and our *Heterornis*; *Heterornis* at all events must take place next *Pteruthius*; but I think the true position of *Stachyris* is among the Brachypods, near to *Iöra* and *Icteria*, with the forms that we shall next give, and leading to the Crateropodans.

Genus *Mixornis*, mihi.

General structure of *Iöra*, but the bill quite different and Meruline; commissure and culmen subarched throughout; tarse lower and not exceeding the large thumb with its nail; tail fully rounded. Type, *M. ruficeps*, mihi.—*Timalia gularis* of Horsfield?

M. ruficeps.—Body vernal green, passing to yellow on the throat and breast, where also there are dark lines down the shafts of the plumes; cap, wing and tail brunescent; bill bluish horn; legs fleshy grey; iris hazel. Length $5\frac{3}{8}$ inches; bill, $\frac{5}{8}$; tail, $2\frac{1}{8}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{9}{16}$; hind, $\frac{8}{16}$; closed wing, $2\frac{3}{8}$. Sexes alike.

Genus *Erpornis*.

General structure of the last, but the bill very straight, compressed, with the culmen well-raised and keeled between the nares, as in *Stachyris* and in *Iöra*, but less thick and rounded and the notch more remote than in *Iöra*; wings longer and more acuminate, with the first three quills less equally gradated; legs smaller; tail even.

Type, *Erpornis xanthochlora*, mihi.—Above vernal yellow, below white; legs and bill fleshy grey; iris brown. Five inches long; bill, $\frac{5}{8}$; tail, $2\frac{1}{16}$; closed wing, $2\frac{3}{4}$; tarse, $\frac{11}{16}$; central toe and nail, $\frac{9}{16}$; hind, $\frac{8}{16}$. Sexes alike.

Remarks.—The above two forms are much related to each other, as well as to *Stachyris* and the other Brachypodan clinging-birds; but *Mixornis* inclines towards *Timalia* among the Crateropodans, while *Erpornis* is nearer to *Stachyris* and *Zosterops*, which last I consider to be a Brachypod. Both inhabit the lower and central hills, and feed on tiny tree-insects and their larvæ and pupæ. Their tongue is simple.

Genus *Ixulus*.

General structure of *Polyodon*, but the bill, tongue and nares simple, and Brachypodan, not Meliphagian; bill short and singly notched at the tip.

Type, *Polyodon flavicollis* or *Yuhina flavicollis*, as printed.

Remark.—*Polyodon* is a strictly Meliphagian form. *Ixulus* is one of the genera serving to connect the true Honeysuckers with the repent Brachypods, such as *Zosterops*, *Chloropsis*, &c., and which are so like the former.

CRATEROPODINÆ.

Genus *Pyctoris*, mihi.

Bill short, strong, perfectly entire, arched throughout the culminal and tomial lines; nareal fosse and scale obsolete; rictus with very strong short bristles; orbits nude; wings short and feeble, the first two quills much, the next two little gradated; third pair equal and longest; tail long, broad and gradated throughout; legs and feet typically Crateropodan, with a high strong tarse; toes medial, unequal, central not elongated, laterals unequal, hind large; nails large, but not much curved nor acute; hind one largest.

Type, *Timalia hypoleucos*, Auct.

Hab. The plains only, represented in the hills by *Deceira*.

A. rufifrons, mihi.—Above sordid ashen olive, passing to clear rusty brown on the alars, caudals, brows and chin, and the former (typically) marked with frequent regular cross-bars of black; tail longer and more gradated than in *Nipalensis*; head similarly crested; bill and feet embrowned fleshy or horny grey; iris brown. Length, $8\frac{3}{4}$ inches; bill, $\frac{7}{8}$; tail, $4\frac{3}{4}$; wing, $3\frac{1}{2}$; tarse, $1\frac{1}{4}$; central toe and nail, $\frac{13}{16}$; hind, $\frac{11}{16}$.

Remarks.—These birds form one of those singular links which unite the Crateropodan and Brachypodan thrushes with the *Meliphagidæ*, of which last our *Alcopus* is a true member, having the brushed tongue in perfect development. *Zosterops*, *Chloropsis*, *Hypsipetes*, &c. of the Brachypodan group, likewise have the brushed tongue in more or less development, but not so perfectly as in *Alcopus*. In *Ixops* there is little trace of it. *Ixops* leads from a Meliphagian type (*Alcopus*) to the Crateropods, and *Ixulus* from another (*Polyodon*) to the Brachypods.

MYOTHERINÆ.

Genus *Pnoepyga* (olim *Tesia*), mihi.

Bill short, straight, Cinclosylvian, depressed as far as the nares, compressed beyond, with inflexed tomia and tip faintly inclined and notched; nares large, fossed, unplumed, furnished with a salient membranous scale, which lunates the aperture; rictus and brows smooth; wings very short, bowed, and perfectly rounded; tail rudimentary, consisting of only six plumes, which are hid by the puffy rump-feathers; legs and feet ambulatory; tarse elevate, smooth; lateral toes equal. Types, the following:—

1st species, *albiventer* (*M. squamata*, Gould, postea), mihi.—Above and sides olive-brown, more or less dotted with rufous; below white, largely picked out with central dusky drops; feet dusky grey; bill dusky horn. Length, $4\frac{1}{3}$ inches; bill, $\frac{9}{16}$; tail, $\frac{5}{8}$; closed wing, $2\frac{3}{8}$; tarse, 1; central toe and nail, $\frac{13}{16}$; hind, $\frac{10}{16}$.

2nd species, *rufiventer*.—Very like last, but the ground-colour below invariably rufescent, not white, and size rather less.

3rd species, *unicolor*, mihi.—Throughout of a dull brunescent olive, like *Cinclus*. Length, $3\frac{3}{4}$ inches; bill, $\frac{9}{16}$; tail, $\frac{11}{16}$; closed wing, $2\frac{5}{16}$; tarse, $\frac{15}{16}$; central toe and nail, $\frac{3}{4}$; hind, $\frac{9}{16}$.

4th species, *pusillus*, mihi.—Above saturate olive; below orange tawny, margined finely with black above and below; the colours confused towards the vent; legs sordid fleshy; bill dusky horn; iris brown. Length, $3\frac{1}{8}$ inches; bill, $\frac{1}{2}$; tail, $\frac{9}{16}$; closed wing, $1\frac{3}{4}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{9}{16}$.

Genus *Oligura*, mihi.

General structure of *Pnoepyga*, but the tail more developed and furnished with twelve plumes; the bill more depressed; rictus less entirely smooth; nareal tect less developed and nares consequently ovoid; lateral toes unequal, hind large, and nails more acute. Types, the following:—

1st species, *flaviventer*, mihi.—Above deep grass-green, below rich yellow; cap bright chestnut; legs fleshy grey; bill dusky above, fleshy below; iris brown. Length, $3\frac{3}{4}$ inches; bill, $\frac{9}{16}$; tail, 1; wing, $1\frac{7}{8}$; tarse, $\frac{15}{16}$; central toe and nail, $\frac{10}{16}$; hind, plus $\frac{1}{2}$.

2nd species, *cyaniventer*, mihi.—Above grass-green, below slaty blue; legs and feet smoky grey; bill dusky above, horn below. Length, $3\frac{7}{8}$ inches; bill, $\frac{10}{16}$; tail, $\frac{14}{16}$; closed wing, less 2; tarse, 1; central toe and nail, $\frac{11}{16}$; hind, $\frac{9}{16}$.

Remarks.—The above genera were first discovered and described by myself, but I failed then to note the distinction between the two. I have now thrown all the prior and new species together. These singular birds are peculiar to the mountains, and dwell in moist woods where there is plenty of underwood; they are solitary, silent, live and breed on the ground, and feed on seeds, gravel and insects; their stomach is thick—almost a gizzard. They should stand with *Aipunemia* and *Brachypterix*, between *Pitta* and *Cinclus*. Our *Horornis* and *Monticola* are analogous forms among the *Sylvianæ*, and *Todus* among the Muscicaps. Gould has figured our first species of *Tesia*, which he calls *Micrura squamata*.

SYLVIADÆ.

SAXICOLINÆ.

Dimorpha, mihi (see 'Indian Review,' *Siphia*).

Bill short, cylindrico-depressed; Muscicapan, but less wide and less armed at the tip; base loaded with a forward soft zone, putting forth hairs which partly conceal the nares; rictus less wide and less armed than in *Muscicapa*, but approaching thereto; wings more or less elongated and acuminated, with 4th, 5th, or 6th quill longest; the first three or four more regularly gradated than in *Muscicapa*; alar and caudal plumes wedged and mucronate, and the tail itself either slightly gradated from centre and sides, or cuneate; legs and feet more suited to walking than in Muscicaps; tarse smooth and exceeding the mid toe and nail; toes medial, compressed, unequal; hind sometimes large, but not broad; nails large and slender, or small and more bent.

The subgenera seem to be three, or *Dimorpha*, *Digenea*, and *Synornis*.

Dimorpha

proper, with long wings, having the fourth quill longest; tail broad and gradate from centre and sides; feet with the lateral fore-toes nearly equal and the hind-toe small, and the nails falcate and short.

Types, *D. strophiata*, *monileger* and *rubrocyanea*. *D. strophiata* printed apud Indian Review, quod vide.

D.? monileger, mihi.—Above olive-brown, sordid, save on the wings and tail; below diluted and sordid; frontal zone rusty; chin and throat white, enclosed by a black band; bill black; legs fleshy; iris brown. Length, $5\frac{1}{8}$ inches; bill, $\frac{5}{8}$; tail, 2; closed wing caret; tarse, $\frac{15}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{10}{16}$. Sexes alike nearly.

D.? rubrocyanea, mihi.—Above indigo-blue, below deep rusty; frontal zone, basal edges of tail and vent white; bill black; legs fleshy. Length, $4\frac{1}{2}$ inches; bill, $\frac{9}{16}$; tail, $1\frac{7}{8}$; closed wing, $2\frac{3}{8}$; tarse, $\frac{3}{4}$; central toe and nail, plus $\frac{9}{16}$; hind, $\frac{8}{16}$. Deviates from the type in form of wing, which has first three quills much gradated and fifth longest, and it has the legs, feet and nails of the next subgenus,

Digenea, mihi,

which differs from *Dimorpha* proper by having the wings shorter, with the fifth or sixth quill longest, the legs and feet longer and slenderer, and the nails less bent, but larger; the thumb larger and the nail cuneate. The types are *tricolor* and *leucomelanura.*

D. tricolor.—Above olive-green, passing into ruddy olive-brown as you recede from the head; below sordidly luteous or fulvous; bill blackish; legs fleshy grey. Length, $4\frac{5}{8}$ inches; bill, $\frac{1}{2}$; tail, 2; closed wing, $2\frac{5}{16}$; tarse, less $\frac{3}{4}$; central toe and nail, $\frac{5}{8}$; hind, $\frac{1}{2}$.

D. leucomelanura, mihi.—Above saturate slaty, passing to black on wings and tail; tail laterally towards the base white, below albescent slaty; throat pure white; bill and legs black. Length 5 inches; bill, $\frac{1}{2}$; tail, $2\frac{3}{16}$; wing, $2\frac{3}{8}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{10}{16}$; hind, $\frac{8}{16}$.

Passing next to the subgenus

Synornis,

we have a medial Muscicapan wing, whereof the first quill is spurious, the second long, and 3–4 longest. The bill is more exposed at its base, the rictal and nareal hairs are shorter, and the legs and feet are more ambulant, with smaller thumb and nails, neither slenderly elongate nor shortly falcate. The type of this form is our *Joulaimus*, but it is the species whereof the male seems to be Sykes's *Saxicola rubeculoides*, and the female Gmelin's *Muscicapa leucura.*

S. Joulaimus, mihi.—Above earthy brown, below diluted to luteous; throat and breast bright rusty; sides of head and neck dull slaty; tail black, with white lateral base. Female below void of the red colour, being throughout sordid white. Length, $5\frac{5}{8}$ inches; bill, $\frac{9}{16}$; tail, $2\frac{1}{4}$; wing, $2\frac{3}{4}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{9}{16}$; hind, $7\frac{7}{16}$. Weight, $\frac{1}{3}$ oz.

Hab. Tarai. Rarely or never the hills, to which the others are as entirely confined.

PHILOMELINÆ.

Genus *Muscisylvia*, mihi.

General structure as in *Grillivora*, but feebler; gape wider and bristled; tip of the bill more suddenly bent; nares elongated, with nude membranous tect and lunato-elliptic aperture, set over by tiny hairs; wings and tail ample, with broad webs and obtuse mucronated terminations; wings round, acuminate; fifth quill longest; tail medial, even, broad; legs and feet suited to walking and perching; tarse equal to mid toe and nail; toes long and slender; nails acute; hind much the largest, and equal to the digit; exclusively Monticolous; stomach muscular and strong; feeds on hard and soft insects, pulpy berries and small seeds. A shy forester; not gregarious.

Type, *M. leucura*, mihi.—Throughout deep indigo-blue, passing to black on alars and caudals; forehead and shoulders rich cobalt blue; tail basally and laterally whitened; a white spot on the side of the neck of the male; bill and legs black; iris dark. Length, $7\frac{1}{2}$ inches; bill, $\frac{3}{4}$; tail, $3\frac{1}{4}$; wing, $3\frac{3}{4}$; tarse, $1\frac{3}{16}$; central toe and nail, $\frac{15}{16}$; hind, $\frac{3}{4}$. Weight 1 oz.

Genus *Nemura*, mihi.

General structure of *Phœnicura*, but slighter, with slenderer legs and feet, and bill more armed at the point, and lateral toes unequal; wings and tail mucronated, as in the last, but the webs less broad and the tips narrowed wedgewise; nails long, slender and delicate, like the digits and legs. Manners of *Phœnicura*, but a forester and shy. Feeds on insects, soft and hard, and on pulpy berries. Found in central and northern regions of hills. Types, *N. rufilatus* et *flavolivacea* et *cyanura*.

N. rufilatus, mihi.—Above and the cheeks indigo-blue; brows, shoulders and rump soft cærulean; below white, save the flanks, which are bright rusty; bill and legs black; iris brown. Length, $5\frac{3}{8}$ inches; bill, $\frac{5}{8}$; tail, $2\frac{5}{8}$; wing, $3\frac{1}{4}$; tarse, $1\frac{1}{16}$; central toe and nail, $\frac{3}{4}$; hind, $\frac{9}{16}$.

N. flavolivacea, mihi.—Possibly female of the last. Above olive-green, with a yellowish tinge; below sordidly fulvescent; bill and legs fleshy grey. Length, $5\frac{5}{8}$ inches; bill, $\frac{9}{16}$; tail, $2\frac{3}{8}$; wing, 3; tarse, $1\frac{1}{8}$; central toe and nail, $\frac{13}{16}$; hind, $\frac{10}{16}$.

N. cyanura, mihi.—Head, neck, breast and wings olive-brown, more diluted below; rump and tail verditer-blue; flanks bright rusty; chin, belly and vent white; legs and feet black. Sexes alike. Length, $5\frac{5}{8}$ inches; bill, $\frac{5}{8}$; tail, $2\frac{7}{8}$; wing, 3; tarse, 1; central toe and nail, $\frac{3}{4}$; hind, less $\frac{5}{8}$.

SYLVIANÆ.

Genus *Tarsiger*, mihi.

Bill equal to head, straight, subdepressed, feeble, gradually widening from the tip; the upper mandible more than half exceeded by the nareal fosse, and much overlaid by the soft frontal plumes; nares broad lunate, forward, apert, shaded by a nude membrane; tip of bill obtuse, and nearly unarmed; gape rather wide and ciliated; wings submedial, round rather than acuminate, firm; fifth quill longest; 4–6 and 3–7 respectively equal; alars and caudals wedged and mucronate; tail medial, rounded; tarse very elevate, slender and smooth; toes ambulant, simple; laterals unequal, hind rather large; nails large, slender, simple; hind largest. Exclusively monticolous; dwells in low brushwood solitarily, and is much on the ground, feeding chiefly on small ground insects. Makes its nest on the ground, saucer-shape, of moss, and places it under cover of some projecting root or stone; eggs verditer. Has much analogy with both the last genera, which it represents among the feebler *Sylvianæ*, to which it belongs, as they to the *Philomelinæ*. It differs from the last by its feebler, more depressed bill, larger and more membranous nares, and more slender legs and feet; also by its mucronate and wedge-tipped alars and caudals. The mucronation allies it to *Muscisylvia*, from which it differs by its less ample wings and tail, more elevate tarse, and feebler bill.

Type, *T. chrysæus*, mihi.—Below the whole body with the entire shoulders, the lower back and greatest part of tail, deep gamboge-yellow; superciliary line the same; head above, neck and upper back, yellow-tinted olive; lores, orbits and ears continuously, central caudals and tips of the others black; alars dusky black, fringed on the lower edges with yellow; legs fleshy brown; bill horn-yellow below, dusky above. Female duller-hued, devoid of the black cheek-mark and superciliary line; her body above entirely olive-green; alars and caudals dusky olive. Length, $5\frac{3}{4}$ inches; bill, $\frac{11}{16}$; tail, $2\frac{1}{4}$; wing, $2\frac{5}{8}$; tarse, $1\frac{5}{16}$; central toe and nail, $\frac{13}{16}$; hind, $\frac{11}{16}$.

Genus *Orthotomus*, Horsf.

1st subgenus, *Orthotomus*.

Bill sub-certhian, long, slender, inclining to arch, and entire, with the base largely exceeded by the nareal fosse; nares large, membranous, free, the aperture lunate-linear and shaded above by a large unarched membrane; rictus slightly bristled; wings short, bowed, and feeble, but not perfectly rounded; first four quills conspicuously gradated in a diminishing ratio; 5–6 equal and longest; tail moderate, narrow, feeble, much-rounded, with the two central plumes frequently elongated, as in the Bee-eaters; tarse high, stout, double that of the central toe, and strongly scaled; toes short, unequal, the outer fore longer and basally connected; the hind large and strong; nails strong and acute, the hind largest. Nearly confined to the hills; rare below in the cold season; solitary or in pairs; familiar; dwells in low bushes and hedge-rows and fences, picking up minute insects from the leaves and decayed wood, and frequently descending to the ground, where they move fitfully, by hops, to take minute insects, and presently return to their low perch. Make beautiful pensile nests, by sewing together the edges of large leaves, and hence are called 'Patia' or the 'Leaf-bird' in the hills.

Type, *Sylvia putoria, v. sphenura, v. ruficapilla*, Auct.—Above vernal green, below white; the great alars and caudals dusky; the top of the head brown-red; bill dusky horn; legs fleshy brown; iris brown. Female similarly coloured, but wanting almost entirely the prolonged central tail-feathers of the male, and smaller. Length (of male), $5\frac{1}{2}$ inches; bill, $\frac{3}{4}$; tail, $2\frac{3}{4}$; closed wing, $1\frac{7}{8}$; tarse, $\frac{7}{8}$; central toe and nail, $\frac{9}{16}$; hind, $\frac{7}{16}$. Weight $\frac{1}{3}$ or $\frac{1}{4}$ oz. Has a loud shrill monosyllable note—*tee-tee-tee*. I suspect there are two species, because the eggs differ in colour in the nests brought me, some being verditer-blue and unspotted, and others bluish white, with fawn spots. The latter, I think, belong to the above, and the former to a smaller species, having the caudal appendage very little developed. I call this

Orthotomus Patia, and subjoin the following measurements. Length (of male), $4\frac{3}{4}$ inches; bill, $\frac{5}{8}$; tail, $1\frac{3}{4}$; wing, $1\frac{7}{8}$; tarse, $\frac{15}{16}$; central toe and nail, plus $\frac{9}{16}$; hind, $\frac{7}{16}$.

2nd subgenus, *Prinia,* Horsf.

Bill shorter and straighter, but still longer than the head, and not notched; less cut out at the base by the nareal fosse; rictus hispid; nares smaller, with wider aperture; wings yet shorter and absolutely rounded, with the first five quills conspicuously gradated up to the sixth and longest; tail ampler, more elongate and more gradate, fan-shaped, feeble; legs and feet slighter. Manners and nidification of the last, but a lowlander, being more rarely found in the hills than these.

Type, *Prinia fusca,* mihi.—Length 5 inches; bill, $\frac{9}{16}$; tail, $2\frac{1}{16}$; wing, less $1\frac{3}{4}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{9}{16}$; hind, $\frac{7}{16}$. Above lutescent brown; laterally luteous; below white; tips of the caudals with black drops, margined with white; bill dusky; legs carneous; iris brown.

2nd species of *Prinia, P. brunnifrons,* mihi; *ruficapilla,* Auct. ?—Above olive-brown, deeper and ruddier on the cap, wings and tail; below sordid white; under tail-coverts sordid olive, and the thighs the same; bill yellow horn; legs plumbeous grey; tail smaller than in the last. Length, 4 inches; bill, plus $\frac{1}{2}$; tail, $1\frac{5}{8}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{10}{16}$; hind, $\frac{7}{16}$.

Remark.—Aberrant towards *Horeites* by its smaller tail and more perfect foot. This is a common species in the plains, and may possibly be the Tailor-bird of authors rather than our *Patia,* which is rare there.

3rd subgenus, *Horeites,* mihi.

Bill shorter than the head, quite straight, cylindric, feeble, distinctly notched; nares basal, ovoid, covered with a membranous scale; legs and feet stronger than in either of the above, and more suited to ground action; tarse high, strong, and heavily scaled, as in *Orthotomus*; toes longer, more ambulant, with the laterals equal and central elongated; rictus quite smooth; wings and tail as in *Prinia,* or as in *Orthotomus.* Inhabits the northern region near the snows, dwelling in brushwood and being much on the ground.

1st species, *H. pollicaris,* mihi.—Remarkable for its small wings and tail and large hind digit, the tail being equal in length to the closed wing, which is perfectly rounded and short, as in *Prinia.* Above olive-brown; below and the eyebrow pale yellow; bill sordid corneous grey; legs fleshy grey. Length, $3\frac{1}{2}$ inches; bill, $\frac{7}{16}$; tail, $1\frac{5}{8}$; wing the same; tarse, $\frac{13}{16}$; central toe and nail, $\frac{10}{16}$; hind, $\frac{1}{2}$.

2nd species, *H. schistilatus,* mihi.—Has an ampler wing and tail than the last and a smaller thumb; its wing is as large as in *Orthotomus,* and its tail broad and fan-shaped, like *Prinia.* In colours very like *brunnifrons,* but distinguished by its broader ampler tail, larger wing, and shorter Regulus-like bill. Above uniform olive-brown; laterally pale slaty and below pure white; cap clear brown-red or chestnut. Dwells near the snows, like the last-named. Length, $4\frac{1}{2}$ inches; bill, $\frac{1}{2}$; tail, $2\frac{1}{16}$; wing, $1\frac{15}{16}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{5}{8}$; hind, $\frac{7}{16}$.

Allied to the last two species are some more Cachar birds of very similar manners and plumage, distinguished by a compressed bill, which is raised between the keeled nares, as in our *Stachyris*, and by the inner toe and nail of their strong ambulant feet being longer than the outer toe and nail. Some have the tarse smooth and the tail more or less scansorial, that is, cuneate in form and rather rigid or worn; these I call *Tribura*. The others have the tarse scutellate and rather longer, and the tail broad and fan-shaped, and not at all rigid or worn; these I style *Horornis*, though they hardly deserve subgeneric separation.

Genus *Tribura*, mihi.

Bill to gape equal to head or less, straight, cylindric, compressed; at base higher than broad, and having the ridge raised and keeled between the oval apert nares; tip of upper mandible scarcely inclined, but distinctly notched; rictus smooth; wings short and feeble, but not much or equally gradated; first two quills conspicuously gradated, three next subequal and longest; tail more or less elongated, and gradated throughout, rather cuneate than fan-shaped, and somewhat rigid or worn; tarse stout, smooth, longer than the mid toe and nail; toes and nails simple, compressed, inner fore with its nail exceeding the outer fore, central elongate, hind least; nails acute.

Type, *T. luteoventris*, mihi.

Tribura luteoventris, mihi.—Above olive-brown, with a luteous lustre; below lutescent laterally and albescent centrally; a pale line over the eye; bill dusky horn; legs carneous. Length, $5\frac{3}{8}$ inches; bill, $\frac{9}{16}$; tail, $2\frac{1}{2}$; wing, $2\frac{1}{16}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{8}{16}$. Inhabits the Cachar, among brushwood; manners unknown.

Genus *Horornis*, mihi.

General structure of *Tribura*, but the rictus more or less armed; the tarse strongly scaled; the wings more gradated, having the fifth or sixth longest, and the tail broad, fan-shaped, and not worn or rigid. Inhabits the northern hills; manners unknown.

Types, *fortipes* and *flaviventris*.

H. fortipes, mihi.—Above olive-brown, dark and pure; below and the brow yellowish; bill yellow horn; legs pure fleshy. Length, $4\frac{5}{8}$ inches; bill, $\frac{1}{2}$; tail, 2; wing, $2\frac{1}{16}$; tarse, $\frac{15}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{9}{16}$.

H. flaviventris, mihi.—Very similar to the last, but a smaller bird, with shorter tarse; above olive-brown; below and the brow greenish yellow and pale; bill and legs fleshy. Length, $4\frac{3}{8}$ inches; bill, $\frac{1}{2}$; tail, $1\frac{5}{8}$; wing, 2; tarse, $\frac{13}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{9}{16}$.

H. ? fuligiventer, mihi.—Aberrant; probably a *Tribura*, having the wing of that form, but the tail not worn or rigid, and hence perhaps that character may not be permanent. Above dusky olive-brown, diluted into greenish of a dusky cast below; bill and feet dark. Length, 5 inches; bill, $\frac{1}{2}$; tail, 2; wing, $2\frac{1}{4}$; tarse, $\frac{7}{8}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{1}{2}$.

H.? fulviventris, mihi.—Above saturate olive-brown; below sordid luteous, shaded on the flanks with the upper hue; bill and legs dusky grey. Length, $4\frac{7}{8}$ inches; bill, $\frac{9}{16}$; tail, $1\frac{7}{8}$; wing, $2\frac{1}{8}$; tarse, $\frac{13}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{8}{16}$.

Our singular genus

Temnoris (olim *Suthora*),

and which name, if objected to, may give place to *Hemirhynchus*, is I think a Parian form, being much allied to the small long-tailed Tits. It seems however to group well with our *Heteromorpha* and *Conostoma* and Gould's *Paradoxornis*, and the whole may perhaps fall into the *Glaucopinæ*. There are two species of *Suthora* confounded by me under the name of *nipalensis*; I now erase that name, and substitute *atrifrons* and *fulvifrons*, thus:

T. atrifrons, mihi.—General colour bright rusty, palest on the belly and vent, brightest on the wings; false wing black; margins of the prime alars albescent; caudals and alars internally blackish, and apertly so towards their tips; head saturate slaty, margined laterally and in front by a darker zone, and passing into diluted slaty, mixed with rusty on the sides of the neck; chin transversely barred black; cheeks albescent; bill dusky, with a bluish base; legs sordid grey. Length, $4\frac{1}{4}$ inches; bill, less $\frac{1}{4}$; tail, $2\frac{1}{4}$; wing, $1\frac{15}{16}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{1}{2}$; hind, $\frac{3}{8}$.

T. fulvifrons, mihi.—General hue of the preceding, but the head and neck concolorous with the back; the cheeks not whitened, the chin unbarred, and the size larger; bill paler or fleshy, with a dusky ridge. Length, $4\frac{1}{2}$ inches; bill, $\frac{1}{4}$; tail, $2\frac{1}{2}$; wing, $2\frac{1}{16}$; tarse, $\frac{13}{16}$: central toe and nail, $\frac{9}{16}$; hind, $\frac{7}{16}$.

Muscicapinæ.

Genus *Chelidorynx*, mihi.

General structure of *Rhipidura*, but the bill very short and Cryptolopho-hirundine, being as broad as long from the forehead and very slightly armed at the tip; rictal bristles long, as in *Rhipidura*; nares advanced, lateral, elliptic, and shaded above by a membrane; tail rigid, with wedged tips to the plumes, smaller and less rounded than in *Rhipidura*.

Type, *Ch. chrysoschistos*, mihi.—Above slaty, with a greenish smear; below bright yellow; wings and tail dusky; shafts of the caudals whitened; ears, lores and orbits black. Length, $4\frac{7}{8}$ inches; bill to gape, $\frac{3}{8}$; tail, $2\frac{1}{3}$; wing less $2\frac{1}{4}$; tarse, $\frac{9}{16}$; central toe and nail, $\frac{2}{16}$; hind, $\frac{5}{16}$. Weight $\frac{1}{4}$ oz. Inhabits the central hilly region and great valley, on skirts of woods, among shrubs and low trees; very lively and shows itself much; solitary or in pairs. Stomach distinctly muscular; diet small insects.

This type seems to require a place between *Rhipidura* and *Cryptolopha*, to which last it is allied by the bill, which however is shorter and broader, leading to the next singular form, which is a flycatcher in the guise of a swallow, and forms with this one a perfect passage from the Flycatchers to the Swallows.

Genus *Hemichelidon*, mihi.

General structure of a swallow, with only something Muscicapan in wings and rictus; bill as in *Hirundo* exactly, but the gape hardly so wide and slightly bristled; nares round and vertical, as in *Hirundo*; wings long and pointed; 1st quill spurious, 2nd long, 3rd longest; tail moderate and subfurcate; legs and feet small and slender. Types, *H. fuliginosa* and *ferruginea*.

H. fuliginosa, mihi.—Uniform sooty brown, darkest on the wings and tail, and shaded with white on the belly, vent, and under tail-coverts; the body below paler than above. Length, $4\frac{5}{8}$ inches; bill, $\frac{1}{2}$; tail, 2; tarse, $\frac{7}{16}$; central toe and nail, less $\frac{7}{16}$; hind, $\frac{5}{16}$; wing, $2\frac{3}{4}$.

H. ferruginea, mihi.—Size and proportions of the last; colour rusty brown, passing to olive on the cap; alars and caudals internally blackish, and more or less so apertly; bill dusky carneous; legs pure fleshy; tail (in both) moderate and slightly forked.

Found only in the hills, and chiefly the central region; dwell in woods and have the general manners of the Flycatchers, but with a bolder and more continuous flight.

Genus *Hemipus*, mihi.

General structure of *Rhipidura*, passing to *Myiagra*; legs and feet very small; bill more or less elongated and cylindric; rictal bristles moderate, that is, shorter than in *Rhipidura*; tail gradated and narrow.

Type, *H. picæcolor*, mihi.—Above dusky brown, passing to black on the wings and tail; a large oblique central bar of white down the wing; two bars on the croup, the margin of the black cap, and the terminal part of the lateral alars white; below pale sooty to the breast, thence to tail-coverts albescent; bill and legs black. Female wanting the black cap of the male. Length, $5\frac{3}{4}$ inches; bill, $\frac{11}{16}$; tail, $2\frac{5}{8}$; wing, $2\frac{1}{2}$; tarse, $\frac{1}{2}$; central toe and nail, $\frac{7}{16}$; hind, $\frac{5}{16}$.

Inhabits the hills generally; chiefly procured in the great valley.

Alaudinæ.

Genus *Heterura*, mihi.

Bill to gape equal to the head, to brow much less than the head; Anthine in the general character, but stronger, with the culmen, commissure and gonys more or less curved; base of the upper mandible a good deal cut out by the nareal fosse, and its tip inclined and notched; tomiæ trenchant and scarpt internally; nares advanced, lateral, oval, shaded above by a nude scale-like membrane; rictus to eye, and slightly bristled; wings very short, not surpassing the base of the tail, yet strictly Alaudine in all their details, with the primes ungradate, the tertials equal to primes, and all the centrals notched at the tips and emarginated on the outer web towards the tips, as in the Alaudines; 1st quill equal to 5th, and both rather less than 2, 3, 4, which are equal and longest; tail ample, *scansorial*, that is, distinctly rigid, and the separate plumes acutely wedged; form of the tail Parian, or slightly gradate from centre and from sides; legs and feet strong and typically ambulant, with high scutellate tarse and medial, compressed, full, solid toes, having the laterals equal, the central sufficiently long, and the hind least and not depressed; nails simple, slender, fully curved; hind long and nearly equal to the digit.

Exclusively monticolous; found in the brushy uplands of the central region; feed and breed on the ground; food grylli and other insects and seeds; stomach strongly muscular; intestines of medial length and furnished with tiny cæca. Nest made loosely of grass and saucer-shaped; eggs bluish, thickly spotted. Type, *H. sylvana*, mihi.

H. sylvana.—Above clear brown, picked out marginally with clear rufous, as in the Larks; below rufescent, with narrowing central stripes; chin immaculate; a dark mustache; superciliary line pale; tail-feathers internally and laterally albescent; upper coverts prolonged and pointed, as in the Larks; bill sordid fleshy or horn; legs clear, carneous; iris brown; sexes alike. Length, $7\frac{1}{2}$ inches; bill to gape, $\frac{11}{16}$; tail, $2\frac{7}{8}$; wing, 3; tarse, $1\frac{1}{16}$; central toe and nail, $\frac{15}{16}$; hind, $\frac{3}{4}$.

Remark.—This singular bird has been thus particularly described because of the difficulty of sparing details by anything like an assured allocation of it. It seems to be an analogous form to *Praticola*, and to belong to the *Alaudinæ*, near *Brachonyx*. Its tail in form reminds one of *Dolichonyx*.

Parianæ?

Genus *Accentor*, Auct.

These birds are found in the central and northern regions of the hills only, and chiefly in the northern. We have four species, all of which are I believe new.

1. *Acc. Nipalensis*, mihi.—Head and neck dusky olive; body above ferruginous, with large central dashes of black; shoulders and all the wing-coverts dusky, with white drops; alars and caudals blackish, with ochreous red margins; breast and belly ochreous; under coverts of the tail dusky, picked out with white; bill dusky, with a yellow horn base; iris golden brown; legs sordid brown. Length, $6\frac{1}{2}$ inches; bill, $\frac{10}{16}$; tail, $2\frac{5}{8}$; wing, $3\frac{1}{2}$; tarse, 1; central toe and nail, $\frac{13}{16}$; hind, $\frac{10}{16}$.

2. *Acc. Cacharensis*, mihi.—Very similar in colours to the last, but larger, and the wing proportionally longer; head and neck, shoulders and wing-coverts dusky; throat white, with black bars; breast and belly deep clay-red; back and upper tail-coverts rusty, with large central blotches of blackish; alars and caudals blackish, margined and tipt with rusty red; vent dusky, picked out with

whitish; bill yellow horn, with dusky tip; legs fleshy. Length, 7 inches; bill, $\frac{11}{16}$; tail, less 3; wing, $3\frac{7}{8}$; tarse, $1\frac{1}{16}$; central toe and nail, $\frac{13}{16}$; hind, $\frac{10}{16}$.

3. *Acc. immaculatus*, mihi.—Least of the three; not unlike them in colours, but the plumage more uniform and freer from spots and blotches; head and neck dusky olive, passing gradually into embrowned ochreous red on the body above and below, as well as on the whole visible part of the closed wing; shoulders pale slaty blue and unspotted; alars and caudals dusky brown, and nearly void of brighter margins or tips; bill blackish; legs fleshy grey; iris straw-colour. Length, only 6 inches; bill, $\frac{9}{16}$; tail, $1\frac{7}{8}$; wing, $2\frac{7}{8}$; tarse, $\frac{7}{8}$; central toe and nail, $\frac{3}{4}$; hind, $\frac{9}{16}$.

4. *Acc. strophiatus*, mihi.—Above and laterally sordid rusty, with black central blotches; below white, with similar marks, but smaller and paler; wings and tail black-brown; the alars and their coverts margined with embrowned rusty; ears and lores margined towards the body all round with bright rusty, and a large gorget of the same on the top of the breast; from nares to brow a white line, joining the red one above spoken of; bill dusky horn; legs fleshy brown; iris brown; wings shorter and tail longer than in any of the others. Length, 6 inches; bill, plus $\frac{1}{2}$; tail, $2\frac{3}{8}$; wing, $2\frac{1}{2}$; tarse, $\frac{14}{16}$; central toe and nail, $\frac{3}{4}$; hind, $\frac{9}{16}$. Weight less 1 oz. Breeds on the ground, making a saucer-shaped nest of moss, well-compacted. These birds are much on the ground and have an ambulatory structure of legs and feet: I should place them among the Finches, near to the next-named, or Buntings, which also are exclusively monticolous I believe, and are found in the central and northern regions. They are constantly flushed from the ground in corn-fields and are comparatively familiar birds to the Accentors, which avoid houses and cultivation.

Genus *Emberiza*.

We have four species, three of which are the *erythroptera*, *chlorocephala*, and *aureola* of authors, and the fourth is I think new, as follows:—*Emberiza oinops*, mihi.

New subgenus, *Ocyris*, mihi.

Bill very acute and perfectly conic, without any curve along the culmen or gonys; mouth simply angulated, without palatal knob; wings with 2–3 longest and equal.

Type, *E. oinops*, mihi.—Above rusty red, picked out with large blackish central dashes; below white, with narrower dark marks, and none on the lower belly and vent; wings and tail black-brown; wing with large ruddy margins; alars internally and laterally albescent; head and face rusty red, with two longitudinal black marks on the crown and another circling round the ear from the eye nearly to gape; bill dusky horn; legs embrowned fleshy; iris brown. Length, $5\frac{1}{2}$ inches; bill, $\frac{7}{16}$; tail, $2\frac{3}{8}$; wing, $2\frac{3}{8}$; tarse, $\frac{3}{4}$; central toe and nail, $\frac{5}{8}$. Weight $\frac{1}{2}$ to $\frac{3}{4}$ oz. Sexes alike. Stomach gizzard-like; contents seeds and gravel.

Pyrrhulinæ.

Genus *Loxia.*

L. himalayana, mihi.—Structure typical and plumage very similar to that of the European type, and indeed I believe to all the known species; size small, and most resembling the American bird; most part of the head and neck and whole body below red, of a hue between roseate and blood, and more or less sordid; rest of the head, neck, back, wings and tail deep dusky brown, more or less suffused, and emarginated with the richer colour; wings long, reaching two-thirds down the tail; 1–3 quills rather shorter than the second; legs and feet strong; tarse heavily scaled, less the mid-toe and nail; lateral fore-toes equal and basally connected; hind large, equal alone to the laterals, and, *with* its large nail, much exceeding them; claws large, but not greatly curved. Female dusky brown above, slightly suffused and margined with vernal greenish yellow; below greenish yellow, with dusky centres to the plumes; bill and legs in both blackish; female smaller. Male measures $5\frac{5}{8}$ inches; bill, $\frac{9}{16}$; tail, $2\frac{3}{16}$; wing, $3\frac{1}{4}$; tarse, $\frac{10}{16}$; central toe and nail, $\frac{11}{16}$; hind, $\frac{10}{16}$. Inhabits the Cachar only, near the snows, and rare there.

To the same region are for the most part confined the other thick-billed Finches of the genera *Coccothraustes, Corythus, Pyrrhula*, and their allies; but most of these pass into the central hilly region in spring in search of ripe fruits and berries, and in the winter some of them proceed to the plains in search of food and warmth, or are carried there by dealers. The Himalayan Siskin is almost always found in the central region, where indeed it is commoner than in the northern; and one of the roseate Finches is very common below in the winter, under the name of the Tooti or Surkha Tooti. This I believe is the *Hæmorhous rosea* and *Coccothraustes rosea* of authors: it is an anomalous or osculant form, which cannot I think be referred to any known genus. I call it *Pyrrhulinota*, because it unites a semi-pyrrhuline bill with the wings, tail and feet of *Linaria* and *Linota*.

Genus *Pyrrhulinota*, mihi.

Bill Pyrrhulo-Linarian; wings long and pointed, with the first quill usually longest; tail deeply forked; tarse rather shorter than the mid-toe and nail; toes long, laterals unequal, central long, hind least, but with the nail equal to the inner fore; nails simple.

Type, the common Tooti or Surkha Tooti of Hindostan; *Coccothraustes roseata* of Vieillot? *P. roseata*, mihi.

The other two rosy Finches of the hills are much less known below, though they also are found there, in the hands of dealers at least, and are called without distinction Goolabi Tooti. They are the *Fringilla rhodopepla* and *rhodochroa* of Vigors, apud Gould; but they are not I think true *Fringillæ*, but nearer to *Passer*. I denominate them

FRINGILLINÆ.

Genus *Propasser.*

Bill Passerine, with the culmen and gonys more or less curved or straight, and the tip distinctly notched; wings short, first quill less than three next, and longest; tail forked; legs and feet ambulant; tarse longer than mid-toe; toes compressed, laterals equal, central long, hind least; nails simple. Types, *rhodochroa* and *rhodopepla.*

We have in the northern region chiefly two species of true Bullfinch or *Erythrocephala*, Gould, and *Nipalensis*, mihi, to which we must add a third species, styled *epauletta* by me, but which deviates too much from the typical form to remain under *Pyrrhula*; I separate it as a new type, by the name of

Pyrrhoplectes.

Bill Pyrrhuline, but longer and less tumid, with the upper mandible subterminally, and the lower subcentrally notched; the gape angulated; wings shorter and more gradate than in *Pyrrhula*, with the fourth quill commonly longest; tail even or divaricated, not forked; legs and feet slenderer, longer, and more suited to action on the ground than in *Pyrrhula*. Type, *Pyrrhula epauletta*, As. Trans. vol. xix.

Propyrrhula Rubeculoides, mihi.—Above, together with the lower breast, belly and vent, smoky brown; face as far back as the eye, chin, throat and breast, bright red, of a sanguineous scarlet hue; bill dusky horn, paler below; legs dusky. Female fulvous, below with large central dashes of dusky brown, and the croup the same.

I shall conclude this paper with the description of a new and splendid species of Buzzard, peculiar to the Cachar and Tibet.

FALCONIDÆ.

BUTEONINÆ.

Genus *Buteo?*

Buteo leucocephalus, mihi.—General structure Buteonine, but the tarse two-thirds plumed to the front, and the nude part reticulate, not scutellate; acropodia half reticulate and half scutellate; colour medial brown, with the head and neck more or less perfectly albescent; chin to breast darker, and breast again paled crescent-wise; tail with frequent pale buff bars; bill blue; its tips and the talons black; legs and cere greenish yellow; iris hoary; size extremely large. Length, $25\frac{1}{2}$ inches (fœm.) by $58\frac{1}{2}$ in expanse of wing; closed wing, $17\frac{3}{4}$; bill to gape, 2; tail, $11\frac{1}{2}$; tarse (to sole), $3\frac{5}{8}$; central toe and nail, $2\frac{3}{8}$; hind, $1\frac{3}{4}$. Weight $3\frac{1}{2}$ lbs. Caught beyond the snows in Tibet.

Another species, with the tarse considerably plumed, leads to this bird from the Moor Buzzards. This second species has the general form and characters of the moor buzzard, but is distinguished at once by half the tarse being plumed; the tarsi likewise are shorter, and so are the toes; but the tarse is scutellate before and behind, as in that species and the rest of the Buzzards. There is no sign of the Circine facial disc in the present bird, which is I believe new, and belongs to *Buteo* proper and not to *Circus*.

Buteo plumipes, mihi.—Throughout of a uniform dusky brown, as in the moor buzzard; region of the lores only albescent; cere and legs greenish yellow; bill blue, with black tips and talons; tail very vaguely rayed with a paler shade of colour and wings internally. Of slender make, and with long and acute talons, whereas the white head is of very robust make, and has less acute but stronger talons. This is in make as in colours, a *Circus*; that, a buzzard proper or an eagle. In *plumipes* the tarse is scutellate before and behind, reticulate to the sides and at base, and two-thirds of the acropodia likewise are reticulate. The cere is large in both, and in both the nares are longitudinally cleft and irregularly ovoid in form. The one passes towards *Buteo* from *Circus*, the other towards *Aquila* from *Buteo*. Length (fœm.), $19\frac{1}{2}$ inches; bill, $1\frac{1}{4}$; tail, 9; tarse, 3; central toe and nail, 2; hind, $1\frac{1}{4}$. Procured in the central hilly region. Manners not noted.

ENTOMOLOGICAL SOCIETY.

October 2nd, 1843.—George Newport, Esq., President, in the Chair.

Captain Parry exhibited a box of Coleopterous insects from Colombia, including *Megasoma Elephas*, a curious genus allied to *Megalopus*, and another apparently allied to *Ancistrosoma*.

Mr. Westwood exhibited a gynandromorphous specimen of *Endromis versicolor* from the collection of Dr. Becker, the antennæ and wings on the left-hand side being masculine, and those of the right side being female.

The Rev. F. W. Hope exhibited a specimen of the larva of *Acilius* voided by a boy at Tunbridge Wells.

The following memoirs were read:—

"Description of new species of exotic *Coleoptera*." By the Rev. F. W. Hope, F.R.S.

Lucanus Parryi, Hope. *Niger nitidus, mandibulis longitudine capite æqualibus, apicibus acutis supra dentatis; elytris glabris; tibiis anticis externè serratis, posticis unispinosis.* Long. corp. lin. $16\frac{1}{2}$; lat. lin. $5\frac{1}{4}$. *Affinis* L. nepalensi, *Hope*.—Hab. in Agro Nepalensi. Mus. Parry.

Lucanus Vitulus, Dejean (ined.) ♀. *Niger nitidus glaber, mandibulis brevibus acutis; thorace marginato, angulis anticis haud productis, posticis parùm rotundatis; tibiis anticis externè denticulatis, posticis* 4 *in medio unispinosis.* Long. corp. lin. 16; lat. lin. 6.—Hab. in Javâ. Mus. Buquet.

Lucanus (Hexarthrius) Buquettii, Hope. *Niger, mandibulis exsertis arcuatis, apicibus* 2-*furcatis, introrsum crenatis unidentatis denteque majori ferè basali; capite thoraceque scabriusculis; tibiis intermediis* 1-*spinosis, posticis* 2 *inermibus.* Long. corp. lin. 35; lat. lin. 9.—Hab. in Javâ. Mus. Buquet.

Pholiodotus Reichei, Hope, ♀. *Niger, capite thoraceque rugosis hoc tuberculato, mandibulis apice acutis; thoracis lateribus serratis, angulis posticis acutis; elytris ferè glabris obscuris, lineâ elevatâ obliquâ erosâ, e humeris ad medium disci extensâ; pedibus simplicibus.* Long. corp. lin. 15; lat. lin. 5.—Hab. in Colombiâ. Mus. Reiche.

Callirhipis Laportei, Hope. *Rubro-testaceus seu fulvus; antennis nigris, articulo basali antrorsum flavescente; thorace lineis tribus nigris; elytris maculis tribus basalibus apicibusque nigris; pedibus nigris; femoribus fulvis.* Long. corp. lin. $6\frac{1}{4}$; lat. lin. $1\frac{1}{2}$.—Hab. apud Coban. Mus. Hope.

Saperda ocularis, Hope. *Aurantia, antennis nigro-griseis pubescentibus, capite antrorsum atro, oculis albo cinctis; thorace posticè nigro, maculis 5 albis; elytris octo maculis albis atro-cingulatis ornatis; pedibus atro-griseis.* Long. corp. lin. $4\frac{1}{4}$; lat. lin. $1\frac{1}{4}$.—Hab. in Amer. Merid. Mus. Hope.

"Description of a new exotic genus of Longicorn Beetles, remarkable for the dilatation of the anterior femora." By J. O. Westwood, F.L.S.

Eupromera, Westw. *Corpus breve, crassum, subdepressum. Caput breve, verticale, pronoto parùm angustius. Antennæ ferè corporis longitudine, 11-articulatæ, subfiliformes; prothorax subquadratus, dorso lateribusque subtuberculatis, pone medium subconstrictus; elytra lateribus parallelis, apice inermia. Femora antica maxima inflata, tibiæ anticæ curvatæ, tibiæ 4 posticæ in medio haud scopiferæ.*

Eupromera Spryana, Westw. *Griseo-villosa fusco luteoque parùm variegata, apicibus articulorum antennarum fusco-cinctis, elytris fusco tuberculatis.* Long. corp. lin. $3\frac{1}{2}$.—Hab. in Brasiliâ. In Mus. Hope and Westwood.

"Account of the Fire-flies observed at the Baths of Lucca." By G. Woolmer, Esq.

These insects, which are termed *Luccioli* by the natives, evidently from their bearing light, belong to the same family (*Lampyridæ*) as the English fire-fly; but the females are winged, and in the spring and early part of the summer are seen in all directions on the wing, emitting a phosphoric kind of light at intervals; thus producing a most beautiful effect where they abound in company with the glow-worm. Previous to a storm they are more than usually active, and their light much more brilliant. In the day-time they rest on the bushes in a state almost of torpor. Their flight is very regular, the light appearing and disappearing at short distances. They entirely disappear shortly after the hay is gathered in. It is considered that it is the female which emits the light, thus attracting the male. The lower (posterior) part of the body, which emits the light, is of a sulphur colour, and is observed to shine for a short time even after death. When alive, any irritation offered to the part causes the insect to emit its light.

"Descriptions of various exotic *Crustacea, Coleoptera* and *Homo-*

ptera." (Annals of Natural History, vol. xii. p. 342.) By Adam White, Esq.; by whom it was stated, that a nest of *Pelopæus* provisioned with spiders had recently been presented to the British Museum from Sierra Leone by Mr. Whitfield.

November 6th.—The President in the Chair.

Mr. F. Bond exhibited two distinct species of *Geophilus*, which he had ascertained to possess luminous powers. Also a species of *Ornithomyia* (*O. viridis*?) which he had found to be parasitic both on bats and swallows.

Mr. W. F. Evans exhibited a specimen of the common Hornet, which he had confined in a small box, in which, some time subsequently, were found several specimens of the Dipterous genus *Molobrus*, which Mr. J. F. Stephens suggested had been hatched from eggs deposited upon the hornet after death and whilst still damp. He also exhibited the larva and pupa of a Lepidopterous insect (most probably the *Diatræa sacchari*, Guilding) which he had found in sugar-canes brought from Madeira. Also specimens of *Trechus fulvus* captured during flight after dark by candle-light.

Mr. Yarrell exhibited a specimen of *Lemargus imbricatus* which had been found parasitic upon the short sun-fish. Also specimens of *Cecrops Latreillei* from both the sun-fish and tunny.

A paper by G. R. Waterhouse, Esq., containing descriptions of some new species of *Curculionidæ* from the Philippine Islands, was read.

Mr. Walton brought under the notice of the Meeting the following case, in which some fixed rule of nomenclature seemed necessary. It appears that the *Curculio Alliariæ* of Linnæus belongs to the modern genus *Magdalis*. A very careful description of a species of the modern genus *Rhynchites* has however been published by Paykull, who applied the specific name of *Alliariæ* to it, expressing at the same time his doubts whether it were really the *Curculio Alliariæ* of Linnæus. Paykull's specific name has subsequently been altered by Stephens and Schönherr, as they considered, that as it was not the species described by Linnæus under the name of *Alliariæ*, it was improper to give the Linnæan name to it. After considerable discussion among the members present, it appeared to be the general opinion, that as Paykull had first given a good description of *Rhynchites Alliariæ*, it was proper to retain his specific name, citing *his* name, however, and not that of Linnæus, more especially as the Linnæan species belongs to a distinct modern genus, so that no confusion could arise from the employment of the same name in both genera.

December 4th.—The President in the Chair.

Mr. Westwood exhibited a drawing of a new genus of Goliath Beetles, received by Mr. Melly from Signor Passerini (*Amaurodes Passerinii*). Also a box of Beetles from the Ashantee district, including a new genus of Goliath Beetles (*Asthenorhina Turneri*), *Paussus microcephalus*, and other rare and new species from the collection of Mr. Turner.

The Rev. F. W. Hope exhibited a series of drawings of the transformations of various Indian *Lepidoptera,* made by Mr. Ezra Downes.

The following memoirs were read :—

"On the Existence of Thoracic Branchiæ in the Imago state of the Neuropterous genus *Pteronarcys.*" By George Newport, Esq., President E.S. (Annals of Natural History, vol. xiii. p. 21). In reference to this memoir Mr. Westwood stated, that he had detected some thoracic appendages in the genera *Ptychopteryx* and *Heliophilus,* described and figured in his 'Introduction to the Modern Classification of Insects,' vol. ii. fig. 126, 7. p. 526. note †, and p. 557, which he considered to be analogous to the branchiæ discovered by Mr. Newport in *Pteronarcys.* The latter gentleman however objected to this analogy, as the organs in question existed simultaneously with the true spiracles. Mr. E. Doubleday, in reference to a suggestion made by Mr. Newport, stated that he had always noticed that the North American species of *Chauliodes* are on the wing in rainy evenings.

"On the proceedings of a species of *Trombidium* which infested the Plane-trees in the Regent's Park during the past summer." By George Wilson, Esq., M.R.C.S. Communicated with additional notes by A. White, Esq.

At the beginning of September Mr. Wilson's attention was directed to the trees, several of which had the trunks and branches entirely or partially covered with a very delicate web, upon which myriads of a small Arachnidous insect were running to and fro, extending their webs rapidly along the branches. The web was so fine as to appear like a thin compact layer of varnish upon the stems of the trees; and from the vast numbers of the insects, the grey web appeared dusted with a reddish powder, the insects being of a light orange colour inclining to brown. From the web so completely enveloping the tree and obstructing the vital influence of the atmosphere, the leaves became withered and fell. This was especially the case with the plane-trees, the elms and horse-chestnuts being free from them. The weather for several days previously and subsequently was fine and sultry, but in the course of a few days a heavy fall of rain, accompanied by a thunder-storm, put a stop to the injury by destroying the insects. On placing a portion of the web with its inhabitants in a bottle, Mr. Wilson observed that in about an hour a beautiful transparent cylinder had been spun within the bottle from the base of the top, impinging against the side of the bottle at about half its height; and it was remarkable that there was not a single thread stretched across the inside of the cylinder, nor was a single insect enclosed within it. Having completed their first cylinder, they threw a second around it more slender than the former, leaving only a small interval between them.

Mr. White considered the species to be the *Trombidium tiliarium,* Herm., or an allied species, and distinct from the *Acarus telarum,* Linn., and *Trombidium socium,* the habits of which, as described by Hermann, were mentioned by Mr. White.

Mr. Walton informed the Meeting that a specimen of the true

Curculio Bacchus, Linn., but not of Marsham, had been captured on the 20th of September last on a young oak-tree at Birchwood, Kent, by Mr. B. Standish; Mr. J. F. Stephens however stated that he had taken both *R. Bacchus* and *auratus* from the same tree at Crayford.

MISCELLANEOUS.

DESCRIPTION OF A NEW SPECIES OF AFRICAN MONKEY.

Black-cheeked Ascagne, *Cercopithecus melanogenys*, n. s.

Black, olive speckled; ears, middle of the back and end of tail reddish; sides and outer side of the limbs grayish; hands and feet, frontal band, and lower part of the cheeks black; temples yellowish, broad cordate spot on the nose white; chin, chest and beneath ashy white.

Inhab. Africa. British Museum.

This species is at once known from the *Cercopithecus Petaurista*, with which it appears to have been confounded, by the distribution of the colour on the cheeks: in this species they are black below and yellowish above, while in that they are black above and yellow beneath, like the throat and chest, and in the spot of the nose, which is ovate and elongate in *C. Petaurista*, and broad and cordate in the one now described, and it also differs in the general colouring of the fur.

The species of this genus may be thus divided:—

a. Face flesh-coloured, whiskers white: *C. Cynosurus*.

b. Face black, whiskers white. * Frontal band none: *C. Sabæus*. ** Frontal band distinct, not bearded: *C. pygerythrus*, *C. Engythithia* and *C. ruber*. *** Frontal band distinct, chin bearded: *C. Diana*.

c. Face black, whiskers annulated: *C. albogularis*, *C. Mona*, *C. Campbellii*?, *C. leucocampyx*, *C. labiatus*, *C. Temminckii*, *C. Burnettii*, *C. Pogonias*.

d. Nose reddish: *C. erythrotis*.

e. Nose blue, white beneath: *C. Cephus*.

f. Nose white: *C. nictitans*, *C. Petaurista*, and *C. melanogenys*.

J. E. Gray.

MEXICAN FOSSILS.

In a letter to Prof. Bronn, M. Claussen states that he has again found in Brazil a great many fossil bones, and among them the head of a large tiger related to *Felis meganthereon* (*Ursus cultridens*), but it is much larger; the upper canine teeth are nearly 10 inches long and $1\frac{1}{2}$ broad. The French Institute has purchased it for 4000 francs. The remainder of the collection, except the duplicates, has been disposed of to the British Museum. He promises subsequently to communicate some remarks on the occurrence of these fossil bones, and especially on that of the human remains, which are found among the bones of various extinct animals. He has discovered two kinds of *monkeys*, which approximate to the genera *Mycetes* and *Cebus*. A short time since also, among a number of pieces of amber (not copal), he found some containing insects, in which distinct spiders' webs could be seen (thus fossil spiders' webs ! !) ; in some, the webs and also the insects hanging in them were evident.—*Leonhard and Bronn's Jahrbuch für Geologie.*

COUNTY OF DOWN FOSSIL INFUSORIA.

To the Editors of the Annals of Natural History.

Belfast, August 9, 1815.

GENTLEMEN,—As Dr. Mantell, in a communication published in the last Number of the 'Annals,' p. 86, briefly notices some *Fossil Infusoria* from the county of Down, without any allusion to their having been previously described, it is perhaps desirable for the information of persons interested in the subject to state, that a paper on the subject of these same Infusoria, accompanied by some figures, appeared in 1839 in Charlesworth's 'Magazine of Natural History,' vol. iii.

WM. THOMPSON.

CAPTURE OF ACIPENSER HUSO.

Cork, July 31, 1845.

A fine specimen of the Isinglass Sturgeon (*Acipenser Huso*), 8 feet 4 inches long, and weighing $1\frac{1}{2}$ cwt., was taken within a mile of this city on Tuesday July 1st.

I examined it carefully, and compared it with the plate of *A. Huso* in Shaw's 'Zoology,' with which it exactly agreed.

As this is, I believe, the first instance of that fish having been captured on the coast of this county, or, as far as I am aware, on any part of the coast of Ireland, I feel a pleasure in sending information on the subject to the 'Annals of Natural History.' The common sturgeon (*A. Sturio*) has been taken more than once in the river Lee, near Cork.

JOHN HUMPHREYS, *Librarian R C. Institution.*

ON THE CYSTIDEÆ. BY VON BUCH.

In a letter to Prof. Bronn, M. Buch states that his monograph of the *Cystideæ* is now printing. Troschel's drawings to it are very beautiful, and he hopes that the copper-plates will turn out well. A lucky incident has rendered this work more perfect than he had anticipated. The *Echino-encrinus* (a barbarous term, and one founded upon an entirely erroneous analogy !), described by Meyer and Schlotheim,—this extinct form has been collected and brought here in several pieces, by the industry of M. Krantz. Hence he had an opportunity of studying all its peculiarities, its affinity, the points in which it differs from other *Cystideæ*, and the laws of its development. He clearly saw that M. Vollborth in his first paper (Bullet. de Pétersb. 10. no. 19. pl. 1 and 2) had figured it well and accurately, with a commentary which did not seek for laws but curiosities ! In Bullet. 1844, 3. 2 *b*, he imagines that this form possesses two rows of arms, and consequently refers it to the *Crinoidea*. M. Vollborth saw these tentacula once only; no one else has seen them. They are placed on the lip of the mouth; the arms of the *Crinoidea* however are really never placed there; the apertures which our specimen exhibits on the lip, moreover, are so small, that they could only have allowed the passage of very small tentacles. And worse than all, what a huge ovarian aperture! No crinoid ever had such. M. Vollborth continually calls it the anus of the animal, not considering that in all such animals the anus is situated very near the mouth, never in the deeper-seated parts; in fact, in *Pentremites* it is in the mouth itself. But in *Sphæronites* and *Cryptocrinites* this is still more striking; in both, at the point of the five valves which close the ovarian aperture, there are five openings, just as in the minute ovarian plates of the *Cidarites* and other Echinodermata. Who will hereafter seek in them for cloacal excretions?

The *Cystideæ* are essentially distinguished from the *Crinoidea* by these ovarian apertures; this M. Von Buch states that he shall always maintain, and to have explained it is certainly of some service. —*Leonhard and Bronn's Jahrbuch für Geologie, &c.*

ON THE ORIGIN OF INFUSORIA AND MUCOR.

In the 'Ann. des Sci. Nat.' 1845, Zool. p. 182, Dr. M. F. Pineau describes the first origin of infusoria and of mould, which resemble one another so much on their first appearance, that it is impossible to determine what will become an infusorium, what a mould. We shall here merely communicate one of the cases relating to the manner in which *Penicillium glaucum* is formed; as in the other cases enumerated, the observer could not follow the originating mould to its perfect development, and was consequently unable to determine it.

An infusion of bread exhibited up to the sixth day at a temperature of 10° to 12° R. the appearance of a considerable production of *Bacterium Termo*, *Vibrio lineola* and *Monas lens*. Soon after this period acid fermentation commenced, when all these animals died, and the liquid became covered with a uniform granular pellicle. The surface of the piece of bread was also covered with granulations, and numerous particles, more or less in the granular state, were seen floating about in the water. On the following day traces of a separation in the form of a network with polyangular meshes 0·003 millimeters broad were noticed in the granular mass covering the surface. A similar formation of small globules also took place in the granular substance on the bread. After twelve hours these globules possessed well-defined outlines and began to assume an oval form. Small isolated patches consisting of considerably larger oval globules, difficult to separate from one another, likewise floated about. A few hours afterwards the liquid contained a number of micodermic globules which had evidently originated from the above patches; these globules now expanded into filaments and formed the *Penicillium glaucum*. In the same manner this *Penicillium* likewise formed on milk; but the author could not observe what Turpin has said respecting the fat globules which change into filaments of mucor. The other experiment, which was not carried on to the fructification of the mould, was made with isinglass and the addition of a little vinegar. No animals were formed in it, but in other respects it presented all the appearances of the other case, only that the filaments aggregated into a thick thallus.

Preparing for Publication.

Dr. Johnston is preparing for the press a second edition of his 'History of British Zoophytes.' It will be published by Mr. Van Voorst in a style to correspond with that spirited publisher's series of 'Histories of British Animals,' and will contain descriptions of all the species discovered since the publication of the first edition, with numerous additional plates.

METEOROLOGICAL OBSERVATIONS FOR JULY 1845.

Chiswick.—July 1. Rain and boisterous, with heavy rain in forenoon: overcast. 2. Overcast: rain. 3. Sultry: thunder and rain: clear at night. 4, 5. Very fine. 6. Sultry, with slight dry haze: lightning at night. 7, 8. Very fine. 9. Cloudy: rain. 10. Rain: overcast. 11. Rain: cloudy: 1 P.M. thunder and excessively heavy rain commenced. 12. Fine. 13. Slight rain: overcast. 14. Very fine: rain. 15. Showery: fine. 16. Very fine: rain. 17. Showery. 18, 19. Very fine. 20. Cloudy: rain. 21. Fine. 22. Very fine: rain. 23. Drizzly. 24. Overcast. 25, 26. Foggy: overcast. 27, 28. Cloudy: rain. 29. Heavy clouds: clear. 30. Densely clouded: rain. 31. Heavy showers.—Mean temperature of the month $1\frac{1}{2}°$ below the average.

Boston.—July 1. Cloudy: rain early A.M.: rain A.M. and stormy P.M. 2. Cloudy. 3. Cloudy: rain early A.M.: rain with thunder and lightning A.M. 4. Cloudy: rain, with lightning P.M. 5. Fine. 6. Fine: lightning at night. 7. Fine: 3 o'clock P.M. thermometer 81°. 8. Fine. 9. Fine: rain P.M. 10. Cloudy. 11. Rain. 12, 13. Cloudy. 14. Cloudy: rain early A.M.: rain P.M. 15, 16. Fine. 17. Rain. 18. Fine. 19. Cloudy. 20. Cloudy: rain P.M. 21—27. Cloudy. 28. Fine: rain P.M., with thunder and lightning. 29. Rain: rain early A.M: rain P.M. 30. Fine: rain P.M. 31. Fine: rain, with thunder and lightning P.M.

Sandwick Manse, Orkney.—July 1. Cloudy: rain. 2. Damp: clear. 3. Clear: drizzle. 4. Clear: showers. 5, 6. Clear. 7. Rain: fog. 8. Clear. 9. Cloudy: showers. 10. Showers: clear: damp. 11. Bright: showers. 12. Showers. 13. Showers: clear. 14, 15. Cloudy: showers. 16. Cloudy. 17. Clear. 18, 19. Bright: hot. 20. Damp: fog. 21. Fog. 22, 23. Cloudy. 24. Cloudy: damp. 25. Cloudy: drops. 26. Drops: cloudy. 27. Clear: showers. 28. Clear: rain: clear. 29. Fine. 30. Cloudy: fine. 31. Bright: drops.

Applegarth Manse, Dumfries-shire.—July 1. Very heavy rain. 2. Very beautiful day. 3. Showers: thunder. 4. Fine. 5. Very fine. 6. Showers: thunder. 7. Showers A.M.: fine P.M. 8, 9. Showers. 10. Fair and fine. 11. Showers. 12. Fair and clear. 13. Wet. 14. Heavy showers. 15. Fair and fine. 16. Heavy showers. 17. Fair and fine. 18, 19. Fair, but cloudy. 20, 21. Fair, but clear. 22, 23. Fair, but cloudy. 24, 25. Fair and fine. 26. Showers. 27. Fair A.M.: showers P.M. 28. Fine: thunder. 29. Showers P.M. 30, 31. Showers.

Mean temperature of the month	56°·2
Mean temperature of July 1844	56 ·9
Mean temperature of July for twenty-three years	58 ·1
Rain in July	2 ·18 inches.
Mean rain in July for eighteen years	3 ·91 „

Meteorological Observations made 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.			
	Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. July.	Max.	Min.		9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9½ a.m.	8½ p.m.								
1.	29·665	29·572	29·09	29·16	29·10	29·46	29·21	71	52	58	57	51	53	51	sw.	s.	e–sw.	ne.	·13	·05	......	......
2.	29·824	29·776	29·26	29·55	29·70	29·45	29·80	65	56	61	64	50	49½	52½	s.	calm	nw.	sw.	·06	·16	......	·46
3.	29·828	29·640	29·19	29·60	29·40	29·88	29·65	84	52	71	65	49	57	52	s.	calm	ne.	e.	·01	·12	......	......
● 4.	30·109	30·033	29·48	29·68	29·94	29·34	29·87	75	50	62·5	62½	50½	58	50	s.	w.	sse.	wsw.	......	·20	......	·24
5.	30·196	30·161	29·69	30·04	30·10	30·03	30·19	77	56	68	66	50	58½	55	s.	w.	ese.	s.	......	·27	......	·06
6.	30·067	29·990	29·58	30·07	29·90	30·21	30·16	81	60	69	68½	52	61	52	e.	se.	se.	e.	......	......	......	......
7.	29·960	29·943	29·34	29·79	29·81	30·00	29·84	84	56	72	68	56½	52	52	se.	w.	s.	s.	·01	......	......	·06
8.	29·959	29·940	29·32	29·71	29·64	29·77	29·60	78	54	66	66	55	60	53½	sw.	w.	s.	se.	·01	......	0·82	·03
9.	30·001	29·978	29·36	29·66	29·66	29·57	29·57	71	53	66	66	54½	58	53	sw.	w.	sw.	wsw.	·15	......	......	......
10.	29·818	29·721	29·22	29·56	29·52	29·60	29·67	71	55	61	67	54	55	50	sw.	w.	s.	n.	·02	·06	......	·10
11.	29·722	29·533	29·04	29·53	29·66	29·72	29·78	70	46	64	65	47	52½	47	sw.	w.	nne.	nw.	·71	·10	......	·10
☽ 12.	29·946	29·907	29·40	29·78	29·81	29·83	29·87	64	48	56	63	44½	55	50	nw.	w.	nnw.	nw.	·07	·08	......	·05
13.	29·940	29·811	29·49	29·79	29·69	29·84	29·80	71	55	64	56½	46½	51½	50	sw.	calm	se.	nw.	·01	......	......	·09
14.	30·035	29·884	29·35	29·80	29·96	29·84	30·03	71	49	61	63½	52½	51½	49½	w.	w.	nw.	nw.	·04	·06	......	·04
15.	30·069	30·059	29·61	30·00	29·94	30·10	30·09	71	46	60	63½	44	49	49	n.	nw.	nw.	n.	·03	·06	......	·15
16.	30·045	30·005	29·56	29·93	29·82	30·02	29·94	71	54	58·5	62	41½	49½	50	sw.	calm	sw.	sw.	·07	......	0·60	......
17.	30·029	29·974	29·47	29·77	29·84	29·92	29·94	75	54	58	62½	51½	54	53	sw.	calm	w.	se.	·02	·09	......	......
18.	30·091	30·066	29·55	29·94	30·00	30·08	30·17	76	48	64	68	52½	58	53½	sw.	w.	e.	e.	......	......	......	......
○ 19.	30·058	30·020	29·58	30·03	30·05	30·22	30·22	71	52	58	65	51½	58	53	e.	w.	ene.	se.	......	......	......	......
20.	30·041	29·955	29·60	30·08	30·04	30·26	30·27	71	53	57	62½	51½	54	52	e.	n.	n.	n.	·24	......	......	......
21.	29·924	29·908	29·50	30·02	30·04	30·27	30·25	73	57	61	64	54	54	50	e.	calm	ene.	ne.	......	·12	......	......
22.	29·935	29·866	29·49	30·00	30·00	30·25	30·20	71	54	57	60½	51½	51½	52	ne.	e.	ene.	n.	·05	......	......	......
23.	29·910	29·905	29·48	29·98	29·98	30·15	30·10	58	53	57	58	50	52	51	ne.	calm	ne.	nw.	·05	......	......	......
24.	29·924	29·905	29·48	29·92	29·90	30·03	29·92	60	55	57	60½	51½	55	52	ne.	calm	w.	w.	......	......	0·25	......
25.	29·932	29·931	29·50	29·83	29·80	29·85	29·78	64	57	61	65½	54½	56	53½	ne.	calm	s.	sw.	......	......	......	......
☾ 26.	29·929	29·921	29·43	29·78	29·68	29·66	29·51	71	52	64	63½	50	53	57	se.	calm	sw.	s.	......	......	......	......
27.	29·869	29·774	29·27	29·48	29·54	29·40	29·42	67	48	63	64	55½	60	52	w.	calm	sw.	w.	·07	......	......	·16
28.	29·746	29·577	29·22	29·55	29·53	29·55	29·65	72	44	63·5	63½	45½	55	51	nw.	calm	w.	......	·05	......	......	......
29.	29·794	29·559	29·10	29·58	29·60	29·74	29·72	65	43	53	65	41½	56	52	w.	calm	sw.	......	......	·78	......	·15
30.	29·790	29·577	29·24	29·50	29·30	29·55	29·60	64	45	62	62½	40½	53	51	sw.	calm	se.	se.	·33	·19	0·51	......
31.	29·587	29·545	29·09	29·28	29·29	29·62	29·65	69	50	61	61½	51	56	54½	sw.	w.	se.	e.	·18	·17	......	......
Mean.	29·927	29·852	29·38	29·464	29·749	29·845	29·853	71·03	51·84	61·7	63·5	48·4	54·88	51·74					2·31	2·51	2·18	1·69

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XXII.—*On the Howling Monkeys* (Mycetes, *Illiger*). By J. E. Gray, Esq., F.R.S. &c.

Much attention has been paid by various zoologists to the species of Monkeys of the Old World, but as yet little consideration has been devoted to those of the western hemisphere, and probably zoologists have been deterred from attending to them on account of the difficulty of the subject.

Humboldt in his 'Zoological Observations,' Prince Maximilian and Spix in their works on Brazilian zoology, are almost the only modern authors who appear to have written on them from the personal examination of the specimens, having moreover enjoyed the advantage of observing them in their native forests.

Spix described one of the species, *M. Caraya*, as being black in the male and yellow in the female and young; and Prince Maximilian observes that the males and the specimens of *M. ursinus* from the more northern regions of Brazil are rufous or ferruginous, whilst the female and those from the more southern regions are brown or blackish brown, and Lichtenstein describes the young of this species as blackish. Cuvier observes, that there is very little difference between *M. ursinus* and *M. seniculus*.

We have been fortunate at the British Museum in having procured a considerable number of specimens of this genus, and as I find amongst those that have been received at the same time or from the same localities the two sexes of nearly the same colour, and the young and adult equally so, I am inclined for the present to regard them as species; at the same time I must confess that some of the specimens of the same apparent species vary considerably in tint, and that some of the black species have so many red hairs scattered amongst their fur when it is bent back and examined, as to make one almost doubt if the black are not another state or local variety of the red ones.

Under these difficulties, I think it is desirable that the various specimens which we have in the British Museum should be accurately described, leaving the consideration of the permanence of the distinctions pointed out to be determined at some future time, or by a person more fortunately placed for such a purpose. In examining the species, I have been induced to believe that the manner in which the hair of the forehead is directed offers perhaps a better character for the separation of the species than that of the colour, or the length, softness or stiffness of the hairs; I have therefore used it to divide the species or varieties into two groups, though it separates specimens of nearly the same colour and external appearance; and I am aware that sometimes the hair of the forehead has its direction more or less changed by the animal-preserver; yet, as far as I have been able to examine these animals, it appears to afford a very available character.

The next character in importance appears to be the length and softness, or the stiffness of the hairs of the fur; unfortunately, the different degrees of this character are not easily expressed in words. In most of the species the hair is of one colour, appearing more or less annulated from the slight curl or rather wave in the hair; but in others it is darker at the base, and one species has an obscure indication of a paler central ring.

I shall now proceed to characterize the different specimens in the British Museum collection, premising, that for the purpose of coming to a more correct conclusion as to their distinctness, I have examined all the specimens which have come under my observation in other English and continental museums. I may remark that measurements are of little importance, as the adults of all the specimens are nearly of the same size, and as nearly as one can judge from stuffed specimens, the limbs, &c. are nearly of the same proportion.

I. *Forehead high, with the hair reflexed, forming a ridge across the centre of the head.*

1. The Araguata or Brown Howler, *Mycetes ursinus,* Pr. Max. Abbild. t. *Simia ursina,* Humb. Obs. t. 30. *S. Guariba,* Humb. Obs. Zool. *M. fuscus,* Kuhl, Beytr.; Spix, Braz. t. 30. brown var.; *M. stramineus,* Spix, Braz. t. 31. yellow var.; *M. barbatus,* fœm., Spix, Braz. t. 33 ? yellow var. ?

Brown or blackish, yellow-washed; hairs rather rigid, brown with yellowish tips.

Inhab. Brazils and British Guiana.

We have two males and two females of this species; one of the latter is young and the other adult. One male is yellow, with the tail, hands and feet, the sides of the head, body and limbs redder. It agrees well with the *M. stramineus,* Spix, t. 31. The young female is yellow-brown, darker on the shoulders; the adult is black slightly washed with yellow from the small yellow tips to the blackish hairs, and the other male is just intermediate in colour between the two females; the latter nearly agrees with *M. fuscus,* Spix, t. 30. In the Zoological Society's museum are two females from British Guiana, which are of a uniform dark brown, with the hair between the shoulders very minutely yellow-tipped.

2. The Golden Howler, *Mycetes seniculus,* Kuhl. *Simia seniculus,* Linn. Royal Monkey, *Penn.*; Buffon, N. H. Supp. vii. t. 25.

Reddish chestnut; middle of the back golden yellow; hair one-coloured to the base, short, rather rigid, without any under-fur; of the head short.

Inhab. Brazils.

The Museum collection contains three adult males: we have no females of a different colour that would suit them, and we have none that have not their proper-coloured mates.

3. The Silky Howler, *Mycetes laniger.*

Reddish chestnut; middle of the back golden yellow; hair elongate, very soft and silky, dark brown at the base, golden or chestnut at the tip, with a close under-fur; of the head rather elongate.

Inhab. Columbia. Purchased at Paris.

We have two males and two females of this species, an adult and half-grown specimen of each sex; one of the females has the end half of the tail decidedly rather paler, so that in this particular it agrees with *M. chrysurus* of M. I. Geoffroy; but the other specimen varies a little in the intensity of the colour of this part, so that I cannot consider it of any importance.

4. Black and Yellow Howler, *Mycetes bicolor.*

Black; hair rather rigid, uniform black, sides of the loins varied with yellow; hair of this part black, with a broad subcentral reddish-yellow band.

Inhab. Brazils.

We have an adult male; it is much like *M. Caraya* in external appearance, but the hair of the forehead is decidedly reflexed, marking a distinct ridge. It is most like *M. seniculus* in texture of fur, &c., but very different-coloured. If it had not been of the same sex and age as our specimen of that species, I might have been inclined to have regarded it as identical.

II. *Forehead with the hair directed forwards; crown smooth with radiating hairs.*

5. Red and Yellow Howler, *Mycetes auratus.*

Dark red chestnut-brown; back and sides golden yellow; hairs rather short and rigid, dark at the base; beard darker.

Inhab. Brazils.

We have an adult specimen which appears to be a female. It is very like *M. seniculus* in colour and in the shortness and rigidness of the fur, but differs in the hair being brown at the base, like *M. ursinus* and *M. laniger,* and from all these species in the direction of the rather short close-pressed hair of the forehead.

6. Black Howler, *Mycetes Caraya. Simia Caraya,* Humb. Obs. Zool. *M. niger,* Pr. Max. Abbild.

Black; hair rather elongate and rigid, uniform black; the sides, especially at the loins, with interspersed reddish hairs.

Inhab. Brazils.

We have an adult male.

7. Gray-handed Howler, *Mycetes barbatus,* Spix, Braz. t. 32 ♂.

Black; circumference of the face, hands, feet, inside of the thighs and end of the tail grayish; hair moderately long, rather rigid, uniform-coloured.

Inhab. Brazils.

An adult (sex doubtful, probably female).

8. Yellow-handed Howler or Guariba, *Mycetes Beelzebul. Simia Beelzebul,* Linn. *M. rufimanus,* Kuhl, Dict. Sci. Nat. xlix. *M. discolor,* Spix, Braz. t. 34?

Black; hands, feet, upper line and tip of the tail, spot in front of the ears and on knee reddish yellow; hairs rather soft, uniform black or reddish, with a few interspersed brown hairs on the shoulders.

Inhab. Brazils, Para.

We have an adult and a half-grown female, and the very young of the adult specimen.

9. The Villose Howler, *Mycetes villosus.*

Black; hair very long, silky, uniform black, on the cheeks under the ears brownish at the base.

Inhab. Brazils.

We have an adult specimen of this species, which is immediately known by the abundance, softness and length of the hair; but unfortunately it is in such bad condition that we cannot be quite certain of the direction of the hair on the forehead, though it appears to be directed forwards, nor of the sex.

Besides the nine species here described, there have been described two which do not exactly agree with any specimens I have seen, viz. *M. chrysurus,* I. Geoff., Guérin, Mag. Zool. 1832, and *M. flavicaudatus,* Humboldt.

XXIII.—*Notes, &c. on the genera of Insects* Oxystoma *and* Magdalis. By John Walton, Esq., F.L.S.

Fam. CURCULIONIDÆ.

Genus Oxystoma, *Steph., Westw., Spry and Shuckard.*

Mr. Stephens has created this genus for the reception of the following three species, separated by him from that of *Apion,* which he refers to Duméril; but the latter author has taken his characters from *Attelabus Pomonæ* of Fabricius*, and it is very remarkable, that Duméril appears not to have been aware that Kirby had previously characterized the genus *Apion* as a tribe of insects which includes that species, consequently the name *Oxystoma* of Duméril is cited by Kirby and Schönherr as a synonym to that of *Apion.* I have always entertained considerable doubt, from the characters selected by Mr. Stephens, whether *Apion fuscirostris, Ulicis* and *Genistæ* ought to be separated generically; Kirby and Curtis have located them in a separate section in the genus *Apion,* because the rostrum is bent downwards or nutant (a character common to many species), and this appears to be the chief character upon which the new genus *Oxystoma* is founded. It is generally understood that the female of *Oxys. Ulicis,* with its remarkable elongate deflexed rostrum, is the type of the genus as figured and referred to in the 'British Coleoptera' by Spry and Shuckard, and is also referred to *Ap. Ulicis* of Kirby by Westwood in his 'Generic Synopsis'; but Stephens describes the second and third joints of the antennæ as "subglobose," whereas they are elongate, neither does the form of the rostrum nor the structure of the antennæ in the male agree with the characters given by him; therefore I think he has drawn them from *Oxys. fuscirostris,* as it stands first in the genus. The three insects in question approximate rather closely in general habit and affinity to some of those species of the genus *Apion* which are placed by Germar and Schönherr in the section that have their antennæ seated near to the base of the rostrum, and likewise have the rostrum (when in its natural position) deflexed; for example, the small males of *Ap.*

* Dumér. Consid. sur les Ins. tab. 16. f. 6, 1823.

Ulicis to the large females of *Ap. atomarium*, and the female of *Ap. Hookeri* to that of *Ap. Genistæ*: in the construction of the rostrum *Ap. fuscirostris* resembles *Ap. Ervi, Viciæ, vicinum* and *vorax*, whilst others are more curved and deflexed, as *Ap. varipes, Ononides* of Gyll., &c. Many species both foreign and British are clothed more or less with hairs or bristles, and some with elongate scales of various forms, as *Ap. Malvæ, vernale, fuscirostris, Ulicis* and *Genistæ*, but these characters are only regarded as specific, not generic. All the species of the genus *Apion* have the rostrum with two oblique fossulets or oblong foveæ more or less deep, terminating outwardly at the sides and inwardly beneath the rostrum; their external edges or margins are more or less incrassated or dilated, and are placed at a greater or less distance from the base; the antennæ are inserted within the fossulets at the under sides, and always in the same relative situation; the form of the rostrum, the structure of the antennæ, together with the sexual dissimilarities in those organs are so extremely anomalous and discrepant in this natural group of insects, that it is very difficult to find good or fixed characters for the foundation of genera; the species are held together by general habit, and especially by a peculiarity in the form of the trochanters first described by Kirby*.

The three species comprised in the genus *Oxystoma* are furnished with a remarkable process at the base of the rostrum beneath, which I shall endeavour to describe under their respective names, and which, as far as I know, has not been noticed before; but these appendages or processes are not confined to those species, for *Apion Carduorum* participates, and others in the genus *Apion* have modifications of the same, but not so fully developed; *Oxys. fuscirostris, Ulicis* and *Genistæ* differ however from all the species of the genus *Apion* that I have examined in not having antennal grooves at the base of the rostrum beneath, or under the head, as in *Apion Craccæ, Pomonæ* and *subulatum*; these characters may be considered of sufficient importance to constitute a new genus, and I therefore leave *Oxystoma* as it is.

1. *O. fuscirostris*, Fab., Steph.
   Apion melanopum, Marsh., Kirb.
   — *fuscirostris*, Germ., Schönh.

This insect is sparingly clothed with whitish and cinnamon-coloured elongate scales, which are distinct and well-defined when magnified. The rostrum is thickened at the base above, and dilated on both sides at the points of insertion of the antennæ, and has two deep oblong foveæ very near the base beneath,

* Linn. Trans. vol. x. p. 347.

diverging outwardly and terminating on each side in a deep sinus for the reception of the antennæ when extended forward; the decurved edges behind each sinus are much produced in the middle, curved inwardly, and form the posterior edges of the foveæ; the latter have between them a narrow longitudinal ridge; the rostrum, when viewed at the sides, has the appearance of being bidentate at the base; the antennæ are inserted at the under sides of the rostrum near the base and within the foveæ.

Apion difficile of Herbst, of which I have specimens from Germar, is a distinct species, but closely allied to *O. fuscirostris*, and having the rostrum at the base, as described by Germar, bidentate.

I have taken many specimens of this insect in the Charlton sand-pits, and at Shirley Common near Croydon, from the broom (*Spartium Scoparium*) in October.

2. *O. Ulicis*, Foster, Steph.
Apion Ulicis, Marsh., Kirb., Germ., Curt., Schönh.

This insect is densely covered with silvery gray elongate scales. The female differs from the male in having the rostrum remarkably longer, the antennæ distinctly longer and more slender, and as a consequence the length of the articulations is extremely disproportionate in the sexes. The rostrum at the base above and beneath and its appendages are very similar to the preceding species, but it differs in having the foveæ strictly at the base, with their external decurved edges considerably more dilated in the middle, and when viewed laterally it appears to be acutely bidentate; the antennæ are inserted at the under sides of the rostrum near the base and within the foveæ.

Very abundant in Yorkshire and in the south of England on the common furze (*Ulex europæus*) from February to November. Mr. George Luxford, by gathering (on the 1st of August) a number of the unopened pods of the common furze, found several perfect insects of this species inclosed in nearly every one that he examined.

3. *O. Genistæ*, Steph.
Apion Genistæ, Kirb., Germ., Curt., Schönh.

Densely clothed with silvery white and fawn-coloured elongate scales; the rostrum at the base is constructed like that of *fuscirostris*, and with a similar process, but the decurved edges of the foveæ in the middle are less produced, and consequently when viewed in profile it appears indistinctly bidentate.

I found this insect abundant on the north side of the Lake House, Wanstead Flats, on *Genista tinctoria* in September, and it is the only locality for it near London that I am acquainted with; it appears to be very local and not frequently met with.

Genus Magdalis, *Germ.*, *Steph.*, *Curt.*

Magdalinus, Schönh. vii. p. 135.

Thamnophilus Schönh. olim, *Rhinodes Schönh.* olim, Steph., *Panus Schönh.* olim, Steph., Westw.

The few indigenous species of this genus have been described by British and foreign authors under so many different names, which have been so often transposed, that the nomenclature and synonymy of several species are in the greatest confusion; the sexual dissimilarities in the form of the rostrum and the clava of the antennæ in many species, and the great variation in magnitude in nearly the whole, have added to the difficulty of determining the species correctly.

A. *Femora dentate.*

1. *M. phlegmatica*, Herbst, Gyll., Germ., Schönh.

Linear-elongate, blue-black and subglabrous. Head narrow, oblong, subconical, depressed between the eyes, very closely and minutely punctured; eyes rather large, prominent, and obscure brown; rostrum subcylindrical, nearly as long as the head and thorax, porrect, a little bent, slender, black and shining, delicately punctulated throughout. Antennæ rather longer than the rostrum, the basal joint piceous, the club robust, pubescent and fuscous, inserted just behind the middle of the rostrum. Thorax longer than broad, constricted and deeply impressed in front, the anterior margin elevated, the base bisinuated, with the posterior angles produced and reflexed, almost flat above, very thickly punctured and dull blue-black. Elytra punctate-striate, the intersticies very distinctly punctulated and shining, and greenish blue. Legs blue-black, with all the femora acutely dentate. (Length $2\frac{1}{4}$—$2\frac{3}{4}$ lines.)

I possess specimens of *M. frontalis* of Gyll. from Germar, which are identical with *Curc. Alliaria* and *C. violaceus* of the Linnæan cabinet, and I also possess Swedish specimens that agree with the description of *Rhynch. violaceus* of Gyllenhal.

A specimen of this fine insect, which is new to our fauna, was first found by the Rev. Wm. Little four or five years ago, on the 25th of May, by sweeping in marshy ground in Dalmeny Park, Scotland; subsequently Mr. R. N. Greville captured two others in the same locality, one of which he kindly presented to me: these are all that are known.

2. *M. carbonaria*, Linn. (Mus. Linn.), Gyll. ♀, Curtis ♂ ♀.
Rhynch. atratus, Gyll. ♂, vol. iii.
M. atramentaria, Germ. (not Marsh.), Gyll. ♂ ♀, Schönh.

This insect differs from the following in having the thorax narrowed in front, dilated and rounded at the sides, and the latter crenulated before the middle; the elytra very shining, profoundly punctate-sulcate, the intervals between the punctures narrow and distinctly elevated, the interstices of the sulci narrow, convex, nearly smooth or very finely rugose transversely. (Length 2—3½ lines.) Gyllenhal justly observes, that it varies greatly in magnitude; it also varies in having the sides of the thorax more or less dilated and rounded in the middle. Mr. Waterhouse has a fine male specimen (3⅓ lines) that has the thorax subglobose, with the sides remarkably dilated and rounded. I have a very small female specimen that only measures two lines in length, and has the thorax less rounded at the sides in proportion. The insect preserved in the Linnæan museum, which is pinned to the name *carbonarius*, agrees so well with the short description of Linnæus, that I have no doubt of its authenticity; it is a large female (3½ lines), and the insect placed near to the label, but not upon it, is certainly a small male (2 lines) of the same species; these insects agree so very closely in every character with Gyllenhal's descriptions of *Rhynch. carbonarius* (♀) which he refers to Linnæus, and *R. atratus* (♂), that there can be no doubt of their identity. Mr. Curtis has figured with his usual accuracy the female, and the head and rostrum of the male; I have frequently inspected the two insects in his cabinet, and I am now satisfied they are correctly referred by him to *Curc. carbonarius* of Linnæus, although at one period, from the variable form of the sides of the thorax and their small sides, I was a little dubious. Germar has incorrectly referred this insect to *Curc. atramentarius* of Marsham*; Gyllenhal in his 4th volume, in accordance with the opinions of Schönherr and Germar, has adopted that name, and cited *carbonarius* of Linnæus as synonymous; Schönherr in his Supplement (vii. p. 140) still adheres to the Marshamian name, and there refers it to Germar!, notwithstanding he had previously received specimens from me (as will be seen below) of the true *Curc. atramentarius* of Marsham and Kirby. *Curc. carbonarius* of Fab. (Mus. Fab.) is referred with doubt by Germar to Linnæus; it is elaborately and well described by Professor C. H. Boheman in the work of Schönherr under the name of *Magdalinus carbonarius* of Fabr., a name that must necessarily be changed. I possess an insect given to me by Mr. Bracey Clark (which he found upon the fir, *Pinus sylvestris*, at the sides of the Jura mountains in Switzerland) that agrees exactly with the description by Boheman of *Curc. carbonarius* of Fab.

Only seven specimens of this insect have come under my observation: two in the collection of Mr. Curtis, taken by him from a hazel-tree near Ambleside the 19th of June; one in each of the

* Ins. Spec. p. 193.

cabinets of Mr. Dale and Mr. Waterhouse; the fifth in that of the Rev. Wm. Little, captured at Rachills in Dumfries-shire; the sixth received by Mr. S. Stevens from Newcastle, and the seventh kindly presented to me by Mr. Heysham of Carlisle; it appears to be rare and only found in the north.

3. *M. aterrima,* Fab. 1781 (Mus. Fab., Mus. Banks), Germ., Steph.
   Curc. atramentarius, Marsh. 1802 (Mus. Steph., Mus. Kirb.), Steph.
   — *stygius,* Marsh. var., Gyll., Schönh., Curt.
   M. asphaltina, Steph. ♂.

This insect differs from the preceding in having the thorax subquadrate, the sides slightly rounded, sometimes nearly straight, and armed on each side adjacent to the anterior margin with a large tooth, behind which are several smaller ones; the elytra less deeply punctate-striate, the interstices flat, broader than the striæ, and very finely strigated transversely or coriaceous. I forwarded many specimens of this insect to Schönherr and Germar, with the name *Curc. atramentarius* of Marsham and Kirby, citing *Curc. stygius* as synonymous, with a note of interrogation to the latter name; all my specimens were referred by them to *Magd. stygia* of Gyll., *aterrima* of Fab.; subsequently I have had an opportunity of examining a typical example of *Curc. stygius* of Marsham, and I have now no doubt whatever it is but a small narrow variety of his *Curc. atramentarius.* According to the museums of Fabricius and Banks, the first examined by Germar and the last by myself, this species is doubtless the true *Curc. aterrimus* of Fabricius; but he refers it to Linnæus; yet the Linnæan *Curc. aterrimus,* according to the insect in his cabinet, is the *Apion marchicum* of Herbst, and as it does not entirely agree with the description of Linnæus, the name is sunk into a synonym (see notes on *Apion marchicum*); under these circumstances I consider there will be less risk of confusion by following Germar and Stephens in adopting the oldest name.

This is rather a common insect in the south of England, but apparently very scarce in the north; I have found it in Yorkshire, and plentifully near Gravesend, always upon the common elm-tree (*Ulmus campestris*), in July.

B. *Femora unarmed.*

4. *M. Cerasi,* Linn., Marsh., Germ., Gyll., Schönh.
   Rhynch. Rhini, Gyll. ♀, vol. iii.
   Rhinodes Cerasi, Steph. ♀.
   Panus barbicornis, Steph. ♂, Mus. Steph.
   Curc. Cerasi, Mus. Kirb.

The males of my foreign specimens of *Magd. barbicornis* from

Germar and Chevrolat differ from the males of this insect in having the basal joints of the antennæ rufous; the club of a very different form, being narrower, considerably longer, and densely clothed with erect rigid hairs; the thorax very finely punctured; the elytra glossy, deeply sulcate, the sulci faintly punctured, and the interstices convex and finely coriaceous: although I have examined many collections of this family of insects, I have never seen a British example of *Magd. barbicornis.*

Occasionally found upon the black-thorn (*Prunus spinosa*) in hedges in July.

5. *M. Pruni,* Linn., Mus. Linn., Marsh., Gyll., Germ., Curt., Schönh.
   Curc. ruficorne, Linn., Mus. Linn.
   Rhinodes Pruni, Steph.
   Curc. Pruni, Mus. Kirb.

Mr. Stephens has separated this and the preceding species from *Magdalis* under the name of *Rhinodes,* but they are closely linked in general habit and in affinity to *M. carbonaria* and *M. aterrima,* especially in the sexual disparities in the form of the rostrum; and as no other writer that I am aware of, excepting Mr. Westwood in his 'Generic Synopsis,' has concurred in this subdivision, I have no hesitation in following those authors who have retained them in the genus *Magdalis.*

I have always found this insect (but not plentifully) upon the same plant as the foregoing in July.

The following observations on genera, on which I have nothing further to remark, may be as well introduced here.

Phloëobius griseus, Steph., is, according to Schönherr, *Aræcerus Coffeæ,* Fab., a native of the East Indies, &c.

Rhinobatus planus, Steph.: British specimens sent to Schönherr were named *Larinus Carlinæ,* Oliv.

Lixus productus, Marsh., Steph., is, according to the Linnæan museum, *Lixus paraplecticus* of Linn.

Bothynoderes, Schönh. olim, *albidus,* Fab.; now *Cleonus,* Schönh., *albidus,* Fab.

XXIV.—*Descriptions of some apparently new species of Birds from Malacca.* By T. C. Eyton, Esq., F.L.S.

The collection of birds from which the following have been selected was brought to this country by Capt. Andrew Charlton of the East India Service, the discoverer of the tea-plant in Assam, and collected by him on the Malay Peninsula.

Astur barbatus. A. brunneus, gula alba linea atra longitudinali

notata; posteriore parte colli albis maculis ornata, macula postoculari subtusque strigis transversis albis notatis; tectricibus superioribus caudæ albis maculis notatis, inferioribus totius ejusdem coloris; rectricibus caudæ supra quatuor vectibus, subtusque apicali, transversatis; rostro atro, cera pedibusque flavis.
Long. tot. $16\frac{1}{2}$ unc.; tarsi $2\frac{2}{10}$ unc.; ros. fron. 1 unc.

Athene malaccensis. A. fuliginoso-brunnea subtus alba maculis rotundatis brunneis notatis rectricibus secondariis vectibus angustis albis et transversis ornatis; cauda utrinque fasciis quatuor atris transversatis; rostro atro, culmine pedibusque flavis.
Long. tot. 11 unc.; tarsi 1 unc.; ros. fron. $\frac{3}{4}$ unc.

Pycnonotus rufocaudatus. P. vertice cinereo, gula alba dorso alis tectricibusque caudæ flavo-brunneis; subtus læte flavus, cauda rufa, pedibus flavis; rostro nigrescente, marginibus flavescentibus.
Long. tot. $7\frac{1}{4}$ unc.; tarsi 11 lin.; ros. fron. $\frac{3}{4}$ in.
Fem. mari similis, sed capite brunnea et reliquis coloribus obscuris.

Malacopteron squamatum. M. capite dorsoque superiore oleaceobrunneis, gula subtusque albis, singulis pennis media parte atro notatis; uropygio marginibusque exterioribus rectricum caudæ læte castaneis; ventre imo brunneo; rostro atro, pedibus tarsisque cinereis.
Long. tot. $6\frac{1}{4}$ unc.; ros. fron. $\frac{3}{4}$ unc.; tarsi 10 lin.

Malacopteron aureum. M. dorso uropygio marginibus externis rectricum caudæ alarumque aureo-viridibus tectricibus inferioribus caudæ læte aureis, capite collo subtusque cinereis; rostro atro, pedibus viridibus.
Long. tot. $5\frac{1}{4}$ unc.; tarsi $\frac{1}{2}$ unc.; ros. fron. $\frac{1}{2}$ unc.

Ixos metallicus. I. flavus capite gulaque atro-æneis, remigibus fasciaque prope apicem caudæ atris, rostro pedibusque atris.
Long. tot. 8 unc.; tarsi $\frac{1}{2}$ unc.; ros. fron. 5 lin.
Fem. mari similis, sed capite subtusque cinereis rectricibusque caudæ interne brunneis.

Brachypteryx maculatus. B. partibus superioribus brunneis, vertice saturatiore, medio pennarum capite dorso superiore scapularibusque striga longitudinali alba ornatis; genis gula subtusque albis, macula ad basin rostri lateribusque ferrugineis, pectore fascia atra indefinita transversato; rostro atro, pedibus flavis.
Long. tot. 5 unc.; ros. fron. 5 lin.; tarsi 9 lin.

Brachypteryx nigrogularis. B. capite gula thoraceque atris, linea superciliari macula ad basin rostri marginibus pennarum frontis fasciaque pectorali semicirculari albis; dorso, scapularibus, marginibus externis remigum rectricibusque caudæ læte brunneis, subtus cinereis; rostro atro mandibula inferiore ad basin alba, pedibus nigris.
Long. tot. $5\frac{1}{2}$ unc.; ros. fron. 7 lin.; tarsi 11 lin.

Brachypteryx acutirostris. B. vertice dorso caudaque brunneis scapularibus marginibusque exterioribus remigum læte castaneis subtus genisque cinereis; rostro atro, pedibus cinereis.

Long. tot. $4\frac{3}{4}$ unc.; ros. fron. $\frac{1}{2}$ unc.; tarsi $\frac{3}{4}$ unc.

This is the smallest species of the genus with which I am acquainted. The above three species differ in the comparative length of the bill, but as they agree in the structure of the wings, feet and tail, I am unwilling to increase the number of genera by subdividing them.

PHILENTOMA, n. g.

Rostrum capite æquale ad apicem incisum latum depressum lateribus tumidis, ad basin setis longis armatis nares ovales.

Tarsi mediocres digiti externi vix longiores quam interni posteriores medios æquantes, ungues compressi, posteriores longissimi, scuta tarsi indivisa.

Alæ rotundatæ prima penna remigum spuria, secunda breviore tertia, tertia duabus proximis inter se æqualibus.

Cauda mediocris rotundata tectricibus superioribus mollibus et longis.

The above genus has the bill of nearly the same form as in *Muscipeta*, but the long and soft feathers at the base of the tail at once distinguish it from that genus.

Philentoma castaneum. P. capite pectore dorsoque superiore azureis, gula cauda marginibusque rectricum alarum castaneis, ventre tectricibusque inferioribus caudæ albis ferrugineo leviter tinctis, tectricibus superioribus caudæ elongatis mollibus et ferrugineo-cinereis; rostro atro, pedibus corneis.

Long. tot. $6\frac{1}{2}$ unc.; tarsi 7 lin.; ros. fron. 7 lin.; ros. latum 4 lin.

Fem. mari similis, sed capite pectore dorsoque superiore cinereis, et rostro corneo.

Picus rubiginosus. P. capite gula subtusque brunneis fronte pallidiore collo capistro coccineo circumdato nisi anteriore parte, dorso brunneo verticibus pennarum sordide rubiginosis remigibus marginibus exterioribus rubiginosis interioribus fuscis, totiusque fasciis angustis brunneis transversatis, cauda atra; rostro flavo, pedibus atris.

Long. tot. 8 unc.; ros. fron. $1\frac{5}{12}$ unc.; tarsi 10 lin.

Dendrocopus sordidus. D. gula genis paucisque pennarum cristæ sordide cinereis reliquis cristæ verticeque flavo brunneo, dorso remigibusque secondariis atris, marginibus flavo-albis remigibus primariis caudaque atris, uropygio marginibusque pennarum tectricum inferiorum caudæ flavo-albis tinctis; rostro pedibusque atris.

Long. tot. $5\frac{1}{2}$ unc.; ros. fron. $\frac{3}{4}$ unc.; tarsi 7 lin.

Fem. mari similis, sed crista verticeque totius cinereis.

Tripsurus auritus. T. ater fronte verticeque cinereis brunneis leviter tinctis, occipite atro vix cristato lateribus utrinque macula parva coccinea, dorso alis caudaque atris, illo immaculato, his transversatis et maculatis albo, subtus sordide albus mediis pennarum atris, rostro pedibusque atris.

Long. tot. $4\frac{3}{4}$ unc.; ros. fron. 7 lin.; tarsi $\frac{1}{2}$ unc.

Theron tenuirostre. T. capite colloque castaneis, dorso humerisque vinaceis, pectore ochraceo, uropygio ventreque canis, cauda superiore parte tectricibusque viridibus inferiore atra apice cano tectricibus inferioribus læte castaneis et elongatis ad extremitatem caudæ, tibiis maculaque inter illos flavis remigibus scapularibusque atris flavo læte marginatis; rostro flavo, pedibus rubris.
Long. tot. 10 unc.; tarsi $\frac{3}{4}$ unc.; ros. fron. 7 lin.

Perdix Charltonii. P. dorso alisque superiore parte atris oleaceo-brunneis irroratis et maculatis, vertice nuchaque brunneis, gula fronte lineaque superciliari albis singulis pennarum atro apice maculatis, collo capistro ferrugineo ornato pectore lateribusque atris, fasciis ferrugineis, transversatis ventre maculaque post-oculari ferrugineis, tibiis albidis, rostro pedibusque flavis.
Long. tot. 12 unc.; tarsi $1\frac{1}{2}$ unc.; ros. fron. $\frac{3}{4}$ unc.

Rallus superciliaris. R. oleaceo-brunneus gula alba striga superciliari rufo subtus strigis atris et albis transversis alternate notatis, pedibus rostroque viridibus.
Long. tot. $9\frac{1}{2}$ unc.; tarsi $1\frac{1}{2}$ unc.; ros. fron. $\frac{1}{10}$ unc.

XXV.—*On the* Glyceria fluitans *and* G. plicata. By Thomas Moore, Esq.

To the Editors of the Annals of Natural History.

Gentlemen,

It may be interesting to some of your readers to know that the *Glyceria plicata* of Fries has been determined to hold a place in the British flora.

The following are the circumstances upon which this statement has been made. In the summer of 1844 I was much struck by the great difference in appearance between the plants of *Glyceria* (assumed to be *G. fluitans*) which surrounded one or two pools of water in some meadows northwards of London. The plants appeared to consist of two distinct forms, which grew intermixed, and were so different from each other as to be detected on the slightest glance. One of these forms had the leaves about half-folded, so as to appear channeled; at the same time, they were long and gradually tapering to a fine point, and consequently had the appearance of being much narrower than those of the other form, which had (comparatively) short, flat (and therefore apparently broad) and obtusely-pointed leaves. On a closer examination, that which may be termed the narrow-leaved plant was found to have large, oblong outer paleæ, whilst in the broad-leaved plant these were smaller and of an ovate form. I generally noticed that in plants of equal vigour the spikelet was about of equal size in the two kinds, but in the broad-leaved one there are a greater number, about one-third more, of flowers.

From the first, I had formed an opinion that the plants were abundantly distinct *either as species or varieties*; and with this impression I took an early opportunity of sending them to Mr. Babington, who, not having time to give them the requisite careful examination, forwarded them to Dr. Parnell, and also subsequently communicated to me Dr. Parnell's opinion, that "he could find no character to distinguish them." I could not however believe that two grasses, as different in their foliation as grasses well could be, were really identical; and accordingly I procured some seeds of the broad-leaved plant, which I conceived to be the least common, and from them I have this season raised a plant or two, which though not old enough to flower, retain precisely the same character in their foliage, and thus furnish collateral evidence that the plant in question is permanently different.

Mr. Babington has subsequently given both plants a most rigid and careful examination, and has detected the following *specific* distinctions:—

Narrow-leaved (G. fluitans).	*Broad-leaved* (G. plicata).
Outer pale oblong, nearly three times as long as broad; apex rounded, or with a large triangular point, and a minute tooth on each side.	Outer pale oval, twice as long as broad; apex obtuse-angled, with three nearly equal teeth.
Anthers about five times as long as broad, pale yellow when dry.	Anthers three times as long as broad, fuscous when dry.
Panicle nearly simple, with few (1—3) branches from the lower joints.	Panicle with numerous branches from the lower joints.

To which the following may be added:—

Leaves tapering, acute.	Leaves broad, less acute.
Ligule twice as long as broad; apex rounded, ending in a fine point.	Ligule about as long as broad; apex with a long central tooth and two smaller toothlets.

Another summer acquaintance with the plants, both in a wild and cultivated state, tends only to confirm the conviction of their being decidedly distinct. Mr. Babington has also several times during the present summer examined fresh specimens; and the result is, that he considers the narrow-leaved plant to be undoubtedly the *G. fluitans*, and the broad-leaved one the *G. plicata* of Fries.

The figure given in 'English Botany,' t. 1520, most nearly agrees with the latter plant.

Having directed attention to these plants, I shall leave for more competent hands the task of pointing out the details of the differences between them. I may mention, that I have since met with both plants in several localities; in fact, both appear to be plentiful in situations suitable for them.

I am, yours, &c.,

September 1, 1845. THOMAS MOORE.

P.S. Mr. Babington has just favoured me with the following specific characters for these two plants :—

G. fluitans (R. Br.); panicle subsecund, slightly branched, very long; branches nearly simple, roughish, divaricated whilst in flower; spikelets linear, of 7—12 flowers; outer pale nearly thrice as long as broad, blunt; *anthers about five times as long as broad* (*purple*); sheaths compressed. Leaves pale green, acute. Ligule elongate. Outer pale blunt, with a triangular central point. Dry anthers pale yellow.—*Poa fluitans, var. subspicata,* Parnell's British Grasses, pl. 95. This plant is considered as the true *Festuca fluitans* of Linnæus by the Swedish botanists; it was originally published under that name in 'Linn. Fl. Suec.'

G. plicata (Fries); panicle compound; branches compound, nearly smooth, divaricated whilst in flower; spikelets linear, of 7—20 flowers; outer pale oval, twice as long as broad; apex obtuse-angled, with three nearly equal teeth; *anthers thrice as long as broad* (*yellow*); sheaths compressed. Resembling *G. fluitans.* Ligule shorter. Dry anthers fuscous. Leaves glaucous, bluntish. —*G. plicata,* Fries, Nov. Fl. Suec. Mant. ii. 6. *F. fluitans,* Eng. Bot. pl. 1520. *Poa fluitans,* Parn. pl. 45 (not good). Mr. Babington has seen authentic specimens of this plant, from Fries himself, which agree with that found commonly in Britain.

XXVI.—*Descriptions of new or imperfectly described Diurnal Lepidoptera.* By EDWARD DOUBLEDAY, Esq., Assistant in the Zoological Department of the British Museum, F.L.S. &c.

[Continued from p. 182.]

Fam. NYMPHALIDÆ.

Genus DIADEMA, *Boisd.*

Diadema Nama, Boisd. MSS. D. alis anticis sinuatis nigris, posticis castaneis, omnibus albo lineatis maculatisque. Exp. alar. 3 unc. 6 lin. vel 90 millim.

Hab. Sylhet, &c.

Anterior wings with the outer margin sinuate, slightly glossed with purplish, especially towards the apex; with numerous semitransparent markings of a bluish white, viz. a longitudinal vitta in the cell at the base, followed by two spots, of which the outer one is triangular; above these three indistinct spots, the middle one sometimes wanting; between the lower median nervule and the radial nervure two vittæ united at the base, the upper one followed by a round spot; above these between the nervules five vittæ, of which the one nearest the costa is pointed, the others bifid externally, each vitta followed by three spots, of which the lower are somewhat lunulate, the upper ones more rounded; four rounded spots near the apex, two near the anal angle. The inner margin is glaucous, the apex tinged with brown. Posterior wings castaneous, darker in the females than in the males, with seven whitish subdiaphanous vittæ placed between the nervules, all, except the innermost, followed by a round white dot, beyond which the ground-colour of the wings is slightly darker; towards the outer margin a series of indistinct whitish spots, sometimes nearly obsolete. Cilia of all the wings spotted with white. Below, the anterior wings are black with strong blue reflections, the apex broadly chestnut, slightly bronzed towards the disc; the markings as above but clearer, with two additional spots on the costa near the base. Posterior wings paler than above, the white portions more or less irrorated with chestnut scales; on the margin a distinct series of whitish lunules.

Head, thorax and abdomen black, clothed with gray hairs; head above and thorax below spotted with white; abdomen below gray; palpi black, spotted with white; antennæ black.

In the cabinets of the British Museum, &c.

This species, which much resembles *Pap. Agestor* and *Danais Tytia*, has the cells of all the wings open. The genus *Diadema* as it now stands requires subdivision; the neuration I believe will be of great service for this purpose.

D. Lisarda. D. alis omnibus fuscis, vittis discoidalibus albidis, seriebus duabus submarginalibus punctorum albidorum. Exp. alar. 5 unc. 6 lin. vel 140 millim.

Hab. Sylhet.

Anterior wings fuscous with whitish markings, viz. an elongate spot at the base and extremity of the discoidal cell, an oval one near the costa towards the middle, a series of vittæ between the nervules, of which the first and third from the costa are short and narrow, the second also slender but longer, the fourth long, the fifth and sixth progressively shorter, well-defined towards the base, less so externally, the seventh broad, short, the eighth broad, longer than the seventh, the ninth long, commencing near the base, the tenth occupying the inner margin from the base nearly to the anal angle; near the margin between the nervules a series of seven more or less rounded spots, of which the one nearest the anal angle is geminate; this series, preceded by another of six spots, of which all except the first are connected with the vittæ by indistinct prolongations. Posterior wings with the base and abdominal margin whitish, the nervures broadly brown, a broad vitta near the anterior margin, five vittæ around the cell, a series of eight round spots near the margin, and four between these and the terminations of the vittæ, all whitish. Cilia fuscous, spotted with white. Below, anterior wings with the disc fuscous, the apex light brown, the markings nearly as above but more defined; posterior wings brown, the discoidal cell and abdominal fold whitish, the vittæ nearly as above but much less distinct; the vitta between the first and second discoidal nervules terminated by a rounded spot; the inner row of whitish dots very small, the outer much larger.

Head and thorax black, spotted with white, the latter gray posteriorly. Abdomen gray at the sides, fuscous above and below.

This insect in form and in some respects in colouring resembles *P. dissimilis*. It has the cell of both wings closed. Of three specimens in the Museum collection, no one has the antennæ perfect; a fragment on one specimen is black.

Fam. MORPHIDÆ.

Genus Thaumantis.

Th. Diores. Th. alis omnibus nigro-fuscis supra maculis magnis disci, perpulchre cæruleis, nitidis; subtus strigis disci fuscis marginisque externi albidis; posticis ocellis duobus. Exp. alar. 3 unc. 9 lin. vel 95 millim.

Hab. Sylhet.

Above, all the wings fuscous black, the anterior with a broad band-like spot, commencing near the costa beyond the middle, and extending towards the anal as far as the lowest median nervule. This spot is of a brilliant metallic, changeable blue, much paler and less changeable externally. On the posterior wings is a large patch of the same rich blue, paler in the centre, occupying the whole disc of the wing. Below, all the wings less black than above, the outer margin paler; this pale portion bounded internally by an undulated pale or whitish striga, becoming brown towards its termination at the anal angle of the posterior wings: between this and the margin is another less distinct similar striga. The anterior wings have besides two fuscous strigæ in the discoidal cell inclosing a paler space, and a third striga commencing on the costa beyond the cell and extending obliquely nearly to the anal angle, slightly bordered internally with whitish. The posterior wings have a transverse fuscous striga near the base, and another commencing near the middle of the costa and reaching nearly to the anal angle. Just within the pale submarginal striga near the costa is a round yellowish spot, inclosing a brown one placed towards its outer margin, and between the first and second median nervule a round black spot sprinkled with blue atoms anteriorly, and surrounded by a yellowish and a black iris. Anal angle with a geminate spot composed of black and white atoms.

Head, thorax and abdomen fuscous.

In the collection of the British Museum, &c.

This species seems to be the representative of *Th. Odana* in Northern India, and does not seem to be rare. The blue is of a peculiar brilliancy.

Fam. PAPILIONIDÆ.

Genus Papilio.

P. Evan. P. alis anticis elongatis falcatis acuminatis, posticis elongatis, dentatis, caudatis, omnibus luteo-rufis, margine externo late fusco-brunneo, maculis lunulisque luteo-rufis. Exp. alar. 5 unc. 1 lin. vel 130 millim.

Anterior wings elongate, falcate, acuminate, of bright light fulvous, the base and anterior portion of the costa more obscure, the costa from the middle to the apex and the exterior margin deep brown, with fulvous spots at the apex and anal angle; a sigmoid spot in the cell and a larger spot on the discocellular nervure of the same colour as the margin. Posterior wings elongate, dentate, caudate, light fulvous at the base, deep fuscous brown beyond; a series of five lunulate light fulvous spots near the outer margin, preceded by three spots and a striga of a deeper fulvous near the anal angle, the tail fulvous brown, paler towards the apex; cilia marked with pale fulvous near the outer angle. Below, the wings a bright yellow-ochre colour, the anterior with several irregular spots in the cell, a larger one on the discoidal, three on the costa near the apex, a fourth below the last of these, followed by a zigzag line, and the outer margin bright brown: the margin is marked with lighter-coloured clouds, and preceded by some indistinct spots on the nervures more or less confounded with it. The posterior wings have four brown spots at the base, a broad band beyond the middle of deep rich brown, extending along the abdominal margin to the tails, which are brown. This band is marked anteriorly between the nervules with silvery atoms, those nearest the inner margin forming a silvery lunule. Beyond the band the wings are of the same colour as at the base, with four sigmoid spots, a narrow line on the margin itself, and the cilia at the ends of the nervules rich brown.

Head and antennæ brown.

Thorax bright shining black, covered at the sides with brown hair and scales, apparently naturally almost bare on the disc.

Abdomen very pointed, luteo-fulvous.

This beautiful species, figured on the second plate of my Genera of Diurnal Lepidoptera, is closely allied to *P. Payeni* of Van der Hoeven; but a comparison of the two figures will at once show the difference, *P. Payeni* being much smaller and not having the posterior wings dentate, and also wanting the broad deep brown band below.

[To be continued.]

XXVII.—*On the Surface of the Stem and Contents of the Medullary Cells of* Nuphar lutea (*Smith*). By Julius Münter*.

Although the internal structure of the submersed stems of *Nuphar lutea*, Sm., is but little adapted for indicating the dicotyledonous nature of the *Nymphæaceæ*, still in other respects it possesses so much interest, that it appears well-worthy of a special notice in these pages. The stem of the yellow water-lily is found in tolerably deep stagnant waters, lakes and large rivers; its length is 5 feet or more, and its diameter from $2\frac{1}{2}$ to 3 inches; it is sometimes simple and sometimes branched, and sends off from its summit to the surface of the water its floating leaves and beautiful flowers on smooth footstalks, which are often 6 to 8 inches long. The stem is sometimes brought to the surface of the water or the banks either by the net of the fisherman or the drying up of the water, and we are then enabled to examine it more accurately.

The entire surface of the stem is coated with elastic leaf-scars directed obliquely from above downwards, as in the stems of the *Cycadeæ*, and the torn bundles of woody fibre are indicated on these scars. We do not, however, usually find any buds in the angles of the leaf-scars, and in such a case not even the slightest trace of one. But where the buds situated in the angles are developed, they form a branch directed almost at right angles to the axis, which soon acquires the thickness of the stem. A little below the leaf-stalk scars, which are arranged circularly around the stem, we find single or grouped foveolæ of the size of a pea, of a more or less rounded form, which are either arranged beneath these leaf-scars around the stem, or are only visible on those parts of its surface directed towards the soil. When these foveolæ are grouped, three, five or six together, the lower ones are usually larger than the upper, and on minutely examining them we find a remarkable resemblance of each foveole to the cavity of the human acetabulum. In the former a circular protuberance (limbus) surrounds the foveoles, as in the latter, but this has in addition a notch at its lower part; we then find on the inner surface of the pit a ring running parallel with the limb, *i. e.* con-

* Translated from the Botanische Zeitung, Aug. 1845.

centric; at the bottom of the pit a bundle of woody fibres, broken off, but still somewhat projecting, like the ligamentum teres of the human acetabulum; the surface of the pit between this woody bundle and the ring-shaped scar is smooth, and presents nothing remarkable. As regards the nature of these elegant pit-like scars, by comparing all parts of the surface we soon perceive that they owe their origin to roots, which *separate spontaneously*; this view is confirmed by tracing the course of the separation. Even whilst the root is perfectly entire, the bark of the stem is raised from the surface of the latter, and gives rise to the above-mentioned limb. The concentric ring on the inner surface of the pit is formed by the separation of the bark of the root from that of the stem, and the broken-off woody bundle found in the bottom of the pit was previously continuous with the central woody bundle of the root.

Besides this interesting formation of scars from the spontaneous separation of roots, a phænomenon which I have never elsewhere observed, the solid contents of the cells of the highly developed pith excited particular interest.

If we examine microscopically that portion of the stem most remote from the buds placed on the summit, we find that the contents of the cells do not assume any definite shape, but form a parenchymatous tissue filled with water or air. At the distance of 2—3 inches, however, and especially just beneath the buds on the summit, all the cells of the pith are filled with a solid substance which has a definite form, is coloured blue on the addition of aqueous solution of iodine, and consequently agrees in properties with starch. As regards the forms of the particles, some are simple, more or less rounded cells; others are hemispherical, and formed of two grains lying in contact like rolls; again, others form segments of circles, and derive their shape from the union of three double grains, and are arranged either in a linear or superficial manner: we also observe granules which are formed from the union of four, and finally perfect penta- and polyhedra.

Whilst these forms agree most distinctly with those of the starch particles which I found and described in *Gloriosa superba*, their size forms also another point of similitude; it cannot indeed be asserted that the *Nuphar* starch in general exhibits such large particles as the *Gloriosa*, but it most resembles it in the relative size of the separate granules; in it the internal layers are as sharply outlined as in the *Gloriosa* starch, and thus afford a good substitute for the latter, which is so difficult to obtain. For this reason I recommend the *Nuphar* starch as an excellent example for those who have occasion to demonstrate microscopically; and also to those who may think it worth while to test my view of the centripetal formation of the starch granules, as I am unacquainted with any other plant, except the *Gloriosa*, which exhibits the innermost layers of the compound starch forms with such remarkable distinctness.

XXVIII.—*Note on some Marine Animals, brought up by Deep-sea Dredging, during the Antarctic Voyage of* Captain Sir James C. Ross, R.N.

To Richard Taylor, Esq.

My dear Sir, West Park, Kew, Aug. 31, 1845.

Having remarked, in the notice given of Mr. Goodsir's valuable labours in the last number of the 'Annals of Nat. Hist.,' that 300 fathoms is supposed to be the extreme depth from which living animals have been dredged, I think it may interest some of your readers to know that Sir James Ross, during the late Antarctic Voyage, used the dredge on several occasions with considerable success in the same and in much deeper water.

In latitude 33° 32′ S. and long. 167° 40′ E., living specimens of *Hornera frondosa*, besides four other Corals, a *Dictrupia*, two *Ophiuræ*, an Annelide, one small *Echinus* (and the spines of another, three inches in length), were all procured in a living state from 400 fathoms.

Off Victoria Land, between the parallels of 71° and 78° of south latitude, the dredge was repeatedly employed; once with great success at 380 fathoms. Generally the contents of the net, after dredging at between 200 and 400 fathoms in these latitudes, were various Crustacea, as numerous *Nymphia, Pycnogona* of a very large size, and such Arctic genera as *Crangon, Alpheus, Gammarus* and *Idotea*, the species sometimes resembling very closely indeed those that Capt. Ross had met with during the North Polar voyages: of Mollusca, the genus *Chiton, Boltenia*, and the remains of both univalve and bivalve shells, of which we found no traces on the lands we visited; various Annelides and *Serpulæ, Ophiuræ* and *Asteriæ, Alectos, Bicellariæ*, an Encrinite resembling the Irish one, very many *Virgulariæ* and Sponges, with *Holothuriæ* several inches in length. The pebbles were generally covered with *Flustræ*; but on one occasion a magnificent mass of syenite was procured, the edges of which were sharp and the surface clean; it must have been but recently deposited by an iceberg, for the greater proportion of the stones around were of trap or basalt of various kinds.

The most remarkable circumstance connected with this subject of deep-sea dredging is, that the bottom of the Antarctic Ocean, near the lands visited by Sir James Ross, was found to be covered with a mud consisting in great part of the remains of Infusoria, very similar to those forming the "fossil powder" detected in the neighbourhood of New York and in other parts of the globe. Prof. Ehrenberg has described from our collections as many as 140 species, or thereabouts, all brought from the vicinity of Palmer's and Victoria Land. In a living state they inhabit the surface of the ocean and the newly-forming ice, and afford food for *Salpæ* and animals of a higher organization; which, in their turn, nourish the most fully-developed beings inhabiting those regions where the animal kingdom lives and abounds independently it would seem of the vegetable. Well may we agree with Professor Owen in regarding these "minute Infusory animalcules" as "the wakeful members of nature's invisible police, everywhere ready to arrest the fugitive organized particles which are suspended in water, and to turn them back into the ascending stream of animal life."

It is probable that animal life exists at a very great depth, suspended in the ocean. On one occasion a sounding-line that had been lowered to 1000 fathoms brought up at the 550-fathom mark, long strings of animal matter, about the diameter of a crow-quill, of indefinite length, great elasticity, and as viscid as bird-lime. It is certainly possible that in descending or ascending the line may have become entangled with this substance nearer the surface; but I am not inclined to suppose so for the following reasons: because the tow-net was constantly used, both during and before and after the soundings, without procuring any of the substance; because its viscidity was so great, that no other part of the line could well have passed through without a portion adhering to it; and because, upon two future occasions, the same substance came up on the sounding-line from unquestionably very deep water.

Allow me to conclude by expressing my earnest hope that your pages may be destined to announce the results of dredgings at far greater depths than those I have just mentioned, and in lesser ones too, from all longitudes between Baffin's Bay and Behring's Straits; for I am satisfied that every means of forwarding this object will be granted to Mr. Goodsir, who has already proved himself admirably qualified to turn such opportunities to the best account.

Believe me ever yours very truly and respectfully,

JOSEPH DALTON HOOKER.

XXIX.—*Report on a memoir by* M. P. Duchartre, *entitled* '*Observations on the Organogeny of the Flower of the* Malvaceæ.' By MM. Brongniart, Richard and De Jussieu*.

We have been requested by the Academy to give an account of the botanical memoir presented by M. Duchartre, and bearing the above title.

M. Duchartre has distinguished himself by various investigations, several of which have had the same object as the present, but related to different plants; many of them have been submitted to the Academy and have received its approbation. These researches may serve to explain several particular questions relating to the vegetables to which they refer; but in addition to their interest in this point of view, they are of much greater importance for the solution of general questions. We shall commence by giving a sketch of them, and enunciating the problems to which they relate, before detailing the results at which the author has arrived in seeking for their solution.

It is well known that botanists agree pretty generally in considering that the different parts of a flower represent so many more or less modified leaves. These leaves, which constitute the segments of the calyx and of the corolla, the stamens and the parts of the pistil, are sometimes independent of each other as the true leaves generally are, sometimes coherent by a portion of their margins or their surfaces. DeCandolle, who has contributed so much to the establishment of this theory, has proposed the word *soudure* (confluence) to express this union, which implies that the parts were primarily separate before being thus combined. However, he admitted that the separation could only have existed prior to that period at which the parts become accessible to observation, and then this adhesion is called by him *predisposed*. But that which he had not been able directly to establish, others might anticipate doing, when the perfection of instruments and methods of observation had removed the barrier by which he was checked. This is, in fact, what has been accomplished. With the aid of the microscope, the development of the organs has been traced from their first appearance; that is to say, from the moment at which they separate from the axis to which they are attached, and appear constituted simply by the aggregation of a few cells.

Now, are these primary rudiments constantly or only occasionally independent of each other? Upon this point observers are not agreed.

M. Schleiden speaks decidedly for the primitive independence

* Translated from the Comptes Rendus for August 15, 1845.

of the parts*: "In all those calyces and corollæ called *monophyllous*, the various parts, which subsequently cohere, are at their origin everywhere, and without exception, separate, and their independent existence is prolonged for a sufficient length of time to render all reasoning on the number of parts superfluous, because it is a matter of observation susceptible of demonstrative evidence." He subsequently maintains the same original independence of the stamens and carpels. He has supported his conclusions by numerous examples, and especially, at a later period, by a very detailed history of the development of the flower of one of the papilionaceous *Leguminosæ*.

However, on the other hand, M. Adolphe Brongniart † had established the fact, that in the very young buds of monopetalous flowers, the corolla at first forms a kind of minute ring around the stamens. A high authority, Mr. R. Brown ‡, also adopts this view: he says, "In the description of the modifications of the ovary and stigma which I have given, in conformity with the ordinary language of botanists, I have employed the term *confluence*, by which however we must not understand the union or cohesion of parts originally distinct. For in the great majority of cases, the separation or the complete development of these parts from their original cellular and pulpy state has never occurred; but with this understanding the term may be preserved, unless we prefer the word *connate* as subject to less objection." The previous memoirs of M. Duchartre led to the same result, by proving in certain cases the union of certain parts of the flower after their first appearance; and we shall see that he has found new examples of this original cohesion in the *Malvaceæ*.

There is another class of facts in the history of the flower which may throw great light upon organogenic researches; such are those known by the name of *duplication*. Frequently in the place which should be occupied by a single organ we find two or more arranged in the same plane, or in several different planes, *i. e.* in bundles. Each of these bundles may then be considered to represent a single leaf. Is this the case? and how has this multiplication of organs, this duplication of a single one, occurred?

The family of the *Malvaceæ* is well-chosen for studying this question. In that of the *Byttneriaceæ*, which was once united with it, and which, although now separated, cannot be far removed from it, and evidently forms part of the same natural group, we sometimes find only five stamens opposed to as many petals; sometimes opposite each petal, a system of several united

* Wiegmann's Archiv. [A translation of this paper appeared in the Philosophical Magazine for Feb. 1838. Ed.]

† Ann. des Sc. Nat. vol. xxiii. p. 229. ‡ Plant. Javan. Rar. p. 112.

stamens, consequently represented in the first case by a single one; and alternating with these systems of stamens in a circle a little more internally situated, an equal number of lobes or teeth, which according to the laws of position should represent the row of normal stamens,—that which should alternate with these same petals. In the true *Malvaceæ* we find a large number of stamens cohering inferiorly into a single hollow column, which envelopes the pistil; but notwithstanding the apparent confusion resulting from their multiplicity, it is not difficult to perceive, in many cases, that this collection of stamens is divided into five groups, which are opposite to the petals; and even where it is difficult to prove this distinction, it is indicated by the existence of double vascular bundles, which, arising from the base of the petal, follow the column to its summit, where it divides into a large number of antheriferous filaments. Frequently the column within and above these threads is divided at the summit into five more internal teeth alternating with these vascular bundles, and these more or less distinct groups of stamens; these teeth are incontestably analogous to those described in many of the *Byttneriaceæ*. Finally, in the centre of the flower we find a pistil composed of five more or less intimately combined carpels; but at other times the carpels are more than five, and even become very numerous, and either still arranged in a circle or situated at unequal heights, so as to form together a kind of capitulum. Does each of these carpels then represent a carpellary leaf? or is each of these five carpellary leaves doubled so as to simulate several? Their arrangement in five distinct systems can hardly leave a doubt on this point in *Kitaibelia*; but in *Malope*, and others of the same group, an apparent confusion results from the unequal or completely arrested developments of a certain number of carpels.

In tracing these parts from their first appearance, we should expect a decided answer to these questions; this is what M. Duchartre has proposed in the memoir before us, and which it remains for us to analyse.

The calyx, which at a later period becomes monophyllous with five divisions, appears at first in the form of a continuous rim, surrounding the central mass of the flower, bounded by a large convex tubercle having no distinction of parts. This border soon sends off five small festoons, which correspond to the five sepals thus united at the base from the commencement. The author insists upon this mode of formation, which he has found in the envelopes of all those flowers having a monophyllous calyx or corolla, the development of which he has had an opportunity of studying. The petals and stamens may be subsequently distinguished and are simultaneously developed, so that it is well to trace their evolutions together. Soon after the appearance of the calyx, the margin of the central tubercle becomes raised into five smaller tubercles, which are rounded, alternating with the segments of the calyx, and thus representing the floral whorl which immediately succeeds it. Each of these tubercles soon appears like two in juxtaposition, its development ensuing more rapidly at the two sides than in the median line; and thus, instead of five small primitive eminences, we have five pairs. Nearly at the same time a slight transverse fold appears below and outside of each of these five projections; this appears to be another appendage of the tubercle, which, at first single, subsequently becomes double. The fold becomes the petal; the tubercles become stamens. Hence the petals and stamens here belong to one and the same group of organs developed from a base which is common to that spot which in most flowers is occupied by the petal alone.

The petal in its further development, which is generally rather slow, much more so than that of the stamens, does not become doubled, and gives no other indication of this tendency except in its more or less bilobate summit.

Not so however with the stamens; for shortly after the first ten staminal tubercles have become distinct, we find that a formation perfectly similar to the first is produced. Five new pairs of tubercles opposite to the first appear in a more internal circle; then a third arranged concentrically, and consisting of ten other tubercles; then a fourth, so that the total number is successively doubled, tripled, and quadrupled. We thus have ten radiant series, opposed in pairs to the petals, and supported upon a common base, which is frequently cut into five corresponding lobes, more or less marked. At a little later period, each of these tubercles, continuing to grow more at the sides than in the median line, is itself divided into two, and we find that four parallel series become substituted for the two before each petal, and the total number is a second time doubled. The same occurs in those flowers which have very numerous stamens; but there is a slight difference in those in which they exist in less numbers. Then, either fewer concentric rows are formed, or each of these rows stops at that period at which the pairs are simple and not doubled, or within the first pairs a single tubercle only is formed; this is slightly lateral and oblique, then another still more internal and on the opposite side, so that within the first pair we find only isolated tubercles, sent off alternately, first from one side, then from the other, in a zigzag direction. In all cases, there are invariably five systems of stamens opposite to the petals.

During these changes, the small common tube, to which all these organs are attached, continues to elongate, raising these concentric formations so as to produce a system of stages arranged one above the other; and although they enlarge at the same time, they do not do so in the same proportion. The organs which enlarge do not then find sufficient room to lie side by side in regular and concentric circles; they become rather confusedly mixed, and the original symmetry becomes less and less apparent. When they have arrived at a certain degree of development, each of the tubercles shrinks up at the base into a minute filament which becomes more and more elongated. Each also becomes marked by a median furrow, and buried within two cells which subsequently fuse into a single one. In short, these are so many reniform, unilocular anthers, which tend more and more to assume their definite form.

In several species M. Duchartre has observed an ulterior change, from which a new increase in the number of stamens results. Several of them are curved into a horse-shoe form, and terminate by becoming divided into two by a constriction of the summit of their curve,—a constriction which ends by forming a complete solution of continuity; this, extending from above downwards, also divides the filament which was at first simple into two corresponding to the anthers thus formed. This is a true duplication.

This term would apply with less accuracy to the anterior formations, from which the multiplication of the stamens has resulted; for we may say, that at each of these changes they have doubled rather than multipled. Be this as it may, we have clearly five groups of organs alternating with the five leaflets of the calyx, each comprising a petal and several stamens, supported upon a base which is common and simultaneously developed. This is the whorl which is within and alternate to the calyx, and which is ordinarily called the corolla, with this difference, that here each petal is replaced by a group or bundle of organs.

One of us has long since professed the doctrine, that in those flowers which have stamens double in number to the petals, whenever the stamens of the external row are opposed to the petals (and this is most frequently the case) they do not constitute a distinct whorl, but form a part of that of the corolla. The development of the flower of the *Malvaceæ* supports this opinion, exhibiting to us each of the petals, opposed, not to a stamen, but to an entire bundle. We may add, that such appears to be the most common symmetry in polyadelphous polypetalous flowers, as is seen in so many *Myrtaceæ*, *Hypericaceæ*, &c., where the bundles, which are perfectly distinct, are opposite to the petals.

But what has become of the normal whorl of the stamens,—that which should alternate with the petals? M. Duchartre discovers this in the five terminal lobes of the staminal tube, situated upon a plane anterior to that of the filaments, alternating with their five groups,—lobes which we observe in many of the *Malvaceæ,* although they are barely perceptible, and even are entirely wanting in many others. MM. Dunal and Moquin-Tandon recognised them, and considered them as the border of a five-lobed disc. But the nature of the disc is far from rigorously defined, and in many cases this term exactly applies to abortive whorls, as may be seen in many *Viniferæ,* in the *Myrsineæ,* &c.,—families which are equally remarkable by the opposition of their stamens to the petals, to which they are equal in number. M. Duchartre mentions this example of the *Myrsineæ* as exhibiting exactly the symmetry of the *Malvaceæ,* with this difference, that a single stamen only corresponds to each petal. We do not agree with him in this opinion, but think that in the *Myrsineæ* there are two whorls of stamens independent of the corolla, the external or that alternating with the petal being metamorphosed or abortive. This appears to be demonstrated by the flowers of *Theophrasta,* or better still by *Jacquinia.*

The author, arriving at the pistil of the *Malvaceæ,* finds in their different genera variations which are sufficiently considerable to establish four different categories, which he successively examines. In the first the quinary symmetry is at once apparent, and the five carpels differ but little in their mode of development from the views and theories generally adopted. In fact, we know that each carpel is considered as a leaf folded on itself, and that numerous organogenic observations exhibit this organ to us in the form of a minute scale which soon becomes concave internally, then tends more and more to close up by the approximation of the borders of the concavity, the adhesion of which completes the formation of the ovary and forms a perfectly closed cavity, in which one or more ovules subsequently become developed. Now, imagine five of these scales or plates soldered together by their lateral surfaces, we then have the first condition of the pistil of *Hibiscus.* That will be a small border having five angles, which alternately project and recede internally; the projecting angles correspond to the borders of five carpels, approximated in pairs, and these angles projecting more and more and converging, terminate by uniting so as to form a quinquelocular ovary. But at a still earlier period, before the internal projections were marked, we had a pentagonal border which soon becomes festooned by five tubercles, the first indications of the styles.

In a second category, *Malope* for instance, we also observe a pentagonal border, the five angles of which are opposite to the petals, and consequently correspond to the place which five normal carpels should occupy. That border of the pentagon which is first united sends out a series of rounded tubercles, which subsequently become slightly swollen externally and inferiorly, so that each tubercle presents two enlargements; one external and inferior, the future ovary,—another superior and internal, the future style. The latter becomes elongated and raised in proportion as the former increases in size; but as it elongates, the stylous portions, remaining distinct at their summits, are confounded at their base, —at least all those which correspond to the same angle of the common support of the carpels; an angle which becomes more and more marked as far as the point at which the entire body is as it were cut into five oblique lobes loaded with ovules on every part of their surface. A bundle of styles, equal in number, distinct superiorly and united inferiorly, thus corresponds to each of these systems of ovaries; and each of these systems, in the general symmetry, plays an analogous part to that which we have found assigned to each of the bundles of stamens, because it occupies the place which a single carpel should occupy, and which it consequently represents. How is the cavity of the ovary formed?

M. Duchartre has not in this case found that the margins of a folded leaflet approximate towards one another, then touch and adhere; but, at a certain period, dissection has exhibited to him the cellular mass of the ovary excavated by a slight fissure, which continues to enlarge, without any manifest external appearance.

A third category, and that includes the greater part of the *Malvaceæ*, exhibits the carpels not in constant relation with the quinary number of the other parts of the flower; but they form a perfect circle, are not grouped into five systems, and frequently their entire number is no multiple of five. However, M. Duchartre is led to believe that the same symmetry occurs here as in the preceding case. The ovaries and styles are developed in the same manner, with this difference, that all the styles are united inferiorly into a single cylinder.

Finally, a fourth category seems to belong to the first by the quinary number of the carpels; but here we observe ten tubercles on the pistillary border, which subsequently form ten summits of distinct styles, and which correspond in pairs to five ovaries, the centre of which also becomes hollowed by a fissure, which forms its cavity without any change being externally apparent.

The necessary conclusion from all these observations is, that the parts, from their earliest appearance, present the relations of adhesion which they subsequently exhibit in the perfect flower. The monophyllous calyx on its first appearance was a body simple at the base. The petals, coherent by their base with the staminal tube, originated from a base common to them with the stamens, and the latter at their origin were united by this base in the same manner as they appear subsequently. The ovaries were from the first grouped and adherent together, nearly in the same manner as the flower subsequently exhibits them, their styles being distinct at the summit, coherent in the rest of their extent, which has been more slowly developed. As regards the peculiar results to be deduced from these observations relative to the symmetry of the flower of the *Malvaceæ*, we have noticed them above, and it would be useless to repeat them.

Undoubtedly we have not been able ourselves to verify all these facts, for this would occupy almost as much time as that devoted by the author to the original investigations; but we have verified a sufficient number to justify the truth of most of them. We regret that M. Duchartre has not carried out his extensive researches still further, so as to teach us by anatomical details the formation of the tissues in the organs, the external forms of which he describes, and informing us at what periods the developments he describes correspond to the changes gradually established in the tissues, which are at first entirely cellular.

We think that these details would throw a new light upon the phænomena of duplication, which are still so obscure, and would enable us better to comprehend the mechanism of this substitution of several fascicled organs for a single plane organ. The formation of cavities by an excavation in the centre of a cellular mass, which assimilates certain carpels closely to anthers, is a fact so much opposed to the generally admitted theories as to require new observations and more development, especially by connecting with it the history of the ovule, and ascertaining how it is formed in the cavities thus produced.

We acknowledge that these are researches of extreme delicacy, since the point at which M. Duchartre has arrived presented incontestable difficulties, and the dissection of such minute bodies is exceedingly tedious, and even sometimes appears impossible. But for some years we have seen that microscopic observation surmounts difficulties which had long been considered insurmountable, and facts, the direct knowledge of which had been despaired of, have become familiar to all those who are occupied in this kind of researches: just as those parts of the earth which were long unknown, now, being frequented, have become easily accessible, and from them we set out for more remote unexplored parts. These reflections must not be looked upon as detracting from M. Duchartre's investigations, but rather as an encouragement for pursuing them. We address them to him the less reluctantly, because what he has already done proves what he is capable of doing.

XXX.—*Botanical Notices from Spain.* By MORITZ WILLKOMM*.

[Continued from p. 192.]

No. VII. SEVILLE, December 30, 1844.

ON the 5th of November, after a continuance of the most disagreeable rains for nearly four months, I quitted Granada and travelled the next day to Malaga. From the incessantly rainy and misty weather, I could see very little of the character of the vegetation from the diligence. The only specimens which I had not before seen were some bushes of the cork-oak, which I noticed on the second day of my journey. The environs of Malaga, situated as it is in a kind of paradise,—which in the spring is so rich in plants,—presented now little or nothing, although the surrounding hills began already to be decked with fresh green and gave signs of approaching spring. *Scilla maritima*, long faded, unfolded everywhere its broad dark green leaves, in company with Asphodels; but, with the exception of the ever-blossoming *Alyssum maritimum*, L., and some late plants of *Atractylis humilis*, L., there was scarcely anything in bloom to be remarked. The gardens presented more flowers than the country around. Upon the balconies I saw frequently the splendid *Euphorbia heterophylla*, in the gardens *Datura fastuosa*, *Brugmansia arborea*, *Verbena citriodora*, *Plumbago zeylanica*, *Cestrum nocturnum*, *Viola odorata*, *Calendula officinalis*, &c., and roses in full bloom. In a garden without the city I noticed several gigantic bushes of banana, and a noble tree of *Dracæna Draco* 16 feet high, which grows here quite as in its own climate. The Alameda of Malaga, a public promenade, is planted with large trees of *Gleditschia triacanthos*, *Melia Azedarach*, *Phytolacca dioica* and *Acacia Farnesiana*. In the environs batatas and oranges are much grown, as well as *Annona squamosa*, whose spicy and much-prized fruit is everywhere sold under the name of Chirimoyas.

As it was impossible, on account of the backward state of the season, to study the flora of Malaga from nature, I was greatly desirous of being allowed to do this in the rich herbarium of the chemist Don Pablo Prolongo, whose name is so well known from Boissier's 'Voyage': he is the only botanist at present in Malaga, and unfortunately, from great occupation of his time, he is able to do little for the natural history of his province. Don Prolongo has fortunately also preserved a portion of the herbarium of M. Felix Hänseler, whose death three years ago deprived science of an able botanist; the other portion of his collection is lost. At the desire of Don Prolongo, I undertook the agreeable task of putting in order his herbarium, which was in great confusion; and this gave me an opportunity of becoming generally acquainted with the character of the vegetation of Malaga, which I hope to study from nature also next April. Sometimes by myself, and sometimes accompanied by my friend, I made many excursions in the environs of the city du-

* Translated from the Botanische Zeitung, May 9, 1845.

ring my stay, although, as was to be expected at this season of the year, with little success. On moist grassy spots blossomed the *Ranunculus bullatus*, L., plentifully; in hedges and under impenetrable bushes of dwarf palms and thorny species of asparagus grew *Aristolochia bætica* and *Melissa Calamintha*, and upon the arable fields in great profusion *Mandragora officinarum* in company with *Ecbalium Elaterium*. On the sea-shore I met with *Glaucium corniculatum* in abundance, which had already begun to blossom, or flowered a second time. On the fallow fields the *Verbena supina* began to shoot up its stalk, and on the adjoining hills the root-leaves of the rare *Diplotaxis Prolongi*, Boiss., appeared here and there. Upon an excursion into the neighbouring Sierra de Mijas I found *Viola arborescens*, L., already in full blossom, and the *Thymus capitatus*, Lk. and Hoffm., had also begun to flower. In fissures of the limestone rocks occurred frequent the *Lapiedra Martinezii*, Lag., but not a single specimen in flower, as well as *Cheilanthes odora* and *Lycopodium denticulatum*. Under groups of palms on the loamy plain known by the name of the Dehesilla, between the river Guadalhorce and the sea, I noticed here and there *Narcissus serotinus*, and some scattered plants of *Scilla autumnalis*, L. In hedges of Spanish reed in the vicinity of the shore I found tall luxuriant shrubs of *Tagetes graveolens*, L'Hérit., certainly run wild, and especially on the sea-shore often gigantic tree-like specimens of *Ricinus communis*, L. This is nearly all that can be said of the November flora of Malaga. The coast, which is mostly flat and sandy, presents also but few sea plants, like almost all the flat sandy coasts of the Mediterranean, where, from the absence of a tide, only rarely a few *Algæ* are cast up.

On the 1st of December I quitted Malaga, and, favoured by the most glorious spring weather, I travelled on horseback towards Seville; for the roads between these two cities are only to be found upon the map, but do not exist in reality—not a bit more than roads from Granada and Jaen to Seville! The corn-fields were already clothed in the most beautiful green, as with us in April, and the blossoms of the almond-trees were already far advanced. Everywhere there were still in flower the *Mandragora officinarum*, as well as *Alyssum maritimum* and *Aristolochia bætica*, whilst the *Ranunculus bullatus* and *Balsamita multifida*, Clem., here plentiful, were apparently over. Here and there *Lavandula multifida* was seen in flower, and a small *Calendula*. In the immediate vicinity of Malaga commence arid hills and extensive tracts of uncultivated land, mostly covered with dwarf palms and species of asparagus. Several species of *Ulex* had already unfolded their beautiful yellow flowers. Beyond the small town of Cardama the land is better cultivated, and the banks of the neighbouring Guadalhorce are in many parts clothed with hedges of orange-trees, which were now loaded with golden fruit, and, together with the perfectly leafless fig- and apple-trees, which are found in great quantities in the intervening space, presented the appearance of summer and winter at the same time. On the branches of the olive-trees, whose shining black fruit the people were busied everywhere in gathering, I remarked frequently the *Vis-*

cum cruciatum, Sieb., with yellowish red berries, as well as here and there upon the banks luxuriant shrubs of *Viburnum Tinus*, with young blossoms. On the second day I reached the little town of Yunquera, lying at the foot of the lofty Sierra de la Nieve, to which I made an excursion on the 3rd of December, in spite of the violent rain and snow, which had set in the night before, in order to see the *Abies Pinsapo*, Boiss., and *Quercus alpestris*, Boiss. The first I met with at a height of 5000 feet, but arrived unfortunately too late, for the cones had long fallen off and lay quite withered upon the ground. The *Pinsapo* has the growth of the Scotch fir, but with respect to the bark and position of the branches it resembles the spruce fir, from which it is however very remarkably distinguished by the peculiarly short and thickly-set needles. I cannot say with certainty whether I have found the *Quercus alpestris*. Boissier remarks, that this oak grew in company with the *Pinsapo*. There are however two species of oak frequent here, one of which with evergreen leaves appears to be no other than the *Qu. Ilex*. The other, whose leaves had fallen off, may be the *Qu. alpestris*; but both had quite lost their fruit. In the shade of the adjacent rocks of marble a small *Iberis* blossomed in abundance, the only one which this excursion yielded; I returned to Yunquera wet through to the skin and half-killed by the cutting cold wind. On Wednesday the 4th of December I started again, and after passing through a part of the lonely, wild and rough Serrania de Ronda, I arrived in the evening at the town of Ronda. The above-mentioned mountain, which at this season of the year presents nothing except species of *Ulex* (not yet in flower), although in its proper season it is one of the richest mountains in plants of Andalusia, is almost wholly covered with low bushes, chiefly of *Pistacia Lentiscus*, *P. Terebinthus*, *Rhamnus Alaternus*, *Rh. lycioides*, *Olea europæa*, var. *sylvestris*, *Juniperus Oxycedrus*, *J. phœnicea*, *Daphne Gnidium* and *Quercus coccifera*, as well as a number of *Cisti*. The large and beautifully situated town of Ronda is in summer one of the pleasantest spots in Andalusia, but in winter it is the coldest point, as on the following morning all the ditches and water-courses were covered with ice an inch thick and the fields with hoar-frost,—which is something extraordinary in this country. As soon however as we had passed one of the chains of hills covered with thick oak-woods, in which I noticed among others many species of *Helianthemum*, of course still without blossom, and had entered upon the broad and cheerful valley of the Rio Guadalete, I found myself at once in another and warm climate, in which a perpetual spring reigns. The banks of the above-mentioned river are mostly surrounded with the thickest bushes, 12 feet high, of *Pistacia Lentiscus* and *Nerium Oleander*, encircling whose branches a beautiful *Atragene* (?) occurred here and there in full blossom. In this valley I also found for the first time between groups of palms some few specimens of the odoriferous *Iris scorpioides*, Desf., which I have subsequently observed at Seville on loamy declivities, on the right bank of the Guadalquivir in great quantity and in full blossom. Between the villages of Algodonales and Puerto-Serranos, where I lodged on the fifth night, is a pleasant but quite lonely and very unsafe table-land, almost wholly covered with *Pistacia Lentiscus*, which gives it a beautiful dark green colour. Among these I found single shrubs of *Phillyrea angustifolia*, *Ph. media* and *Arbutus Unedo*, the latter loaded with white bunches of blossom. At Puerto-Serranos, lying on the Guadalete, which from this point rushes in innumerable windings to the Atlantic Ocean, commences the immense broad land of the Guadalquivir. The Sierra de Montellano had still to be crossed,—an undulating plateau covered with pistacios and the kermes-oak, where I found the shrubby *Globularia Alypum*, L., in flower, and for the first time descried the Atlantic in the distance: upon this terrain, extending as far as the little town of Coronil, olive-trees and large groups of palms occur. The country from Coronil as far as the pleasant town of Utrera is an undulating arable land with scarcely a tree upon it, which, as the dried stalks showed, may in summer be covered with, in great part, *Atractylis cancellata*. On the 7th of December I at length rode, in the rain, which from that day to the present has continued almost uninterrupted, from Utrera to Seville, five leagues distant, the road to which leads almost continuously through olive-groves and forests of *Pinus Picea*.

The perfectly level environs of Seville, consisting of a sandy loamy soil, are said to be clothed in April and May with flowers, but I scarcely think the character of the soil is such as to produce any very remarkable flora. For, besides that the country is very level, it is almost all cultivated, with only occasional patches untilled. The heat of the climate of Seville, as I have been assured by Americans from the Havannah and Peru, is in the summer not exceeded by the glowing heat of the West Indies, and its spring is of short duration; as early as June everything is completely burnt up. In the summer a suffocating heat prevails, whilst in winter the air is not cold but disagreeably moist,—so moist, that in the chambers, which are always on the ground-floor, everything,—clothes, beds, books, paper, &c. are in a few hours wet through. This part of Andalusia especially, where snow is only known through tradition, is visited by a thoroughly rainy season, like the tropics. In spite of all my endeavours, I could not succeed in obtaining any dry paper, so that I could only preserve my plants from complete destruction by frequently turning and shifting them; for drying them was out of the question here, where nothing could be had to obtain artificial heat. I took advantage of the few fine days during my stay in the capital of Andalusia to make excursions in the neighbourhood, which at first the Guadalquivir, a mile in width, surrounding the whole city like a lake, utterly prevented. On the walls and ditches in the immediate suburbs I found *Mercurialis annua*, L., and the *Calendula*, which has been before mentioned, frequent; also in the latter part of my stay, on shady grassy spots, *Ficaria ranunculoides*, a *Fumaria* and a beautiful large-flowered yellow *Oxalis*, together with *O. corniculata*, frequent and in flower. Under the high corn I saw *Veronica hederæfolia*, *V. verna*, *V. arvensis*, *Lamium purpureum*, *Capsella Bursa-*

pastoris; in short, the same spring flora as in our corn-fields, only some months later. On some uncultivated spots under clumps of palms I found *Allium Chamæmoly*, L., plentiful in flower, as well as *Arum Arisarum*, L., which occurred also in the olive-groves with *Corrigiola littoralis*, L., *Bellis annua*, L., and a small *Sisymbrium*? The banks of the Guadalquivir are clothed with *Tamarix gallica*, *Ricinus communis* and *Malvæ*; *Anacyclus Valentinus* already unfolded its flowering heads here and there, and on loamy declivities on the other side of the river the *Vinca major* with *Iris scorpioides* before mentioned, and *Doronicum Bellidiastrum*, flower in abundance. The hedges between the orange-groves for the most consisted of *Agave americana*, *Cactus Opuntia*, *Osyris alba* and *Lonicera Caprifolium*.

As the weather did not permit my making daily excursions, and as moreover the vegetation was so backward, I was not a little happy to have an opportunity of inspecting the valuable herbarium of the late botanist Don Claudio Boutelou, the pupil of Cabanilles, which contains above 15,000 species. The present possessor of this collection, Don Pablo Boutelou, son of the late botanist, had the kindness to place it at my disposal. In this herbarium I have not only in a great measure become acquainted with the flora of Seville, but also with the Spanish flora in general, as it contained a great portion of the collections of Clemente, Lagasca, and Cabanilles. M. Boutelou is the present professor of botany in the university of Seville, but he has almost wholly relinquished this branch of natural history, since he has neither any pupils, nor is he in the smallest degree assisted by the government. The botanical garden, of which he was the director, has been unavoidably given up for want of pecuniary resources, and it is at present a complete waste. Boutelou is also director of the gardens of the Alcázar and of the public walks, which, although at first laid out in the stiff French fashion, are kept up in a manner truly praiseworthy.

In the commencement of the approaching new year I think of visiting the town of Sanlúcar de Barrameda, lying at the mouth of the Guadalquivir, where I hope the vegetation will be more advanced, or at least that the shore will yield a richer harvest of maritime plants.

BIBLIOGRAPHICAL NOTICES.

A Monograph of the British Nudibranchiate Mollusca, with Figures of all the Species. By Joshua Alder and Albany Hancock. London, printed for the Ray Society, 1845. 4to. No. 1.

The ten plates in this number represent—1. *Doris flammea*, 2. *Doris Johnstoni*, 3. *Idalia aspersa*, 4. *Dendronotus arborescens*, 5. *Eolis alba*, 6. *Eolis concinna*, 7. *Eolis olivacea*, 8. *Eolis tricolor*, 9. *Eolis Farrani*, and 10. *Eolis despecta*. We have felt a difficulty, as we turned over the leaves to make this enumeration, to suppress the repeated expression of our delight. The figures of the species are admirable in every point of view: the position of the animals well-chosen to exhibit their characters and habits,—nothing overstrained, nothing exaggerated,—and yet, sobered down as they are to nature, nothing can well be imagined more chaste and beautiful in colouring, or more curious in exterior decoration. The letter-press is not less worthy of praise for its correct and almost severe simplicity. The singular beauty of the objects before them has never tempted the authors to the indulgence of a figurative and flowery style, which, while it might have rendered the descriptions obscure, would only have marred the pleasing effect which these portraits must produce on every cultivated mind. All is in keeping,—artists and authors,—and every page of the work bespeaks the correct and excellent taste of the authors of it.

The promise which this number gives us of the value of that which is to come, will be kept, we feel assured, to the letter; and what pleases us most of all, is the fact, that this beautiful volume will have a circulation far beyond what similar works have hitherto had; that it will not be confined to the libraries of the rich, but will travel down, unaided by the cheapness of plain copies and of inferior paper, to the table of the great bulk of the naturalists of this country. It is this diffusive quality of the "Ray Society" that makes us set a value upon it. Here it has placed before a great number, pictures of forms which are novel and hitherto undreamt of by them; and we, who have been long familiar with the animals, can almost envy their new-born feelings of delight at the contemplation of this now unveiled feature in the portraiture of the Divine Mind. There is a great deal of good done, were the effect of this monograph to stop at this; but we even cherish the hope that it may induce some to taste a higher pleasure in the personal study of these "elaborate compositions" of our and their Creator. We cannot but wish all success to a Society which affords so rich a treat at so small an expense.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

April 22, 1845.—Richard C. Griffith, Esq., in the Chair.

"Descriptions of new species of *Helix*, in the cabinet of H. Cuming, Esq.," by Dr. L. Pfeiffer.

HELIX PONDEROSA, Pfr. *Hel. T. imperforatâ, subglobosâ, tumidâ, solidâ, ponderosâ, læviusculâ (striis incrementi et concentricis confertissimis vix perspicuis), albâ, basi epidermide nitidâ, pallidè corneâ indutâ; anfractibus* 4½ *convexiusculis, ultimo subangulato, fasciis albis hydrophanis infra angulum obsoletè notato; columellâ rectâ, latâ, perobliquâ; aperturâ subauriformi, intus albâ; peristomate latè reflexo.*

Diam. long. 23; transv. 17; altit. 13½ lin.

From Banguey, province of North Ilocos, isle of Luzon: found on leaves of trees. (Cuming.)

Differt ab *Hel. latitante* magnitudine, colore et sculpturâ minutissimâ.

Helix semiglobosa, Pfr. *Hel. T. subperforatâ, semiglobosâ, tenui, lutescenti-corneâ, supra minutissimè granulatâ; suturâ vix impressâ; anfractibus* 6 *planis, ultimo carinato, infra carinam lævigato, nitido, fasciâ dilutâ brunneâ notato; umbilico angustissimo; aperturâ lunari-ellipticâ, intus fasciatâ; peristomate simplice, acuto, margine columellari latè reflexo, umbilicum semitegente.*

Diam. 22; altit. 13 lin.

From the isle of Zeyte: found on leaves of trees. (Cuming.)

β. *Anfractu ultimo magis inflato, saturatius brunnescente* (Catbalonga, isle of Samar).

Helix obtusa, Pfr. *Hel. T. imperforatâ, subglobosâ, tenui, striis incrementi et lineis impressis concentricis obsoletis subdecussatâ, nitidâ, lætè castaneâ; spirâ subelevatâ, obtusâ; anfractibus* 4 *convexis, ultimo inflato; columellâ obliquâ, acutâ, albâ; aperturâ dilatatâ, subauriformi, intus margaritaceâ; peristomate simplice, expanso.*

Diam. $17\frac{1}{2}$; altit. 13 lin.

From Catanauan, province of Tayabos, isle of Luzon: found on leaves of bushes. (Cuming.)

β. *Alba, minor* (diam. 15; altit. 10 lin.). From Zigas, province of South Camarines, Luzon: found on leaves of trees.

Helix filaris, Valenc., Mus. Paris. *Hel. T. imperforatâ, depresso-globosâ, tenui, striis incrementi validis notatâ, albidâ, epidermide pallidè corneâ deciduâ munitâ; spirâ parùm elevatâ, obtusâ; suturâ lineari, albo-marginatâ; anfractibus* 4 *planiusculis, ultimo obtusè angulato; columellâ obliquâ, margine granulosâ; aperturâ dilatatâ, lunari; peristomate nigro, subincrassato, parùm expanso.*

Diam. $19\frac{1}{2}$; altit. $12\frac{1}{2}$ lin.

From the island of Marinduque: found on leaves of trees. (Cuming.)

Intermedia inter *Hel. Valenciennesii* et *virginem.*

Helix constricta, Pfr. *Hel. T. imperforatâ, semiglobosâ, nitidâ, concentricè minutissimè striatâ, flavo-albidâ, fasciis* 2 *fuscis interruptis ad peripheriam ornatâ; anfractibus* $4\frac{1}{2}$ *convexiusculis, ultimo basi subplanato, ad aperturam subitò descendente, constricto; aperturâ lunari, intus nitidè flavâ; peristomate acuto, albo, latè reflexo, margine basali subincrassato; areâ columellari callosâ, subexcavatâ.*

Diam. $11\frac{1}{2}$; altit. $6\frac{1}{2}$ lin.

From Calapan, island of Mindoro: found on leaves of trees. (Cuming.) Affinis sequenti.

Helix paradoxa, Pfr. *Hel. T. imperforatâ, globoso-depressâ, nitidâ, concentricè subtilissimè et confertissimè striatâ, virescenti-flavâ, apice nigro-violaceo, areâ basali saturatè castaneâ; anfractibus* 5 *planiusculis, ultimo irregulari, lateraliter subcompresso, prope aperturam tumido; aperturâ lunari-ellipticâ; peristomate* *albo, acuto, latè reflexo, margine superiore intus callo castaneo munito, basi in dentem horizontalem incrassato.*

Diam. long. $12\frac{1}{2}$; transv. 10; altit. 7 lin.

From Sorsogon, province of Albay, isle of Luzon: found on leaves of trees. (Cuming.)

Affinis *H. Thersit.*, margine non carinato, colore et sculpturâ diversâ.

Helix fodiens, Pfr. *Hel. T. umbilicatâ, subglobosâ, tenui, diaphanâ, rufo-corneâ, obliquè confertim rugosâ; anfractibus* $5\frac{1}{2}$ *convexis, ultimo subangulato; umbilico pervio; aperturâ suborbiculari; peristomate simplice, ad umbilicum latè expanso.*

Diam. 11; altit. $7\frac{1}{2}$ lin.

From Banguey, province of North Ilocos, isle of Luzon: found partially buried in earth, under stones. (Cuming.)

β. Minor, pallidior, anfractibus 5, diam. $9\frac{1}{2}$, altit. 6 lin.

From Cagayan, isle of Luzon. (Cuming.)

Differt ab *H. frutico* testâ rugosâ et aperturâ magis dilatatâ, ab *H. tourannensi* rugis testæ, spirâ non acuminatâ, et peristomate intus non labiato.

Helix succinea, Pfr. *Hel. T. depressâ, obsoletè subperforatâ, tenui, pellucidâ, nitidâ, succineâ; suturâ mediocri; anfractibus 5 celeriter crescentibus, vix convexiusculis; aperturâ lunari; peristomate simplice, acuto, margine columellari subreflexo, perforationem obsoletam tegente.*

Diam. 5; altit. 3 lin.

From Sorsogon, province of Albay, isle of Luzon: found on leaves of trees. (Cuming.)

Helix gallinula, Pfr. *Hel. T. umbilicatâ, lenticulari, acutè carinatâ, solidâ, flavescenti-griseâ, fasciis nonnullis rufis et epidermide hydrophanâ, maculas triangulares pallidas formante, ornatâ; anfractibus* $4\frac{1}{2}$ *planis, ultimo ad aperturam subitò deflexo; aperturâ horizontali, ellipticâ; peristomate simplice, marginibus callo tenui junctis, basali reflexo, ad umbilicum mediocrem pervium arcuato.*

Diam. 13; altit. $4\frac{1}{2}$ lin.

From Bongabong, province of Nueva Ecija, isle of Luzon: found on trunks of trees. (Cuming.)

β. Minor, testâ basi obliquè rugulosâ, aperturâ lateraliter minus dilatatâ.

From Mt. St. Cristoval, province of Batangas, isle of Luzon. (Cuming.)

γ. Testâ utrinque lineis impressis obliquis, circa umbilicum subconcentricis notatâ, fasciis obsoletis.

From Daleguete, isle of Zebu. (Cuming.)

Helix horizontalis, Pfr. *Hel. T. umbilicatâ, depressâ, solidâ, obliquè striatâ, carinatâ, luteo-corneâ, rufo-fasciatâ; fasciis 2 supra, 1 infra carinam; anfractibus 5 planis, ultimo supernè convexo, basi planulato, ad aperturam subitò ferè verticaliter deflexo; aperturâ horizontali, integrâ, oblongâ; peristomate crasso, reflexo, carneo, marginibus parallelis.*

Diam. $15\frac{1}{2}$; altit. 7 lin.

From the island of Bantayon, Philippines: found on the trunks of trees. (Cuming.)

Helix radula, Pfr. *Hel. T. umbilicatâ, depressâ, sublenticulari, solidiusculâ, striis incrementi confertis et lineis acutè prominentibus concentricis exasperatâ, pallidè corneâ, carinatâ; anfractibus* $6\frac{1}{2}$ *convexiusculis, lentè crescentibus, ultimo basi inflato, lineis concentricis infra carinam obsoletis; umbilico mediocri, pervio; aperturâ lunari-ellipticâ; peristomate simplice, vix incrassato, marginibus callo lineari junctis.*

Diam. 10; altit. 5 lin.

From Sinait, province of North Ilocos, isle of Luzon: found under stones in earth. (Cuming.)

Helix acutimargo, Pfr. *Hel. T. umbilicatâ, depressâ, supra planiusculâ, basi convexâ, tenui, pellucidâ, pallidè corneâ, acutè carinatâ, supra carinam striis nonnullis confertis, concentricis notatâ; anfractibus 6 lentè crescentibus; umbilico mediocri, pervio; aperturâ securiformi; peristomate simplice, acuto.*

Diam. 8; altit. 3 lin.—An adulta?

From the mountains of the isle of Negros: found on the leaves of bushes. (Cuming.)

Helix biangulata, Pfr. *Hel. T. subperforatâ, scalæformi, tenui, corneo-rubellâ, leviter striatâ, nitidiusculâ; anfractibus 7 lentè crescentibus, ultimo bicarinato; carinâ inferiore filari ad peripheriam, superiore per omnes anfractus adscendente; aperturâ lunari-ovali; peristomate simplice, acuto, perforationem angustissimam ferè occultante.*

Diam. 8; altit. $4\frac{3}{4}$ lin.

From St. Frun, province of Cagayan, isle of Luzon: found in earth at the root of bushes. (Cuming.)

Helix excentrica, Pfr. *Hel. T. subperforatâ, supernè planiusculâ, basi inflatâ, tenui, cereâ, nitidâ, striis excentricis subcostulatâ, acutè carinatâ; anfractibus 4 supra planis, rapidè crescentibus; aperturâ securiformi; peristomate simplice, acuto, ad perforationem angustissimam dilatato-reflexo.*

Diam. 9; altit. $4\frac{1}{4}$ lin.

From the isle of Siquijor: found on the leaves of bushes. (Cuming.)

Differt ab *H. smaragdinâ*, Grat., spirâ minus depressâ, anfractu ultimo minus inflato, et aperturæ formâ.

Helix spectabilis, Pfr. *Hel. T. subperforatâ, depressâ, solidâ, nitidissimâ, corneo-luteâ, fasciâ 1 rufâ percurrente ornatâ; spirâ parùm elevatâ; anfractibus* $5\frac{1}{2}$ *convexiusculis, ultimo infra fasciam angulato; aperturâ latè lunari; peristomate simplice, acuto, margine columellari subreflexo, perforationem tegente.*

Diam. 9; altit. 5 lin.—An adulta?—*Naninæ* spec.?

From Bangojon, isle of Samar: found on the leaves of bushes. (Cuming.)

Helix eximia, Pfr. *Hel. T. umbilicatâ, depresso-globosâ, obliquè rugosâ et confertissimè granulosâ, olivaceo-corneâ, fasciis 5 fusco-viridibus ornatâ; anfractibus* $4\frac{1}{2}$ *convexiusculis, rapidè crescenti-*

bus, ultimo permagno, circa aream umbilicarem fuscam compresso-inflato; aperturâ lunari-ovali, intus margaritaceâ, lilaceâ; peristomate simplice, anguste reflexo, umbilicum angustum semitegente.

Diam. 21; altit. 14 lin.

From Vera Cruz, province of Honduras, Central America: found on leaves of trees. (Delatere.)

Helix trigonostoma, Pfr. *Hel. T. imperforatâ, trochiformi, tenui, obliquè striatulâ, lineis nonnullis concentricis impressis notatâ, albâ, fasciis supernè linearibus, basi latioribus, fusco-violaceis ornatâ; spirâ latè conicâ; anfractibus $4\frac{1}{2}$ planiusculis, ultimo spiram superante, obsoletè angulato; columellâ brevi, callosâ; aperturâ subtriangulari; peristomate simplice, margine supero parùm expanso, columellari reflexo, adpresso.*

Diam. 14; altit. 9 lin.

From Vera Cruz, province of Honduras, Central America: found on leaves of trees. (Delatere.)

Affinis *H. teneræ*, Sow. Differt spirâ minus elevatâ, anfractibus planis, columellâ brevi et aperturæ formâ.

Helix tenuis, Pfr. *Hel. T. imperforatâ, subglobosâ, tenui, fuscâ, rufo-zonatâ, lineis obsoletis impressis, concentricis notatâ, epidermide tenuissimâ, sericinâ indutâ; spirâ obtusiusculâ; anfractibus 5 celeriter crescentibus, vix convexiusculis, ultimo magno, inflato, ad columellam obliquam, subtortam excavato; aperturâ lunari-ovali; peristomate recto, simplice, basi subincrassato.*

Diam. 16; altit. 11 lin.

Patria ignota. (E collectione Cumingianâ.)

Helix dilatata, Pfr. *Hel. T. imperforatâ, subglobosâ, solidâ, pallidè luteâ, lineis confertissimis brunneis, interruptis supra et infra fasciam concolorem medii anfractûs ultimi pictâ, apice albidâ; spirâ parvâ, obtusiusculâ; anfractibus 4 rapidè crescentibus, ultimo amplissimo; columellâ albo-callosâ, arcuatâ; aperturâ maximâ, obliquè ovali, intus lacteâ; peristomate recto, intus incrassato.*

Diam. $17\frac{1}{2}$, altit. 12 lin.

Patria ignota. (E collectione Cumingianâ.)

Glandina obtusa, Pfr. *Glan. T. ovatâ, utrinque attenuatâ, apice obtusâ, solidulâ, pellucidâ, pallidè carneâ; anfractibus $5\frac{1}{2}$ vix convexiusculis, ultimo spiram paulò superante; suturâ crenulato-marginatâ; aperturâ latiusculâ; columellâ verticali, basi subitò truncatâ; peristomate simplice, marginibus callo tenuissimo junctis, dextro medio vix dilatato.*

Long. $9\frac{1}{2}$; diam. 5 lin.

From the Real Llejos, province of Nicaragua, Central America: found on leaves of bushes. (Cuming.)

May 13.—William Yarrell, Esq., Vice-President, in the Chair.

"Descriptions of eighty-nine new species of *Mitra*, chiefly from the collection of H. Cuming, Esq.," by Lovell Reeve, Esq.:—

Mitra fastigium. *Mitr. testâ abbreviato-ovatâ, subventricosâ, solidiusculâ, spirâ brevi, acuminatâ; lævigatâ, basim versus exiliter* *sulcatâ; luteâ; columellâ quadriplicatâ, basi truncatâ; labro simplici, supernè sinuato.*

Conch. Icon., *Mitra*, pl. 28. f. 221.

Hab. —— ?

A small, solid, compact cupola-shaped shell.

Mitra Bulimoides. *Mitr. testâ elongatâ, basi subtruncatâ, spirâ acuminatâ; tenuiculâ, subpellucidâ, quasi corneâ; albido-fuscescente; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 28. f. 224.

Hab. —— ?

A smooth transparent horny shell.

Mitra rhodia. *Mitr. testâ elongatâ, spirâ acuminatâ; læviusculâ, transversim subtilissimè striatâ; nigerrimo-fuscâ; columellâ triplicatâ, aperturâ brevi.*

Conch. Icon., *Mitra*, pl. 28. f. 225.

Hab. —— ?

Not much unlike the preceding species in form, but of a different colour and texture.

Mitra cœligena. *Mitr. testâ ovatâ, spirâ breviusculâ, suturis profundis; transversim sulcatâ, sulcis subpunctatis; luteo-fuscescente, albipunctatâ, anfractuum parte superiori balteo angusto lutescente cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 28. f. 226.

Hab. —— ?

The entire surface of this species is speckled with small white spots.

Mitra Auriculoides. *Mitr. testâ ovatâ, crassâ, solidâ, basim versus striatâ, spirâ brevi, obtusâ; rubido-castaneâ, anfractuum parte superiori, balteo unico albo angusto cingulatâ; columellâ quinqueplicatâ; labro intus supernè sinuato.*

Conch. Icon., *Mitra*, pl. 28. f. 228.

Hab. —— ?

A dark chestnut-brown Auricula-shaped shell, encircled with a conspicuous narrow white belt.

Mitra duplilirata. *Mitr. testâ elongatâ, spirâ valdè acuminatâ, angustâ, tereti, basi tortuoso-recurvâ; transversim subtiliter duplilirata, liris interstitiisque granulosis; albidâ, aurantio-fusco hic illic concentricè flammatâ; columellâ quadriplicatâ, basi subcanaliculatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 229.

Hab. —— ?

This species has a peculiar tapering form, and by the aid of a lens it may be observed that the transverse ridges are all duplicate.

Mitra discoloria. *Mitr. testâ ovatâ, basi granulatâ, spirâ acuminato-turritâ; anfractibus supernè prominentibus, longitudinaliter conspicuè costatis, costis latiusculis, obtusis, transversim impresso-lineatis; fasciis roseis et albis alternatâ, fasciis roseis inter costas ustulato-nigricantibus; columellâ quadriplicatâ, aperturâ parvâ.*

Conch. Icon., *Mitra*, pl. 29. f. 230.

Hab. —— ?

An extremely prettily painted species.

Mitra coriacea. *Mitr. testâ ovatâ, utrinque attenuatâ, spirâ breviusculâ, acutè acuminatâ; anfractibus supernè rotundatis, transversim impresso-lineatis, interstitiis granosis; anfractuum parte superiori albidâ, infra fuscescente; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 231.

Hab. Island of Corrigidor, Philippines (found among coarse sand at the depth of five fathoms); Cuming.

A species of very peculiar character.

Mitra verrucosa. *Mitr. testâ ovatâ, subventricosâ, spirâ breviusculâ, acuminatâ; longitudinaliter concentricè plicatâ, plicis tuberculis parvis prominentibus mucronatis undique armatis; albâ, fuscescente pallidè fasciatâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 232.

Hab. Island of Ticao, Philippines (found in sandy mud in deep water); Cuming.

The tubercles with which the entire surface of this shell is covered are quite sharp and prickly.

Mitra elegans. *Mitr. testâ oblongo-ovatâ, spirâ acuminatâ, suturis subprofundis; longitudinaliter subtilissimè costatâ, costis angustis, interstitiis eleganter clathratis; albicante, aut pallidissimè carneo-fuscescente, lineâ rubrâ unicâ aut pluribus cingulatâ, apice fusco; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 233.

Hab. Island of Burias, Philippines (found among coral sand and shells at the depth of four fathoms); Cuming.

This species is well characterized by the very elegant style of its sculpture and by the sharp red lines with which it is encircled.

Mitra decora. *Mitr. testâ subfusiformi, basi contractâ, spirâ acuminato-turritâ, suturis profundis; transversim impresso-sulcatâ, liris intermediis granulosis, plicisque angustis concentricis subdistantibus longitudinaliter ornatâ; albâ, balteo aurantio-fusco, anfractu ultimo balteis duobus, cingulatâ; columellâ quadriplicatâ, umbilicatâ, subcanaliculatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 234.

Hab. —— ?

The form, colour and sculpture of this species are each of peculiar interest.

Mitra mutabilis. *Mitr. testâ abbreviato-fusiformi, spirâ turritâ, interdum elevatâ, interdum breviusculâ, suturis subprofundis; anfractibus supernè depressis, longitudinaliter concentricè costatis, costis angustis liris subtilibus transversis clathratis; albidâ, olivaceo-viridi fasciatâ, apice fusco; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 235.

Hab. Island of Ticao, Philippines (found under stones at low water, and at the depth of about ten fathoms); Cuming.

An extremely variable species both in form and colour.

Mitra militaris. *Mitr. testâ subfusiformi, basi contractâ, spirâ acuminatâ, suturis subprofundis; longitudinaliter costatâ, costis obtusiusculis, interstitiis transversim impresso-lineatis; anfractibus supernè luteis, ultimo zonâ latâ coccineo-rubrâ cingulato; columellâ quadriplicatâ, umbilicatâ.*

Conch. Icon., *Mitra*, pl. 29. f. 236.

Hab. Island of Ticao, Philippines (found on the sands); Cuming.

Distinguished in part by the rich, broad, crimson-red band which encircles the last whorl.

Mitra tuberosa. *Mitr. testâ obtuso-conicâ, crassâ, obesâ, spirâ brevi, basi truncatâ; longitudinaliter plicato-costatâ, costis rudibus, subdistantibus, supernè tuberculato-nodosis; transversim leneari-sulcatâ, sulcis pertusis; luteo-olivaceâ, aut fuscâ, supernè albâ, basi fuscâ, albipunctatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 237, *a* and *b*.

Hab. Island of Zebu, Philippines (found under stones at low water); Cuming.

A small stout species, somewhat after the form of the *Mitra patriarchalis*.

Mitra forticostata. *Mitr. testâ abbreviato-ovatâ, spirâ subturritâ; anfractibus supernè angulatis, infra angulum longitudinaliter costatis, costis solidis fortissimis, distantibus, basim versus subobsoletè granosis; nigerrimo-fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 238.

Hab. New Holland.

Resembling *Mitra ficulina*, but of a much more solid and angular structure.

Mitra lota. *Mitr. testâ oblongo-ovatâ, spiræ suturis impressis, transversim subtilissimè impresso-striatis, longitudinaliter concentricè costatâ, costis basim versus granosis; rufulo-aurantiâ, viridifusco variegatâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 239.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

The painting of this species is of very irregular character.

Mitra consanguinea. *Mitr. testâ ovatâ, solidiusculâ, obesâ, basim versus contractâ, spirâ obtuso-rotundatâ; transversim subtilissimè punctato-striatâ, longitudinaliter confertim plicato-costatâ, costis infernè granosis; rubidâ, anfractibus maculis parvis rotundis in medio uniseriatim cinctis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 241.

Hab. —— ?

Allied in some measure to the *Mitra pardalis*.

Mitra cremans. *Mitr. testâ obeso-ovatâ, spirâ brevi, suturis subimpressis; lævi, basim versus granosâ, longitudinaliter subobliquè plicatâ; nigerrimâ, flammis rufo-aurantiis hic illic variegatâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 242.

Hab. St. Nicolas, island of Zebu, Philippines (found under stones at low water); Cuming.

This species may be known by its confused flame-like painting.

Mitra leucodesma. *Mitr. testâ obeso-ovatâ, spirâ brevissimâ, longitudinaliter plicato-costatâ; lævi, apice crenulatâ, basi granulatâ; nigerrimo-fuscâ, anfractibus macularum albarum zonâ unicâ in medio cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 243.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

Painted in a manner similar in some degree to the *Mitra microzonias*, from which it is materially distinct in form.

Mitra lauta. *Mitr. testâ obeso-ovatâ, solidiusculâ, spirâ obtuso-rotundatâ, longitudinaliter subobsoletè plicato-costatâ, costis lævibus, interstitiis impresso-striatis; costis, aurantio-rufis, interstitiis nigerrimis, anfractuum medio albo; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 244.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

A stout, very prettily painted species.

Mitra luculenta. *Mitr. testâ ovatâ, lævi, longitudinaliter subobsoletè plicato-costatâ, costis basim versus granosis; anfractibus zonis cæruleo-nigris et albis alternatim conspicuè pictâ, columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 30. f. 245.

Hab. Philippine Islands; Cuming.

This species may be recognized by the decided character of the painting, which consists of alternate blue-black and white zones.

Mitra avenacea. *Mitr. testâ oblongo-ovatâ, transversim undique liratâ, liris angustis, elevatiusculis; flavescente-spadiceâ, juxta suturas albicante subindistinctè maculatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 31. f. 246.

Hab. Islands of Burias, Ticao and Capul, Philippines (found on the reefs and in sandy mud at the depth of about six fathoms); Cuming.

A solid, cylindrical, closely-ridged shell.

Mitra pica. *Mitr. testâ ovatâ, tenuiculâ, subventricosâ, spirâ breviusculâ, acutâ; anfractibus lævibus, aterrimis, supernè et infernè niveis; columellâ triplicatâ; aperturâ subamplâ.*

Conch. Icon., *Mitra*, pl. 31. f. 247.

Hab. —— ?

May be distinguished by the jagged white band with which its black whorls are encircled next the sutures.

Mitra cithara. *Mitr. testâ ovatâ, crassiusculâ, suturis impressis; longitudinaliter creberrimè costatâ, costis angustis, obtusis, interstitiis transversim clathratis; purpureo-plumbeâ, zonulâ pallidâ angustâ cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 31. f. 248.

Hab. —— ?

Of a peculiar purple lead-colour.

Mitra nympha. *Mitr. testâ subfusiformi, spirâ acuminatâ; anfractibus transversim punctato-striatis; incarnato-fuscescente, albo maculato-variegatâ, anfractu ultimo fasciâ albidâ subindistinctâ cingulato; columellâ quadriplicatâ.*
Conch. Icon., *Mitra*, pl. 31. f. 249.
Hab. —— ?
A solid punctured shell, of a fleshy-brown or pale salmon-colour, variegated with white spots, particularly around the sutures.

Mitra callosa. *Mitr. testâ oblongo-ovatâ, spirâ breviusculâ, suturis subimpressis; lævigatâ, basi liratâ; plumbeo-fuscâ, punctis fuscis hic illic variegatâ; columellâ fuscâ, quinqueplicatâ, callositate albâ supernè armatâ, plicis albis; labro subflexuoso.*
Conch. Icon., *Mitra*, pl. 31. f. 251.
Hab. Pasacao, island of Luzon, Philippines (found on the sands); Cuming.
Distantly allied to the *Mitra ebenus.*

Mitra ægra. *Mitr. testâ fusiformi, spirâ acuminatâ, transversim undique crebriliratâ, liris lævibus, interstitiis puncturatis; fuscescente, roseo-albicante pallidè et indistinctè fasciatâ et maculatâ; columellâ quadriplicatâ.*
Conch. Icon., *Mitra*, pl. 31. f. 252.
Hab. —— ?
Like the *Mitra cylindracea* in form, but of a different sculpture.

Mitra modesta. *Mitr. testâ subfusiformi-ovatâ, basi contractâ, spirâ turritâ; anfractibus rotundatis, longitudinaliter costatis, interstitiis transversim cancellato-impressis; niveâ, rosaceo basim versus pallidissimè tinctâ; columellâ quadriplicatâ, aperturæ fauce rosaceâ.*
Conch. Icon., *Mitra*, pl. 31. f. 254.
Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.
A chaste pink-white shell, with a highly-relieved lattice sculpture.

Mitra semen. *Mitr. testâ ovatâ, utrinque attenuatâ, lævigatâ, politâ; castaneo-fuscâ lineis albidis undatis longitudinaliter pictâ; columellâ triplicatâ.*
Conch. Icon., *Mitra*, pl. 32. f. 256.
Hab. Puerto Galero, island of Mindoro, Philippines (found on the sands at low water); Cuming.
Covered with characteristic longitudinal waved lines.

Mitra milium. *Mitr. testâ ovato-fusiformi, crassiusculâ, lineis elevatiusculis undique creberrimè decussatâ; rufescente-fuscâ; columellâ quadriplicatâ; aperturâ subangustâ, labro incrassato.*
Conch. Icon., *Mitra*, pl. 32. f. 257.
Hab. —— ?
Belonging to a small group of a peculiar narrow contracted structure, with thickened lip, of which the *Mitræ gratiosa, recurva, exilis* and *mirifica* may be quoted as examples.

Mitra lachryma. *Mitr. testâ ovatâ, utrinque attenuatâ, tenuiculâ,* *spirâ brevi, subobtusâ; anfractibus supernè longitudinaliter subtilissimè costatâ, transversim obsoletè elevato-striatâ; albâ, maculâ grandi aurantio-fuscescente dorso peculiariter pictâ; columellâ bi- vel tri-plicatâ, plicis ferè obsoletis, labro effuso.*

Conch. Icon., *Mitra*, pl. 32. f. 258.

Hab. ——?

A small white transparent-looking shell, which may be immediately recognised by the large brown stain on the back of the last whorl.

Mitra cimelium. *Mitr. testâ abbreviato-fusiformi, spirâ turritâ, longitudinaliter costatâ, costis supernè tuberculatis; albâ, costis infra tuberculis lineis brevibus nigerrimo-fuscis transversim vividè pictâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 32. f. 260.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

The lower portion of the ribs of this species are crossed in a very peculiar manner with short brown parallel lines.

Mitra turriger. *Mitr. testâ fusiformi, spirâ angulato-turritâ; anfractibus supernè angulatis, longitudinaliter costatis, costis angustis, ad angulum muricato-tuberculatis, interstitiis transversim impressis; albidâ, fasciâ castaneâ latiusculâ inter costas pictâ, columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 32. f. 262.

Hab. Island of Ticao, Philippines (found in sandy mud at the depth of six fathoms); Cuming.

A prickly sharply-turreted species, encircled with a brown band, which only appears in the interstices between the ribs.

Mitra cælata. *Mitr. testâ cylindraceo-ovatâ, basi contractâ, paululùm elongatâ, spiræ suturis subprofundis; anfractibus longitudinaliter costatis, costis angustis, crebris, interstitiis impresso-cancellatis; lutescente-fuscâ, subindistinctè albifasciatâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 32. f. 265.

Hab. Cagayan, province of Misamis, island of Mindanao, Philippines (dredged from sandy mud at the depth of thirty fathoms); Cuming.

The upper portion of this shell has a peculiar cylindrically shortened structure, whilst the base is inclined to become elongated.

Mitra lucida. *Mitr. testâ fusiformi, spirâ turritâ, basi subelongato-contractâ; anfractibus longitudinaliter costatis, costis supernè tumidis, transversim elegantissimè liratis; lucido albicante; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 266.

Hab. Philippine Islands; Cuming.

A delicate transparent species, of a peculiar elongated fusiform growth.

Mitra typha. *Mitr. testâ subelongatâ, spirâ acuminatâ; transversim subtilissimè striatâ, corneâ, translucidâ, fasciâ latâ ferrugineâ cingulatâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 267.

Hab. Loay, island of Bohol, Philippines (found under stones at low water); Cuming.

A minute horny-looking shell, encircled with a conspicuous orange-brown band.

Mitra tornata. *Mitr. testâ oblongo-ovatâ, spirâ acutâ, anfractibus convexis, transversim undique liratis, liris tribus supremis minoribus; lutescente-fuscâ, epidermide fuscâ indutâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 269.

Hab. Island of Guimaras, Philippines.

The ridges of this species are remarkable for their close regularity and precision.

Mitra vultuosa. *Mitr. testâ ovatâ, spirâ breviusculâ; anfractibus convexis ad suturas depresso-planis, transversim costatis, costis crebris sulcis longitudinalibus angustis exsculptis; aurantio-fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 270.

Hab. Island of Capul, Philippines (found on the reefs); Cuming.

The longitudinal grooves impart a nodulous character to the transverse ribs.

Mitra granata. *Mitr. testâ oblongo-ovatâ, crassâ, transversim undique liratâ, liris parvis subtiliter granatis; lutescente-fuscâ, apice albicante; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 271.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

Crossed with finely-grained ridges.

Mitra Pacifica. *Mitr. testâ oblongo-ovatâ, crassiusculâ, spirâ turritâ; anfractibus supernè angulatis, longitudinaliter liratâ, liris numerosis, angustis, transversim impresso-sulcatis; albâ, fasciâ fuscâ inter liras solum cingulatâ; columellâ quadriplicatâ, plicâ supremâ valdè maximâ, aperturâ breviusculâ.*

Conch. Icon., *Mitra*, pl. 33. f. 272.

Hab. Lord Hood's Island; Cuming.

Allied in form to the *Mitra exasperata.*

Mitra turgida. *Mitr. testâ ovoideâ, medio turgidâ, basi contractâ, spirâ brevi, acuminatâ; transversim undique liratâ, sulcis subirregularibus longitudinaliter impressâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 273.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

The sculpture of this species is of a somewhat similar character to that of the *Mitra tornata.*

Mitra amabilis. *Mitr. testâ ovatâ, crassiusculâ, spirâ obtuso-depressâ; anfractibus subrotundatis, longitudinaliter costatis, transversim impresso-sulcatis; cinereo-griseâ variè albifasciatâ; columellâ quadriplicatâ; aperturâ breviusculâ, intus fuscâ.*

Conch. Icon., *Mitra*, pl. 33. f. 274.

Hab. Islands of Ticao and Philippines (found under stones at low water); Cuming.

A pretty species, banded alternately with white and ashy grey.

Mitra purpurata. *Mitr. testâ ovatâ, utrinque attenuatâ, spirâ breviusculâ, subturritâ; anfractibus ad suturas plano-angulatis, longitudinaliter costatis, costis numerosis, angustis, prominentibus, interstitiis impresso-cancellatis; fusco-purpureâ, zonâ angustâ albâ cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 33. f. 275.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

The whorls of this shell being flatly angulated at the sutures, give a turreted character to the spire.

Mitra puella. *Mitr. testâ rotundato-ovatâ, spirâ brevi, subobtusâ, suturis impressis; anfractibus transversim subtilissimè striatis, anfractûs ultimi parte inferiori minutè nodiferâ; aterrimâ, anfractuum parte superiori maculis niveis pyriformibus, concentricè dispositis, conspicuè ornatâ; columellâ triplicatâ; labro intus denticulato.*

Conch. Icon., *Mitra*, pl. 34. f. 276.

Hab. Island of St. Thomas, West Indies; Gruner.

The pyriform white spots which encircle the upper portion of each whorl exhibit a striking contrast with the jet-black ground of the shell.

Mitra gratiosa. *Mitr. testâ elongatâ, subcylindraceâ, liris prominentibus minutis creberrimè decussatâ; fuscâ; columellâ quinqueplicatâ, labro subincrassato.*

Conch. Icon., *Mitra*, pl. 34. f. 277.

Hab. Gallapagos Islands (found among coral sand at a depth of about seven fathoms); Cuming.

A narrow cylindrical shell, with beautifully decussated sculpture, and of an uniform brown colour.

Mitra mirifica. *Mitr. testâ elongatâ, gracili, subcylindraceâ, basi recurvâ, liris minutissimis creberrimè decussatâ; rosaceâ, subpellucidâ, zonulâ angustâ albidâ cingulatâ; columellâ sexplicatâ, labro subincrassato.*

Conch. Icon., *Mitra*, pl. 34. f. 278.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

The general aspect of this shell is very similar to that of the preceding species; upon examination it will be found however of a thinner and more slender structure, whilst the sculpture is of a smaller pattern, and the colour altogether different.

Mitra inermis. *Mitr. testâ oblongo-ovatâ, longitudinaliter creberrimè plicatâ, basi sulcatâ; rufescente-fuscâ, fasciâ albidâ, fusco subtilissimè undulatâ, cinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 279.

Hab. Puteao, province of Albay, island of Luzon (found on the sands); Cuming.

Encircled with a white band, traversed with fine brown zigzag lines.

Mitra brumalis. *Mitr. testâ elongatâ, subcylindraceâ, undique subtilissimè decussatâ; lutescente, aurantio-fusco pallidissimè hic illic tinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 280.

Hab. Philippine Islands; Cuming.

A solid obtuse shell, with the lip slightly effused.

Mitra dædala. *Mitr. testâ subfusiformi-ovatâ, spirâ turritâ; longitudinaliter costatâ, costarum interstitiis fortiter clathratis; cinereo-viridescente, zonâ albâ conspicuâ cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 281.

Hab. Island of Ticao, Philippines (found in sandy mud at the depth of six fathoms); Cuming.

The colour of this shell is a peculiar livid ashy grey.

Mitra suturata. *Mitr. testâ elongato-ovatâ, basi subrecurvâ, spiræ suturis profundè impressis; transversim undique angisulcatis, sulcis profundis, puncturatis, liris intermediis subgranosis; pallidè stramineâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 282.

Hab. Gindulman, island of Bohol, Philippines (found under stones at low water); Cuming.

The entire surface of this shell is encircled with close finely granulated ridges, the interstices between which are deeply grooved and punctured.

Mitra tusa. *Mitr. testâ ovatâ, spiræ suturis profundè impressis, longitudinaliter subtiliter costatâ, transversim impresso-striatâ; anfractuum parte superiori albidâ, maculis grandibus subquadratis fuscis ornatâ, parte inferiori totâ fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 283.

Hab. Puerto Galero, island of Mindoro, Philippines (found on the sands at low water); Cuming.

Distinguished by the dark chocolate-brown spots upon the upper part of the shell, whilst the lower part is entirely stained with the same colour.

Mitra micans. *Mitr. testâ subfusiformi-ovatâ, lævigatâ, politâ, eburneâ, aurantio pallidè fasciatâ, columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 34. f. 285.

Hab. South Pacific Ocean.

A small white orange-banded shell, with a surface as hard and shining as polished ivory.

Mitra armiger. *Mitr. testâ elongatâ, subfusiformi, spirâ turritâ; anfractibus supernè angulatis, longitudinaliter costatis, costis ad angulum nodosis, infernè evanidis, transversim impresso-striatis; rubidâ, albizonatâ, costis supernè albis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 35. f. 288.

Hab. —— ?

A pretty species, the sculpture of which is of a very decided character.

Mitra chelonia. *Mitr. testâ ovatâ, spirâ breviusculâ, acutâ; lævigatâ; nigricante-fuscâ, zonulâ luteâ unicâ, cingulatâ; columellâ triplicatâ, labro supernè sinuato.*

Conch. Icon., *Mitra*, pl. 35. f. 289.

Hab. Island of Burias, Philippines (dredged from sandy mud at the depth of ten fathoms); Cuming.

Belonging to that well-known division of the genus of which the *Mitra ebenus* is the type.

Mitra sculptilis. *Mitr. testâ elongatâ, subcylindraceâ, basi paulùm recurvâ, spiræ suturis subimpressis; longitudinaliter crebriliratâ, interstitiis transversim fortiter clathratis; albicante, fuscescente pallidè maculatâ, anfractûs ultimi parte inferiori fuscescente basi albicante; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 35. f. 290.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

Distinguished by its very closely latticed sculpture.

Mitra spicata. *Mitr. testâ fusiformi, spirâ acuminato-turritâ; anfractibus longitudinaliter crebricostatis, supernè acutangulis, costis ad angulum tuberculato-nodosis, anfractu ultimo medio exiliter noduloso, costis ferè obsoletis; pallidè fulvâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 35. f. 291.

Hab. Island of Ticao, Philippines (found on the sands); Cuming.

The upper whorls of this species are longitudinally finely ribbed, but there is very slight indication of ribs upon the lower.

Mitra Hebes. *Mitr. testâ fusiformi, spirâ acuminatâ, lineis profundè impressis transversis et longitudinalibus undique creberrimè decussatâ, albicante, columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 35. f. 292.

Hab. —— ?

The entire surface of this species is decussated with narrow deeply-cut lines.

Mitra analogica. *Mitr. testâ ovato-oblongâ, basi contractâ, sulcatâ; spiræ anfractibus longitudinaliter plicato-costatis, anfractu ultimo lævigato; nigricante fuscâ, zonulâ luteâ cingulatâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 35. f. 293.

Hab. —— ?

This species has very much the appearance of a gigantic *Mitra Savignii*, from which it however differs in its proportions.

Mitra bilineata. *Mitr. testâ ovatâ, solidiusculâ, spirâ acuminatâ; longitudinaliter subobsoletè plicatâ, lævigatâ, politâ; nigerrimo-*

fuscâ, apicem versus albicante, lineis duabus luteis cingulatâ; columellâ quinqueplicatâ.

Conch. Icon., *Mitra*, pl. 35. f. 294.

Hab. —— ?

A hard polished blackish brown shell, encircled with two distant yellow lines.

Mitra recurva. *Mitr. testâ fusiformi, basi attenuatâ, subrecurvâ; longitudinaliter granoso-liratâ, transversim impresso-striatâ; rosaceo-purpurascente, fusco minutissimè hic illic punctatâ; columellâ quadriplicatâ; labro incrassato.*

Conch. Icon., *Mitra*, pl. 36. f. 297.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

The minute granules with which the surface of this shell is longitudinally sculptured have a semitransparent pearl-like appearance.

Mitra incarnata. *Mitr. testâ oblongo-ovatâ, spirâ breviusculâ, transversim elegantissimè crebriliratâ, longitudinaliter angisulcatâ; incarnatâ; columellâ sexplicatâ, aperturâ longiusculâ.*

Conch. Icon., *Mitra*, pl. 36. f. 299.

Hab. Cagayan, province of Misamis, island of Mindanao, Philippines (dredged from sandy mud at the depth of five and twenty fathoms); Cuming.

The sculpture of this delicately tinted shell is very elaborate.

Mitra articulata. *Mitr. testâ abbreviato-fusiformi, subventricosâ; anfractibus lævibus, longitudinaliter subobsoletè plicatis, medio leviter tuberculatis; pallidè rosaceo-coccineâ, zonulâ albâ fusco articulatâ cinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 36. f. 302.

Hab. —— ?

I have found no specimen approaching comparison with the one above described, from the collection of Thomas Norris, Esq.

Mitra festa. *Mitr. testâ pyramidali-ovatâ, longitudinaliter obtuso-costatâ, costarum interstitiis transversim cancellatis; eburneâ, anfractu ultimo fasciâ latâ olivaceo-cinereâ, fusco indistinctè punctatâ, cingulatâ; columellâ quadriplicatâ.*

Conch. Icon. *Mitra*, pl. 36. f. 303.

Hab. Puerto Galero, island of Mindoro, Philippines (found on the sands); Cuming.

A solid ivory-white shell, encircled with a dark band, which is concealed in the upper part of the shell by the superposition of the whorls.

Mitra pinguis. *Mitr. testâ subobeso-ovatâ, longitudinaliter subobliquè noduloso-costatâ, transversim impresso-striatâ, striis creberrimis, anfractûs ultimi parte inferiori sulcatâ; albidâ, fasciâ unicâ fuscescente cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 36. f. 304.

Hab. Puerto Galero, island of Mindoro, Philippines; Cuming.

The last whorl of this shell exhibits a peculiarity of structure which is worthy of observation; above the brown band it is very closely impressly striated across; below it, it is merely distantly grooved. A difference between the transverse sculpture of the upper and lower portions of the whorls is rarely met with.

Mitra peculiaris. *Mitr. testâ elongatâ, anfractibus lævibus, concavis, carinâ unicâ prominente supernè ornatis; albidâ, fasciâ latâ luteo-fuscescente cingulatâ; columellâ biplicatâ.*

Conch. Icon., *Mitra*, pl. 36. f. 305.

Hab. Puerto Galero, island of Mindoro, Philippines (found under stones at low water); Cuming.

This species may be easily distinguished by the hollow character which is imparted to the whorls by the very prominent keel round the upper part.

Mitra roborea. *Mitr. testâ pyramidali, spirâ acuminatâ; nigricante-fuscâ, liris albidis angustis undique funiculatâ; columellâ biplicatâ, plicis subindistinctis; aperturâ parvâ.*

Conch. Icon., *Mitra*, pl. 37. f. 306.

Hab. —— ?

An interesting dark pyramidal shell, encircled throughout with white cord-like ridges.

Mitra radius. *Mitr. testâ gracili-fusiformi, spirâ acuminatâ, basi contractâ, subelongatâ; anfractibus longitudinaliter concentricè plicato-costatis, interstitiis cancellatis; pallidè carneâ, anfractu ultimo fasciâ fuscescente basim versus cingulato; columellâ biplicatâ.*

Conch. Icon., *Mitra*, pl. 37. f. 309.

Hab. Island of Corregidor, Philippines (found among coarse sand at the depth of seven fathoms); Cuming.

A light elegant shell, in which the ribs are of a peculiarly concentric growth.

Mitra glandiformis. *Mitr. testâ ovatâ, utrinque attenuatâ, spiræ suturis profundè impressis; longitudinaliter costatâ, costis lævibus, interstitiis profundè clathratis; cinereo-griseo alboque variegatâ, basi albicante; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 37. f. 310.

Hab. —— ?

In most examples of this species the white rather predominates.

Mitra cineracea. *Mitr. testâ pyramidali-ovatâ, spirâ turritâ, basi subrecurvâ; anfractibus supernè angulatis, longitudinaliter costatis, costis ad angulum subnodosis, interstitiis liris parvis transversis cancellatis; cinereo-griseâ, fasciâ albidâ subinterruptâ cingulatâ, basi albidâ; columellâ quadriplicatâ, aperturâ parvâ.*

Conch. Icon., *Mitra*, pl. 37. f. 311.

Hab. Cagayan, province of Misamis, island of Mindanao, Philippines (found under stones at low water); Cuming.

A sharply turreted shell, in which the prominent parts of the ribs are white upon a dark ashy ground.

Mitra limata. *Mitr. testâ ovatâ, crassiusculâ, spirâ mediocri; lævigatâ, politâ, transversim undique sulcatâ, sulcis puncturatis;*

albidâ, fasciâ fuscescente albifloccatâ cingulatâ; columellâ quadriplicatâ.

Conch. Icon., *Mitra*, pl. 37. f. 312.

Hab. Island of Bohol, Philippines (found under stones on the reefs at low water); Cuming.

The grooves of this species are more deeply punctured towards the upper part of the whorls.

Mitra exilis. *Mitr. testâ elongatâ, basi subrecurvâ, spirâ subobtusâ; liris minutis undique granoso-decussatâ; pallidè violaceo-purpurascente, anfractu ultimo fasciâ latâ saturatiore cingulato, infra albicante; columellâ quadriplicatâ, plicis parvis; labro incrassato.*

Conch. Icon., *Mitra*, pl. 37. f. 313.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

An interesting small species, with a decussated granular surface, like that of a thimble.

Mitra mica. *Mitr. testâ elongatâ, subcylindraceâ, basim versus contractâ; liris granulosis undique creberrimè decussatâ; fuscâ, zonâ albidâ cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 37. f. 314.

Hab. Island of Guimaras, Philippines (found in coarse sand at the depth of six fathoms); Cuming.

The colour of this shell is a dull earthy brown.

Mitra armillata. *Mitr. testâ pyramidali, spirâ turritâ; anfractibus supernè plano-angulatis, longitudinaliter concentricè costatis, costis angustis, numerosis, ad angulum nodosis, transversim impressis; purpureo-fuscâ, zonulâ lutescente cingulatâ; columellâ quadriplicatâ, aperturâ brevi.*

Conch. Icon., *Mitra*, pl. 37. f. 315.

Hab. Island of Annaa, Pacific Ocean (found on the reefs); Cuming.

A prettily sculptured species, in which the ribs are disposed somewhat concentrically.

Mitra Tornatelloides. *Mitr. testâ rotundato-ovatâ, spirâ brevi, obtusâ; transversim undique sulcatâ, sulcis subindistinctè puncturatis; sanguineo-fuscescente, zonulâ transversâ strigisque longitudinalibus undatis albis vividè notatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 38. f. 316.

Hab. Philippine Islands; Cuming.

The general aspect of this shell is very like that of a well-known species of *Tornatella*.

Mitra gausapata. *Mitr. testâ ovatâ, spirâ subacuminatâ; anfractibus supernè plano-compressis, tuberculato-costatis, transversim undique liratis; nigerrimo-fuscâ, anfractuum areâ superâ luteâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 38. f. 317.

Hab. Gallapagos Islands (dredged from the depth of about ten fathoms); Cuming.

The whorls are characterized by a peculiar narrow depression round the upper part, beneath which they are for a short distance tubercularly ribbed.

Mitra amanda. *Mitr. testâ subpyramidali, spirâ acuto-turritâ; anfractibus longitudinaliter crebricostatis, transversim impressis; fasciis angustis rubido-fuscis albisque undique cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra,* pl. 38. f. 318.

Hab. Islands of Burias and Negros, Philippines (found among coral sand at the depth of four fathoms); Cuming.

Encircled throughout with narrow white and reddish brown bands.

Mitra crocea. *Mitr. testâ ovatâ, spiræ suturis impressis; anfractibus supernè plano-angulatis; longitudinaliter crebricostatis, transversim basim versus sulcatis; pallidè croceâ, aperturæ fauce aurantio tinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra,* pl. 38. f. 320.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

Of a beautiful clear yellow colour, with orange mouth.

Mitra rosacea. *Mitr. testâ ovatâ, spirâ breviusculâ; liris granatis undique cingulatâ; niveâ, maculis grandibus pallidè rosaceis bifasciatim ornatâ; columellâ quinqueplicatâ; aperturâ oblongo-ovatâ; labro crenulato.*

Conch. Icon., *Mitra,* pl. 38. f. 321.

Hab. Island of Corrigidor, Philippines (found among coral sand at the depth of ten fathoms); Cuming.

An extremely delicate semitransparent pink-stained white shell.

Mitra mœsta. *Mitr. testâ oblongo-ovatâ, transversim sulcatâ, lævigatâ; fuscescente, anfractuum parte superiori pallidè luteâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra,* pl. 38. f. 323.

Hab. Island of Corrigidor, Philippines (dredged among coral sand at the depth of ten fathoms); Cuming.

The columella and mouth of this species are brightly enamelled.

Mitra Æthiops. *Mitr. testâ ovatâ, crassâ, spirâ acutâ, liris parvis transversis et longitudinalibus, concentricis, undique decussatâ; nigerrimâ, vel olivaceo-nigrâ; columellâ planatâ, quadriplicatâ, callositate supernè munitâ; labro planato, intus denticulato, supernè sinuato.*

Conch. Icon., *Mitra,* pl. 38. f. 324.

Hab. Islands of Ticao and Luzon, Philippine Islands (found under stones at low water); Cuming.

Belonging to that interesting group of which the *Mitræ Ziervogeliana* and *Woldemarii* form part.

Mitra zelotypa. *Mitr. testâ ovatâ, anfractibus supernè rotundatis, longitudinaliter costatis, transversim fortiter cancellato-liratis; luteo alboque undique fasciatâ; columellâ quadriplicatâ, aperturæ fauce violascente.*

Conch. Icon., *Mitra*, pl. 38. f. 325.

Hab. —— ?

A very distinct species, from the collection of H. Cuming, Esq., concerning which he possesses no information as to its locality.

Mitra infausta. *Mitr. testâ ovatâ, solidiusculâ, longitudinaliter subundato-costatâ, transversim impresso-striatâ; incarnato-stramineâ, lineis impressis rubido-fusco hic illic exiliter tinctis; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 326.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

The transverse impressed striæ are chiefly stained with reddish brown where they pass over the ribs.

Mitra Graia. *Mitr. testâ ovatâ, solidâ, spirâ brevi, acuminatâ; lævigatâ, albâ, opacâ, epidermide luteâ indutâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 327.

Hab. Island of Paros, Grecian Archipelago; —— Miller, R.N.

A stout solid shell, of a peculiar opake marble-white, covered with a yellow epidermis.

Mitra candida. *Mitr. testâ ovatâ, subfusiformi, transversim crebriliratâ, lirarum interstitiis longitudinaliter subtilissimè striatis; candidâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 328.

Hab. La Guayra, South America.

A white closely-ridged species, in the collection of His Majesty the king of Denmark, by whose permission it has been forwarded to me for illustration.

Mitra rustica. *Mitr. testâ oblongo-ovatâ, spirâ turritâ; anfractibus supernè angulatis, longitudinaliter costatis, costis subdistantibus, ad angulum muricato-tuberculatis, transversim puncturatis; albidâ, infernè cinereâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 329.

Hab. —— ?

The upper edge of the ash-colour is slightly marked between the ribs with one or two brown dots.

Mitra corallina. *Mitr. testâ subfusiformi, politâ, basi subrecurvâ; anfractibus transversim obsoletè striatis, longitudinaliter plicato-costatis; electro- vel corallio-rubrâ, costis albicantibus; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 330 *a* and *b*.

Hab. Island of Masbate, Philippines (found on the sands); Cuming.

This is a beautiful species, some examples having the appearance of bright amber, whilst others resemble red coral.

Mitra lubens. *Mitr. testâ elongatâ, subfusiformi, basi contractâ, spirâ turritâ; anfractibus supernè angulatis, liris parvis longitudinalibus et transversis creberrimè clathratis; albidâ, apice basique rosaceis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 331.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

The ridges of this very delicate and pretty shell are slightly nodulous, and prickly on the angle.

Mitra patula. *Mitr. testâ ovatâ, tenuiculâ, ventricosiusculâ, lævigatâ; cincreâ, fusco hic illic variegatâ et nebulatâ; columellâ quadriplicatâ; aperturâ amplâ; labro tenui, supernè sinuato.*

Conch. Icon., *Mitra*, pl. 39. f. 333.

Hab. —— ?

Very distinct from any form of the genus I have met with.

Mitra alveolus. *Mitr. testâ abbreviato-ovatâ, spiræ suturis profundè impressis; longitudinaliter subtiliter plicato-costatâ, basi transversim sulcatâ; anfractibus infernè aterrimis, supernè albis, nigro tessellatis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 39. f. 334.

Hab. —— ?

A characteristic tessellated species, from the collection of Thomas Norris, Esq.

ENTOMOLOGICAL SOCIETY.

January 1st, 1844.—The President in the Chair.

An extract from a letter addressed by the Rev. Mr. Savage to the Rev. F. W. Hope was read, giving an account of the capture of a new species of Goliath Beetle on the west coast of Africa, *Mecynorhina Savagii* (Harris, Journ. of Boston Nat. Hist. Soc. vol. iv. pl. 21; Westw. Arc. Ent. ii. pl. 81. f. 1, 2).

Extracts were also read from two letters addressed to Mr. Hope by C. D. E. Fortnum, Esq., giving some account of the entomology in the neighbourhood of Port Adelaide, and mentioning some particulars respecting the reproduction of the limbs in a species of *Phasmidæ*, *Diura violascens*, Gray, a larva of which (about one inch long and having much the appearance of a *Bacillus*) had its left intermediate leg broken off when captured. It fed on the young leaves of the gum-tree, *Eucalyptus*, and grew very fast. On the first moult after the accident a small leg appeared on the old stump, but with a withered appearance, and apparently the joints were not formed. At the second moult the leg had grown to half its natural size, with all the joints perfect. The third moulting produced the pupa with the leg about two-thirds of the original size. On the change to the imago the limb had regained its full size. Mr. Fortnum adds, that the young *Phasmidæ* invariably eat the old skin after moulting. He also mentions the capture of a species of *Mantispa* and one of *Ascalaphus*. In a subsequent communication he mentions the capture of several apparently new species of *Phasmidæ*, and states that *Diura violascens* and *roseipennis* are the sexes of the same species, having reared several from the larva. He had collected a great many species of ants, and several new predaceous beetles (including a beautiful *Harpalus* with the head and thorax splendid green); likewise several new aquatic beetles and *Buprestidæ,* and two new species of *Onthophagus*; but he had met with no *Necrophaga.* The little insect allied to *Elaphrus* is exceedingly abundant, and he had collected three species of *Adelotopus,* one described by Mr. Hope in Trans. Ent. Soc. vol. i., and two others; he had also seen one or two more, and had collected another species of *Scarites,* a species of *Trox* (very abundant), nine *Melolonthidæ,* three species of *Mantispa* and seven of *Myrmeleon.*

In reference to the *Phasmidæ* noticed by Mr. Fortnum, the President stated that he considered Mr. Fortnum's communication to be one of great interest, as affording a further proof that reproduction of the limbs takes place in true insects. He also stated that he is equally sure that reproduction of lost parts takes place in the *Myriapoda,* as he formerly expressed his belief when exhibiting an instance of what he regarded as the first noticed occurrence of this fact in a *Scolopendra,* at the meeting of this Society in November 1839. In consequence of the suggestions made by Mr. Westwood on that occasion, that the limb in the specimen in question had not been reproduced, but was only an instance of retarded development of the original limb, and at a subsequent meeting of the Society (November 2, 1840), Mr. Newport had instituted a series of experiments on the *Iulidæ* and *Lithobii,* in which reproduction both of the antennæ and legs had taken place, and in one instance the reproduction of some of the legs was repeated a second time in the same individual *Lithobius.* He stated also that reproduction of lost parts does not take place after the individual has acquired, or has very nearly attained its adult size.

Mr. Marshall also stated that he had observed a specimen of the common species of *Blatta,* one of the legs of which was much smaller than the rest.

Mr. Yarrell mentioned, in reference to the continued growth of the limbs in the *Crustacea,* that it appeared to have its limits, as he had observed lobsters several years old which had certainly not lately cast their shells, which they did not fill.

An extract was also read from a letter addressed by Colonel Hearsey to Mr. Westwood, giving an account of the habits of a minute species of the genus *Diopsis,* in India.

This species is very closely allied to Say's *D. brevicornis**, and was captured by Colonel Hearsey in different months and various localities; some on window-panes in June, some on orange and citron leaves in gardens in July, and some in the middle of August on cucumber leaves; they appear to feed either on the sweet deposit of

* It may be thus characterized:

Diopsis Hearseiana, W. *Brevis, robusta; capite fulvo, nigro vario, cornubus oculiferis abbreviatis crassis, apice nigris; thorace griseo-nigro, spinâ brevi utrinque sub basin alarum aliisque duabus, apicalibus albidis longè setigeris; abdomine nigro nitido; pedibus flavescentibus, femoribus anticis intùs fusco maculatis, tibiisque anticis nigris, alis hyalinis.* Long. corp. lin. 2; expans. alar. lin. 4.

the *Aphis*, or on the *Aphides** themselves. The different kinds of *Diptera* which he had collected in the latter situation were numerous, some very curiously marked, and others very minute and of brilliant colours.

A memoir, containing descriptions of two species of Sacred Beetles from Southern Africa, was read by J. O. Westwood, F.L.S. &c.

SEBASTEOS, Westwood.

Typus Scarabæorum sacrorum Heliocantharo magis affinis.

Antennæ articulis 3 et 4, 5to duplò longioribus, 5to et 6to brevibus; clypeus radiatus, subtùs tridentatus. Tibiæ anticæ angulatæ, extùs 4-dentatæ, dentibus 2 apicalibus inter se remotis, intùs serrulatæ, denteque medio armatæ. Tarsi 2 postici articulis subclavatis.

Species unica, Scarabæus (Sebasteos) Galenus, Westw. *Niger, nitidus; capite magno varioloso-punctato, pronoto punctato, margine postico lævi; elytris striâ suturali alterisque 5 tenuibus sub lente punctatis.* Long. corp. lin. 14.—Hab. in Africâ meridionali. D. Burke.

SCELIAGES HIPPIAS, Westw. *Niger, nitidus; capite sub lente tenuissimè punctato, clypeo cornubus 2 mediis porrectis, pronoto ferè lævi, elytrisque sublævibus et minus nitidis, singulo striis 6 vix discernendis; tibiis anticis haud in medio angulatis, extùs 4-dentatis et serrulatis, metasterno anticè producto.* Long. corp. lin. 8.—Hab. cum præcedente.

February 5th.—George Newport, Esq. (who had been re-elected President of the Society at the Anniversary meeting on the 22nd January), in the Chair.

The President exhibited a specimen of *Hypena rostralis*, which had continued alive in a state of hybernation since the 1st of September last.

Mr. Edward Doubleday exhibited a large box of North American *Lepidoptera*, collected by Mr. Barnstone near the Albany River, in a climate nearly corresponding with that of Lapland, and remarkable on account of a very large proportion of the species being apparently identical with those of this country. Some species and even genera were however quite unlike any of those known in Europe, amongst which was a very large species of *Hepialus*, two new species of *Alypa*, &c., whilst some of the species were evidently identical with those of Florida, thus exhibiting a very wide geographical range.

Mr. F. Bond exhibited a specimen of *Pontia Rapæ*, evidently but recently disclosed from the chrysalis, which he had captured during the month of January. Mr. Walton exhibited a monstrous specimen

* Col. Sykes's observations on the predaceous habits of *D. Sykesii* might lead to the opinion that it was upon the *Aphides* themselves that the *Diopsis* feeds.

of *Otiorhynchus picipes*, each antenna having only four joints in the funiculus instead of the ordinary number.

The following memoirs were read :—

"Description of a genus and species of Syrphideous Diptera new to Britain." By P. Desvignes, Esq.

Didea, Macquart (Enica? Meigen). *Antennæ porrectæ, articulo 3tio elliptico, compresso, intus attenuato, setâ tertiâ parte longitudinis insertâ, nudâ; oculi nudi; abdomen oblongum, valdè depressum, limbatum; cellula marginalis alarum aperta, submarginalis pediformis.*

Didea fasciata, Macq. *Face and forehead yellow; antennæ inserted on a prominence, black; thorax metallic green with yellow hairs on the sides; scutellum yellowish; abdomen with two large lateral yellow spots on 2nd segment, 3rd and 4th segments with a broad yellow band posteriorly crescent-shaped; four anterior thighs black at base; tibiæ yellow; hind legs and all the tarsi black, the former yellow at the knees; wings hyaline, with a faint tinge of yellow; submarginal and mediastinal cell brown.* (Syn. Enica Foersteri?)

This genus approximates to *Eristalis* in having the submarginal cell pediform, and to *Syrphus*, Macq., in having the marginal cell open; but differs from both in its antennæ.

It appears very rare abroad. Taken in October 1841 at Birch Wood. In Mus. Desvignes.

"Descriptions of some new species of the Lamellicorn genus *Parastasia*, Westw." By Professor Erichson of Berlin.

Parastasia scutellaris, Erichs. *Supra lutea, capite scutelloque nigris, infra nigra, abdominis lateribus luteis.* Long. lin. 7.—Hab. in insulâ Riouw, propè Sumatram. Mus. Reg. Berol.

Parastasia dimidiata, Erichs. *Nigra, nitida, elytris posticè luteis, pygidio rufo.* Long. lin. $4\frac{1}{2}$.—Hab. in insulâ Riouw. Mus. Reg. Berol.

Parastasia nitidula, Erichs. *Nigra, nitida, elytris fusco-æneis politis.* Long. lin. 4.—Hab. in insulâ Bintam, propè Sumatram. Mus. Reg. Berol. Omnes sunt genuinæ *Parastasiæ.*

"Descriptions of some new exotic species of *Lucanidæ.*" By J. O. Westwood, F.L.S.

Ægus platycephalus, Guérin MSS. *Niger, tenuissimè punctatus, capite et pronoto latissimis; mandibulis capite longioribus, apice falcatis, intus ante medium dente valido, suberecto, obtuso, instructis; pedibus et elytris piceis, his 6-striatis; tibiis 4 posticis in medio 1-dentatis.*—Long. corp. mand. excl. lin. 16. Mus. Guérin.

Ægus æqualis, Hope MSS. *Piceo-niger, capitis et pronoti lateribus magis piceis, lævis, oblongus, elytris 6 punctato-striatis; capite lato; mandibulis capite parùm longioribus falcatis, singulâ ad basin dente supero armatâ.* Long. corp. mand. excl. lin. $11\frac{1}{2}$.

Ægus Malabaricus, Hope MSS. *Niger, elytris opacis punctatissimis, singulo 7-striato; striis alternatis, profundioribus; capite angusto, lateribus angulatis, pronoto ferè quadrato; mandibulis* *depressis, capite duplo brevioribus, subtriangularibus, intus dente armatis.* Long. corp. (mand. excl.) lin. 10.—Hab. in Malabariâ.

Ægus distinctus, Hope MSS. *Niger, nitidus, capite et pronoto elytrorum latitudine; mandibulis falcatis, basi supra dente acuto armatis; pedibus et elytris piceis; his 7-striatis, lateribusque punctatis.* Long. corp. (mand. excl.) lin. $12\frac{1}{4}$.

A correspondence between Messrs. Melly and Westwood on the extent of the detrimental effects of insects in dissipating the active principle of vegetable manure was also read.

March 4th.—The President in the Chair.

The President announced the terms and subjects of the Essays for two prizes of £5 each, offered by the Rev. F. W. Hope, one being upon the natural history and medical properties of vesicatory insects, and the other upon the natural history and early stages of the genus *Stylops*.

The Secretary announced that the Address delivered by the President at the last Anniversary Meeting had been printed for distribution among the Members.

Mr. Evans exhibited a monstrosity in the common moth, *Arctia Caia*, in which the antennæ and wings of the left side of the body were much smaller than those of the other side, without however showing any appearance of gynandromorphism.

Mr. S. Stevens exhibited a remarkable variety of *Melitæa Euphrosyne*, taken at Darenth Wood; likewise varieties of *Fidonia atomaria* and *Cidaria fluctuata*; also a fine specimen of the rare *Charæas nigra*, taken at Leith Hill in September last.

Mr. E. Doubleday exhibited a specimen of a new and large species of *Polyommatus* from the Missouri, being the fifth species of that genus which inhabits North America.

Mr. Westwood exhibited four hitherto unfigured Assamese species of the genus *Papilio*, which he had received from Major Jenkins (since published in the 'Arcana Entomologica').

He also exhibited a specimen of *Crœsus septentrionalis* with one of the hind feet much smaller than the other, which he regarded as a case of arrested development; and also a large apterous *Phasma* from Mexico, collected by Mr. Coffin, one of the hind legs of which was also rather smaller than the other, but destitute of the small foliaceous appendages of the femur, tibia and basal joint of the tarsus, and which he regarded as a case of reproduction in consequence of the details given by Mr. Fortnum at the meeting of the Society on the 1st of January last; stating at the same time his opinion, that in those orders of insects which ndergo an incomplete metamorphosis (having active larvæ and pupæ similar to the imago), reproduction of limbs alone takes place, those insects which undergo a complete metamorphosis being considered by him as incapable (so far at least as hitherto observed) of undergoing such a reproduction; and which opinion seemed to be confirmed by the remarks of M. Schneider upon the genus *Raphidia*, recently published in his elaborate monograph of that genus. The President, however, was unwilling to admit that the case mentioned by Mr. Westwood was an instance of retarded development, and contended that reproduction was capable of occurring throughout all the orders of insects, as it was now proved to be throughout the Crustacea, Arachnida and Myriapoda; and Mr. Desvignes mentioned the fact recorded by Reaumur, that the hairs of caterpillars, when shaven off previously to moulting, were reproduced on the shedding of the skin. [See the account of Mr. Newport's subsequent experiments on this subject given at the meeting of the 7th October 1844.]

A memoir was read "On the Economy of the genus *Palmon*, Dalm." By J. O. Westwood, F.L.S.

After alluding to the singular economy by which the female *Ichneumonidæ* are enabled to introduce their eggs into various substances, within which are contained the insects upon which their larvæ are destined to feed, and giving an extract from an anonymous writer in the Entomological Magazine respecting the production of specimens of one of the *Chalcididæ* from the egg-cases of the *Mantidæ*, the author states that the latter insect evidently belongs to the genus *Palmon* of Dalman (Swed. Trans. 1825), founded upon a species observed in gum copal, and that the *Priomerus pachymerus* of Walker is another species of the genus; and then illustrates the genus in detail, and describes the following species, the majority of which possess the same singular habits.

Sp. 1. Palmon bellator, Dalm.

Sp. 2. Palmon clavatellus, Dalm.

Sp. 3. Palmon pachymerus (*Priomerus pach.*, Walker).

Sp. 4. Palmon religiosus, Westw. *Niger, subæneus; thorace tenuissimè punctato; antennis nigricantibus, articulo basali luteo; abdomine piceo, subtùs magis luteo, dorso æneo tincto nitido; pedibus luteis, coxis posticis, dentibusque femorum posticorum nigris, oviductu corpore ferè dimidio longiori* (♀). Long. corp. lin. $1\frac{1}{2}$.—Hab. in ovis Mantidis religiosæ. D. Kollar. Mus. Hope.

Sp. 5. Palmon insularis, Westw. *Cupreo-nigricans, vix tenuissimè punctatus, collari magis cuprescenti; antennis nigricantibus, basi fuscis; abdomine chalybæo-nitido, basi subluteo, oviductu vix corporis longitudine; pedibus anticis albidis, femoribus in medio infumatis, coxis et femoribus posticis cupreo-æneis, apice tarsisque albidis* (♀). Long. corp. lin. $1\frac{1}{2}$.—Hab. in ovis Mantidis ex "Ile de France." D. V. Audouin. Mus. Westwood.

Sp. 6. Palmon fraternus, Westw. *Cæruleo-viridis, tenuissimè punctatus; antennis crassiusculis luteis, apice fuscescentibus; abdomine purpureo nitidissimo, subtùs luteo, oviductu abbreviato; pedibus luteo-fulvis; coxis et femoribus posticis æneis vel chalybæis, apice extremo luteis* (♂ ♀). Long. corp. lin. $1\frac{1}{4}$.—Hab. cum præcedente. Mus. Westw.

Sp. 7. Palmon obscurus, Westw. *Niger, æneo vix tinctus, ferè lævis, opacus; antennis nigris, basi articuli* 1*mi luteo, articuloque apicali albido; abdomine nigro, submetallico, nitido, oviductu corpore ferè dimidio longiori; pedibus* 4 *anticis piceo-luteis, posticis ni-*

gricanti-æneis dentibus validis, tarsis luteis (♀). Long. corp. lin. $1\frac{1}{2}$.—Hab. King George's Sound. D. Dr. J. Hooker. Mus. Westwood.

Sp. 8. Palmon melleus, Westw. *Lætè aurato-viridis, punctatissimus; abdomine melleo; antennis crassis, melleis, apice fuscis; pedibus melleis, coxis posticis, basi viridibus, spinisque femorum posticorum nigris* (♂). Long. corp. ferè lin. 2.—Hab. in ovis Mantidis Brasiliæ. D. Klug. Mus. Westwood.

Subgenus novum Pachytomus, Westw.

Palmoni *congruit nisi abdomine maris plano depresso-elongato, spinis femorum posticorum tantum* 4, *articulo basali tarsorum omnium dilatato, necnon œconomiâ, habitanti in ficubus more Blastophagarum.*

Sp. 1. Pachytomus Klugianus, Westw. *Cupreo-æneus, tenuissimè punctatissimus; antennis basi tantum luteis; abdomine piceo-fulvo apice nigricanti; pedibus* 4 *anticis pallide flavescentibus, posticis piceis, geniculis luteis.* Long. corp. lin. $1\frac{1}{2}$.—Hab. in ficubus Ægypti. D. Klug. Mus. Westwood.

MISCELLANEOUS.

ON THE GENUS SACCOPTERYX OF ILLIGER.

Schreber, in his work on Mammalia, described and figured a bat from Surinam under the name of *Vespertilio lepturus*, remarkable for having on the end of the fore-arm-bone nearest the elbow a peculiar sac. Illiger, from the description (for it does not appear that he ever saw a specimen of the species), as was his habit, formed for this bat a genus which he called *Saccopteryx*. Geoffroy, who had never seen the species, referred it with doubt to his genus *Taphozous*, which is peculiar to the old world; and Temminck has followed him, and appears to doubt the accuracy of Schreber's description and figure. Among a most interesting collection of bats, birds and other animals lately sent to the British Museum (collected in various parts of the Brazils by the late Mr. Graham, who with his family was so distressingly lost at Para, just as he was returning home with his very extensive collections and notes elucidating their habits), are two specimens which exactly agree with Schreber's figure. The pouches are about half an inch long, and are convex and bag-like on the lower side of the fore-arm-bone, a short distance from the elbow-joint; they have a slit-like opening on the upper edge of the upper side of the same bone about half an inch long, and the inner surface of the bag is plaited, and appears to secrete an unctuous fluid. From the side of the neck there is a rather thick band which extends to the middle of the bag, and there is another lesser one from the other side of the bag to the edge of the membrane on the front of the wing.

I may observe that *Saccopteryx* is more nearly allied to *Embalonura* than *Taphozous*, and that Cuvier (Règ. Anim. i. 121) considers the existence of this bag in the wing as one of the characters of *Taphozous*; for he observes, " Un petit prolongement de la membrane de leur ailes forme une sorte de pouche près du carpe" (should be elbow). "C'est ce qui avait fait nommer par Illiger *Saccopteryx*, celui de ces genres qui comprend les Taphiens."

J. E. Gray.

ON THE OFFICINAL SPECIES OF PEPPER. By M. Miquel.

Miquel, like Jussieu, De Candolle and Endlicher, places the *Piperaceæ* among the Dicotyledons, as the embryo in germination exhibits two regular seed-lobes, which are uncommonly small, and so difficult to discover while the embryo in the ripe seed is enclosed in the permanent embryo-sac, half sunk in the apex of the albumen, that very recently this was regarded as the only cotyledon.

The *Piperaceæ* belong to the imperfect Dicotyledons, and stand best among Endlicher's *Iuliflores*, somewhere near the *Betulaceæ*, and in the vicinity of the *Urticaceæ*, with which indeed Jussieu united them. The family is evidently quite tropical, the species being dispersed universally over the torrid zone of the earth; the individuals are most abundant in the hot parts of America, and proportionally rare in tropical Africa. The American are almost all generically, or, with the exception of one truly cosmopolitan species, at least specifically different from those of the Old World.

Miquel divides the *Piperaceæ* into two tribes, the first of which, *Piperomieæ*, comprehends the herbaceous with axillary catkins, androgynous flowers and anthers one-celled in dehiscence. They are, with very few exceptions, American, and none are employed officinally.

The second tribe, *Pipereæ*, contains the shrubby and arborescent species. Their catkins are situated opposite the leaves; flowers mostly diœcious, the female exhibiting several distinct stigmas, the males with two-celled anthers. To the first division, characterized by permanent stipulæ and numerous sessile catkins, belong the genus *Pothomorphe*, Miq., of which many species, especially *Pothomorphe umbellata*, Miq., have pungent aromatic roots, which, under the name of Caapeba, are used in Brazil as stomachics and sudorifics.

The root of *Macropiper methysticum*, Miq., possesses similar qualities. It is used in the South Sea islands in the preparation of an intoxicating drink (highly pernicious in its effects), called Awa or Kawa, and has lately been made use of in medicine in England under the name of *Radix Awæ*.

Of the true *Pipereæ*, which are separated from the preceding division by deciduous stipulæ and solitary catkins, two genera in this first volume are to be noticed here:—*Chavica*, Miq. and *Cubeba*, Miq.

I. Genus *Chavica*, Miq.—Flowers diœcious. Bracts of the male like those of the female catkins, shortly stalked, almost four-angled, shield-shaped. ♂ Stamens 2, with two-celled anthers. ♀ Style very short or wanting. In the latter case the 3–6 thick stigmas are immediately sessile on the ovate ovarium. The berries unite with the permanent bracteæ and the thickened axis of the catkins into a fleshy fusiform fruit. Seeds longish or almost lenticular, with scaly, finely-pitted testa. Albumen mealy, often horny at the outer part. Species all Asiatic.

Chavica Betle, Miq., and *Chavica Siriboa*, Miq., are frequently cultivated throughout the East Indies; their sharp aromatic leaves, with chalk and areca nuts, furnish the material for the habit of betel-chewing, universal in those countries.

The three following species are to be named as the plants furnishing the officinal *Piper longum* :—

1. *Chavica peepuloides*, Miq.—The younger branches, as well as the leaf- and flower-stalks, are clothed with fine hairs; the leaves smooth, membranous, and with transparent dots; the lower ovate, seven-nerved, rounded at the base, attenuated at the apex; the upper unequal, lanceolate, with an attenuated apex, five-nerved. Male catkins shortly stalked, slender, with circular bracts; the female also shortly stalked and cylindrical.

Synonym, *Piper peepuloides*, Roxb.

2. *Chavica Roxburghii*, Miq.—A forked-branched, trailing shrub, only erect during the flowering period, with stems at first finely hairy, afterwards smooth, and thick membranous leaves at first clothed with fine hair on the nerves, afterwards smooth, covered with fine transparent dots. The lower leaves have long stalks, are roundish, with broadly-cordate base; the upper are sessile, of a more elongated form, and with an unequally-cordate base embracing the stem. The male catkins filiform, cylindrical, with their stalk as long as the leaf; female scarcely half as long, but thicker than the male; the stems as long as the catkins.

Synonym, *Piper longum*, L. Z. Thl. Abbildg.; Nees, Plant. Medic., tab. 23.

This species, growing wild in damp thickets throughout the frontier of India and cultivated frequently in Bengal, yields like the preceding the *Piper longum* coming from the English colonies, which is gathered in January, and consists of the fruit-catkins dried in the sun. In India they use instead of these the roots and stem of the plant cut in small pieces.

3. *Chavica officinarum*, Miq.—A climbing shrub, with coriaceous leaves covered with fine transparent dots, smooth and paler below; the lower are longer-stalked, 3–5-nerved and ovato-cordate; the upper more shortly stalked, more elongated, with an unequal rounded or attenuated base and an attenuated apex. The stalks of the catkins are longer than the leaf-stalks. The female catkins are short and cylindrical, slenderer towards the apex.

Synonym, *Piper longum*, Rumph, Blume, Linn. in part.

This species grows wild in the Philippines, the Sunda Islands (perhaps also in Bengal), and is cultivated particularly in the island of Java, in the neighbourhood of the sea. It yields the *Piper longum* coming from the Dutch colonies. The dried catkins smell strongly aromatic, and have a sharp burning aromatic taste, stronger than black pepper. They are of a grayish-brown or grayish-cinnamon colour; their stalk is roundish, compressed, somewhat woody, curved, $1\frac{1}{2}$ centim. long, and almost smooth. They are thick, cylindrical, somewhat attenuated towards the apex, obtuse, 2–4 centim. long, straight or slightly curved, 5–8 millimet. thick at the base, with an almost cylindrical axis, and facetted with a sort of net-work of the projecting apices of the berries. The berries are very thickly planted in spiral lines, so that about ten are always seen in a transverse section. The persistent bracts situated between the berries are shield-shaped, with compressed membranous-winged stalks, which adhere in some degree to the surrounding berries and to the coriaceous, round or roundly-triangular scutellum, which usually coheres very firmly with the three bracts enclosing it, and is of a blackish-brown colour, with a membranous, somewhat incurved border. The dried berries are about 2 millimet. long, obovate, and from the base to two-thirds of their height mostly five-angled through compression, as they are in contact with one another to that point. The remaining upper part projects out beyond the shields of the bracts, is smooth, compressed below, hemispherical, with an obtuse apex. The dried pericarp is thin, the seed about $1\frac{1}{2}$ millimet. long, obovate or rather spherical, somewhat angular beneath, and with an inconspicuous umbilicus; slightly pointed above. The testa or outer seed-membrane is crustaceous, black, shining, and under the lens presents groups of dots; the inner seed-membrane (*Endopleura*) is whitish; both adhere firmly, in the scarcely-ripe seed, to the cellular albumen, in the apex of which is imbedded the embryo, enclosed in the conico-circular embryo-sac.

II. Genus *Cubeba*, Miq.—Flowers diœcious. The male catkins are smaller, and have unstalked bracts overlapping one another, behind which stand 2–5 stamens, with ovate or reniform two-celled anthers. The bracts of the female catkins are almost sessile, roundly shield-shaped, often hairy beneath and persistent. Ovarium sessile, ovate, with 3–5 sessile, recurved, short stigmas. The berries are, from their contracted base, apparently stalked (*pseudo-pedicellatæ*). Fruit-membrane thin. Seeds roundish, with coriaceous or horny testa and mealy albumen.

Climbing shrubs from the East Indies and hotter parts of Africa. The female plant is often distinguished from the male by habit and the form of the leaf, but always by the catkins being thicker, and presenting at maturity an almost clustered appearance on account of the stalked berries.

Cubeba officinalis, Miq.—A climbing shrub with smooth leaves; the lower cordate at the base, ovate, and with a short point; the upper ovate, but more elongated, with a rounded base and smaller. Those of the male plant are 5-, those of the female 5-9 nerved. The catkins grow on stalks of the length of the leaf-stalks; the male are slender, the female thicker; the bracts coarsely hairy, the berries globular, and their stalks longer than themselves.

Synonyms, *Piper Cubeba*, Linn. fil., Blume, Abbildung.; Miquel, Comment. Phytogr., tab. i. et ii.

This species, the only one furnishing the true cubebs, grows wild in Bantam, the west part of Java, as well as in the neighbouring small islands. It is cultivated now only in the lower parts of the island of Java, whence an extraordinary quantity is annually exported.

The cubebs, the dried ripe fruit of this species, are globular, with a stalk (which is more properly the contracted base of the berry) thicker at the upper part, and exceeding them in length. Their colour is a sometimes brighter, sometimes duller, dark brownish-gray, with a grayish ring. Their surface is wrinkled as their succulent flesh shrinks into folds in drying, which form 20 or 30 regular 5-, 6- or more angled planes. The largest are about 5 millimet. in diameter; length of the stalks 5–8 millim., more rarely 1 centim. The seed adheres firmly to the dried flesh of the berry; its outer membrane (*testa*) is grayish-white; the inner (*Endopleura*) is shining, sometimes grayish or dull yellow, sometimes reddish. The *nucleus* is externally brownish or yellowish, internally whitish and comes into view on fracture, as the seed-membranes adhere closely to the fruit-membrane.

This cubeb-plant has very often been confounded with an allied species, namely—

Cubeba canina, Miq. = *Piper caninum*, Rumph., Blume; *Piper Cubeba*, Vahl; Nees, Plant. Med., tab. xxii. fig. 1. This is distinguished by its flexible, rooting stem, by its leaves being hairy beneath, the lower 5-nerved and somewhat unequally cordiform, while the upper or younger are 7-nerved and regularly cordate. The berries are more ovate than the genuine cubebs, somewhat pointed, and a little longer than their stalk.

This species grows in the Sunda Islands and the Moluccas. The figures 2, 4 and 5 of Nees's plate xxii. represent another species, erroneously taken for the plant yielding genuine cubebs; this Miquel calls *Cubeba costulata*. It is a native of the Mascarenhas Islands, and is easily distinguished by its lower, distant, soft-haired leaves, the midribs of which send off 10 nervures; by the stalks of the catkins, which are twice as long as the leaf-stalks, and lastly by the elongate-ovate fruit.

Cubeba borboniensis, Miq. = *Piper Cubeba*, Linn., is also an allied species. Cubebs have also been obtained lately from the Cape of Good Hope and Guinea. Miquel, however, holds that the plants furnishing both are specifically different from *Cubeba officinalis*, and calls the former *Cubeba capensis*, the latter *Cubeba Clusii* (= *Piper e Guinea*, Clusius). He believes that, besides the fruit of *Cubeba officinalis*, the very similar one of *Cubeba sumatrana*, and occasionally the two Indian species, named *C. Neesii* and *C. Wallichii*, are met with in commerce.—From Miquel's *Systema Piperacearum*.

OBITUARY.

Professor Graham of Edinburgh.—It is with sincere sorrow that we announce the death of this distinguished individual. The mournful event took place at Coldoch, in Perthshire, on the 7th of August, after a painful and protracted illness, which he bore with calmness and Christian fortitude.

Robert Graham, M.D., F.R.S.E., Professor of Botany and Medicine in the University of Edinburgh, the third son of Dr. Robert Graham, afterwards Moir of Leckie, was born at Stirling on 7th Dec. 1786.

In the first part of his career he practised in Glasgow, where he was highly respected and very popular. In 1818 he was appointed Professor of Botany in the University of that city. Previous to that time, there was no separate chair of Botany in Glasgow. The Professor of Anatomy, by his commission, was also Professor of Botany: he was bound to lecture on Anatomy during the winter, and on Botany during the summer session. Dr. Jeffray, the present Professor of Anatomy, lectured occasionally on Botany; but subsequently a separate lectureship was established. Dr. Thomas Brown of Langfine held this office for some time. Before retiring, he asked Dr. Graham to lecture for him, which Dr. Graham declined to do, urging as an apology the inadequacy of his botanical knowledge; but ultimately he was prevailed on to read Dr. Brown's lectures. On the resignation of Dr. Brown, the Crown instituted a distinct chair of Botany, and conferred it upon Dr. Graham, who was in the habit of referring to this appointment as an unexpected event, on which his future success in life depended. He held this office till his translation to the chair of Botany in the University of Edinburgh in 1821 *. From this time, Dr. Graham devoted himself assiduously and successfully to botanical pursuits. To his exertions Edinburgh is in no small degree indebted for the excellent Botanical Garden which it now possesses. By his enthusiasm and energy, as well as by his affable and pleasing manners, he did much to promote a taste for his favourite science among the pupils of his class.

Under his auspices, the Edinburgh school became famous for the number of accomplished and zealous cultivators of botanical science which it sent forth, many of whom now occupy the most distinguished places as professors, teachers, and collectors. One of the chief circumstances which tended to bring about these results, was Dr. Graham's practice of taking excursions with his pupils, not merely in the neighbourhood of Edinburgh, but in various districts of Scotland, England, and Ireland—excursions to which, as we well know, his pupils look back with feelings of the highest satisfaction and delight. The first long excursion was made in 1826, when Sutherlandshire was the district explored. In 1827 he paid another visit to the same county, accompanied by several pupils. These excursions were continued annually in the month of August; and in this way were explored the floras of various parts of Scotland, such as Clova, Glen-Isla, Braemar, Ben Lawers, the Breadalbane districts, Wigtonshire, Ross-shire, &c. The floras of Cunnemara in Ireland, and of North Wales, were also, in this way, carefully examined. In all these excursions, the Professor was ably assisted by Mr. M'Nab, the excellent superintendent of the Edinburgh Botanic Garden. During the excursions several additions were made to the

* Dr. Graham was succeeded in Glasgow by Sir William Jackson Hooker, (at that time Dr Hooker,) who upon his appointment to Kew resigned the chair, which was bestowed upon Dr. J. H. Balfour, the present incumbent.

flora of Scotland; among some of which may be mentioned, *Astragalus alpinus, Lychnis alpina, Carex Vahlii* and *aquatilis, Thlaspi alpestre, Luzula arcuata,* and *Ononis reclinata.*

No one enjoyed these trips more than the Professor, and no one was better able to endure their attendant fatigues and hardships. His walking powers were unrivalled; his constitution seemed to be one of the most robust; and by all who knew him, he was regarded as one likely to enjoy long health, and attain a good old age.

Dr. Graham was long engaged in preparing a Flora of Britain; but he died without being able to give it to the world. His published works consist chiefly of descriptions of new and rare plants, which flowered in the Edinburgh Botanic Garden. These, as well as notices of his excursions, appeared in the 'Edinburgh New Philosophical Magazine,' and 'Curtis's Botanical Magazine.' He also published in 'Hooker's Companion to the Botanical Magazine,' an account of the Gamboge-tree of Ceylon, which he named *Hebradendron Cambogioides.*

A *genus* of Chilian plants has been called *Grahamia*, by Gillies, in honour of the deceased Professor; and several *species* of plants have also been named in a similar manner, among which we would particularly mention a new alpine species of *Carex* (allied to *C. saxatilis*), found in Clova, the scene of many of Dr. Graham's excursions, and designated *Carex Grahami* by Boott.

Some years ago, Dr. Graham began to experience some peculiar sensations in his chest, which he attributed to incipient disease of the heart, or great vessels: they gradually became more marked, and were ultimately accompanied by severe pain and occasional spasms. It soon became evident, from various symptoms—especially from his diminished strength and increasing emaciation—that he was the subject of organic disease; but of what precise nature his physicians were unable to decide, from the extreme obscurity and ambiguity of some of the signs. They were latterly of opinion, that the symptoms were referable to a malignant tumour deeply seated in the chest or abdomen.

Amid all his sufferings, Dr. Graham continued to the last to take a lively interest in botany. At the beginning of May, he appeared for the last time in his class-room in the Garden; upon which occasion he introduced Dr. Hooker to the students, as his substitute for the season.

Finding his end approaching, he expressed a wish to go to Perthshire, and was accordingly conveyed to Coldoch. He there breathed his last, on the 7th of August. Upon examining the body after death, an encephaloid tumour was discovered in the posterior mediastinum, lying close to the vertebræ, pressing on the vessels, thoracic duct, &c., and extending to the diaphragm. Thus terminated the career of one, who had contributed in a great degree to advance the fame of the University of Edinburgh, by the numerous enthusiastic students whom he sent forth to prosecute botany in every region of the globe;—one whose kindness and genuine frankness of manner endeared him to all who came in contact with him, in the various relations of teacher, hospital physician, and friend;—one of whom it may be truly said, that while he was eminently conspicuous as a successful and able Professor, he was not less distinguished by his candour, straightforward conduct, scrupulous honour, and unswerving rectitude.—J. H. B.

Dr. J. W. Meigen.—This celebrated entomologist died in his 82nd year, on the 11th of last July, at Stolberg, near Aix-la-Chapelle.—*Bot. Zeitung*, Sept. 12.

SHOWER OF DUST AT ORKNEY.

Sandwick Manse, Sept. 19, 1845.

On the morning of the 3rd inst. there was a fall of dust resembling Roman cement over all Orkney, and probably Jutland also; at least it extended as far as Lerwick, the capital of these islands, as it fell on the sails of a French sloop-of-war which was in that bay at the time; and by all the intelligent people here as well as there, it is thought to be of volcanic origin, and to be the produce of a burning mountain in Iceland.

We were disposed to ascribe it to Mount Hecla then, but the French officers and *savans*, who had just returned from Iceland, think it more probable that it is from another mountain, which, though not so celebrated as Hecla, was threatening an eruption when they left that country. I have not yet heard of its extending to other counties in Scotland, but think there is little doubt of the fall of some on the N.E. of Caithness, whether observed or not. Some people in different parts of Orkney had clothes out bleaching on the preceding night, and they were not a little distressed to find them covered with the dust next morning; but it seemed so much like common dust from a road, that they were more disposed to blame their neighbours for the trick than Hecla, or any of its neighbours. I am told that it was observed floating on the surface of the sea that morning, and it could be collected from flag-stones, glass, or leaves of cabbage, and other plants, for some days after. I do not know the duration of the fall, but a medical man who had occasion to be out between 3 and 4 o'clock that morning was much distressed with the dust in his eyes and on his face, which could not have arisen from the ground, as it was too wet at the time; and it also fell on board of ships and fishing-boats, much to the annoyance of the fishermen. Iceland lies about 500 miles N.W. of this, and the wind for some days previous had been from that quarter. This may appear a long way for the ashes to be carried through the air, but such cases are not unprecedented, and Dr. Barry, in his 'History of Orkney,' mentions a similar occurrence about eighty years ago, which was known by the name of "the black snow." The weather for several days before was fine; the barometer being high and steady, about 30·27, and the daily average height of the thermometer from 57 to 52. Some people observed a sulphureous smell in the atmosphere a few days before.

C. Clouston.

RAIN DURING THE PRESENT YEAR.

Mr. Luke Howard has furnished us with the following monthly amounts of rain for this year up to the end of August inclusive :—

January	0·83	4·69 first four months.
February	0·65	
March	1·85	
April	1·36	
May........	2 00	13·40 last four months.
June	3·09	18 09
July........	3·95	
August......	4·36	
	18·09 in the eight months,	

the usual average of a year being 26 inches.

METEOROLOGICAL OBSERVATIONS FOR AUG. 1845.

Chiswick.—August 1. Fine: cloudy: overcast. 2. Very heavy rain. 3. Cloudy: showery : partially overcast. 4. Cloudy: fine: clear. 5. Showery. 6. Very fine. 7. Rain : thunder-showers in afternoon : clear. 8. Fine. 9. Rain : boisterous, with rain. 10. Overcast. 11. Heavy showers : thunder. 12. Overcast. 13. Slight rain : cloudy : showers. 14. Densely clouded. 15. Cloudy : clear and fine. 16, 17. Cloudy. 18. Very fine : rain. 19. Foggy : heavy rain. 20. Very clear : cloudy. 21. Very fine. 22. Cloudless and very fine. 23. Overcast : rain at night. 24. Very fine. 25. Foggy : very fine : rain at night. 26, 27. Fine. 28. Clear : cloudy. 29, 30. Bright sun and very fine. 31. Slight haze: very fine: overcast.—Mean temperature of the month 2° below the average.

Boston.—Aug. 1. Windy : rain yesterday (rain P.M.). 2. Fine : rain A.M. and P.M. 3. Cloudy. 4. Rain. 5. Cloudy : rain A.M. and P.M. 6. Cloudy. 7. Cloudy : hail and rain, with thunder. 8. Cloudy. 9. Cloudy : rain early A.M. 10. Cloudy : rain early A.M. : rain A.M. 11. Cloudy : rain P.M. 12. Cloudy : rain early A.M. 13. Cloudy. 14. Cloudy : rain A.M. and P.M. 15. Cloudy : rain early A.M. : rain P.M. 16—18. Cloudy. 19. Rain : stormy P.M. : rain A.M. and P.M. 20. Stormy. 21. Fine : rain P.M. 22. Fine. 23. Fine : rain P.M. 24. Fine. 25. Fine : rain P.M. 26. Fine : rain P.M., with thunder and lightning. 27. Fine. 28. Cloudy. 29, 30. Foggy. 31. Fine.—Not so much rain in one month since August 1831, nor so cold an August since August 1833.

Sandwick Manse, Orkney.—Aug. 1. Bright : clear. 2. Bright : cloudy. 3. Rain : rain and cloudy. 4. Rain : showers. 5. Cloudy : fine. 6. Bright : cloudy. 7. Damp : rain. 8. Much rain : rain. 9. Bright : clear. 10. Bright : damp. 11. Cloudy : drizzle. 12. Cloudy. 13. Cloudy : drizzle. 14, 15. Showers. 16. Showers : cloudy. 17. Bright : damp. 18, 19. Showers : cloudy. 20. Rain : showers. 21. Bright : cloudy. 22. Cloudy : rain. 23. Bright : showers. 24. Clear. 25. Rain : clear. 26. Much rain : rain. 27. Bright : clear. 28. Cloudy : clear. 29. Cloudy : damp. 30. Showers : drizzle. 31. Fog : drizzle.

Applegarth Manse, Dumfries-shire.—Aug. 1—3. Showery. 4. Rain heavy A.M. 5, 6. Slight showers. 7. Fine and fair : a few drops. 8. Fine and fair. 9. Rain all day. 10. Slight shower. 11. Fine : a few drops. 12—16. Fine. 17. Rain from 11 A.M. 18. Shower. 19. Showers. 20. Fair, but cloudy. 21. Fair and fine. 22. Fair, but cloudy : stormy and rain P.M. 23. Heavy showers. 24. Fine after one shower A.M. 25. Heavy rain : thunder. 26. Fine : one shower. 27. Fair and fine. 28. Very fine and clear. 29. Fine, but cloudy. 30, 31. Very fine.

Mean temperature of the month	56°·4
Mean temperature of Aug. 1844	54 ·6
Mean temperature for 23 years	57 ·0

Meteorological Observations made 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.			
	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. Aug.	Max.	Min.		9 a.m.	9 p.m.	9¼ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9¼ a.m.	8½ p.m.								
1.	29·732	29·578	29·14	29·35	29·38	29·63	29·53	68	52	61	64	51½	59	52	sw.	sw.	se.	e.	·06	·08	......	......
2.	29·518	29·340	29·00	29·35	29·29	29·51	29·47	64	48	64	63	49	57	55	sw.	calm	se.	e.	·61	·03	......	......
● 3.	29·764	29·630	29·07	29·21	29·32	29·29	29·26	69	54	59	58	51	53	51½	sw.	w.	se.	s.	·10	·37	......	·42
4.	29·694	29·681	29·17	29·42	29·52	29·26	29·50	71	55	60	63	54	54	53	sw.	w.	se.	w.	......	·02	......	·30
5.	29·672	29·597	29·20	29·58	29·65	29·67	29·78	75	55	63	66	46½	54	55	s.	calm	s.	......	·05	·38	......	·13
6.	29·824	29·778	29·27	29·66	29·60	29·75	29·72	73	50	59	64½	48½	56½	53½	w.	w.	ssw.	e.	·12	·77	......	......
7.	29·786	29·728	29·17	29·59	29·62	29·72	29·74	69	47	64	67	52	57	54	sw.	w.	wnw.	n.	·24	......	......	......
8.	29·831	29·820	29·29	29·66	29·61	29·68	29·60	71	55	61·5	64	53½	52	52½	sw.	w.	wnw.	nnw.	·26	·20	1·10	·62
9.	29·628	29·427	28·97	29·40	29·35	29·48	29·64	68	52	61·5	58½	52½	58	52½	sw.	sw.	w.	e.	·01	·35	......	·35
☽ 10.	29·577	29·526	28·92	29·35	29·48	29·73	29·76	68	53	57	63	52	57	53	sw.	sw.	n.	nne.	·05	·58	......	......
11.	29·760	29·623	29·10	29·58	29·72	29·84	29·93	70	53	60	67	50½	53½	50½	sw.	nw.	nne.	n.	·36	·17	......	·11
12.	29·929	29·826	29·35	29·80	29·89	29·96	30·00	63	49	56	62	53½	51½	50	nw.	nw.	nne.	nw.	·01	·53	......	......
13.	30·036	30·003	29·50	29·92	29·91	29·98	29·95	66	50	56	63	48	52½	52½	nw.	nw.	nw.	wnw.	·07	......	......	......
14.	29·952	29·819	29·40	29·83	29·73	29·88	29·85	62	52	56	63½	51½	49	49	nw.	calm	wnw.	wnw.	......	......	......	·14
15.	29·800	29·728	29·26	29·72	29·80	29·90	29·95	62	44	56	62	48½	52	48½	nw.	nw.	n.	n.	......	·10	......	·06
16.	29·911	29·837	29·48	29·82	29·80	29·93	29·89	61	48	54·5	60	44	49	48	nw.	nw.	n.	nw.	......	·06	0·28	......
○ 17.	29·901	29·727	29·44	29·75	29·57	29·80	29·73	69	43	57	56½	41	52	50½	sw.	calm	sw.	nne.	......	......	......	......
18.	29·762	29·594	29·22	29·51	29·50	29·66	29·65	71	52	57·5	64	53½	52½	52	sw.	w.	sw.	ese.	·28	......	......	......
19.	29·371	29·111	28·94	29·39	29·28	29·60	29·53	67	49	58	59	49½	51½	51	sw.	calm	sse.	ne.	·42	·02	......	......
20.	29·765	29·524	28·90	29·20	29·44	29·42	29·53	66	45	58	56½	50½	53	50	sw.	w.	w.	n.	......	·84	......	·38
21.	30·060	29·894	29·30	29·68	29·86	29·73	29·88	68	39	58	59½	46½	50½	49	w.	w.	w.	nw.	·04	......	......	......
22.	30·207	30·184	29·65	29·98	29·88	29·95	29·76	72	49	58	62	41	55	53½	w.	w.	sw.	se.	......	·09	......	......
23.	30·139	30·004	29·62	29·71	29·70	29·60	29·63	70	50	58	64	54	58½	52	sw.	w.	ssw.	wsw.	·07	......	......	·21
☾ 24.	29·979	29·975	29·44	29·78	29·81	29·80	29·85	72	44	61	62½	46½	51	47	w.	w.	sw.	se.	......	·09	0·38	·05
25.	30·004	29·824	29·45	29·67	29·50	29·69	29·57	73	50	59·5	59½	53	54	52½	sw.	w.	e & s.	sw.	·04	......	......	·08
26.	30·020	29·850	29·30	29·62	29·80	29·49	29·79	71	46	59	62½	51½	53	53	w.	w.	w.	n.	......	·09	......	·74
27.	30·182	30·080	29·60	30·03	30·16	30·12	30·22	71	51	59	65	49	53½	50	nw.	w.	w.	s.	......	·08	......	·36
28.	30·296	30·217	29·81	30·20	30·22	30·21	30·25	66	47	58	67½	47½	61	55	ne.	calm	nw.	wsw.	......	......	......	......
29.	30·303	30·271	29·90	30·25	30·27	30·27	30·27	69	42	52·5	68½	55½	61	57	ne.	calm	w.	sw.	......	......	......	......
30.	30·295	30·262	29·90	30·30	30·29	30·21	30·25	72	47	56	70½	56	57	55	ne.	calm	w.	w.	......	......	1·33	·18
31.	30·288	30·266	29·83	30·28	30·28	30·32	30·34	75	54	63	73	54	57	53	ne.	calm	w.	w.	......	......	......	......
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	48·10	58·7	63·2	50·1	54·27	51·06					2·79	4·85	3·09	4·13

THE ANNALS

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XXXI.—*Anatomical and Physiological Observations on* Sagitta bipunctata. By M. A. Krohn*.

[With a Plate.]

The *Sagitta bipunctata* was first observed by MM. Quoy and Gaimard in the Straits of Gibraltar, at the commencement of their second voyage round the world†. Since that time the fauna of the Mediterranean Sea has been often explored and described by German and French naturalists; but, to my knowledge, none of these observers has again noticed this remarkable animal. It is extraordinary therefore, that last autumn and winter, during my stay at Messina, such a considerable number of these animals were to be met with, that I was sure, whenever the sea was calm, to perceive several carried along by the currents which prevail in those latitudes. This favourable circumstance enabled me very thoroughly to examine this animal, whose structure is still little known by zoologists.

The rapid sketch of the form and external parts of the *Sagitta*, given by MM. Quoy and Gaimard, was made from a young specimen four to five lines long. It is very conceivable that, from the small size of this specimen, several of its most important parts should have escaped the observers, and that they should have had but a vague apprehension of some other organs.

The body of the *Sagitta* is transparent as crystal, cylindrical,

* Translated from the Annales des Sciences Naturelles for Feb. 1845.

† Annales des Sciences Naturelles, 1st series, t. x. p. 232. I may also state here, that I am obliged to the kindness of Prof. Eschricht for the information that Mr. Scoresby met with an animal in the Arctic zone which has great analogy with the *S. bipunctata*, and which he has figured in his work (Account of the Arctic Regions, t. ii. pl. 16. fig. 1 & 2.). The reader will learn with pleasure that the researches of M. Eschricht on the *Sagitta* of the North, made in company with MM. Lovèn and Kröyer, are soon to be published.

almost regularly fusiform, growing narrow at its two extremities, but particularly at its posterior extremity. At the anterior extremity of the body a head is readily perceptible. Five projecting appendages then strike the eye of the observer, extended horizontally, and placed on the posterior half of the body: these appendages have the form of leaflets or fins, and give the animal, at first sight, some resemblance to a fish*. They are attached to the body by a widened base, and diminish gradually in thickness up to their margin, where they are very soft and flexible. The hindmost of these fins, that which embraces the posterior extremity of the body, is an odd one: the four others are arranged in pairs, that is to say, one opposite another, on each side of the body. The posterior fin is triangular, similar to the caudal fin of a fish, or rather, on account of its horizontal position, comparable to the terminal fin of the Cetacea. Each leaflet of the anterior pair of fins, placed almost in the middle of the body, has the form of a segment of a circle, whilst the two laminæ which constitute the following pair, longer and wider than the laminæ of the first pair, resemble, up to a certain point, a segment of a rhomb.

The head is manifestly isolated from the body, and surrounded by a kind of membranous hood, which the animal can draw back, and which it does in fact draw back when it seizes its prey. The upper surface of the head is placed on a level with the upper plane of the body; its lower surface, on the contrary, is oblique from above downwards and from before backwards. When the hood is in the state of the most complete expansion and brought over the head, the latter is entirely enveloped in it, with the exception of its under surface, in the middle of which is seen the mouth in the form of an elongated depression. When the animal draws back this hood, the head, and particularly its sides, are exposed, and the parts which I proceed to describe are perceived. In front and on each side there is a simple row of horny hooked prickles, arranged in a curved line, directed obliquely from above downwards and from before backwards (these are the *palpes striés* of MM. Quoy and Gaimard); they enable the animal to seize and bruise its prey. Their number varies in different individuals from five to seven on each side. They differ from one another in size; the upper or anterior hooks being most frequently shorter than the lower or posterior ones, which in their turn are shorter than the three or five middle hooks. They are very much flattened, but present a decided curve and a pointed end. The base by which they are attached to the skin

* For this reason the fishermen of Messina call this animal *Spadella*,—the diminutive of *spada*, a sword.

of the head is furnished at its edges with rather a broad ligula, but growing narrow as it rises. If the hood covers the head, and consequently the hooked spines, the latter, on both sides of the head, approach and touch one another at their points, which are turned towards the mouth. When the animal seizes its prey, these hooks, by a simultaneous retraction of the hood, first point upwards separating from one another, and are then lowered towards the object which the animal wishes to seize. Besides these spines, the head has two rounded prominences, situated on its anterior margin, and a simple series of very small, straight, sharp, and horny spines. Another similar series of spines is found on two ligulæ situated on two prominences on the under surface of the head. Nearly in the middle of the upper surface of the head, two very small oculiform, blackish points are observed, which have been already indicated by MM. Quoy and Gaimard.

It is well to remark here, that the apertures of the excretory canals, of the organs of generation and the anus are on the posterior half of the body. The animal is evidently hermaphrodite, for it possesses two ovaries, one on each side, and two cavities or cells in the posterior part of the abdomen or tail, and which serve for the secretion of the seminal fluid. The two apertures of the excretory ducts of the ovaries are at the base of the pair of intermediate fins, on the surface of the body, opposite to one another. Immediately in front of the base of the caudal fin there exists, on each side, a rounded and blackish prominence, which presents an aperture in the form of a fissure, directed obliquely from above downwards*. Each aperture, as we shall observe in detail further on, communicates with one of the seminal cavities above-mentioned, and assists in the secretion of the semen. The anus is situated nearly at the same height as the apertures of the excretory canals of the ovaries; but it is placed on the mesial ventral line of the body.

The length of the most developed individuals is nearly two inches and a half; the smallest which I have observed were about two lines and a half long; they were consequently only half the size of those observed by MM. Quoy and Gaimard. They resembled however, in all other respects, adult individuals.

This animal swims with great swiftness, and justifies the name which has been given it by the French naturalists. When it is touched after a long repose, it darts away suddenly with the rapidity of an arrow. During these movements, the fins appear to be wholly inactive. Indeed, from their structure, these parts do

* It is these two parts, these two blackish points, but not of this colour in all individuals, which have caused its specific name to be given to our *Sagitta*.

not seem adapted for swimming. Probably they facilitate the suspension of the animal in the water by increasing the extent of surface of the body.

I now proceed to consider the internal structure. I shall commence by that of the teguments and of the subjacent fibrous layer lying beneath : I shall then pass in review the organization of the three sections of the body, the head, trunk, and tail*. The study of the nervous system, followed by that of the eye, will conclude our remarks on this animal.

Teguments.—With the exception of the head, the skin is throughout, proportionally speaking, coriaceous and thick; it is at the same time smooth, and scarcely loses its transparency. When immersed in spirits of wine, an epidermis appears to separate from it; it is completely homogeneous and presents no peculiar elementary tissue. On animals which have been kept for some time in alcohol, a great number of isolated, white, opake, and clearly circumscribed spots are discernible; these are probably mucous follicles, more numerous and more pressed together on the anterior part of the trunk. On examining the internal surface of the skin, peculiar delineations, the nature of which I could not ascertain, are easily discernible with a moderate magnifying power. They are very clearly distinguishable on the lateral surfaces of the trunk, where, as I shall observe presently, there exists no subjacent muscular layer. With a higher power, these designs appear to traverse a number of fields, the outline of which is serrated in a zigzag manner by a large number of incisions, the denticulations of one space corresponding exactly to those of the adjoining, so that in no part can any void be perceived. At several points, very little extended, polygonal cells may be detected, often very regular, and presenting a central nucleus. Neither these cells nor the nuclei form any independent layer which can be isolated from the skin.

Fins.—As the fins are intimately blended at their base with the skin, the description of their structure will best follow here. They are formed, 1st, of a fundamental very transparent substance, which does not in the least become opake in spirits of wine, and presents no trace of either cells or fibres; and 2ndly, of a peculiar envelope, of the elementary structure of which the microscope may furnish some indications. Even with the naked eye, loosened striæ in the form of rays, directed from the base to the margin of the fins, are distinguished; but, viewed thus, it is a very coarse image compared with that which it presents under the microscope. A number of very elongated, flexuous and delicate

* Every one will immediately understand that the division of the body into trunk and tail is arbitrary, and that the only advantage it has, is its being convenient and clear.

fascicles of fibres are perceived, advancing parallel to one another in the direction which I have indicated. These fibres, which, in their course from the base to the margin of the fin, become more and more slender as they advance, adhere so intimately to the fundamental substance, that they cannot be detached by any means, neither by compression nor by sliding one plate of glass over another, between which a fin had been previously placed. I must state here that these fibres in no manner resemble the muscular fibres.

Muscular layer.—The fascicles of muscular fibres, placed immediately beneath the skin, and which aid the animal's locomotion, form two bands extending the whole length of the body, but separated from each other by a considerable space. These two bands are placed opposite to one another; one on the dorsal surface, and the other on the ventral surface of the animal. Each of them however occupies a small portion of the two lateral surfaces. From the isolation of these bands, a considerable interval on each side results, where the skin is not furnished with a fleshy layer,—a circumstance which it is not easy to perceive in the living animal, on account of the transparency of all the tissues in their normal state, but which becomes evident after the muscular bands have been rendered turbid by their immersion in alcohol. The width of these muscular bands diminishes in the same proportion as the body recedes towards its two extremities. This is equally true for the intervals between them. To speak strictly, each band is resolved into two lateral halves, which remain closely connected with one another; so that the number of the muscular bands properly speaking is four. They are composed solely of fascicles of longitudinal fibres, arranged in several layers superposed and striated horizontally, like the primitive muscular fascicles of Insects and Crustacea. For this reason the animal is only capable of bending and extending the body; any diminution of the volume of the body in the direction of its transversal diameter is impossible. From what we have said respecting the direction of the muscular fascicles, it will be understood that all the motions from above downward, or from below upward, are effected by these animals with greater energy than the lateral motions. The observations of MM. Quoy and Gaimard perfectly agree with our own; for they have seen the *Sagitta*, whilst swimming, strike the water with its tail like a Cetacean.

I. *Head*:—*Hood*.—The hood is formed by the duplicature of the teguments of the head; the internal lamella appears to be more delicate than the external. Its insertion on the head follows the course of a line which, starting from the middle of the upper surface of the head, is directed a little behind its anterior margin. This line describes on each side a great curve, passing round the base of the hooks outside and behind, in proceeding toward the lower surface of the head, behind the mouth. As we have already said, the hood only covers a portion of the head, leaving the lower surface almost completely exposed; the result is, that its lateral parts must be wider than its upper and lower portions. Between the two leaflets composing it we observe very evident slender fascicles of fibres, which have a parallel course to the outline; these fibres probably serve for the expansion of this part, whilst a simple mechanical action, the straightening of the hooks, and the swelling of the head, which is the consequence of it, casts back this organ.

Hooks.—These are composed of horny fibres, excessively delicate, and having a longitudinal direction. Their base is hollow, and contains a substance which becomes white and turbid in spirits of wine; it is probably a kind of bulb destined to regenerate the hook when this latter is worn or destroyed.

Muscular apparatus.—The principal mass of the head is composed of muscles arranged symmetrically on the two sides of the head; the most voluminous among them are those which form its base, and on this account, these masses, seen in profile, appear to be obliquely truncated; in fact, each of them constitutes the corresponding half of the head. When they are in action, raising the hooks, they form two considerable eminences which project beyond the two prominences which surround the mouth. They are resolved into numerous fascicles, the direction of which it is difficult to detect. We know however positively that most of these fascicles are inserted at the base of the hooks, and others on to a thin and hard plate, which I must here describe. This plate exists on each side, immediately beneath the skin. It extends on the surface of the muscles in question, at first between the bases of the hooks and the points of insertion of the hood; it then forms a curve, following this insertion as far as the anterior margin of the head; and lastly, growing thinner, enters into the eminences which bear the little spines abovementioned.

With regard to the other pairs of muscles, I confess that I have not been able to follow them in a satisfactory manner; their minuteness baffled my patience; and if I were able to indicate the origin and insertion of some of them, I should still find it impossible to explain their action.

Pharynx.—The pharynx is a short duct, situated in the middle of the head, and only a little wider than the stomachal swelling. Laterally, it is limited by the two muscles of the hooks, and, as it seems also, by walls furnished with very decided muscular fibres, crossing one another.

II. *Trunk.*—The cavity of the trunk is filled, during the life of the animal, with a soft, translucid, apparently mucous substance, which is coagulated and rendered flocculent by the addition of alcohol; it contains no other organs than the stomachal swelling and the ovaries; it is isolated, as well from the head as from the tail, by transversal partitions.

The *stomachal swelling* is a somewhat considerable canal, which extends through the whole length of the cavity of the trunk; it is a little compressed laterally, but its width is throughout the same. After having reached the last transversal partition, it there describes a small curve, taking a direction toward the anus, and during this short passage it becomes funnel-shaped. It is difficult to detect the structure of its walls, and what I shall here advance must not be regarded as proved. These walls appear to be composed of three layers. The outer one is formed of excessively minute annular fibres, close together, and readily detected under a high magnifying power. I have only been able to distinguish longitudinal fibres in two limited spots, that is to say, only on the central line of the walls. They form, in fact, upon the upper central line, as well as on the lower line, two filaments isolated from one another throughout the extent of the stomachal swelling, and are placed exteriorly to the annular fibres. The central layer is formed of polygonal cellular spaces, above or beneath which is perceived a number of round bodies, produced by the union of very small and nowise polygonal cellules. These are apparently glands, which, perhaps, are destined to secrete the liquid necessary for digestion. The internal layer is a homogeneous epithelium, furnished with long and thin cilia possessed of a lively vibratory motion. Above, the stomachal swelling is attached by a simple ligament, tolerably resisting, extending throughout its length, to the upper wall of the cavity of the trunk; inferiorly, numerous slender fibrous filaments are perceived, mostly ramified, attached to the wall opposite to the cavity of the trunk, and which are fixed to the stomachal swelling, on the other side of the superior ligament. I have often taken these last for vessels. On this point, as I shall not return to it, I may observe that I have never been able to distinguish the least trace of a vascular system. The observation of very young individuals, under a convenient magnifying power, has furnished me with no result in this respect, any more than the dissection of larger individuals; but I do not intend by this to affirm that there is a complete absence of the vascular system.

Most frequently the stomachal swelling is found in a state apparently quite empty; I have only observed it to be filled with solid nutritive matter, such as fragments of small fishes and crustacea, in a few instances. When several of these animals were kept in the same vessel, I rarely remarked that they devoured one another, or that they were inclined to do so.

The *ovaries* have been already described by MM. Quoy and Gaimard. Each ovary is a pouch terminated anteriorly in a cæcum, and fixed by a slender ligament to the inferior wall of the cavity of the trunk; it extends in a straight line from anteriorly backwards, parallel to the corresponding margin of the inferior muscular band, and lastly forms a loop, on rising towards the dorsal surface of the animal. There it opens exteriorly between the upper muscular band and the base of the last fin. I fancied that I perceived in the sides of the ovarian pouch, under a strong magnifier, thin fibres, which, where the germs of ova (*stroma*) occurred, appeared to form two interlaced layers. The stroma, which may be detected throughout the whole length of each ovarian pouch, only exists in the half of this organ, in relation with the ligament.

The length and the width of the ovaries, very variable according to the age of the individuals, are in direct relation, as may easily be conceived, to the number and development of the eggs contained in them. In individuals of two lines and a half in length, only feeble rudiments of them are seen; the ovules are then extremely small. These ovaries increase more and more in length and breadth up to the adult age, that is to say, up to the moment of coition, at which period they are seen to project above the first pair of fins*. All the eggs, the smallest as well as the largest, exhibit a germinal vesicle; but no circumscribed germinal spot can be discovered in them. The vesicle appears of a relatively very considerable volume in the youngest ovules; it increases at first a little in size in proportion as the vitellus diminishes; but it remains at length stationary,—relations which exist in all known animals. When we examine very developed ovaries, we find that the youngest ovules are appended to the stroma by a short pedicel, whilst the most advanced ovules, which are surrounded by a very visible chorion, are not provided with this pedicel.

III. *Tail:—Seminal cells.*—The cavity of the tail is divided throughout its length by a vertical partition attached to the transversal septum, which limits posteriorly the cavity of the trunk, and is thus divided into two cells perfectly independent of one another. It is in these cells, as we have already stated, that

* There are however exceptions to this rule: the ovaries are sometimes less developed in the large individuals than in other smaller ones. I remember in particular an individual the length of which was only three-quarters that of a normal adult, and in which the fecundation nevertheless took place in the interior of the ovaries, which were highly developed.

the seminal fluid is elaborated. The *Sagitta* therefore presents no seminal gland organized in the manner of a testicle.

The apparatus destined to contain and to convey the mature seminal fluid is very singular. It is already known that each cell opens exteriorly, before the caudal fin, by an aperture situated on a rounded prominence. This prominence is excavated and communicates with a canal hollowed in the thickness of the skin of the tail, and which goes finally into the cell of the corresponding side. In fact, if we open each cell inferiorly, by a longitudinal section, and examine the interior surface of the upper wall thus exposed, after having removed with the greatest care all the viscous matter, we distinctly observe, with a magnifying power of ten to twelve diameters, that at a small distance from each prominence there is a rounded aperture with swelled margins. This cavity leads into the canal above-mentioned, which extends posteriorly, following the margin of the upper muscular band, and describing a slight curve. At first somewhat broad, it gradually becomes more and more narrow, and opens into the cavity of the prominence. This cavity is relatively very large, and appears, for this reason, to serve to collect and preserve the seminal fluid, before its final exit. The internal sides of the two excretory canals, and the apertures with swelled sacculated margins are covered with a fine membrane furnished with very numerous long cilia close together and very vibratory.

Seminal fluid.—The mature fluid is of a chalky-white colour, thick, and formed solely of spermatozoids. It is often found on the external aperture of the seminal cells in the form of flakes or drops. When one of these drops is observed with the microscope, the phænomenon known by the name of total movement of the seminal mass is instantly observed. The spermatozoa are capilliform, much elongated, and evidently narrowed toward their two extremities, where they are pointed; they have an undulatory or serpentine movement.

The results of my researches on the development of these bodies are very limited; I believe however that they agree generally with those of Dr. Kœlliker on certain Annelides, and in particular on the *Branchiobdella parasita* or *Pontobdella spinosa*. [See his memoir entitled "Beiträge zur Kenntniss der Geschlechtsverhältnisse und der Samen-flussigkeit wirbellosen Thiere," pp. 18 and 24.] In all the individuals except those in which the period of fecundation is near, and even in those which are only two lines and a half long, bodies resulting from the agglomeration of a great number of vesicles, or of small and spherical cells, are perceived in the limpid seminal fluid; these are the bodies known by the name of aggregations of cells (*Zellenhaufen*), or by the still more recent name of seminal globules (*Samenkugeln*): it is in these aggregations that the spermatozoa are subsequently developed. Their size varies in the different individuals, and they are more numerous in proportion as they are younger. In the greater number of individuals, below or little above the mean size, only these aggregations of cells are met with; when the animals increase in size their number visibly diminishes, by their transformation into spermatozoa. Lastly, the seminal cells of the adult individuals contain, shortly before fecundation, only spermatozoa. The cells which compose the seminal globules are all of the same size, do not adhere together by any apparent means of union, and contain numerous small granules, rarely a voluminous nucleus, which is immediately rendered perceptible by the addition of dilute acetic acid; by this means also the sides of the cells containing them become visible. The spermatozoa, which, as I have already stated, become more numerous in proportion as the animal is developed, appear under a variety of forms. Sometimes they are bodies split in their middle into two prolongations or tails, more or less long, following the same direction, receding more and more, terminating in a point and forming amongst themselves an angle more or less open; at other times these tails extend in a straight line; at others again a third tail is added, which is directed laterally, starting from the middle part, &c. The result of an attentive examination is, that these varied forms may be attributed to the differences which each of the successive phases of development presents: thus we see a great number of very small tails developed upon a seminal globule, which may be compared to spurs; these prolongations, the first rudiments of the spermatozoa, already exhibit, at their base, traces of organization at its commencement, which extends more and more, becomes general, and advances in the same proportion as the volume of the spermatozoon increases. During these metamorphoses, the primordial cells are very considerably modified; they become smaller, lose their granular contents, and, at a certain period, appear only as simple appendages,—filaments: these are the spermatozoa in the process of formation. The masses formed principally of spermatozoa in the mature state are easily distinguished by their intensely white colour, whilst the masses of less-developed spermatozoa may be recognised by their faint white aspect. Probably the spermatozoa become disaggregated at the period of their maturity; then, being free, they pass into the excretory canals, and, propelled by the currents produced by the movements of the vibratory cilia, they finally reach the hollow prominences.

I should here mention a very remarkable phænomenon which occurs in the interior of the seminal cells. This consists in slow, very manifest movements of the seminal globules and masses of spermatozoa, which take place in a greater or less extent, and which are frequently effected by a sort of rotation, and resemble a true circulation. In fact, in this latter case, one or several of these bodies progress along one of the sides of the seminal cell, then pass to the opposite side of the same cell, proceed along it in a direction reverse to the first, and so on. [This circulation is far more active and more general in individuals less developed.] In other cases these bodies have very little motion, being sometimes attracted and sometimes repulsed by the walls. Frequently indeed the majority of these bodies remain immoveable, until, at a given moment, each begins to move, as if its turn had arrived. Generally these movements do not extend beyond the posterior part of the seminal cells. The cause of this phænomenon is due to the existence of very minute and at the same time very transparent vibratile cilia on the posterior wall of the cells, and which by their motion produce currents in the seminal fluid.

The seminal globules move also in the same manner in the testicular vesicle of the leech, that is to say, describing a continual circle along the sides of that vesicle. Professor Henle observed it several years ago (see his observations on the *Branchiobdella* in the 'Archives' of Müller for 1835, p. 586), and recently, in speaking of the same phænomenon in his beautiful work on the tissues of animals (Allgem. Anatom. p. 211), he states that the cause of it is not well known. But, in all probability, this rotation is equally produced by these vibratory cilia.

The maturation of the seminal fluid advances in each individual parallel to that of the eggs, which might be presumed from what has been said on these two products. In a young or in an adult animal, the products of the male and female generative organs are always at an equally advanced period of their development. The result of this is, that at a determined period, the ova and the seminal fluid have acquired a simultaneous maturity, and that the fecundating fluid is introduced into the ovarian pouch. In fact, in certain individuals the fecundation is already effected. Their ovaries, filled with a great number of very large eggs, which extend from two to three lines below the first pair of fins, contain, at the side of the ova, a considerable quantity of seminal fluid, the spermatozoa of which exhibit very lively movements, as is indeed the case with those of other animals at the rutting period.

The question still remains to be ascertained, whether the *Sagittæ* fecundate mutually, or whether they are androgynous. With respect to this point, I must attribute great weight to a constant phænomenon which strikes us when we examine the individuals in question. In fact, the seminal cells in them are constantly empty, without any trace of spermatozoa, which were before so numerous, or at least only a very small number are found, almost all in their state of maturity. According to this, it is scarcely doubtful that the seminal fluid introduced into the ovarian cavities belongs to them, and that, consequently, the *Sagitta* fecundates itself. But by what means is the seminal fluid transferred from the male into the female apertures, and how does it pass over so great a space? It is difficult to say; I can only offer presumptions on this point. If we suppose that the water serves as the vehicle, we are scarcely more advanced, as it is necessary to explain how the seminal fluid is conducted into the ovary. Shall we admit that it is propelled by currents produced by the movements of the vibratory cilia, existing either toward the entrance into the ovaries or at the mouth of their excretory ducts? But I have never been able to perceive, in any part, these vibratory cilia in the female genital apparatus. It is therefore probable that the transference of the seminal fluid is effected by the alternate approach of the male and female apertures; and this may take place by means of the tail being curved under the body.

Nervous system:—Cephalic ganglion.—The principal ganglion of the head, or the cephalic ganglion properly so called, is situated in the middle of the upper surface of the head and at a short distance from its anterior margin, immediately beneath the skin and above the pharynx. It is flattened, nearly hexagonal, and, in adult individuals, it is about a quarter of a millimetre in extent. It sends out two pairs of nerves, one anterior, one posterior, and communicates with the trunk or ventral ganglion by two strong and elongated œsophagian commissures.

Each of the anterior cephalic nerves is detached from the anterior margin of the ganglion, remains at first almost parallel to its congener, is then directed toward the prominence furnished with bristles already mentioned, penetrates into the fascicles of some muscles, and finally loses itself in the muscle of the hooks of the corresponding side, after having become swelled into a kind of ganglion, in the vicinity of this muscle. From this swelling several filaments radiate, which divide themselves in the muscle.

The two posterior cephalic nerves, which spring from the posterior margin of the ganglion, exhibit remarkable peculiarities. They are larger and more elongated than the anterior ones, remain, throughout their course, just beneath the skin of the upper surface of the head, and extend to the limits of the trunk. They diverge considerably from their very commencement, and curve finally into a circle toward the median line of the head, where they anastomose, forming a kind of nervous arcade. At a little distance from their origin, each of these small trunks furnishes an optic nerve, which will be considered hereafter.

Ventral ganglion.—This ganglion is situated in the middle of the ventral surface of the trunk, and like the preceding one, just beneath the skin; it must be sought for between the head and the first pair of fins, but nearer to the latter. It is ovoid, elongated, swollen, and in adult individuals is nearly a millimetre and a half long. It consists of a medullary substance or intense white nucleus, and of a cortical layer of a fainter white. This last layer is composed of a multitude of ganglionic globules. This nerve furnishes four principal branches, which, in their course, proceed along the ventral surface of the animal. Of these branches two are anterior; these are the pharyngeal commissures; the two others are posterior. Beside these branches, this ganglion furnishes a great number of nervous filaments, which detach themselves from it on all sides.

The two pharyngeal commissures proceed from the anterior extremity of the ganglion, at first diverging from it; but they soon proceed in a straight line and parallel to the head. They attach themselves strongly to the skin, are very flattened throughout their course, and become more and more narrow in proportion as they approach the head. When they reach it, each of them follows the lateral and upper insertion of the cephalic hood, creeping immediately under the skin; they form a kind of beautiful arcade, and after becoming extremely delicate, unite with the cephalic ganglion.

The two branches furnished by the posterior part of the ventral ganglion are larger, but shorter than the pharyngeal commissures, for they scarcely pass the first pair of fins; they also detach themselves from the ganglion, diverging from it, but soon take a parallel course backwards. At their posterior extremity they furnish a multitude of ramifications which at first remain at the side of one another, but subsequently exhibit greater divergence and assume something of the form of a horse-tail.

From the external margins of all the branches of the ventral ganglion a number of nerves separate; these ramifications, like those proceeding directly from the ventral ganglion, form all of them a curve on ascending toward the dorsal surface of the animal, and during their course become more and more divided, and furnish, by adhering and anastomosing, a fine and very complicated nervous network beneath the skin of the trunk.

Eyes.—We have already said that the optic nerves arise from the posterior cephalic nerves. Each optic nerve has its origin at the external margin of the branch which furnishes it; it then swells into a rounded ganglion, on which the eye is as it were set. The ganglion and the eye are placed in a peculiar closed cavity, hollowed in the skin of the head. The eye is much smaller than its ganglion; it is spherical, and enveloped in a pigment of a deep colour. When this eye is examined with the microscope there is seen in one spot a spherical prominence, transparent as glass, and projecting beyond the pigmentary envelope; it is perhaps the cornea or the crystalline lens. At the circumference of the eye a very great number of short fibrils are perceived; in all probability these are fascicles of delicate nervous fibres which spring from the ganglion, and which seem to penetrate through the pigmentary envelope in the cavity of the eye.

Conclusions.—After having passed in review the structure of the *Sagitta,* we come at last to the question as to what place it should occupy in the animal series. MM. Quoy and Gaimard, who first noticed this animal, leave us in doubt on this point, and they admit that they did not sufficiently examine its structure to be able to pronounce an opinion. But even at present, when the organization of the *Sagitta* is better known, it is difficult to arrange it in a positive manner in any of the classes of our present systems. It is certain that the *Sagitta* is no mollusk; for although its nervous system seems organized on the general plan of these animals, most of the other parts of its organism and the habits of the animal do not seem to justify this affinity. In my opinion it can only be referred to the Annelides*. Here again great difficulties present themselves; for, not to mention the absence of rings, and taking only a small number of the peculiar characters of the *Sagitta,* where shall we find a genus of Annelides provided with a hood and a similar cephalic armature, fins, and so remarkable a disposition of the apparatus of generation? Nevertheless it seems evident to me that the *Sagitta* cannot enter into any other class than that of the Annelides, and that we must consider it as an anomalous genus, until we shall discover other animal forms which may connect it by gradual transitions of organization with some known genus of Annelides, or which shall completely separate it from this class of animals.

EXPLANATION OF PLATE IV. B.

In order not to encumber the figures with letters, we shall only indicate a single organ or a single half of an organ, when there is a pair of them. Figs. 3, 4, 5 and 6 represent the head magnified from ten to twelve times

* Having had occasion to observe the *Sagitta bipunctata* during my last voyage to Messina, I think I may say that I do not in any way share the opinion of M. Krohn on the natural affinities of that animal. I find nothing in its organization which can lead me to consider it as an Annelide, and I do not doubt that it is a mollusk, having in certain respects a great analogy to the *Firolæ*. It seems to me that the part designated by the author under the name of *head* is formed principally by the fleshy bulb of the mouth carrying the dental armature, and that it is the fold called hood in the preceding memoir which represents the head. The curious arrangement of the organs of generation noticed by M. Krohn constitutes the chief anomaly in the structure of this animal.—Milne Edwards.

as seen with a lens. The other figures are drawn from the organs seen under the microscope, and the determination of the magnifying power was made from the calculation of a vision of $7\frac{1}{2}$ inches.

Fig. 1. The *Sagitta*, a little larger than its natural size,—a view of its dorsal surface: *a*, the head; *b*, first pair of lateral fins; *c*, second pair of lateral fins; *d*, caudal fin; *e*, openings of the excretory duct of the ovaries; *f*, prominence of the seminal cavities.

Fig. 2. The same animal—view of its ventral surface: *g*, ventral ganglion of the nervous system, seen by transmitted light; *h*, anterior branches of nerves, or pharyngeal commissures; *k*, posterior branches of nerves; *l*, the ovaries seen by transmitted light (they are here little developed); *m*, the anus.

Fig. 3. A view of the under-side of the head, with the hood in a state of complete expansion: *a*, the hood; *b*, inferior surface of the head; *c*, prominences furnished with bristles; *d*, the mouth; *e*, the hooks seen through the lateral parts of the hood: they are closed together; *f*, commencement of the trunk.

Fig. 4. Profile view of the head in a young specimen; the hood expanded: *a*, prominence on the upper surface of the head, beneath which is situated the right eye; *b*, the hooks of the right side in their state of repose; *c*, the trunk.

Fig. 5. Upper view of the head. The hood is retracted, and the hooks are in their state of erection: *a a*, superior and lateral points of insertion of the retracted hood; *b*, the free margin of the hood; *c*, the superior and lateral parts of the head and the hooks exposed; *d*, transparent view of the cephalic ganglion; *e*, the anterior cephalic nerves; *f*, the nervous loop formed by the posterior cephalic nerve; *g*, the eyes.

Fig. 6. Under view of the head, with the hood retracted and the hooks erect: *a a*, portion of the hood; *b*, the prominences furnished with bristles; *c*, the margin furnished with bristles; *d*, the mouth; *e*, the muscles of the hooks, forming a hemispherical projection.

Fig. 7. A ventral view of the posterior parts of the body, magnified five to six times, and turned so as to exhibit a larger portion of the left lateral surface: *a*, pair of posterior fins; *b*, caudal fin; *c*, anus; *d*, ovary seen by transmitted light, exhibiting the curve which it describes above; *e*, prominences of the seminal cells.

Fig. 8. Excretory apparatus of the seminal fluid; it is seen on two sides, magnified from ten to twelve diameters, and exposed as has been said in the text: *a*, the superior muscular band seen withinside; *b*, the two canals with their rounded apertures opening into the seminal cells; *c*, the cavities, the prominences of which are hollowed: at their bottom is seen the opening by which they communicate outwardly, in the form of a fissure.

Fig. 9. Excretory apparatus of the seminal fluid of the left side, more powerfully magnified: *a*, the canal; *b*, its opening, conducting into the seminal cells; *c*, cavity of the prominence; *d*, external opening visible on the sides of this cavity.

Fig. 10. An aggregation of cells (seminal globule), which is subsequently changed into spermatozoa (magnified more than seventy diameters).

Fig. 11. Indication of a very common state of development of the spermatozoa, and more advanced than the preceding; it is not mentioned in the text. In the centre are seen the cells of the primitive seminal globule diminished in volume (magnified ninety-five diameters).

Fig. 12. Mature spermatozoa, magnified 420 diameters.

Fig. 13. Systematic arrangement of the nervous system: *a*, cephalic ganglion; *b*, ventral ganglion; *c*, anterior branch of nerves or pharyngeal commissure; *d*, posterior branch; *e*, anterior cephalic nerves, with their ganglionic protuberances; *f*, *g*, posterior cephalic nerves describing a loop; *h*, optic nerves with their ganglions *k*.

Fig. 14. The eye, optic nerve and its ganglion, magnified ninety-five diameters: *a*, optic nerve; *b*, ganglion; *c*, eye; *d*, cornea or crystalline lens, forming a rounded prominence; *e*, fibrils visible toward the circumference of the eye; *f*, excavation in the skin of the head, in the interior of which the eye and the ganglion are inclosed.

XXXII.—*Descriptions of new or imperfectly described Diurnal Lepidoptera.* By Edward Doubleday, Esq., Assistant in the Zoological Department of the British Museum, F.L.S. &c.

[Continued from p. 236.]

Fam. PAPILIONIDÆ.

Genus Papilio.

The description of *P. Evan* given in the last Number had scarcely passed through the press, when the Museum received a large and valuable collection of insects from Sylhet, amongst which were specimens of this species, up to that time unique in Mr. Harrington's cabinet. One of these fortunately is a female, and I am therefore able to point out the characters in which this sex differs from the other. In size it is much larger, the expansion of the wings being full an inch and a half greater; the anterior wings are less falcate, their colour above much paler; the base is not shaded with fuscous, the spot on the disco-cellular nervule is more distinct, there are two or three irregular dark spots in the cell, the dark border is narrower and not quite of so deep a colour, the light fulvous spots are more distinct; the posterior wings are paler, the dark margin much narrower, the inner row of spots very distinct, the indentations and the tail pale fulvous, and the under surface is much paler.

In addition to some species described by Mr. Westwood not previously in the cabinets of the Museum, this collection contained a new species remarkable for the form of its posterior wings, and connecting *P. Protenor* and *Rhetenor* with *P. Ganesa*, *Bianor* and the other species of that group which have some of the nervules covered with down towards the extremities. For this species I propose the name of *P. Elephenor*, under which it will be found described below.

Whilst on the subject of the Indian *Papiliones*, I may remark upon an error in regard to three Indian species into which Erichson, in his Report on Entomology for 1842, has fallen. I have not troubled myself to do this so long as the report remained in its original German, but now that it has been translated and widely circulated by the Ray Society, it becomes almost imperative on me to do so, and to put our English naturalists on their guard against this and numerous—I am sorry to say very numerous—similar errors, in this and other reports in the same volume. I am the more surprised at the error in the case of these species, as I believe the information relative to them was given to Erichson by an English entomologist who well knew their distinction.

Erichson states that *P. Ganesa* is synonymous with *P. Arcturus, P. Polyeuctes* with *P. Bootes,* and *P. Xenocles* with *P. Pollux.* Had he ever read the descriptions, he could not have fallen into this error.

P. Ganesa is in both sexes destitute of the splendid blue patch on the posterior wings so conspicuous in *P. Arcturus,* and is far more nearly allied to *P. Paris* than to that species, but differs from it in many points besides the downy nervures of the anterior wings in the males.

P. Polyeuctes is much nearer to *P. Philoxenus* than to *P. Bootes,* and may possibly be only a variety of the former, though I think its characters are too clearly marked for this to be the case. Of the four species in this singular group, *P. Polyeuctes* has the posterior wings by far the narrowest, *P. Bootes* by far the widest. *P. Bootes* has a large red patch at the base of the wings below, *P. Polyeuctes* has not; *P. Bootes* has the white spots on the disc of the posterior wings of a totally different form, and in a different position to *P. Polyeuctes.*

P. Xenocles being almost a white insect, *P. Pollux* almost entirely brown; *P. Pollux* extending in extent of wing little less than double the expanse of *P. Xenocles,* cannot very easily be confounded. The species nearest to *P. Xenocles* is *P. Macareus*; but this is a darker insect, the dark markings extending over a wider space, the light colour not being nearly so white; it also wants the orange spot at the anal angle of the posterior wings.

I am convinced that Erichson cannot have seen the descriptions of these species, and has been misled by erroneous information from England. Other mistakes in his report I shall hereafter point out.

P. Elephenor. P. alis anticis elongatis, supra nigris, viridi irroratis, nervulis tribus pubescentibus, subtus pallidis nigro lineatis, posticis ovatis elongatis, angustatis, dentatis, nigris viridi irroratis, antice cærulescenti nitentibus, lunula anali rufa, subtus nigro-cæruleis, lunulis marginalibus rufis, cæruleo irroratis (♂). Exp. alar. 5 unc. 3 lin. vel 132 millim.

Hab. Sylhet.

Anterior wings elongate, triangular, the outer margin about two-thirds the length of the anterior, the inner bearing the same proportion to the outer margin; black, irrorated with green at the base of the discoidal cell and on each side of the nervules; the radial nervure, the fold between that and the first median nervule, the first and second median nervules clothed with long hairs, as in *P. Bianor*, &c. Posterior wings elongate-ovate, the abdominal margin nearly straight, the outer quadridentate, black, irrorated with green, the anterior margin shaded with blue as in *P. Bianor*; the anal angle marked with an ocellus incomplete towards the margin, the pupil jet-black, the iris purplish red, irrorated with light blue. Cilia of the inner margin and of the indentations pale. Below, the anterior wings are pale, more fuscous towards the apex, the nervures and nervules, four streaks in the cell, and a series of streaks between the nervules fuscous. Posterior wings fuscous black, with purplish reflections, the anal angle with a large rufous patch pupilled with black, irrorated with blue, surmounted by an intense black cloud, and connected with a large lunule of the same rufous colour, and also irrorated with blue; the outer angle has an imperfect black pupilled ocellus followed by three lunules, and in the interstice of the second and third median nervule a cloud of scattered scales of the same colours; the black ground-colour being more intense above all these markings.

Head buff, vertex and antennæ black.

Thorax black.

Abdomen pale, marked down the back with a black streak.

In the collection of the British Museum.

Fam. SATYRIDÆ.

Genus Hætera.

H. Esmeralda. H. alis omnibus hyalinis, pube tenuissima brunnea vestitis, posticis fusco-fimbriatis ocello magno ad angulum externum, punctis duobus marginalibus albis, plagaque læte ianthina in qua maculæ duæ chermesinæ. Exp. alar. 2 unc. 6 lin. vel 65 millim.
Hab. Para.

All the wings diaphanous, the nervures and nervules brown, the whole wing covered with delicate downy hairs of the same colour, longest on the dilated portion of the costal nervure and the anterior part of the cell of the anterior wings, which are immaculate. Posterior wings with a slender brown margin externally, the outer angle with a large purplish black spot, surrounded by a yellowish and a brownish iris, and pupilled by a pure white spot placed beyond the centre; this ocellus followed by two pure white spots, beyond which, extending to the anal angle, is a large patch of the most beautiful ultramarine, in which are two slightly opalescent carmine spots. Below, the markings nearly as above, the ocellus with a few white scales before the pupil, the spot at the anal angle brown, marked with pale rose-colour in the place of the carmine of the upper surface.

Head dark brown, white posteriorly; antennæ pale brown; palpi white.

Thorax brown above, paler below; anterior legs white, posterior pale brown.

Abdomen brown, pale below.

In the collection of the British Museum. Presented by Mrs. J. P. F. Smith.

This beautiful species is closely allied to *H. Andromeda*, but is readily distinguished by its immaculate anterior wings and the brilliant blue patch of the posterior.

Genus Argyrophenga.

Maxillæ rather long, slender.

Labial palpi long, porrect, divergent, the basal joint short, the second joint very long, both densely clothed with long hairs; third joint not quite so long as, and slenderer than, the second, densely clothed with hairs of moderate length.

Antennæ short, gradually tapering to a compressed blunt club.

Anterior wings rather elongate, subtriangular, anal angle rounded; the subcostal, median and radial nervules slightly dilated at the base, the first median nervule thrown off at the end of the cell. Posterior wings obovate.

This genus is closely allied to *Erebia*, and from Mr. Earl's account of its habits, they seem much to resemble those of the subalpine species of that genus. The elongate palpi and short antennæ give it at first sight the appearance of *Libythea*, but there does not appear to be any real affinity between them. The silvery markings below suffice alone to distinguish it from all the other *Satyridæ*, giving it a resemblance to the *Argynnidæ*.

A. Antipodum. A. alis omnibus fusco-brunneis, plaga, magna pone medium rufa, in qua in alis anticis ocellus niger albo bipupillatus, in posticis tres vel quatuor unipupillati, posticis subtus ochraceo-brunneis, vittis novem longitudinalibus argenteis (♂). Exp. alar. 2 unc. vel 50 millim.

Hab. Nova Zealandia.

Anterior wings fuscous brown, the base and costa thickly sprinkled with paler scales and hairs, with a large fulvous patch beyond the cell, occupying the whole disc of the outer half of the wings, and in some specimens almost attaining the inner margin, in which, near the middle of its anterior margin, is a large black ocellus with two snow-white pupils. Posterior wings coloured as the anterior, the fulvous patch with a series near its outer margin of three or four black ocelli pupilled with snow-white. Below, the anterior wings are much paler at the base and along the costa; the outer margin is ochraceous brown, bordered internally with black, externally with a bright silvery line, and marked towards the apex between the nervules with three or more silvery vittæ. Posterior wings ochraceous brown, margined externally by a silvery line; a vitta in the cell, commencing above it at the base of the subcostal nervure, a very slight one above the first subcostal nervule, a long slender one below it, followed by four very distinct ones in the interstices between the nervules, a longer one extending to the base between the median and radial nervures, and a similar one between the latter and the abdominal margin bright silvery white, all except the two first-mentioned connected with the marginal line. Cilia of the anterior wings rufescent, darkest towards the anal angle; of the posterior ochraceous brown.

Head brown; antennæ brown above, white below; palpi light brown.

Thorax clothed with long brown hair; legs very pale brown.

Abdomen black above, very pale brown below.

The female is smaller, much paler in colour; the outer margin of all the wings above, and of the anterior below, very pale brown; the apex of the anterior marked above with two silvery vittæ, their discoidal cell on both sides and that of the posterior above with a fulvous vitta.

In the collection of the British Museum, Mr. W. W. Saunders, &c.

The only specimens of this insect which I have seen were obtained by P. Earl, Esq., who discovered them on a plain in the southern island of New Zealand. The specific name was suggested to me by Dr. Boisduval, who agreed with me in the opinion that it was one of the most, if not the most, interesting species of the family yet known. At present it is the only one from New Zealand.

XXXIII.—*On the Genera* Spirulina *and* Coleochæte. By John Ralfs, Esq., M.R.C.S., Penzance*.

[With a Plate.]

Spirulina, *Turpin* (*Kütz.*).

Filaments collected into a mucous film-like stratum, simple, spiral, oscillating, "inarticulate."—*Kütz. Phycologia Generalis*, p. 182.

Spirulina has its filaments interwoven into a thin stratum of

* Read before the Botanical Society of Edinburgh, Dec. 12th, 1844, and Jan. 9th, 1845.

no determinate form, and by the naked eye cannot be distinguished from *Oscillatoria,* to which indeed it is nearly allied, as its filaments are in like manner simple, oscillating and radiating. Kützing describes them as inarticulate, and I have failed to detect any joints or striæ; but as I have also been unable to perceive any granular matter, the apparent absence of striæ may probably depend upon the extreme fineness of the filaments.

The close and regular spires formed by the filament are very remarkable, and constitute, I believe, the only certain distinctive mark between *Spirulina* and *Oscillatoria.*

1. *S. tenuissima,* Kütz. "Stratum very lubricous, æruginose, subradiant; filaments densely spiral, very slender, parallel, flexuose." Kütz. Alg. xiv. no. 131 !; Phycol. Gener. p. 183.

On decaying algæ in a brackish pool near the Menai Bridge, Anglesea. On sticks in brackish pools at Penman Pool near Dolgelley.

It forms at first a thin pellicle of a rich green colour, but in an advanced state becomes somewhat skin-like and tinged with brown; filaments shortly radiate.

Under the microscope the filaments are extremely slender, of a pale bluish green colour, elongated, straight when free, equal, not attenuated at the extremities, vividly oscillating. Spires very close, like the volutions of some shells, broader than long. There is no appearance of granular matter, and the filaments are so fine that I cannot ascertain whether they are jointed.

The oscillations of this plant are more vivid than those of any species of *Oscillatoria* I have examined.

When I first gathered this plant in 1841, I suspected, notwithstanding its different colour, that it might be the *Oscillatoria spiralis* of Capt. Carmichael; but having communicated a specimen to the Rev. M. J. Berkeley, he informed me of its real name, and sent me a specimen of Carmichael's plant, which is a true *Oscillatoria,* and cannot belong to this genus, as the filaments, in the dried state at least, though somewhat distorted, are not regularly spiral.

Through the kindness of Mr. Borrer I have been able to compare our plant with the specimen in Kützing's 'Alg. Aq. Dul.,' and am satisfied of their identity, although his specimens were gathered in fresh water, and I have always found mine in brackish pools.

Plate X. fig. 1. *Spirulina tenuissima.*

Coleochæte, *Bréb.*

Fronds minute, parasitic, green, disciform, appressed, composed of series of cells radiating from a centre and connected together by a hyaline substance; spores imbedded in the frond*.

1. *C. scutata*, Bréb. Cells having on their upper surface a cylindrical truncate sheath, from which a bristle at length protrudes. Bréb. Ann. d. Sc. Nat. série 3. vol. i. p. 29. tab. 2.

In ponds, parasitic on aquatic plants, especially on the under surface of the leaves of *Potamogeton natans* and *Nymphæa alba* when verging to decay. Victoria Park, Manchester, and in Windermere, *Mr. Sidebotham*; Aberdeen, *Dr. Dickie*; Henfield and near Tunbridge Wells, Sussex, *Mr. Jenner*; near Fleetwood, *Mr. J. S. Ashworth*; near Bristol, *Mr. Thwaites*; ponds at Singleton and Sketty near Swansea, *Mr. Moggridge*; also abundant in Cromlyn Bogs near the same town. In several stations near Penzance and Dolgelley.

This parasite, I suspect, is not uncommon, but from its minuteness it is difficult to detect, especially when growing on leaves which still remain slightly green. It was first gathered in this country by Mr. Sidebotham, who kindly sent me specimens exceedingly well-mounted.

The very minute fronds, which to the naked eye seem mere specks, are under the microscope found to consist of many series of cells radiating from a centre and connected together by a colourless substance, which is best seen at the margin. Each series of cells is repeatedly dichotomous; the cells are longer than broad and truncate, the four or five central ones somewhat irregular, the others of equal length, forming concentric circles. These circles vary from five to twenty in number. Endochrome green, and usually contracted into a central spot in each cell.

After some time a cylindrical, colourless process appears on the upper surface of each cell; it is directed outwards and is truncate at the extremity; within it a bristle becomes visible, gradually protrudes, and finally becomes much elongated. The bristle sometimes contains pale granular matter, when it may be traced even before it issues from the tube. Before the protrusion of the bristle the sheath is always truncate, as if open at the end, but afterwards it is sometimes conical, as if a membrane was pushed out and then perforated.

Although the fronds are closely appressed, if care be used they may generally be separated by a penknife from the leaf on which they grow. The margin of the frond is well-defined; in young plants it is usually circular, but in the larger specimens often slightly lobed.

The spores, which are imbedded in the frond, are suborbicular

* "Frons disciformis, adpressa filamentis e centro radiantibus sæpius coadunatis; formata filamenta articulata dichotomo-ramosa e dorso articulorum vaginas cylindricas, truncatas longe setigeras passim prodeunt. Endochromas viride."—*Bréb. Ann. d. Sc. Nat.* série 3. vol. i. p. 29.

and at first green, but finally brown; they are large compared with the size of the plant, and are arranged in a circle near the margin.

I am indebted to Dr. Dickie for determining the name of this plant, which I had supposed was one hitherto undescribed, and also for a specimen gathered at Falaise which he had received from M. Lenormand.

Having sent a British specimen to Professor Kützing, he informed me, that as far as he could determine from the dried specimen, it is his *Phylactidium pulchellum*; but although he considers it distinct from *Coleochæte scutata*, which he has also gathered in Prussia, I believe that he has only described its young state as *Phylactidium pulchellum*, for his figure well represents our plant before the appearance of bristles; and as it is undoubtedly Brébisson's plant, I have retained the present name*.

Plate X. fig. 2. *Coleochæte scutata*: *b*, portion of a frond in fructification; *c*, portion magnified to show the processes.

XXXIV.—*Notice of a new genus and several new species of Nudibranchiate Mollusca.* By Joshua Alder and Albany Hancock, Esqrs.

Genus Eumenis.

Body elongated, quadrilateral; head subinferior, with corneous jaws; veil very small or none. Tentacles two, dorsal, clavate and laminated, with sheaths. Branchiæ papillose, set on a waved pallial expansion down the sides of the back. Foot linear. Orifices of the generative organs and of the anus? on the right side.

Eumenis marmorata. Body nearly linear, tapering to an obtuse point behind; olive-brown, streaked and spotted with dark chocolate-brown and white. Head with a few tubercular processes in front. Tentacles clavate, broadly laminated on the upper part and truncated at the apex; lower part plain, inclosed in small and rather tight sheaths. The sides of the body are produced into a pallial expansion, which undulates into three or four lobes, the margin set with irregular papillose branchiæ of a fawn-colour with pale edges. Interrupted dark brown markings run down the centre of the back, streaked and spotted on each side with brown and white. The sides of the body below the margin of the cloak are also streaked with interrupted lines of dark brown

* "*Phylactidium*, Kütz. Phylloma minutum, monostromaticum, orbiculare, s. flabellatim conjuncta constituentibus compositum. Spermatia ignota." —*Kütz. Phycologia Generalis*, p. 294.

"1. *P. pulchellum*, Kütz. Orbiculare, amœne viride; cellulis cœlogonimicis, demum transverse zonatis, centro globulo gonimico majori notatis." —*Kütz. l. c.* p. 295. t. 16. f. 11.

and white. Foot nearly linear, transparent white, the front transversely slit and produced at the sides into tentacular points. Length rather more than half an inch.

From deep water, Torbay.

This genus belongs to the family of *Eolididæ*, having a ramified digestive system. In general appearance however it greatly resembles a *Tritonia*. It has the same squared or prismatic form, with a pallial expansion down the sides of the back bearing the branchiæ, which are papillose and not branched as in that genus. The jaws are large and powerful, resembling those of *Eolis*, but rather shorter and flatter. The tongue is covered with numerous rows of strong teeth denticulated at the edges. In most respects, the anatomy, as far as it could be made out from a single specimen imperfectly preserved, agrees pretty nearly with that of *Eolis*. The principal trunk of the digestive system appears to be folliculated and the branches much-divided. The foot, in the only known species, has long tentacular processes, as in several of the *Eolides*, which it also approaches in the papillose branchiæ. We thus find the external characters of the two typical genera of the *Tritoniadæ* and the *Eolididæ* so united in this animal, that were it not for its internal organization, we should have been at a loss in which family to place it.

From this circumstance we see the impropriety of dividing these families into separate orders. The anatomy of *Dendronotus* leads to the same conclusion. This genus, which we have found it necessary to establish in the first part of our 'Monograph of the British Nudibranchiate Mollusca' for the *Tritonia arborescens* of authors, shows the ramifications of the digestive system peculiar to the *Eolididæ*, with a remarkable modification approaching it to the other two families of the order. The follicular portion, instead of being entirely at the extremity of the branches as in *Eolis*, is principally concentrated round the main trunk, thus reverting in part to the form of the true liver, and supporting the views of those anatomists who consider the ramifications to be merely modifications of the hepatic ducts. So far, therefore, as the digestive system is concerned, there appears to be no good reason for dividing the order as proposed by M. de Quatrefages; and respecting the vascular system, we have cause for believing that we were correct when we hazarded an opinion that there would be found less difference throughout the order than was supposed.

We have recently discovered that the *Dorides*—even the most spiculose—have the whole of the cloak covered with vibratile cilia. From this circumstance alone it might be inferred that the *Dorididæ* as well as the *Eolididæ* have the blood partially aërated from the general surface of the body. This inference however is rendered still more probable from the fact that the skin is a tissue of cells, or perhaps is rather composed of a sort of network of vessels running in every direction and uniting in two large trunks that pass along the sides and pour themselves into the *posterior angles of the auricle.* The blood that comes from the skin consequently never passes into the true branchiæ. Cuvier, we are aware, states that these vessels empty themselves into the gills. With all deference to his high authority, we have convinced ourselves after repeated dissections that such is not the case, but that they go at once, as above stated, to the auricle.

This fact is interesting, as it shows that even in those Nudibranchs which have the branchiæ most perfectly specialized, only a portion of the blood passes through the gill; and when taken in connexion with the anatomy of *Dendronotus,* and with the peculiar form and internal organization of *Eumenis,* goes far to establish the unity of the order *Nudibranchiata.*

Doris diaphana. Body not much depressed, equally rounded at both ends, transparent yellowish white: cloak covered with rather large clavate tubercles. Tentacles nearly linear, laminated with eight oblique plates; apertures without sheaths. Branchial plumes eleven, simply pinnate, retractile within separate cavities, set in an imperfect open circle. Head with a large veil. Foot yellowish white, showing the liver through in a large dark patch. Length nearly an inch.

Under stones near low-water mark on Meadfoot sands, Torbay.

This *Doris* approaches nearest to *D. bilamellata,* but has much fewer plumes and is quite transparent and colourless.

Doris pusilla. Body ovate, much depressed: cloak yellowish white, thickly freckled with dark brown spots, and having numerous conical papillæ obtusely pointed at the top. Tentacles long and slender, pure white and finely laminated. Branchial plumes nine, beautifully white, simply pinnate, set in an incomplete, rather distant circle round the vent, and retractile within separate cavities. Head with a broad veil. Foot rather broad. Length about three lines.

Under stones between tide-marks, Torbay.

This pretty little species is not unlike *D. depressa,* but has the papillæ less slender. The plumes are fewer and form a smaller circle, but are more conspicuous from their snowy whiteness contrasted with the darker colour of the cloak.

Doris subquadrata. Body rather elevated, white with a slight yellowish tinge, semitransparent. Cloak small, scarcely covering the head and foot, a little squared before and behind, with the edge slightly raised, not very convex, thinly covered with small papillary tubercles. Dorsal tentacles finely laminated, retractile within short smooth sheaths. Branchial plumes seven, non-retractile, large and spreading, bipinnate, the central stem large and lying flat on the back. Head covered by a broad veil, projecting frequently a little beyond the cloak in front. Foot large and thick, rounded before, and extending to a blunt point considerably beyond the cloak behind; the sides rather high. Length nearly an inch.

One specimen was dredged near Berry Head in Torbay.

Doris oblonga. Body rather convex, oblong-ovate, tapering behind. Cloak pale straw-coloured, freckled and spotted with umber-brown, densely spiculose, covered with moderate-sized, nearly equal conical papillæ. Tentacles rather thick and finely laminated, without sheaths. Branchial plumes seven, shortish and not much spreading, surrounded by a circle of large tubercles. Head furnished with a large veil. Foot narrowish, straight and slightly notched in front, not extending beyond the cloak behind. Length nearly half an inch.

Obtained with the last.

Goniodoris castanea. Body ovate, rather broad and flattish, of a reddish brown hue, covered with soft warty tubercles. Head bilobed, deeply sinuated in the centre, arched and terminating in tentacular points at the sides. Cloak small, warty, the margin reflected all round; interrupted behind. An elevated waved ridge runs down the centre of the back, intersected by a small transverse one about half-way down. Dorsal tentacles small, very broadly laminated and truncated at the apex. Branchial plumes eight or nine, rather large, purplish brown, bipinnate, forming a complete circle round the vent. A waved tubercular ridge extends down to the tail, which is rather obtuse. Foot broad, extending much beyond the cloak, with a deep notch under the mouth in front, and rounded at the sides; yellowish with a tinge of purple. The upper surface tuberculated like the rest of the body, the prominent parts being blotched with opake white. Length three-quarters of an inch.

Under stones at low-water mark near the ruins of Salcombe Castle, Devonshire.

Eolis glauca. Body rather depressed, oblong, tapering to a fine point behind, of a pale brick-red, more intense towards the head. Dorsal tentacles moderately long and rather slender, tapering. Oral tentacles about the same length as the dorsal ones, set wide apart, whitish with a tinge of red. Branchiæ numerous, rather stout, vermicular, tapering at the ends and depressed towards the base; of a pale sage-green colour, speckled with brown and opake white, and frequently with a reddish tinge near the apex; arranged in about fourteen transverse rows on each side, leaving a bare space for about half-way down the back; the front rows divided into clusters of two or three rows each. Foot pellucid, broadish in front, slightly arched and extending into broad tentacular points at the sides; tapering to a fine point behind. Length $1\frac{3}{4}$ inch.

One specimen of this fine species was dredged up in Torbay.

Eolis inornata. Body ovate-oblong, rather depressed, tapering to a fine point behind. Oral and dorsal tentacles rather short and thick, nearly of the same length; the first white, the others yellowish and slightly wrinkled. Back pale fawn-coloured or nearly white. Branchiæ cylindrical, tapering to an obtuse point, set in eight or nine rows of four or five papillæ each; of a dull brownish orange freckled with brown and white: apices for some distance transparent white, with the ovate vesicle of a more opake white seen distinctly through. Foot white, expanded in front, curved and extended into points at the sides. Length $\frac{4}{10}$ths of an inch.

Under stones near low-water mark, Torbay. When in motion, the branchiæ nearly cover the whole of the back. This species is allied to *E. angulata.*

Eolis punctata. Body yellowish, inclining to flesh-colour on the back, covered with largish opake white spots. Dorsal tentacles yellow, thickish, tapering and truncated at the top; laminated with twelve or thirteen oblique folds sloping downwards behind as in *Doris.* Oral tentacles very long and tapering. Branchiæ nearly linear, tapering to a fine point; of a yellowish brown colour spotted with white, arranged in five or six clusters down the sides of the back, the first and second large, the rest small and confluent, extending nearly to the tail. Foot nearly linear, the front bow-shaped and extending into tentacular points at the sides. Length nearly an inch.

Dredged in deepish water, Torbay.

This *Eolis* is peculiar from the shape of its dorsal tentacles and the conspicuous white spots with which it is entirely covered. It is allied to the *Eolis Drummondi* of Mr. Thompson.

Eolis tenuibranchialis. Body fawn-coloured or yellowish, rose-coloured near the head. Dorsal tentacles orange tipped with yellow, and ringed with numerous small laminæ. Oral tentacles rather longish and thick at the base. Branchiæ small and very slender, linear, of an olive colour tipped with opake white; set in seven clusters down the sides of the back, the first three distinct, the others coalescing. The back in the region of the stomach is of a dark purplish colour. Foot with a deep transverse slit in front and extending into tentacular processes at the sides. Length an inch and a quarter.

A single specimen in a sickly state was dredged in Torbay and died very soon afterwards.

Allied to *E. Drummondi.*

Eolis amœna. Body slender, greenish or yellowish white. Dorsal tentacles wrinkled, long, linear, greenish with a band of brown and spotted with white. Oral tentacles much shorter than the dorsal ones, white. Branchiæ linear or slightly elliptical, of a warm green spotted with white, brownish towards the base, and a faint yellowish white ring near the apex. They are set in eight transverse rows; each row has three, sometimes four papillæ on each side: the three anterior rows are placed close together, the rest wide apart. The back has rich brown markings near the region of the heart. Foot rather slender, rounded in front, and not produced at the sides. Length about three lines.

Two specimens of this beautiful little *Eolis* were dredged up at different times in Torbay.

Allied to *E. viridis* of Forbes.

Eolis elegans. Body slender, subpellucid, yellowish white. Oral tentacles long, tapering. An opake white line runs down each, and is continued across the front of the head. Dorsal tentacles not above half the length of the oral ones, stoutish, erect, tapering at the top and wrinkled, pale fawn-coloured or buff. Branchiæ numerous, slender, nearly linear, set in about seven dense clusters on each side: the first cluster large and approaching very near the dorsal tentacles; the remaining diminish gradually and extend very close to the tail. They are of a deep rosy flesh-colour, terminated above and below by a dark patch of purplish brown approaching to black, above which, on the apex, is a ring of white. Foot slender, produced into longish angles at the sides. Length half an inch.

One specimen dredged up near Berry Head, Torbay.

The contrast of the dark spot with the white and red on the papillæ gives this species a very elegant appearance.

Eolis amethystina. Body yellowish, slightly depressed. Oral and dorsal tentacles of a yellowish tinge, the latter twice as long as the former, bases approximating, points fine and spreading. Branchiæ elliptical, much inflated one way and somewhat depressed the other, set in nine or ten rows of four papillæ each; the gland linear, purple, granulated; apices with a broad ring of pale orange-red. Foot transparent, linear, rounded in front, and a little widened for a considerable way backwards. Length three-eighths of an inch.

Under stones at low-water mark, Cullercoats.

This species comes near to *E. tricolor*, but differs from it in the shape of the anterior portion of the foot, in the length of the tentacles, and in the size and character of the branchiæ.

XXXV.—*Descriptions of some new genera and species of Heteromerous Coleoptera.* By G. R. Waterhouse, Esq.

Platesthes, nov. gen.

Head rather short, the lateral lobes or ridges protecting the base of the antennæ, less prominent than the eye.

Clypeus separated from the head by a distinct transverse impression, and by two less distinct lateral grooves; the anterior margin slightly emarginated.

Eyes transverse, convex, rather large and distinctly emarginated in front.

Labrum prominent, transverse, distinctly emarginated in front.

Mandibles moderate, bidentate at the apex.

Maxillæ with the outer lobe entirely uncovered by the mentum: the maxillary palpi moderate, the terminal joint triangular.

Labial palpi short and stout, the terminal joint truncated.

Mentum broader than long, four-sided, the hinder margin distinctly shorter than the front, which is obscurely emarginated, but nearly straight.

Labium transverse, corneous, exposed.

*Throat-plate** with a narrowish oblong polished and transversely grooved area in the middle, joining the mentum by a straight margin.

Antennæ rather long and slender; if extended backwards would nearly reach the base of the thorax; the joints, most of them, of a long obconic form; the second joint short, the third scarcely longer than the fourth; the three terminal joints distinctly broader than the rest, the last of a short ovate form and equal to the penultimate.

Thorax large, very nearly equal in width to the elytra, and nearly quadrate, but slightly narrower in front, the outer edge emarginated, the posterior margin very nearly straight, and not closely applied to the elytra; the angles nearly right angles, but slightly rounded; the upper surface slightly convex in the middle, but the lateral margins are recurved; the whole dorsal surface however is pretty nearly flat.

Scutellum very broad, but rather short, and obtusely pointed behind.

Elytra soldered together at the suture; oblong; the dorsal surface nearly flat, the sides parallel, but on the posterior third gradually contracted, so that the outline of that region would form half an oval; the apex however is produced, recurved and

* This part, which I term *throat-plate*, often furnishes somewhat important characters: it is the mesial part of the head beneath, below (or behind) the mentum.

rounded; the lateral keel is very distinct, acute, and remote from the lateral margins of the elytra.

Legs moderate; the anterior tibiæ but little compressed, and very little dilated at the extremity: they are provided with a short spine on the inner side at the apex, and the outer angle is somewhat prominent. Tarsi moderate as to thickness and rather long, those of the middle and hind legs being equal to the tibiæ in length, and those of the anterior pair of legs but little shorter than the tibiæ from which they spring: claws rather large.

Præsternum not produced posteriorly.

This genus, to which I have given the name *Platesthes* in allusion to its flat covering, the whole back of the insect being depressed and nearly on the same plane, evidently approaches closely to the genera *Gyriosomus* and *Praocis*, near to which should also be placed, in my opinion, the genus *Physogaster*. The last-mentioned genus, M. Le Comte de Castelnau says, is closely allied to *Pimelia*; but in making this assertion he must entirely have overlooked the structure and position of the labium, a part of the mouth which furnishes good characters for the sections of the *Heteromera*. On this subject I cannot enter at present, but I will merely remark, that in the *Pimelidæ*, *Akisidæ*, *Tentyriidæ* and *Erodiidæ* the labium is attached to the back part of the mentum in such a manner as to be totally hidden, or, at most, to leave exposed the points only of the paraglossæ*; to these we may also add the *Adesmia* and *Epitragus* group†. In the genus, the affinities of which I wish to determine, as well as the genera with which I have associated it, the labium is attached to the anterior extremity of the mentum, and is completely exposed and combined with a great similarity in the structure of other parts of the mouth; they all have the throat-plate marked with the pecu-

* The term paraglossæ is applied by Kirby and Spence to the lateral lobes of the labium of the bees, and as the same parts exist in beetles, I think it well to call them by the same name; they lie for the most part behind the tongue, and are nearly always fringed with hairs in the *Heteromera*; but in the latter groups (according to Dejean's arrangement of the order), *Taxicornes* and *Tenebrionites*, where the tongue is narrower, the outer margins of the paraglossæ are distinctly exposed; in some cases where the tongue is broad, as in *Bolitophagus*, the paraglossæ are still very distinct (viewing the labium from its outer surface), projecting as they do considerably in the lateral direction.

† Why should not these groups, in which the tongue is hidden, be associated together? We might commence with *Epitragus*, and continue through the other groups, *Tentyriidæ*, *Erodiidæ*, *Adesmia*, &c., where there is no separate emargination for the maxillæ, and where the mentum covers that organ, to the *Pimelidæ*, *Akisidæ* and *Nyctelidæ*, where there is a separate notch in the throat-plate for the maxillæ, which are exposed—at the base at least.

liar transverse rugæ in the middle, and the part thus marked is more or less distinctly separated from the other under parts of the head by an oblong furrow on each side. Near to these insects are the *Nyctelidæ,* also a South American group, in which the throat-plate presents a more striking peculiarity,—that of having a distinct and deep mesial groove immediately under the mentum, and extended more or less in the longitudinal direction; they however have the labium almost entirely hidden.

Platesthes silphoides. Platesth. ater, nitidus, corpore oblongo, lateribus fere parallelis; capite distincte punctatis; thorace crebre punctatis, lateribus piceis; elytris punctis distinctis adspersis, singulo tricostatis; antennis tarsisque piceis.—Long. corp. 6 lin.; lat. 3 lin.

This insect was found by Mr. Darwin at Port Desire, Patagonia: in general aspect it greatly resembles a *Silpha.* The head has large punctures scattered on its upper surface, but on the fold covering the base of the antennæ and under surface they are smaller, more dense, and for the most part confluent. The thorax is very thickly punctured, the punctures distinct and of a triangular form; on and near the lateral margins, however, they are less numerous and more delicate: on the anterior portion of the thorax the lateral margins are scarcely reflected, but they become gradually more so towards the posterior margin, where the reflected portion is broad; a slightly impressed line runs parallel with, and close to the lateral margin. The elytra have the dorsal surface nearly flat, but on each elytron are two sharp longitudinal ridges, besides a third, which forms the lateral keel: between the ridge on each elytron which is nearest the suture, the space is flat, but the other interspaces are concave, and the whole surface has distinct, and widely, and irregularly scattered punctures: the ridges themselves have a few punctures. The produced apical portion of the elytra is pitchy; distinct scattered punctures are observable on all the under parts.

Scotobius Akidoïdes. Scot. ater, obscurus; corpore supra fere plano, punctulato; thoracis marginibus lateralibus reflexis; elytris carina laterali distincta.—Long. corp. 9 lin.; lat. $4\frac{1}{4}$ lin.

This species, brought by Mr. Darwin from Port Desire, Patagonia, is remarkable for the produced and reflected lateral keel of the thorax, the distinct lateral keel to the elytra, and the absence of any distinct sculpturing on the upper parts of the body, to which peculiarities we may add, the very slight convexity of the dorsal surface of the thorax and elytra. In size it is nearly equal to the *Scotobius pilularius*; its thorax, however, is larger in proportion to the elytra than in that insect, and the anterior tibiæ are stouter. The head is distinctly punctured; the thorax is strongly emarginated in front, much broader than long, and but little narrower than the elytra; it is contracted in front and behind, and broadest rather behind the middle; the lateral margins are greatly produced and distinctly curved upwards; the dorsal surface is slightly convex and thickly but finely punctured. The elytra are but slightly convex above, have a distinct lateral keel, which is slightly reflected, and towards the apex of the elytra this keel is indistinctly broken up into some small tubercles; the whole surface is finely punctured, and there are some extremely faint traces of striæ; the apex of the elytra is slightly produced. It is the distinct lateral keels to the thorax and elytra which gives the flatness to the back of this insect, and imparts to it the aspect of an *Akis*.

Family TENTYRIIDÆ.

Genus Thinobatis, *Eschscholtz*.

Thinobatis rotundicollis. Thin. piceo-rufa, pilis minutissimis adspersis; thorace transverso subrotundato, supra convexo; elytris breviter ovatis, postice subacutis, indistincte striatis, interstitiis paulo convexis; antennis pedibusque ferrugineis.—Long. corp. $1\frac{2}{3}$ lin.

This species, as it would appear (judging partly from Eschscholtz's description and partly from his figure*), is of smaller size than the *Th. ferruginea*, the thorax more transverse, and more boldly rounded at the sides, and the posterior angles must be more obtuse; indeed the hinder margin is almost evenly rounded, the angles being scarcely perceptible.

The characters of the genus *Thinobatis*, as drawn up by M. Solier†, are taken from an insect which evidently differs in several respects from the type of the genus (*Thinobatis ferruginea*), and more especially in having distinct posterior angles to the thorax, the humeral angles of the elytra prominent, and, I strongly suspect, in the form of the mentum. Unfortunately Eschscholtz is silent on this last point; but in the insect above described, which approaches *most nearly* to the *Th. ferruginea*, the mentum is either truncated in front or most *indistinctly* emarginated, and not deeply emarginated as in the figure and description of M. Solier. Again, the elytra are of an ovate form in the two species of *Thinobatis* with which I am acquainted, and not subparallel. The terms "*corps filiforme, déprimé*," used by the Comte de Castelnau ‡ in his definition of *Thinobatis*, will by no means apply to the type of the genus.

* See Eschscholtz's Zoologischer Atlas, part 4. pl. 18. fig. 3. p. 8.
† Annales de la Société Entomologique de France, tom. iv. p. 406.
‡ Cours complet d'Histoire Naturelle, Insectes, tom. ii.

Genus Megalophrys*.

Head large, but little narrower than the thorax, strongly trilobed in front, the mesial lobe the largest, nearly semicircular, but having an indistinct angle in the middle: the lateral lobes very prominent, recurved and descending posteriorly, so as partially to inclose the base of the antenna, and indistinctly encroaching upon the fore part of the eye, above which is a longitudinal ridge. The eye lateral, tolerably prominent, with the vertical diameter the greatest, slightly emarginated in front.

Labrum small, obtusely pointed in front; hidden when the jaws are closed.

Mandibles short and stout, very broad at the apex, which is strongly notched, and thus divided into two lobes, of which the lower one is the largest and longest and truncated at the extremity, and the upper one is pointed.

Maxillary palpi moderately long; the terminal joint securiform, and obliquely truncated at the apex.

Mentum broad, hiding the maxillæ, truncated in front: it may be described as hexagonal, with the hinder margin by far the longest, and the remaining sides nearly equal to each other.

Antennæ moderately long and slender; the joints, most of them, of a longish obconic form; the second joint nearly equal in length to the fourth or fifth, the third about half as long again as the fourth: from the fourth to the tenth the joints become gradually and successively shorter; the penultimate joint presents a nearly triangular outline, and the last is of a short ovate form, and smaller than the preceding; the terminal joints are of equal width, or *very* nearly so, to the other joints.

Thorax rather narrow, but little convex above, the width in front exceeding the length; contracted behind and with the angles acute: its posterior margin is bisinuated, and applied to the base of the thorax: a delicately impressed line is observed close to the lateral and posterior margins, which are acute.

Scutellum small, and rounded behind.

Elytra soldered together at the suture, distinctly broader than the thorax, convex, and of an oblong-ovate form, sinuated at the base so as to present an outline corresponding to the hinder margin of the thorax; the humeral angles obtuse, and the apex somewhat pointed: they are simply rounded at the sides, the lateral keel being only represented by a line situated close to the lateral margin, and which can scarcely be said to be raised excepting at, and near the humeral angle.

Legs moderately long and slender, the tibiæ cylindrical or nearly

* This name is suggested by the great projection of the lobes of the head, which are situated in front of the eye.

so: tarsi slender; the hindermost but little shorter than the tibiæ.

Præsternum rather narrow, with a longitudinal groove, and not produced posteriorly beyond the hinder margin of the anterior coxæ.

In having the scutellum distinct, the eyes not crossed by the lateral keel of the head, the tibiæ filiform, the thorax contracted behind, and the clypeus rounded in front, this genus approaches *Tentyria*; it has the head proportionately larger, the thorax more strongly margined at the sides, the antennæ longer, and the second joint not so distinctly shorter than the rest; its more direct affinity I believe to be with *Hylithus, Thinobatis, Evaniosomus* and *Melaphorus*. *Megalophrys* evinces its affinity to these insects in having the eye nearly round, more convex (as compared with *Tentyria*), and with the lenses very large (they appear to be positively larger and more distinct in the small insect, *Megalophrys patagonica*, than in a *Tentyria* of at least five or six times the bulk): the lateral lobes of the head, or folds which cover the base of the antennæ, are more produced, and separated from the clypeus by a distinct notch in all these genera with the exception of *Thinobatis*. None of these insects have the comparatively hard wing-cases which we find in *Tentyria* and its approximate genera. The principal distinctive characters of the South American genera above alluded to, may be thus expressed:—

I. Antennæ cylindrical, the terminal joint smaller than the others.

A. Antennæ with the three basal joints equal or very nearly so; the head elongated; thorax without lateral keel.

a. Eye minute........................ 1. { *Melaphorus*, Guerin. / *Stenholma*, Solier.

b. Eye large .... 2. *Evaniosomus*.

B. Antennæ with the second joint shorter than the first or third, and the third the longest; head as broad or broader than long; thorax with a distinct lateral keel .... *Megalophrys*.

II. Antennæ incrassated at the apex, the last joint as large, or larger than the penultimate.

A. Antennæ with the three basal joints nearly of equal length; clypeus truncated in front; anterior tibiæ short and distinctly dilated at the apex .... *Thinobatis*, Eschsch.

B. Antennæ with the second joint short, the third longer than the other joints; clypeus rounded in front ... *Hylithus*, Guerin.

Megalophrys patagonica. Megaloph. picea; antennis pedibusque piceo-rufescentibus; capite thoraceque crebre punctatis; thorace subquadrato, postice angustiore, marginato, angulis anticis posticisque acutis, supra subconvexo; elytris elongato-ovatis, convexis, seriatim punctatis interstitiis subseriatim punctulatis; corpore subtus punctato.—Long. corp. $4\frac{1}{2}$ lin.; lat. $1\frac{3}{4}$ lin.

In general form this insect somewhat resembles a *Tagenia*, but its body is rather less narrow in proportion, and the elytra are more convex; they are considerably broader than the thorax. The thorax is rather broader than long, broadest in front, and considerably contracted behind. The elytra have the punctures forming the ordinary striæ rather small, and there are some very minute punctures between these rows, and these have a tendency to a linear arrangement, there being two irregular rows of them on the fore part of the elytra, and one row on the hinder part.

Mr. Darwin found this insect at Port Desire in Patagonia.

Family TAGENIIDÆ.

Grammicus, nov. gen.

Head with obtuse posterior angles, which are rather remote from the thorax (the head being furnished with a long neck, which however is but little seen), longer than broad, the sides straight and parallel and with a lateral keel; the part in front of the eye as long as the hind part; the clypeus contracted and truncated in front; the fold covering the base of the antennæ but little prominent, not produced laterally beyond the outline of the head, its margin somewhat reflected: cheek-plate considerably produced in front; the space between it and the mentum, for the maxilla, narrow.

Eye small, nearly round; situated entirely above the lateral groove of the head, its vertex directed upwards.

Antennæ about equal in length to the head and thorax taken together; very thick, the joints equal to each other, with the exception of the last two, and presenting a square outline; each joint is joined to the next by a narrow neck; the penultimate joint longer than the rest; the last very small, somewhat pointed, and so joined to the last that the line of separation is with difficulty perceived.

Mandibles short and stout, very broad and bidentate at the extremity.

Maxillary palpi rather long and with the joints moderately stout; the first and second obconic; the third rather the longest, of an elongate-ovate form, the broadest part however rather beyond the middle.

Mentum moderate; transverse, hexagonal, slightly emarginated in front, not covering the maxillæ.

Thorax fully as long as broad, slightly trisinuated in front; the hinder margin straight (or very nearly so), the lateral margins parallel on the fore half of the thorax, and from the middle gradually contracted to the hinder angles; the angles right angles; the sides keeled.

Scutellum very small.

Elytra elongated, but little broader in the middle than at the base, rounded at the extremity; distinctly broader at the base than the thorax at the same part, and with a transverse ridge; the humeral angles prominent; lateral keel distinct.

Legs moderate; the tibiæ simple; tarsi rather shorter than the tibiæ.

Grammicus chilensis. Gramm. rufo-piceus; corpore elongato, subdepresso; capite thoraceque rugoso-punctatis; thorace bicostato; elytris singulis quadricostatis, seriatim punctatis, subtransversim rugosis.—Long. corp. $1\frac{3}{4}$ lin.

This little insect was found by Mr. Darwin at Valparaiso. It is exceedingly like a *Tagenia*, having the small, narrow, elongated form, and in having the thorax and elytra furnished with distinct longitudinal ridges it will bear a still closer comparison with M. Solier's genus *Microtelus*; from both these genera, and indeed all the *Tageniidæ*, it differs in having the eye situated entirely above the lateral groove of the head *; from *Tagenia* it may moreover be distinguished by the antennæ being of equal width throughout, the joints being less transverse, and indeed presenting a nearly square outline, though rather broader than long,—by the penultimate joint being distinctly longer than the rest, and longer than broad, and the terminal joint smaller and confounded with the penultimate, to which differences may be added that of the mentum not being notched at the side. The long head and equal joints of the antennæ (if we except the last two) at once distinguish the present insect from *Microtelus*; the epistoma or clypeus moreover is not emarginated in front, and in the genus last mentioned we do not find the penultimate joint of the antennæ longer than the rest.

The two longitudinal keels on the thorax divide its dorsal surface into three equal parts, and the interspaces are flat: the keels or ridges of the elytra are nearly equidistant, sharp and distinct; and in the interspaces are two rows of distinct punctures, each row being placed close to a ridge; and there are moreover some irregularly transverse rugæ, but these are by no means strongly marked.

* In *Leptinoderes* I find the nearest approach, in the extremely contracted condition of the eye, to the present insect.

XXXVI.—*On several new species of Crustaceans allied to* Saphirina. By Harry D. S. Goodsir, M.W.S., late Conservator of the Museum of the Roy. Coll. Surg. Edinburgh, Assist. Surgeon in H.M. Arctic Exploring Ship Erebus.

One of the most striking features in the structure of this peculiar form of Crustacean is the double eye in a single dark spot.

The antennæ are similar in form to those of the *Isopoda*, being either filiform or almost truncate, the general form of these organs in the *Isopoda*, and by no means like those of the *Monoculi*, which are setaceous and very often dilated in the middle. As in the *Isopoda*, they are short, being generally about as long as one-half of the breadth of the body.

The animals here referred to have a projection from the mesial line of the carapace, analogous to the rostrum, generally found in the *Monoculi*, and in the extremity of this rostrum the eye is generally situated.

The first segment of the body is in all cases longer than the remaining segments combined, and in some instances the lateral edge is curved inwards and downwards, so as to give it the appearance and form of a carapace. The remaining segments of the body are small, gradually decreasing from the second to the terminal.

In several species the terminal abdominal segment is provided with a jointed pedicle on each side, which is armed at the extremity with spines, and in some species this structure is exactly similar to *Monoculus*. The anterior extremities are very short, so much so as not to be seen extending beyond the edge of the body; generally however one or more joints of the last pair of legs are seen posteriorly.

The most striking character in this order of animals is the double extremities, a character common to the *Stomapoda* and *Monoculi* as well as this form of Crustaceans. As in *Stomapoda* the two terminal filaments arise from one common pedicle, the external one being much longer than the internal; the former also is chelate and three-jointed, the latter four-jointed. The number of joints however in these legs varies. The legs arising from the carapace (first thoracic legs) are not double, or if so, one of the terminal filaments is obsolete.

These animals are very active in their habits, and swim about in company with the other forms of the family *Pontia*.

Body depressed as in the *Isopoda*; posterior thoracic legs double.

Sterope ovalis. Plate XI. fig. 11.

Rostrum not prominent; antennæ unarmed, three- or four-jointed. Eye situated behind the rostrum, rhomboid, transverse. Posterior pair of legs showing only one joint from the posterior and lateral edge of the body, armed on the lateral edges with strong spines, the two terminal spines being strongest.

Description.—Body ovoid, rather dilated, anteriorly quite smooth. The anterior segment of the body as large as the whole of the remaining segments, and having the lateral edges surrounded with a narrow border. This animal is very aetive and swims about with great rapidity. It is exceedingly minute, not being larger than a mere point.

Sterope armatus. Plate XI. fig. 9.

Rostrum very prominent, rounded, and one-third the whole breadth of the body; antennæ six-jointed, and armed at the extremity and on the anterior edge with a series of robust long spines. Eye not apparent.

Carrillus oblongus. Plate XI. fig. 12.

Rostrum one-eighth the breadth of the whole body, prominent, rounded at the extremity, with the eye very small, and situated almost upon the anterior edge; anterior edge of body hollowed out on either side of the rostrum. Antennæ clavate and eight-jointed, very little longer than half the breadth of the body, unarmed, last joint pointed. Abdominal legs delicate, and armed at the extremities only with one or more spines. Abdominal segments of body taper gradually.

Sterope interruptus. Plate XI. fig. 10.

Rostrum prominent, one-tenth the breadth of the whole body, pointed. Eye large, and filling almost the whole of the rostrum. Anterior edge of the body hollowed out on either side of the rostrum. Posterior thoracie legs strong, spined, and serrated on the external edges. Three strong short spines arise from each side of the abdominal portion of the body, and a strong pedicle armed with three spines arises from the posterior edge of the last abdominal segment on each side of the mesial line.

Zaus spinatus. Plate XI. fig. 1.

Antennæ three-jointed. A spine arises from the anterior edge of the carapace on each side of the mesial line, one from the base of each of the antennæ. Abdominal pedicles three-jointed, distal one armed at its extremity with three robust strong spines, the central ones longest.

EXPLANATION OF PLATE XI.

Fig. 1. *Zaus spinatus*, magnified.
Figs. 2, 4, 5, 7, 8. Organs of locomotion.
Fig. 6. One of the first antennæ.

Fig. 9. *Sterope armatus.*
Fig. 10. *Sterope interruptus.*
Fig. 11. *Sterope ovalis.*
Fig. 12. *Carrillus oblongus.*
Fig. 13. Second thoracic leg of *Carrillus oblongus.*
Fig. 14. First abdominal extremity of *Carrillus.*
Fig. 15. Second abdominal extremity.

XXXVII.—*On the Fructification of the genera* Clathrus *and* Phallus. By M. Maurice Lespiault*.

The Rev. M. J. Berkeley, in a notice published in 1839†, described the fructification of *Phallus caninus*, Huds. (*Cynophallus caninus*, Fries); he demonstrated by delicate observations, that, in this genus, until then wrongly separated from the *Hymenomycetes*, or rather the *Basidiosporæ* of Léveillé, the spores were supported on basidia, as in the *Boleti*, the *Agarici*, and other mushrooms of the same class. Mr. Berkeley thence presumed that an analogous organization must be found in all the *Phalloideæ*, but no further recent observations had as yet supported this hypothesis.

M. Corda, whose analyses have thrown so much light on the intimate structure of Fungi, denies the existence of the basidia in the genus *Phallus*: "*Sporæ in strata congestæ, muco primum firmo dein diffluente immersæ, simplices, basidia nulla*‡." (Anleitung, p. 119.)

The investigations of botanists on this subject have not gone further; the fructification of the genus *Clathrus* is still more imperfectly known. Nor can we be surprised, when the analysis of these mushrooms presents such great difficulties.

It is, in fact, not sufficient to subject to examination individuals little developed or inclosed in their volva; the substance which contains the fructiferous organs must be firm and of an almost fleshy consistence. As soon as it has begun to soften, the spores are displaced, and the basidia disappear. It is moreover very difficult, even with the aid of a perfectly fine-pointed lancet, to remove very thin sections of a mucilage which yields to the slightest pressure: we are therefore obliged, in order to obtain

* Translated from the *Annales des Sciences Naturelles* for July.—The position which *Clathrus cancellatus* should occupy in the class of the *Basidiosporæ*, and the mode of insertion of the spores of this curious plant, have been already established by Mr. Léveillé, but, notwithstanding the priority and accuracy of the observations of M. Léveillé, we think the memoir of M. Lespiault, who has extended his researches to other plants of the group of the *Phalloideæ*, will be read with interest.—(*Ed. Ann. des Sci. Nat.*)

† Annals of Natural History, vol. iv. p. 155.

‡ There is no question here of the *Phallus caninus*, which has become the type of a new genus.

some transparency, to wet the substance subjected to examination; but then the action of the water detaches a cloud of spores, which immediately obscure the field of the microscope. All these circumstances suffice to explain how the observations of botanists have remained so long without result.

If a *Clathrus cancellatus* still undeveloped is cut vertically, we remark at first externally, a volva composed of two membranes separated by a thick gelatinous layer; immediately under the volva and applied to its interior surface are seen the branches, almost in a rudimentary state, which are subsequently developed, to form the most brilliant part of the mushroom. The interior of the space circumscribed by this network is occupied by a greenish matter, in the centre of which is a small cavity filled with a colourless and gelatinous liquid.

A microscopical examination is necessary to ascertain the intimate structure of these various parts of the mushroom. The gelatine of the volva is formed of or intermingled with a great number of anastomosed filaments, sometimes articulated, and terminated by small swellings; it is divided by a thin membrane into parts completely isolated from one another, and susceptible of separating like the sections of an orange. This arrangement makes the volva appear, on the outside, barred into small polygons. The substance of the trellis, of a rose-colour, is solely composed of large, round and perfectly distinct cells: some botanists, deceived by a superficial examination, have imagined that these cells contained a liquid which carried along with it the seeds; but the branches of the *Clathrus* are in reality only a support analogous to the stem of the *Phallus*, and serve solely to prop the greenish substance, the structure of which we proceed to examine.

This substance, at first fleshy, then mucilaginous, is composed, as in the Lycoperdons, of sinuous cavities, variously anastomosed, separated from one another by a colourless zone, and strewed with greenish spores, supported, to the number of four to six, on club-shaped basidia. These basidia, scarcely refracting the light, should be observed with attention to be seen distinctly; they are sometimes furnished with, and at other times deprived of, sterigmata, and as they do not rise to the same height, the greenish layer of spores which surrounds the hymenial cavities appears to have a certain thickness.

All this fructiferous mass speedily softens, tears into shreds, by the development of the anastomosing branches to which it adheres, and deliquesces. The liquid which carries the seeds diffuses a well-known cadaverous odour*.

* The volva of *Clathrus*, on the contrary, exhales a delicious aroma,—a remarkable singularity hitherto unnoticed.

In the *Phallus impudicus,* the type of the genus *Phallus,* there exists, as in the preceding genus, a gelatinous volva, inclosed in two thin membranes, hymenial cavities whose agglomeration forms a mucilaginous mass, and lastly a central axis, which serves, like the branches of the *Clathrus,* to support the hymenium.

The analogy is perfect, and to dilate further on the structure of *Phallus* would merely be to repeat what we have already said.

The organs of fructification deserve however particular notice. The hymenial cavities do not at all differ from those of *Clathrus,* but they are furnished with spores at least twice as large; these spores are grouped in fours, fives and sixes, and are undoubtedly supported on basidia, which it is very difficult to isolate and to see distinctly, but the existence of which is evident. The fructiferous substance undergoes the same modifications as in *Clathrus;* at first adhesive, it afterwards becomes mucilaginous, and in the end deliquesces, forming a liquid of a very disagreeable odour.

An identical organization already observed in the genus *Cynophallus* ought necessarily to exist in the rest of the *Phalloideæ* and of the *Clathraceæ;* it doubtless extends also to the *Lysuroideæ* and to the genus *Battarea,* which forms a point of transition with the *Trichogastreæ.*

We hope that further observations will confirm these hypotheses, and throw some light on the structure, so imperfectly known, of the mushrooms belonging to these various groups.

XXXVIII.—*Journey through Java, descriptive of its Topography and Natural History.* By Dr. Fr. Junghuhn*.

The present work, by the well-known botanist Dr. Junghuhn, furnishes us with the results of the author's great labours in natural history in Java. They are the more interesting, as his descriptions (as might be expected from a botanist) relate especially to vegetation. They are also the more important to the phytographer, as the author has shown himself capable of connecting intimately these descriptions with the other natural features of the country; and thus to present to our minds picturesquely all the details of natural history, and at the same time in a strictly scientific manner. We may also infer, from the ability of the author, that his geognostical and physical investigations possess the greatest accuracy; from which circumstance, we have in this work a valuable mass of observations in natural history, corresponding to the magnificence of the natural features of Java.

It is our intention to give a sketch of this journey as far as our limits will allow, which will be the more easy, as the author characterizes episodically every distinct subject in all its relations to natural history.

* From the *Botanische Zeitung,* Aug. 29th, 1845.

Sketch of the environs of Weltevreden and Batavia lying adjacent on the north.

Two leagues distant from the sea-coast, these two places lie on a plain scarcely 50 or 60 feet high, covered with the richest vegetation, which appears like one large continuous forest when viewed from a height. This large wood consists of a varied mixture of fruit-trees, under whose thick foliage are concealed the buildings and kampongs. If any one expects to see a wilderness or a primitive forest, he finds himself deceived when he enters it and goes amongst the wide-spreading stems of lofty fruit-trees ; one while hemmed in by bushes of the pisang or the sirip plantations (*Piper Betle*), which creep up the slender stems of the *Hyperanthera Moringa*, W., or by coffee-bushes and shrubs of Ananas (*Bromelia Ananas*).

Of these trees the most plentiful are *Garcinia Mangostana, Mangifera indica*, and other species of this genus, *Artocarpus incisa* and *integrifolia, Nephelium lappaceum*, numerous species of *Citrus, Averrhoa Bilimbi, Morinda citrifolia*, many *Eugeniæ* (*Jambos*), *Anona muricata* and *tuberculata, Persea gratissima, Lansium domesticum, Durio Zibethinus, Carica Papaya*, and innumerable cocoa-palms, which are partly scattered among the former, and partly form groups in small copses. More scattered among the rest are *Areca communis* and the Areng-palms (*Gomutus Rumphii*), the stem of which is covered by numerous ferns. In the neighbourhood of Weltevreden are also found *Tamarindus indica, Citrus decumana* and *Canarium commune*, which form lofty and noble alleys ; on many roads are planted the *Morus indica* and *Hibiscus tiliaceus*, a small tree, whose large yellow flowers captivate the eye. The *Musa paradisiaca* and bamboo bushes (*Bambusa arundinacea*) may also from their dimensions be reckoned trees. The latter is especially found at the entrance to villages in large clusters and on the banks of rivers, to which it imparts a peculiar physiognomy, uniting the expression of beauty and lightness with strength. Its slender stalks, as thick as an arm, shoot up to a height of 40 to 50 feet, and interlace themselves into a foliage which forming a vaulted top gives the most agreeable shade. On the sides of the road leading toward Buitenzorg (as on many other roads in Java) is planted the *Bixa Orellana*, small round trees covered with red hairy fruit, which at a distance give it the appearance of rose-bushes in bloom.

The *Casuarina equisetifolia* is an ornamental garden-plant ; its slender branches are divided like our fir-trees, and here and there are seen upon the tall rounded foliage the beautiful lilac-coloured blossoms of the *Lagerstrœmia Reginæ*, Rxb. : species of *Ixora, Dracæna terminalis, Jatropha multifida*, &c. adorn the sides of the road.

The whole appearance of this luxuriance of thick groups of trees affords an enjoyment which can better be expressed by the pencil than the pen. Let the reader transport himself for example to the shade of a high vaulted *Mangifera*, drink in the perfume which the flowers of the *Uvaria odoratissima*, the *Michelia Champaca*, or the *Plumeria obtusa*, spread around ; and let him cast a glance upon the wood which rises on the other side of the small river :—A young bamboo-bush, crisp and round, borders the water's edge ; then are seen upon a dark ground the light green of the gigantic Pisang-leaves, which rise up from their spongy stems and are slowly moved by the gentle breezes. Behind these the view is closed by the interwoven foliage of the trees, among which are distinguished by their brilliant foliage numerous species of *Citrus*,—the *Artocarpus incisa* by its large serrated leaves, and *Bombax pentandrum* by its horizontal branches ; among these rises up the bluish green foliage of the Areng-palm ; but all these trees are surmounted by the crowns of the cocoa-palms, whose gray stems, covered with lichens, rise perpendicularly out of the dark arborescence, and majestically overtop with their lofty summits the rounded foliage of the other trees. Golden fruit, as large as gourds, glitter among their long feathery branches, which rustle gently in the wind.

In the woods and plantations of this kind there remain here and there small open spaces and irrigated rice-fields, lying in the lovely enameled fields of young grass; here the *Pontederia vaginalis* unfolds its azure blossoms. The streets in the town and the arid grass-plots, which occur here and there among the houses, are overgrown with the weeds of species of *Sida* (*S. acuta, retusa, elongata*, &c.), by *Urena lobata*, by some Compositæ, also by species of *Mercurialis*, *Celosia*, *Achyranthes*, and by *Portulaca oleracea*, L. ; between which are here and there hidden upon sandy and stony places the small *Portulaca quadrifida*, C. In fertile spots, on the borders of the ditches, is found the *Heliotropium indicum*. The small bushes which above Weltevreden enliven by their green the margin of some rivulets, consist of species of *Psidium* and *Melastoma Malabathricum* ; with which are mingled the *Mussænda glabra*, V., whose fiery yellow blossoms and milk-white yellow calycine bracts attract the eye of the traveller. [The author here only refers to those plants which characterize the physiognomy of the country and attract attention from their masses.] Woods, properly so called, are no longer found in the immediate environs of Batavia ; but we meet with them on the moist, inhospitable sea-shore (even at Anjol), stretching along a great portion of the north coast.

What the author says *of the occurrence of the Fungi in the tropics* (p. 99) is interesting : They appear under the tropics to be limited to no fixed season of the year. The difference between the temperature in the wet and dry half-year is very small, at least in the mountains, where also in the dry season frequent rains fall. Heat, the first impulse of production of all vegetable life, is therefore always present ; moisture of the ground, the second thing of importance which the formation of spongy plants requires, also obtains from year to year in these primæval forests, whose thick foliage is never penetrated by the sun's rays. The rich, brown soil, abounding in humus, is always soaked and loose and spongy ; the watery particles of the atmosphere, which are precipitated by the coolness at night, and the amount of the exhalated carbonated water, moisten with their dew-drops all the leaves, so that a person can scarcely go into the wood in the middle of a dry day without being wetted through. Added to all this is the quantity of fallen branches, sticks and whole trunks of trees, which rot upon the ground, and the inside of which is frequently already converted into rich earth, even if their outer bark has been preserved as a thin and light fragile crust. Thus the outer conditions requisite for the growth and origin of the fungi (heat, moisture, and abundance of decaying organic substances) are always present in the tropical woods; and indeed we find these woods decorated with manifold forms of fungi throughout the whole year, without its being possible to observe at any particular time a more frequent occurrence, as in the autumn of the temperate zones. Even the individual species are limited to no time, and the occurrence of the same species is uninterruptedly continued. On the other hand, the fungi are not found in the tropics in such groups; they are less sociable than in our climate, where in autumn they principally enliven the woods. They here occur more scattered and isolated, although found at every period of the year; and it is the parasitic *Polypori*, which are especially numerous on the branches of the trees, that delight the eye by their brilliant colours. In central Europe the *Agarici terrestres* prevail, and determine the physiognomy of an autumnal wood.

[To be continued.]

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

May 13, 1845.—William Yarrell, Esq., Vice-President, in the Chair.

"Descriptions of new species of Land Shells, from the collection of Hugh Cuming, Esq.," by Dr. Louis Pfeiffer:—

1. HELIX GRANDIS, Pfr. *Hel. testâ imperforatâ, globoso-turbinatâ, solidâ, ponderosâ, striatâ, nigricanti-rufâ, epidermide griseo-fuscescente fasciatim obductâ; spirâ conicâ, apice pallidâ; anfractibus 6 vix convexiusculis, ultimo spirâ breviore, basi inflato, fortius striato; columellâ verticali, brevi, subtortâ; aperturâ latè lunari, intus margaritaceâ; peristomate nigricante, latè expanso, margine basali incrassato, reflexo, cum columellari valdè dilatato, albido angulum obtusum formante.*

Diam. 68; alt. 58 mill.

Found at Bangui, province of North Ilocos, island of Luzon, by H. Cuming, Esq.

2. HELIX GMELINIANA, Pfr. *Hel. testâ imperforatâ, globoso-depressâ, solidulâ, irregulariter rugoso-malleatâ, carinatâ, nitidâ, pallidè viridi, ad suturam et infra carinam albo-cingulatâ; spirâ subelevatâ, apice obtusâ, albidâ; anfractibus 4½ vix convexiusculis, sensim accrescentibus, ultimo non descendente, basi planiusculâ; aperturæ angulato-lunari; peristomate subincrassato, margine supero breviter expanso, antrorsum arcuato, basali reflexo, columellari declivi, dilatato, albo-calloso.*

Diam. 23; alt. 13 mill.

Found at Bayambong, island of Luzon, by H. Cuming, Esq.

3. Helix Linnæana, Pfr. *Hel. testâ umbilicatâ, depressâ, utrinque convexiusculâ, acutè carinatâ, pallidè fulvâ, supernè rugoso-malleatâ, basi minutè et obliquè rugulosâ; anfractibus* $5\frac{1}{2}$ *lentè accrescentibus, planulatis, ultimo basi subinflato, anticè vix descendente; umbilico majusculo, cylindrico; aperturâ angulato-lunari, ad carinam canaliculatâ; peristomate incrassato, carneo, marginibus callo junctis, supero brevi, expanso, basali arcuato, reflexo, columellari breviter descendente, subdilatatâ.*

Diam. 62; alt. 28 mill.

Locality unknown. Mus. Cuming.

4. Helix Chemnitziana, Pfr. *Hel. testâ imperforatâ, depressâ, solidâ, supernè radiatim plicato-malleatâ, undique granulosâ, sub epidermide olivaceo-rufâ, acutè carinatâ; spirâ subelevatâ, obtusâ; anfractibus 5 planis, ultimo basi convexo; aperturâ subtriangulari, intus nitidâ, carneâ; peristomate carneo, margine supero subexpanso, basali reflexo, dente unico valido instructo, columellari stricto, dilatato, adpresso, inæqualiter pluridentato.*

Diam. 57; alt. 26 mill.

Locality unknown. Mus. Cuming.

5. Helix Bainbridgii, Pfr. *Hel. testâ umbilicatâ, depressâ, subdiscoideâ, solidâ, striatâ, undique granulatâ, cinnamomeâ, basi pallidâ; spirâ vix elevatâ, obtusâ; anfractibus* $5\frac{1}{2}$ *planis, ultimo rotundato, basi vix convexo; aperturâ perobliquâ, lunato-subtriangulari, intus nitidâ, carneâ; peristomate subincrassato, carneo, marginibus callo junctis, supero latè expanso, basali reflexo, dente unico, valido, complanato instructâ, columellari perdilatato, umbilicum mediocrem semi-occultante.*

Diam. 64; alt. 26 mill.

Found at Demerara by Mr. Bainbridge. Mus. Cuming.

6. Helix Martiniana, Pfr. *Hel. testâ obtestè perforatâ, discoideâ, acutè carinatâ, solidâ, striatâ et minutissimè granulatâ, olivaceo-fuscâ; spirâ depressâ; anfractibus 5 planulatis, ultimo non descendente, basi inflato, anticè profundè scrobiculato; aperturâ depressâ, latè angulato-lunari, intus lacteâ; peristomate albo, incrassato, marginibus callo tenui junctis, supero expanso, basali reflexo, dentibus 2 conjunctis, columellari dilatato, dentibus 2 inæqualibus armato.*

Diam. 34; alt. 14 mill.

From the island of Jamaica. Mus. Cuming.

7. Helix Schroeteriana, Pfr. *Hel. testâ umbilicatâ, depressâ, lenticulari, acutè carinatâ, solidâ, obsoletè granulatâ, luteolâ, utrinque rufo-latefasciatâ; spirâ subelevatâ; anfractibus 5 planulatis, ultimo anticè deflexo, basi inflato, anticè profundè scrobiculato; aperturâ subhorizontali, ellipticâ; peristomate incrassato, latè expanso, reflexo, fusco-carneo, marginibus callo junctis, supero leviter arcuato, basali dilatato, umbilicum angustum semitegente, intus 3–4-dentato; dentibus 2 majoribus basi junctis, 1–2 minoribus propè columellam.*

Diam. 31 ; alt. 14 mill.

From the island of Jamaica ; Mr. P. Gosset. Mus. Cuming.

Intermediate between *H. tridentina*, Fér., and *H. Martiniana*, Pfr. The position of the teeth is the same, but from the former it is at once to be distinguished by the sharp keel, from the latter by the deflexion of the last whorl.

8. Helix Bruguieriana, Pfr. *Hel. testâ imperforatâ, turbinato-globosâ, solidâ, nigro-castaneâ, epidermide hydrophanâ, fuscâ strigatâ, sursum pallescente obductâ ; spirâ conoideâ, apice obtusâ, purpureâ, nitidâ ; anfractibus 5 convexiusculis, ultimo non descendente, basi vix convexo, denudato ; columellâ intrante, obliquâ, strictiusculâ, planatâ, albâ ; aperturâ lunato-ovali, intus lacteâ ; peristomate simplice, brevissimè reflexiusculo, intus nigro-marginato.*

Diam. 29 ; alt. 24 mill.

Collected on the island of Tablas by H. Cuming, Esq.

9. Bulimus gilvus, Sow. *Bul. testâ imperforatâ, ovatâ, solidulâ, striatâ, sub epidermide gilvâ rufescens ; spirâ apice obtusâ, nudâ, pallidâ ; anfractibus 6 convexis, ultimo spirâ paulò breviore ; columellâ strictiusculâ, albâ, subexcavatâ ; aperturâ obliquâ, lunato-ovali, intus lacteâ ; peristomate subincrassato, breviter reflexo, margine dextro arcuato, columellari adpresso.*

Long. 54 ; diam. 38 mill.

Collected in several varieties on the island of Bohol, by H. Cuming, Esq.

Geomelania, nov. gen.

Testa imperforata, turrita ; apertura integra, effusa ; peristoma simplex, reflexum, ad basin appendiculo porrecto instructum.

10. Geomelania jamaicensis, Pfr. *Geom. testâ truncatâ, turritâ, arcuatim costatâ, nitidâ, albâ ; anfractibus 6 convexis, ultimo $\frac{1}{3}$ longitudinis subæquante ; aperturâ ovali, intus nitidâ ; peristomate simplice, margine dextro sinuoso, basi in appendiculum linguiformem porrecto, columellari adpresso.*

Long. 12 ; diam. 4 mill.

Found at Jamaica, "Savanah la Mar," under stones in earth, by M. Attanasio. Mus. Cuming.

11. Tomogeres turbinatus, Pfr. *Tom. testâ rimatâ, compresso-turbinatâ, tenui, lævissimè striatulâ, pallidè corneâ, nitidulâ ; spirâ turbinatâ, acutiusculâ ; anfractibus 5 convexis, ultimo spiram vix æquante, à latere compresso, basi subangulato, anticè adscendente, subtùs constricto, scrobiculato ; aperturâ verticali, subauriformi, ferè clausâ ; peristomate latè expanso, tenui, margine dextro arcuato, internè laminâ validâ, supernè bifidâ, munito, basali obliquè descendente, tridentato ; pariete aperturali lamellis 3 inæqualibus armato.*

Diam. maj. 11, min. $7\frac{1}{2}$; alt. 10 mill.

Hab. In Brasiliâ.

This interesting shell is nearly allied with *Tomogeres clausus*, Spix, but easily to be distinguished by the substance of its shell, by the raised spire and the thin peristome, characters quite constant in all specimens known.

May 27.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Gould exhibited to the Meeting four new species of Birds from Australia, which he characterized as follows:—

Ardea (Herodias) picata. *Ard. capite superiore, occipite, plumis occipitalibus, corpore superiore, caudâ, alisque cæruleo-nigris; mento, nuchâ, pectore, et quibusdam plumis a pectore dependentibus albis.*

Upper part of the head, occiput, occipital plumes, the whole of the plumage of the body, wings and tail bluish slaty black; chin, neck, chest and some of the lanceolate feathers dependent therefrom white; some few of the lanceolate feathers on the neck and breast have one web white and the other web bluish slaty black; the remainder of these lanceolate feathers are the same colour as the body; irides yellow; bill, legs and feet greenish yellow. In young specimens the whole of the under surface is white.

Total length, 17 inches; bill, $3\frac{1}{4}$; wing, 10; tail, $3\frac{1}{2}$; tarsi, $3\frac{1}{4}$.

Hab. Port Essington.

Colluricincla parvula. *Col. corpore superiore, caudâ, alisque olivaceo-brunneis; subtùs pallidè cervinâ; medio plumarum gulæ et pectoris vittâ latâ brunneâ ornato.*

All the upper surface, wings and tail olive-brown; a faint line over the eye and the chin white; all the under surface pale buff, the feathers of the throat and breast with a broad stripe of brown down the centre; irides dark brownish red; bill blackish grey; tarsi bluish grey.

Total length, 7 inches; bill, 1; wing, 4; tail, $3\frac{1}{4}$; tarsi, 1.

Hab. Port Essington.

This is the smallest species of the genus yet discovered.

Melithreptus melanocephalus. *Mel. toto capite, gulâ, et maculâ semilunari apud latera pectoris saturatè nigris; corpore supernè flavo-olivaceo pectore albo.*

The whole of the head and throat, and a semilunar mark on either side of the chest, deep glossy black; all the upper surface yellowish olive, becoming brighter on the rump; wings and tail brownish grey, with lighter margins; breast white; remainder of the under surface greyish white; bill black; irides reddish brown; feet brown; bare skin over the eye pearly white, slightly tinged with green.

Total length, $5\frac{1}{4}$ inches; bill, $\frac{9}{16}$; wing, 3; tail, $2\frac{5}{8}$; tarsi, $\frac{3}{4}$.

Hab. Van Diemen's Land.

Hemipodius scintillans. *Hem. corpore supernè pallidè castaneo, singulis plumis fasciis latis brunneo-nigris ornatis; marginibus plumarum cinereis; intra margines lineis angustis nigris et albis ornatis; tectricibus alarum et tertiariis pallidè castaneo-rubris balteis irregularibus ziczac fasciatis; interspatiis balteorum cinereo-albis; mento genisque albis maculâ semilunari brunneâ ad* *apicem singulæ plumæ; pectore et corpore inferiore pallidè cervino-albis; plumis pectoris ordine macularum saturatè grisearum ad marginem ornatis.*

Upper surface light chestnut-red, all the feathers crossed by broad bars of brownish black and margined with grey, within which are two narrow lines of black and white; wing-coverts and tertiaries light chestnut-red, crossed by irregular zigzag bars of black, the interspaces margined externally with greyish white; chin and sides of the face white, with a narrow crescent-shaped mark of brown at the tip of each feather; sides of the breast chestnut, each feather tipped with white, within which is an indistinct mark of deep black; chest and under surface pale buffy white, the feathers of the chest with a row of dark grey spots on each margin, giving that part a speckled appearance; primaries brown, narrowly edged with white; irides reddish orange; feet yellow; bill horn-colour.

Total length, male, 5 inches; bill, $\frac{11}{16}$; wing, $3\frac{1}{4}$; tarsi, $\frac{11}{16}$. Female, 6 inches; bill, $\frac{3}{4}$; wing, $3\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. Houtmann's Abrolhos, off the western coast of Australia.

Remark.—Like the rest of the genus, the male is much inferior in size to the female. The species is very nearly allied to, but much smaller than, *Hemipodius varius.*

"Description of twenty-two new species of Land-Shells, belonging to the collection of Mr. H. Cuming," by Dr. L. Pfeiffer:—

1. Helix Gruneri, Pfr. *Hel. testâ umbilicatâ, depressâ, supernè planiusculâ, minutissimè punctato-striatâ, rufâ; anfractibus $5\frac{1}{2}$ sensim crescentibus, planiusculis, ultimo rotundato, anticè vix deflexo; umbilico angusto, pervio; aperturâ subverticali, depressâ, latè lunari; peristomate incrassato, reflexo, marginibus callo tenui, supernè dentem arcuatum, validum, callosum formante junctis.*

Diam. 38, alt. 18 mill.

Locality unknown. A beautiful shell, next allied to *H. unguicula,* De Férussac, differing by the strong and arcuated tooth on the body of the penultimate whorl.

2. Helix Okeniana, Pfr. *Hel. testâ imperforatâ, orbiculari, utrinque convexiusculâ, obtusè carinatâ, undique regulariter granulatâ, supernè fuscâ, basi pallidâ; anfractibus $5\frac{1}{2}$ rotundato-planatis, ultimo anticè deflexo, basi profundè biscrobiculato; aperturâ subhorizontali, ellipticâ, coarctatâ; peristomate carneo-fusco, incrassato, marginibus callo junctis, supero expanso, basali reflexo, tridentato; dentibus æquidistantibus, 2 minoribus prope columellam, tertio majore supernè sulcato.*

Diam. 37, alt. 17 mill.

Found on the island of Jamaica at Savannah la Mar, by M. Attanasio. To be distinguished from *H. lucerna,* Müll., by having three teeth at the basal margin of the aperture.

3. Helix neogranatensis, Pfr. *Hel. testâ imperforatâ, depressâ, carinatâ, tenui, undique minutè granulosâ, saturatè rufâ; spirâ vix elevatâ; anfractibus $4\frac{1}{2}$ planiusculis, ultimo basi convexo, an-*

ticè deflexo, constricto; aperturâ perobliquâ, lunato-rotundatâ; peristomate carneo, simplice, expanso, reflexiusculo, marginibus callo tenui junctis, basali obsoletissimè unidentato, columellari brevi, dilatato, adpresso.

Diam. 34, alt. 15 mill.

Found in the mountain Quendeu at New Granada.

4. Helix cinerascens, Pfr. *Hel. testâ imperforatâ, globoso-turbinatâ, tenuiusculâ, stramineâ, fasciis 2 latis et areâ basali nigricantibus ornatâ, epidermide tenui, hydrophanâ, cinereâ, obductâ; spirâ breviter turbinatâ, apice obtusâ; anfractibus $5\frac{1}{2}$ convexiusculis, ultimo basi inflato; columellâ subarcuatâ, carneo-fuscâ; aperturâ rotundato-lunari, intus albâ; peristomate breviter expanso, subincrassato, castaneo-limbato.*

Diam. 41, alt. 37 mill.

Found by H. Cuming, Esq. at the island of Masbate.

5. Helix Turbo, Pfr. *Hel. testâ imperforatâ, turbinatâ, solidiusculâ, distinctè striatâ, sub epidermide tenuissimâ, deciduâ, flavescente albâ, medio rufo-fasciatâ; spirâ brevi, conoideâ, obtusâ; anfractibus 5 convexis, ultimo obsoletè angulato, basi vix convexo; columellâ strictâ, dilatatâ, albidâ; aperturâ irregulariter lunari; peristomate expanso, margine columellari dilatato, reflexo, rimam formante, cum basali angulatim juncto.*

Diam. 43, alt. 35 mill.

Hab. Isle of Mindoro.

6. Helix unicolor, Pfr. *Hel. testâ umbilicatâ, depressâ, acutè carinatâ, tenui, fuscâ, supernè subtiliter striatâ, subtùs lineis nonnullis spiralibus elevatis munitâ; spirâ depresso-conoideâ; anfractibus 5 planiusculis, sensim accrescentibus, ultimo anticè non descendente, basi convexo, ad umbilicum angustum abruptè angulato; aperturâ rhomboideâ; peristomate saturatè fusco, marginibus callo tenuissimo junctis, supero dilatato, expanso, basali ascendente, stricto, columellari brevi, dilatato, umbilicum semi-occultante, cum basali angulatim juncto.*

Diam. 32, alt. 16 mill.

Locality unknown. Constantly distinguished from *H. Xystera*, Valenc., by its narrow umbilicus, elevated spire, and the number of its whorls.

7. Helix omphalodes, Pfr. *Hel. testâ latè umbilicatâ, depressâ, solidâ, leviter striatulâ, sub epidermide flavescente, deciduâ albâ, ad peripheriam et suturam rufo-cingulatâ; spirâ vix convexâ; anfractibus 5 planiusculis, ultimo anticè vix descendente, basi paulò convexiore, circa umbilicum magnum, spiralem, intus castaneum subcompresso; aperturâ perobliquâ, lunato-ovali; peristomate breviter reflexo, fusco, marginibus conniventibus.*

Diam. 41, alt. 16 mill.

Locality unknown.

8. Helix involuta, Pfr. *Hel. testâ imperforatâ, depressâ, supernè convexiusculâ, basi planiusculâ, medio impressâ, tenuissimâ,*

striatulâ, nitidissimâ, corneâ, fusco-radiatâ; anfractibus planè involutis, ultimo anticè obliquè depresso; aperturâ depressâ, lunato-oblongâ; peristomate simplice, recto, marginibus utrinque centro testæ insertis, dextro antrorsum arcuato-dilatato.

Diam. 18, alt. $7\frac{1}{2}$ mill.

Found on the mountains of Quendeu in New Granada.

9. Helix campanula, Pfr. *Hel. testâ umbilicatâ, globosâ, solidâ, subtiliter et regulariter obliquè striatâ, castaneâ; spirâ semiglobosâ, apice obtuso, pallido; anfractibus $4\frac{1}{2}$ convexiusculis, ultimo antecedente vix latiore, anticè vix descendente, medio pallidè cingulato; aperturâ perobliquâ, lunato-ovali, intus livescente; peristomate fusco, subincrassato, breviter reflexo, marginibus callo junctis, basali introrsum obsoletè albo-unidentato, extrorsum dilatato, umbilicum angustum, profundum semi-occultante.*

Diam. 27, alt. 21 mill.

Locality unknown.

10. Helix labiata, Pfr. *Hel. testâ apertè perforatâ, depressâ, tenui, striatulâ, supernè lineis concentricis obsoletè decussatâ, basi lævigatâ, nitidâ, fulvâ; spirâ planiusculâ; anfractibus 6 subplanulatis, ultimo dilatato, depresso; aperturâ latè lunari; peristomate acuto, intus calloso-labiato, margine supero antrorsum rotundato, basali planè arcuato, columellari vix reflexiusculâ.*

Diam. 40, alt. 20 mill.

Locality unknown. Distinguished from *H. citrina*, Linn., by the concentrical striæ, the number of its whorls, and the callus within the aperture.

11. Helix Hanleyi, Pfr. *Hel. testâ imperforatâ, depressâ, lenticulari, acutè carinatâ, tenui, subtilissimè decussatâ, nitidâ, sulphureâ, ad suturam et carinam albo-fasciatâ; spiræ parùm elevatâ; anfractibus 4 subplanulatis, ultimo anticè angulatim deflexo, constricto; aperturâ parvulâ, horizontali, oblongâ; peristomate simplice, undique expanso et reflexo, marginibus ferè contiguis.*

Diam. 19, alt. 9 mill.

β. *Testâ supernè nigricanti-purpureâ, ad aperturam albo-fasciatâ, basi albidâ, infra carinam castaneo-fasciatâ.*

Found by Mr. Cuming at Sinait, island of Luzon. This fine shell is not unlike some varieties of the *Hel. bifasciata*, Lea, but constantly to be distinguished from that species by the angular deflection of its last whorl and by the shape of its small aperture.

12. Helix amœna, Pfr. *Hel. testâ imperforatâ, globoso-depressâ, lineis longitudinalibus et spiralibus sub lente decussatâ, albidâ, fasciâ unicâ spadiceâ supra peripheriam et lineâ rufâ, suturali ornatâ; anfractibus 4 vix convexiusculis, ultimo obsoletè angulato, anticè deflexo, basi parùm convexâ; aperturâ transversè lunari-oblongâ, intus concolore; peristomate simplice, marginibus subparallelis, dextro expanso, basali anticè reflexo, ad columellam dilatato, adpressè reflexo.*

Diam. 18, alt. $10\frac{1}{2}$ mill.

Found by Mr. Cuming at Catanauan, island of Luzon. This species is likewise similar to several unkeeled varieties of *Hel. bifasciata*, but by examining a large number of specimens of this and the other ones, I found the above characters to be invariably constant.

13. Helix Metcalfii, Pfr. *Hel. testâ latè umbilicatâ, depressâ, discoideâ, acutè carinatâ, striatulâ, pallidè vel rufescenti-corneâ, utrinque juxta carinam albam castaneo-unifasciatâ; spirâ vix elevatâ; anfractibus 6 vix convexiusculis, ultimo anticè vix descendente; aperturâ subtriangulari; peristomate simplice, margine supero antrorsum arcuatim dilatato, depresso, basali ad columellam leviter arcuato.*

Diam. 21, alt. 7 mill.

β. *Minor, flavida, lineis angustis nigricanti-rufis juxta carinam.* Diam. 17, alt. $5\frac{1}{2}$ mill.

γ. *Unicolor, fusco-cornea.* Diam. 15, alt. 5 mill.

Found by Mr. Cuming on the Philippine Islands and at Sibonga, island of Zebu; β. at Tanhay, island of Negros; γ. on the island of Siquijor. Distinguished from all species belonging to the same group by its flattened shape.

14. Helix tristis, Pfr. *Hel. testâ imperforatâ, ovato-globosâ, tenui, striatâ, lineis concentricis obsoletè decussatâ, olivaceo-fuscâ, rufo 5-fasciatâ; spirâ parvulâ, conoideâ; anfractibus 4 convexiusculis, ultimo inflato; aperturâ lunato-ovali, intus nitidâ; peristomate simplice, recto, margine columellari dilatato, reflexo, adpresso.*

Diam. 21, alt. 18 mill.

This species is said to be found in Sicily, but there may be a mistake.

15. Helix Adamsii, Pfr. *Hel. testâ imperforatâ, orbiculato-convexiusculâ, leviter striatulâ, nitidissimâ, fulvescenti-luteâ, unicolore vel fasciis saturatè fulvis et castaneis multimodè ornatâ et radiatâ; spirâ convexiusculâ, obtusâ; anfractibus $3\frac{1}{2}$–4 vix convexiusculis, ultimo basi planiore; aperturâ rotundato-lunari; peristomate simplice, acuto, margine columellari subobliquo, dilatato, albo.*

Diam. 12, alt. $6\frac{1}{2}$ mill.

Hab. Pitcairn's Island and Opara. Collected by Mr. Cuming.

The late patriarch of the island pointed out this shell to Mr. Cuming, and at his request I have the pleasure to dedicate it to the venerable man's memory.

16. Helix bahamensis, Pfr. *Hel. testâ angustè umbilicatâ, depressâ, tenui, corneâ, costulato-striatâ; spirâ brevi, convexiusculâ; anfractibus $4\frac{1}{2}$ vix convexiusculis, ultimo anticè deflexo; aperturâ subhorizontali, transversè ovali; peristomate simplice, tenui, marginibus approximatis, supero breviter expanso, basali reflexo, intus dente triangulari, valido munito, columellari dilatato, reflexo, umbilicum angustum, pervium semitegente.*

Diam. 17, alt. $7\frac{1}{2}$ mill.

Hab. Bahamas.

17. Helix bermudensis, Pfr. *Hel. testâ umbilicatâ, lenticulari,*

tenuiusculâ, carinatâ, leviter ruguloso-striatâ, pallidè fulvescente, cingulo castaneo supra et latiore infra carinam ornatâ; anfractibus 7 vix convexiusculis, lentè accrescentibus; umbilico angusto, pervio; aperturâ subtrapeziâ; peristomate simplice, recto, margine columellari verticali, brevi, reflexiusculo, cum basali angulum rectum formante.

Diam. 19, alt. $10\frac{1}{2}$ mill.

Hab. Bermuda.

18. Helix Pennantiana, Pfr. *Hel. testâ angustè umbilicatâ, orbiculato-conoideâ, acutè carinatâ, tenui, striatulâ, irregulariter et leviter malleatâ, unicolore carneâ, apice rufescente; anfractibus $5\frac{1}{2}$ vix convexiusculis, ultimo anticè vix descendente, basi planiusculo; aperturâ perobliquâ, angulato-lunari, intus albâ; peristomate roseo, latè expanso, margine basali reflexo, columellari brevi, strictiusculo, dilatato, umbilicum ferè tegente.*

Diam. 37, alt. 20 mill.

Hab. Philippine Islands?

Nearly allied to *H. labium*, Fér., from which it may easily be distinguished by its sharp keel and sculpture.

19. Bulimus Leopardus, Pfr. *Bul. testâ imperforatâ, ovatâ, solidiusculâ, longitudinaliter confertim costulato-striatâ, fulvâ, strigis et maculis albidis epidermidis hydrophanæ eleganter variegatâ; spirâ brevi, conoideâ, sursum pallescente; anfractibus 5 convexis, rapidè accrescentibus, ultimo spiram superante; columellâ elongatâ, introrsum acutâ; aperturâ amplissimâ, rotundato-ovali, intus albâ; peristomate latè expanso, reflexiusculo, castaneo-limbato.*

Long. 47, diam. 30 mill.

Hab. Isle of Mindanao, Philippine Islands.

20. Bulimus egregius, Pfr. *Bul. testâ perforatâ, fusiformi, solidulâ, striis longitudinalibus confertis et lineis spiralibus remotioribus subdecussatâ, nitidâ, flammis castaneis pellucidis et fulvis, opacis egregiè pictâ; anfractibus 6 vix convexiusculis, ultimo spiram turritam æquante, basi compresso; columellâ subangulato-arcuatâ; aperturâ oblongâ, utrinque acutâ, intus lividâ; peristomate vividè rubro, latè expanso, breviter reflexo, basi canaliculato, marginibus callo tenui junctis.*

Long. 41, diam. 15 mill.

Locality unknown. Distinguished from *B. goniostoma*, Sow., by its size, colouring and widely expanded peristome.

21. Bulimus canaliculatus, Pfr. *Bul. testâ umbilicatâ, obliquè fusiformi, ruguloso-striatâ, nitidâ, albido, carneo et spadiceo marmoratâ; spirâ turrito-conicâ, acutâ; anfractibus 7 vix convexiusculis, ultimo spirâ vix longiore, basi valdè constricto-carinato; columellâ arcuatim antrorsum elongatâ; aperturâ ovali, basi canaliculatâ; peristomate simplice, tenui, margine dextro vix expansiusculo, columellari dilatato, reflexo.*

Long. 37, diam. 14 mill.

Hab. Bolivia.

22. Bulimus castaneus, Pfr. *Bul. testâ vix perforatâ, ovato-*

acuminatâ, solidiusculâ, longitudinaliter confertim striatâ, lineis spiralibus distantioribus decussatâ, unicolore castaneâ; spirâ brevi, conicâ, acutiusculâ; anfractibus $4\frac{1}{2}$ vix convexiusculis, ultimo inflato, 2–3 longitudinis subæquante; columellâ tenui, subsimplice; aperturâ ovali, intus saturatè fuscâ, nitidâ; peristomate vix incrassato, brevissimè reflexo, marginibus callo tenui junctis, columellari vix dilatato.

Long. 70, diam. 39 mill.

Hab. Nova Granada; Vegas on the river Quendeu.

Nearly allied to *Bul. Gibbonius*, Lea; distinguished by its transverse striæ, closed umbilicus, peristome, etc.

" Description of a new species of *Amphipeplea*," by Dr. L. Pfeiffer.

The shell I am describing belongs to the genus of freshwater shells distinguished by Nilsson from *Limnæus* under the name of *Amphipeplea*, and sufficiently characterized by the shape and habits of its animal, perfectly agreeing with our new species, according to Mr. Cuming's information, who first discovered it, and by whose name I am pleased to illustrate the species.

Amphipeplea Cumingiana, Pfr. *Amph. testâ ovato-globosâ, tenuissimâ, longitudinaliter confertim striatulâ, nitidissimâ, pellucidâ, pallidè corneâ; spirâ brevissimâ, mucronulatâ, callo tenui semi-obtectâ; columellâ nullâ; margine anfractuum interno arcuato, appendice membranaceo (deciduo) munito; aperturâ amplissimâ, semi-ovali, margine supero breviter arcuato, patente.*

Long. 30, diam. 22 mill.; apertura 26 mill. longa.

Found at Naga, province of South Camerines, island of Luzon, by H. Cuming, Esq.

June 10.—Rev. John Barlow in the Chair.

" Descriptions of twenty-two new species of *Helix*, from the collections of Miss Saul, — Walton, Esq., and H. Cuming, Esq.," by Dr. Louis Pfeiffer:—

1. Helix pachystyla, Pfr. *Hel. testâ imperforatâ, globosâ, solidâ, ponderosâ, striatâ, lineis concentricis decussatâ, albâ, epidermide sordidè viridi, nigricanti-radiatâ indutâ; spirâ brevi; anfractibus 5 celeriter accrescentibus, ultimo globoso, anticè breviter deflexo; columellâ obliquâ, dilatatâ, callosâ, albâ, obsoletè et latè unidentatâ; aperturâ irreguluriter lunato-rotundatâ, intus lacteâ; peristomate recto, intus subincrassato, margine basali reflexiusculo.*

Diam. 43, alt. 37 mill.

Locality, New Zealand.

Similar to *H. pomum*, Pfr., from which it may be distinguished by its transverse striæ, and by being quite imperforate. (Coll. Metcalfe.)

2. Helix euryomphala, Pfr. *Hel. testâ umbilicatâ, orbiculato-convexâ, tenui, pellucidâ, virenti-corneâ, supernè regulariter costulato-striatâ, lineis concentricis obsoletè decussatâ, basi remotius striatâ, nitidissimâ; spirâ parùm elevatâ, obtusâ; anfractibus 6 convexiusculis, ultimo dilatato, subdepresso, anticè non descendente;*

umbilico magno, pervio; aperturâ obliquè lunato-ovali, intus margaritaceâ; peristomate recto, simplice, marginibus conniventibus.

Diam. 37, alt. 17 mill.

Locality, Cuba.

To be distinguished from *H. laxata*, Fér., by the number of its whorls, forming a more elevated spire, by the last whorl not deflected and less dilated, &c. (Coll. Cuming.)

3. Helix micans, Pfr. *Hel. testâ imperforatâ, globosâ, tenui, fragili, striatulâ, lineis confertissimis obsoletè decussatâ, diaphanâ, albidâ; spirâ parvulâ; anfractibus 4 planiusculis, rapidè accrescentibus, ultimo inflato; columellâ tenui, intrante, excavatâ; aperturâ rotundato-lunari; peristomate simplice, recto, margine dextro antrorsum subarcuato.*

Diam. 28, alt. 19 mill.

Found at S. Juan, province of Cagayan, island of Luzon, on bushes, by H. Cuming, Esq.

This shell might easily be taken for an enormous species of *Vitrina.*

4. Helix Forbesii, Pfr. *Hel. testâ umbilicatâ, discoideâ, tenui, obliquè confertim striatâ, unicolore rufâ; spirâ planiusculâ; anfractibus 5 convexis, ultimo basi convexiore, anticè vix descendente, obtusè angulato, supernè obsoletè impresso; umbilico magno, spirali; aperturâ perobliquâ, rotundato-lunari; peristomate simplice, acuto, albido-carneo, intus subincrassato, margine supero latè expanso, basali reflexo, columellari subdilatato.*

Diam. 41, alt. 14 mill.

Locality unknown. (Coll. Walton.)

5. Helix rubicunda, Pfr. *Hel. testâ perforatâ, depressè turbinatâ, rugoso-striatâ, obsoletè et minutissimè granulatâ, subepidermide corneâ, deciduâ rubicundâ; anfractibus $5\frac{1}{2}$ subplanulatis, ultimo medio obtusè angulato, basi convexiore; aperturâ obliquè lunari; peristomate simplice, recto, margine dextro antrorsum subdilatato, columellari dilatato, reflexo, perforationem semi-occultante.*

Diam. 27, alt. 15 mill.

Locality unknown. (Coll. Walton.)

6. Helix Sauliæ, Pfr. *Hel. testâ umbilicatâ, globoso-depressâ, solidiusculâ, obliquè striatâ, fulvidâ, medio fasciâ unicâ albâ, utrinque rufo-marginatâ ornatâ; spirâ brevi, obtusâ; anfractibus 4 vix convexiusculis, ultimo basi subplanato, anticè subitò deflexo, circa umbilicum angustum, pervium rufo; aperturâ perobliquâ, lunato-ovali; peristomate breviter reflexo, marginibus conniventibus, callo tenui junctis, columellari castaneo, valdè dilatato, umbilicum ferè occultante.*

Diam. 32, alt. 20 mill.

Locality unknown. (Coll. Cuming. et Saul.)

7. Helix rhombostoma, Pfr. *Hel. testâ imperforatâ, trochiformi, tenuiusculâ, obliquè striatulâ, lineis confertissimis concentricis subdecussatâ, nitidulâ, albido-fulvescente, fasciis castaneis plurimis*

ornatâ; spirâ brevi, conicâ, apice acutâ; anfractibus 5 planiusculis, ultimo acutè carinato, basi vix convexo, anticè parùm deflexo, à latere subcompresso; aperturâ rhombeâ; peristomate violaceo, margine supero expanso, supernè impresso, columellari stricto, dilatato, plano, adpresso.

Diam. 28, alt. 15 mill.

Locality unknown. (Coll. Saul. et Metcalf.)

8. Helix planissima, Pfr. *Hel. testâ umbilicatâ, depressissimâ, lenticulari, tenui, utrinque obliquè rugoso-costatâ, albidâ, subtùs interdum corneo-fasciatâ; anfractibus $5\frac{1}{2}$ convexiusculis, acutè carinatis (carinâ compressâ, prominente, serratâ), ultimo anticè vix descendente, basi convexiore, circa umbilicum mediocrem, spiralem subangulato; aperturâ depressâ, angulato-lunari; peristomate simplice, margine basali planè arcuato, reflexo.*

Diam. $11\frac{1}{2}$, alt. $4\frac{1}{2}$ mill.

Locality unknown. (Coll. Walton.)

Similar to *H. amanda*, Rossm., from which it may be distinguished by its thin and flattened shell, its umbilicus, and the peristome not thickened.

9. Helix filicosta, Pfr. *Hel. testâ subobtectè perforatâ, depresso-globosâ, regulariter costatâ (costis filiformibus), tenuiusculâ, carneo-albidâ, lineis fuscis obsoletis cinctâ; anfractibus $4\frac{1}{2}$ convexis, ultimo anticè deflexo; aperturâ lunato-orbiculari; peristomate acuto, intus subincrassato, labiato, marginibus conniventibus, callo introrsum diffuso roseo junctis, dextro vix expanso, columellari dilatato, reflexo, roseo.*

Diam. 14, alt. 9 mill.

Locality unknown. (Coll. Saul.)

10. Helix retifera, Pfr. *Hel. testâ umbilicatâ, obtusè trochiformi, striato-plicatulâ, lineis nonnullis concentricis elevatis reticulatâ, carinatâ, diaphanâ, pallidè corneâ; spirâ elevatâ, obtusâ; anfractibus $6\frac{1}{2}$ planiusculis, ultimo basi subplanulato, striato; umbilico mediocri, pervio; aperturâ depressâ, securiformi; peristomate simplice, acuto, margine supero brevi, basali planè arcuato.*

Diam. 7, alt. 4 mill.

Locality unknown. (Coll. Metcalf.)

11. Bulimus Grayanus, Pfr. *Bul. testâ gracili, turritâ, solidulâ, longitudinaliter subtilissimè striatâ et lineis impressis spiralibus subdecussatâ, cinnamomeâ; spirâ turritâ, apice valdè attenuatâ; anfractibus 6 vix convexiusculis, ultimo $\frac{2}{3}$ longitudinis subæquante, anticè deflexo, soluto, dorso et basi carinato, lateribus scrobiculato; aperturâ angustâ, oblongâ, basi canaliculatâ; peristomate simplice, undique expanso, dentibus 7 marginem non attingentibus armato; 3 in latere dextro, 4 in sinistro, summo tuberculiformi, secundo valido, lamelliformi.*

Long. 35, diam. 11 mill.

Locality, Brazils.

Nearly allied to *Bul. odontostoma*, Sow., but quite distinct from the two varieties figured by Férussac. (Coll. Cuming.)

12. Bulimus coarctatus, Pfr. *Bul. testâ rimato-perforatâ, ovato-acutâ, solidâ, albidâ, lineis interruptis, fuscis cingulatâ; spirâ conicâ, acutâ; anfractibus* $6\frac{1}{2}$ *planulatis, ultimo convexiore, spiram æquante; aperturâ angustâ, oblongâ, coarctatâ; columellâ incrassatâ, tuberculatâ; peristomate latè expanso, margine dextro introrsum incrassato, acutè prominente, medio sinuolato, cum columellari dilatato, reflexo, patente angulatim juncto.*

Long. 34, diam. 17 mill.

Locality unknown.

Nearly allied to *B. signatus*, Desh.

13. Bulimus Deshayesii, Pfr. *Bul. testâ umbilicatâ, turritâ, solidâ, striatulâ, violascenti-albâ, strigis et maculis violascenti-fuscis irregulariter signatâ; suturâ subcrenulatâ; anfractibus 9 vix convexiusculis, ultimo* $\frac{1}{3}$ *longitudinis subæquante; columellâ subrectâ; aperturâ ovali, intus violaceâ; peristomate simplice, recto, margine columellari dilatato, fornicatim reflexo, rimam umbilicarem non occultante.*

Long. 45, diam. 15 mill.

Locality unknown. (Coll. Cuming.)

14. Bulimus Thompsonii, Pfr. *Bul. testâ imperforatâ, ovato-oblongâ, solidulâ, longitudinaliter striatâ, fusco-olivaceâ; spirâ conicâ, apice obtusâ, rubrâ; anfractibus 6, supremis planulatis, purpureo-strigatis, ultimo spiram æquante; suturâ albo-marginatâ, crenulatâ; columellâ rectâ (non tortâ), leviter arcuatâ; aperturâ oblongo-ovali, intus lividâ; peristomate subincrassato, recto, intus nigro-limbato, marginibus callo castaneo junctis, basali cum columellâ basin attingente subangulatim juncto.*

Long. 70, diam. 31 mill.

Locality, Quito. (Coll. Cuming.)

Nearly allied to *B. Taunaysii.*

15. Bulimus Siquijorensis, Pfr. *Bul. testâ imperforatâ, ovato-oblongâ, tenui, fulvâ, epidermide pallidè fuscâ elegantissimè marmoratâ et flammatâ; spirâ conicâ, obtusâ, apice nudâ, rufescente; anfractibus 6 vix convexiusculis, ultimo spirâ vix breviore, subangulato; columellâ subtortâ, longitudinaliter biangulatâ, introrsum acutâ; aperturâ oblongo-subpyriformi, intus albidâ; peristomate tenui, breviter expanso, margine dextro deorsum dilatato, basali cum columellari angulum obsoletum formante.*

Long. 52, diam. 25 mill.

Locality, island of Siquijor (Philippines). Collected by Mr. Cuming.

16. Achatina semisculpta, Pfr. *Achat. testâ tenui, ovato-elongatâ, longitudinaliter regulariter striatâ, fuscescenti-albidâ, strigis fulgurantibus rufis pictâ; spirâ conicâ, apice obtusiusculâ, lineis confertis concentricis regulariter granulosâ; anfractibus* $7\frac{1}{2}$ *convexiusculis, ultimo spiram subæquante, usque ad peripheriam lineis impressis distantioribus decussato; columellâ subrectâ, abruptè truncatâ; aperturâ ovali-acutâ; peristomate simplice, recto.*

Long. 55, diam. 23 mill.

Locality, Africa, Loanda, coast of Benguela. (Coll. Cuming.)

17. ACHATINA RETICULATA, Pfr. *Achat. testâ oblongo-acutâ, solidâ, ponderosâ, longitudinaliter confertim plicatâ, sulcis concentricis profundè reticulatâ, albidâ, castaneo-marmoratâ et maculatâ; spirâ elongatâ, acutâ, supernè minutè granulatâ; suturâ subcrenulatâ; anfractibus 8 parùm convexis, ultimo $\frac{3}{7}$ longitudinis subæquante; columellâ crassâ, albâ, arcuatâ, abruptè truncatâ; aperturâ utrinque attenuatâ, oblongo-ovali.*

Long. 160, diam. 70 mill.

Locality, Africa. (Coll. Cuming.)

18. ACHATINA PAPYRACEA, Pfr. *Achat. testâ ovato-oblongâ, tenui, striis longitudinalibus et concentricis obsoletè decussatâ, diaphanâ, fulvâ, castaneo obsoletè marmoratâ; spirâ conicâ, apice obtusâ; suturâ marginatâ; anfractibus $5\frac{1}{2}$ vix convexiusculis, ultimo spiram vix superante; columellâ subrectâ, basin aperturæ ferè attingente, obliquè truncatâ, lineâ purpureâ ornatâ; aperturâ ovali, intus margaritaceâ.*

Long. 66, diam. 30 mill.

Locality, banks of the river Nun in Africa. (Coll. Cuming.)

19. ACHATINA FUSIFORMIS, Pfr. *Achat. testâ ovato-fusiformi, tenui, longitudinaliter confertim costulatâ, lineis transversis minutè reticulatâ, fulvidâ, saturatius strigatâ; spirâ conicâ, acutiusculâ, apice rubescente; suturâ marginatâ; anfractibus 7–8 convexiusculis, ultimo spiram paulò superante, basi attenuato; columellâ leviter arcuatâ, abruptè truncatâ, rubellâ; aperturâ angustâ, oblongâ; peristomate simplice, repando, margine rubicundo.*

Long. 87, diam. 35 mill.

Locality, mountain of Coban, Vera Cruz, Central America. (Coll. Cuming.)

This species, as well as the next following, may perhaps belong to the genus *Glandina*.

20. ACHATINA COSTULATA, Pfr. *Achat. testâ ovato-fusiformi, tenui, longitudinaliter confertim et regulariter costulatâ, diaphanâ, fulvo-rubellâ, strigis parvis saturatioribus ornatâ; spirâ pyramidali, acutâ; suturâ sulco parallelo crenulato-marginatâ; anfractibus 8 vix convexiusculis, ultimo spiram vix æquante; columellâ subrectâ, abruptè truncatâ; aperturâ oblongâ, utrinque attenuatâ, intus margaritaceâ.*

Long. 72, diam. 31 mill.

Locality, mountains of Quendeu, New Granada. (Coll. Cuming.)

21. GLANDINA NIGRICANS, Pfr. *Glan. testâ ovato-oblongâ, solidiusculâ, minutissimè striatulâ, nitidissimâ, nigricante, strigis remotis angustis fulvis ornatâ, basi corneo-luteâ; spirâ conicâ; suturâ virenti-marginatâ; anfractibus 7 planulatis, ultimo $\frac{3}{5}$ longitudinis æquante; columellâ arcuatâ, callosâ, obliquè truncatâ, basin aperturæ non attingente; aperturâ angustâ, semiovali, intus concolore.*

Long. 35, diam. 16 mill.

Locality, Vera Cruz, in Central America. (Coll. Cuming.)

22. Glandina monilifera, Pfr. *Glan. testâ fusiformi-ovatâ, tenui, pellucidâ, regulariter costulato-striatâ, costulis in medio anfractûs ultimi evanescentibus, fulvo-roseâ, lineis remotis rufis pallidè marginatis ornatâ; spirâ brevi, conicâ; suturâ eleganter et confertim granulosâ; anfractibus 7 planiusculis, ultimo $\frac{3}{5}$ longitudinis subæquante, ventroso; columellâ vix arcuatâ, basi abruptè truncatâ; aperturâ angustâ, semiovali.*

Long. 29, diam. $14\frac{1}{2}$ mill.

Locality, mountains of Coban, Vera Cruz, Central America. (Coll. Cuming.)

A number of Birds'-skins from Australia were presented to the Society by Jeremiah Olive, Esq.

The Secretary exhibited to the Meeting a specimen of Sand Grouse, *Tyrrhaptes paradoxus*, and five specimens of Mammals (all of which were new to the Society's collection), from the Altai Mountains of Siberia, viz.:—

Meriones opimus,
Aspalax Zokar,
Mustela Altaica,
Dipus Jaculus,
Mygale moschata.

Mr. Gould laid upon the table a series of Terns, and characterized a new species:—

Sterna gracilis. *St. summo capite et nuchâ posteriore saturatè nigris; lateribus nuchæ et parte inferiore seriaceo-albis; pectore et abdomine leviter rosaceis; rostro carnicolore, apice brunneo-nigro; pedibus aureo-fuscis.*

Crown of the head, nape and back of the neck deep black; sides of the neck and all the under surface silky white, with a blush of rosy red on the breast and abdomen; back, wings and tail light grey, becoming darker on the primaries; irides brownish red; bill flesh-colour, except at the tip, where it is washed with blackish brown; feet orange-red.

Total length, 13 inches; bill, $2\frac{1}{8}$; wing, $8\frac{1}{2}$; tail, $6\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. The Houtmann's Abrolhos, off the western coast of Australia.

MICROSCOPICAL SOCIETY.

Oct. 15, 1845.—J. S. Bowerbank, Esq., F.R.S. &c., in the Chair.

A paper by H. Deane, Esq., being a continuation of a former communication, read at the last meeting of the Society, "On Fossil *Xanthidia* found in Chalk," was read.

After a brief summary of the former paper, in which he stated that various species of the genus *Xanthidium* had been found by him in the Folkstone chalk, Mr. Deane went on to state that this discovery, by affording the means of isolating and mounting these bodies in various ways for examination, suggested to him the possibility of ascertaining their true nature. Their minuteness and other obvious circumstances prevented their chemical examination, and consequently they could only be operated upon mechanically. Their shape is that of a flattened sphere, the major part of them closely resembling some of the gemmules of sponges, most of them having a circular opening. The arms of all appear to be closed at the ends and not tubular, as has been supposed, from the examination of some of the flint specimens under pressure in water between two pieces of glass : they were torn asunder in the same manner as a horny or cartilaginous substance would be, and the arms in contact with the glass were bent ; some, after maceration in water for several weeks, became quite flaccid, thus entirely disproving their siliceous nature. On the contrary, there is every reason to suppose them to have been of a horny or cartilaginous nature. Some other bodies resembling the husks of peas were also observed, which appear to be identical with the *Pixidiculæ* in flints ; but these, although agreeing in colour, he does not consider to have any relation to the *Xanthidia*, but, from their close resemblance to sponge-gemmules, to be some animal or animals in a progressive state of development.

Another paper by the same gentleman, " On a mode of isolating the siliceous shells of Infusorial animals found in the Ichaboe Guano," was also read. After premising that the guano from Ichaboe was soon found to contain siliceous shells of microscopic animals, allied to those brought from Richmond in Virginia, and from Bermuda, he stated that the extreme difficulty of finding them in the ordinary mode induced him to try whether, by decomposing the guano by means of nitric acid, more satisfactory results might not be obtained. The experiment was successful, and the following is the method he employed. Take any quantity of pure Ichaboe guano, and wash it by repeated ablutions of distilled water until the water is no longer coloured, observing after each addition of water that it must be well-stirred two or three times and allowed to settle for some hours. When sufficiently washed, a small quantity of hydrochloric acid is to be added to the water last used. This dissolves some portion of the guano with effervescence, and causes a more perfect subsidence of that portion which it does not act upon. After this, allow sufficient time for the deposit to become well-settled down ; then the clear liquor being poured off as closely as possible without loss of the sediment, a quantity of strong nitric acid in the proportion of two acid ounces to every ounce by weight of the guano employed is to be added ; a strong effervescence results, which is to be assisted by its being placed in a warm situation at a temperature of about 200° for six hours, during which time the greater part of the guano will be dissolved. After allowing it to stand in a cool place for twenty-four hours, pour off the acid liquor and wash the sediment with plenty of distilled water. The fine portion of this sediment will contain all the siliceous shells of the guano, perfectly freed from extraneous matter.

MISCELLANEOUS.

ON A FISH ALLIED TO LEPIDOSIREN ANNECTENS.

At the sitting of the Berlin Academy on the 5th of December 1844, Prof. Müller presented a communication from Dr. Peters, "On a fish from the Quellimane marshes provided with both lungs and gills, related to *Lepidosiren annectens*."

This animal, which resides during the dry season in a cavity formed in the earth and lined with leaves, resembles the *Lepidosiren annectens* so completely in many points of its external and internal organization, that Dr. Peters is inclined to regard these two animals as identical, and to consider the distinguishing characters of the latter as consequent on our still imperfect knowledge of it. The composition of the skull, the vertebral column, the arches furnished with and those not furnished with gills, the lungs, alimentary canal, the generative organs, the brain, heart, external form, scales, and the teeth are exactly as in the *Lepidosiren annectens*. The pectoral and ventral fins, the labial cartilages, the perforated nostrils, and the existence of external gill-filaments differ from what has been hitherto described in the latter.

The pectoral and ventral fins do not consist of merely a single articulated member or ray, but also of cartilaginous rays, which emanate from the inferior margin of the main limb or principal ray of the fin, and to which still finer cartilaginous filaments are attached. These rays are not extensions of the main limbs of the fin, but are attached to it; the length of the rays diminishes towards the end of the main limb or principal ray of the fin until it becomes inappreciable; the extremities of the rays do not lie loosely upon the skin, but the whole fin is covered by a prolongation of the skin, which also covers the principal ray of the fin. In the pectoral fins, the beard of the fin is as long as its ray. In the ventral fins, one-third of the length of the ray is free at the base of the fin; this then commences very low and remains much lower than in the pectoral fins. In the latter the beard of the fin external to the ray is 3 lines broad in its widest part. This kind of formation of the fins, in which the rays arise laterally from a main ray, is quite peculiar, and we have no other example of it amongst fish except in the dorsal fin of *Polypterus*.

The nostrils are double, and the posterior lies on the palatal side of the upper lip, as in *Lepidosiren paradoxa*, the labial cartilage of which is similarly placed.

There are three gill-filaments above the thoracic fin behind the gill-aperture; they are not branched, and consequently appear like tentacles; they are placed closely together, one above the other. Two are of equal length, being 4 lines long; the third is the lowest, and is much shorter. They are not present in the young specimens only, but in all, even those which have attained the length of 2 feet.

These filaments, which are somewhat broad and pointed at the extremity, are composed at their fore-part of a continuation of the external skin of the animal; the posterior part exhibits fine feathery ramifications of blood-vessels. In the middle line of the posterior part this surface is smooth ; its lateral surfaces have a colourless, soft, velvety aspect, and with a lens, crowded, small, shaggy prolongations are perceptible, in which the arteries and veins of the gills ramify. These vessels are elongations of the vessels of the inner gills ; we find them also at the posterior part of the gill-aperture, between the upper end of the gill-arches and the external gills beneath the skin covering the gill-aperture : they are five, three arteries and two veins. One of the arteries arises from the second aortic arch ; the two others are the continuation of the extremities of the gill-arteries of the first and middle of the three posterior and internal gills. The two other vessels, which return the blood from the external gills, terminate in the gill-veins of the first and second of the three internal and posterior gills, after they have separated from the superior extremity of their gill-arches. The most anterior gill, at the anterior margin of which the gill-cavity is situated, and is separated by a cleft from the most anterior of the two gill-arches which are unfurnished with gills, is a true respiratory gill, and thus represents the supernumerary respiratory gill of the cartilaginous fishes, not the pseudo-branchia of other fishes. It receives a branch of the gill-artery and gives off superiorly a gill-vein, which corresponds to the *carotis anterior*. It is however remarkable that the artery of the most anterior gills, although it arises in the same manner as the other gill-arteries, yet before it enters the gill gives off a branch for the nutrition of the body, which is distributed to the inferior aspect of the most anterior part of the head, to the skin and muscles of this part; a fact which is unique in ichthyology, and can only be explained from the gill-arteries of the heart conveying not only dark red but also partly bright red (arterial) blood, which is transmitted from the lungs to the heart. The auricle of the heart is single. The spleen of the *Lepidosiren* has hitherto been overlooked. It is large, and lies behind the stomach and commencement of the intestinal canal, beneath the peritoneal coat of the *tractus intestinalis*. It must be separated from the black pigment which forms a copious substratum beneath the peritoneal covering of the intestines. The lateral anus is not always situated on the same side, being in some on the right, in others on the left.

Should *Lepidosiren annectens* and the fish of Quellimane belong to different genera, which is not probable, Dr. Peters proposes *Rhinocryptis amphibia* for the name of the latter. A circumstance which is much in favour of their identity, and renders it probable that we are not perfectly acquainted with *Lepidosiren annectens*, is, that this has been lately observed by Jardine* also to have filaments on the pectoral fins ; these were mistaken by Jardine for accessory fin-rays.

The next point to be determined is, whether the cartilaginous fin-rays found in the fish of Quellimane are present in *Lepidosiren annectens*. Then comes the question, whether these and the external branchial filaments are also present in *Lepidosiren paradoxa*. Upon this will depend whether the African fish, although identical in genus,

* Ann. of Nat. Hist. vol. vii. p. 24.

is generically different from the American genus *Lepidosiren,* and whether the generic name *Protopterus* proposed by Owen for the *Lepidosiren annectens* should be restored or not.

On the African Musk, Moschus aquaticus, *Ogilby.*

Some time ago Mr. Ogilby, in the Proceedings of the Zoological Society for 1840, described an animal in the collection of the Earl of Derby under the name of *Moschus aquaticus,* which was very interesting as being an African species of a genus which had hitherto only been found in Asia and its islands. The general form and colouring of the animal are so similar to that of the Mouse Deer, or *Traguli,* from Java, Ceylon, and India, that it was natural it should be placed with them in the same genus. But the Earl of Derby having kindly sent a specimen with its skull to the British Museum, the examination of the bones of the head have at once proved, that instead of being a species of an Asiatic genus, it is the type of a peculiar genus as yet only found in Africa, and therefore not, as has hitherto been thought, an exception in the geographic distribution of Mammalia.

The skull is short with short broad nasal bones, which are dilated and rather truncated behind; the intermaxillaries are also short and truncated behind, not extended behind the base of the upper canines. The ear-bones are large, vesicular, and produced beyond the surface of the bones of the skull, while in the genus *Moschus* the nasal bones are narrow, linear-elongate, and produced nearly to the front edge of the orbit; the intermaxillaries are large, dilated behind, and produced behind between the maxillaries and the front of the nasal bones, and the ear-bones are small and inclosed in the base of the skull: from these characters and the pig-like habit of the animal, I propose to form for it a genus under the name of *Hyemoschus.* The skull is much more like that of the genus *Tragulus* than of *Moschus,* as it agrees with it in the large size and vesicular form of the ear-bones; but the *Traguli* are easily known from the *Hyemoschi* by the large size and triangular form of the hinder part of their intermaxillaries, which reach to the nasals and form the front part of the cheek in these animals.

1. Moschus.—Nasal bones linear-elongate; ear-bones small, inclosed; intermaxillaries large, produced behind, narrow, and extended far beyond the base of the upper canines. *M. moschiferus, M. leucogaster, M. chrysogaster.*

2. Tragulus.—Nasal bones elongate, rather dilated and truncated behind; ear-bones large, vesicular; intermaxillaries large, triangular, broad, oblique, truncated behind, hardly produced beyond the base of the upper canines between the maxillaries and the nasal bones. *T. javanica, T. Stanleyanus* (*M. ecaudatus,* Temm. MSS.).

3. Hyemoschus.—Nasal bones short, dilated, and truncated behind. Ear-bones large, vesicular; intermaxillaries small, short, scarcely dilated behind on the front of the maxillaries, and not extended beyond the base of the upper canines. *H. aquaticus.*—J. E. Gray.

OCCURRENCE OF AQUILA NÆVIA IN IRELAND.

Clonmel, Oct. 7, 1845.

To Richard Taylor.

Dear Friend,—At the request of my friend William Thompson of Belfast, I write to inform thee of the occurrence in the south of Ireland of an eagle new to these countries, *Aquila nævia* (Linn.). I need enter into no description of the bird, as of course it is well-described in works on continental ornithology, but will just remark, that it is in the immature or *spotted* stage of plumage ; in contour it closely resembles the golden eagle, but is much smaller.

This specimen (which is now in my possession on loan) was shot on the estate of the Earl of Shannon, and was in a fallow-field in the act of devouring a rabbit at the time ; this was in 1st month (Jan.) 1845 ; and another said to be similarly marked, but of rather a lighter colour, is stated to have been shot in the same place a few days before : both had been observed in the neighbourhood (between Castlemartyr and Clay Castle near Youghal, co. Cork) for several weeks previous, sweeping over the low grounds there.

It at present belongs to my friend Samuel Moss of Youghal, who had it from the gamekeeper who killed it, but I think it is probable that before long it will be placed in the Museum of Trinity College, Dublin.

I have made a rough coloured drawing of it which I sent to Wm. Yarrell *, with similar information to what this note contains.

I am, thy friend,

Robert Da~~irs~~, Jun. vis

ON MOUNTING MINUTE ALGÆ FOR THE MICROSCOPE.

In describing the method pursued by Mr. Thwaites in the preparation of algæ for microscopical observation, I stated that the cells were made of gold-size. As this is however liable to be softened and redissolved by the gold-size employed in fastening down the piece of thin glass, he found it advisable to look out for some more convenient substance.

He now uses two compositions, one suitable for very shallow, and the other for somewhat deeper cells. For the former he takes equal *measures* of finely-powdered lamp-black and litharge ; a portion of this is rubbed down with equal parts of gold-size and black japan, and the cells immediately formed on the glass slides with a camel's hair pencil. As the composition hardens very rapidly, the cells should be made as quick as possible, and to save time and trouble, a good many should be made at once. If the mixture becomes too thick for use before all the intended cells have been made, a little more gold-size may be rubbed down with it, and this may be repeated if necessary, but the last-made cells will take longer drying than the first. Before the walls are quite hard, they may be flattened by pressing them with a piece of *wet* glass. If this is not done, it takes

* For insertion in his 2nd edition of 'British Birds,' expected to appear next month.

a longer time to grind down the irregularities of the surface, which is best effected by rubbing them upon a piece of wet unpolished marble.

For the deeper cells Mr. Thwaites finds nothing so good as marine glue, which must be melted and dropped on the slip of glass, like sealing-wax, then warmed and flattened with a piece of wet glass: what is superfluous must be cut away with a knife, so as to leave only the wall of the cell; should this become loose, it can easily be fixed by heating the other side of the slip of glass over a spirit-lamp and gently pressing. Before these cells are used, it is desirable to flatten them by rubbing gently upon a piece of wood and then upon the wet marble.

In using the cells, as small a quantity as possible of gold-size, of a thick consistence, should be laid on the wall of the cell, and also on the edge of the piece of thin glass; and in covering up the cells, gentle pressure should be employed in order to squeeze out the superfluous fluid.

It would be a very useful thing for travellers to take with them the proper ingredients for preparing the two solutions for fresh and marine algæ. A portion of each species of alga might then be preserved in small phials carefully sealed and ticketed, which may be mounted and observed at leisure. The benefit of such a practice has been strongly impressed upon me during the examination of some highly curious foreign algæ which have lost many of their distinctive characters in drying. M. J. Berkeley.

On the Discovery of a Fossil Frog and Butterfly in the Gypsum Deposits of Aix. By M. Coquand.

Among the fossils in my possession from the gypsum formation of Aix, a remarkable and very distinct impression of a reptile belonging to the order of the Batracians, and to the family *Anouræ*, has particularly caught my attention: M. Boué (Guide du Géol. vol. ii. p. 259) notices indeed, in the tertiary formations, the presence of some reptiles, such as salamanders, frogs and ophidians; but as he does not enter into any details, either of their description or the localities in which they have been found, the palæontologist will perhaps read with interest some details respecting the species in my possession. Its dimensions are as follows:—

	Millimetres		Millimetres
Total length of the body, including the head	32	Cubitus and radius truncated in part	
Great diameter of the head	13	Femur	12
Transversal diameter	8	Tibia	12
Diameter of the sternum at the origin of the anterior feet	9	Tarsus	7
Length of the humerus	6	Toe of the posterior foot	5

The body of this species, which I shall name *Rana aquensis*, is not so plump as that of the common frog; its head, although as flat, is more elongated, and is terminated by a snout which describes an almost perfect oval. The bones of the hind feet are proportionably longer, although less strong; lastly, its form is much more slender than that of the other Anourous Batracians, and may belong as well to the Frogs properly so called as to the Tree-frogs (*Hyla*), which differ from the former only in the extremity of each of their toes, which is enlarged and rounded into a kind of viscous swelling. But, as may be imagined, this character has not been preserved. The *Rana aquensis* has preserved a portion of its skin; there is scarcely any part but the feet which has been deprived of it, and these are represented by the bones which form their skeleton. As may be judged by its dimensions, this fossil frog is small, and its form is far from corresponding to the idea which we may form of the tertiary fauna of Aix, if we imagine it among the palm-trees, the crocodiles and other animals which have left their remains in the gypsiferous marls.

It is well known, that when the discovery of a diurnal lepidopterous insect in the same formation was announced to the Entomological Society of Paris, M. Boisduval, one of the most celebrated entomologists in Europe, considered the fact as so novel, that he would not credit it until he had examined the specimen. As this discovery has passed, we may say, unnoticed, I shall be pardoned for entering into some details on the almost miraculous occurrence which enabled M. Boisduval not only to recognise the genus to which this butterfly belonged, but also to determine its species with the greatest ease. As the opinion of this naturalist perfectly agrees with the ideas which I have previously entertained and published on the probable temperature of the globe at the period of the deposit of the gypsums of Aix, I cannot resist supporting my opinion by such an authority, especially as M. de Serres (Géognosie des Terrains Tertiaires, p. 220, &c.) states that the genera of fossil insects of that locality are mostly identical with those which now inhabit Provence and more southern climates, as Sicily and Calabria; and as M. Boué (Guide, ii. p. 286) says that it is well-known that the fossil plants and fishes of Aix are most nearly related to the vegetables and marine *fishes of Provence*, whilst it has been proved that the gypsiferous marls of Aix are essentially of a lacustrine origin, and that no maritime plant or animal has ever been discovered there. Mr. Curtis (Edinburgh New Phil. Journal, Oct. 1829) in the same manner refers all the specimens from Aix to still existing forms. Now as the gypsums of Aix are inferior to the marine molasses of the central beds, containing animals the greater part of whose genera only live in the tropical regions, the occurrence in a lower stratum of species still existing in the country or in the adjoining countries, established a fact of anomalous distribution, and a contradiction, not only to almost all known facts, but also to the presence in the same stratum of crocodiles, palm-trees, and other species of warm climates. We must therefore consider the conclusions advanced by the naturalists whom we have cited as the result of erroneous determinations, into which the specialty of M. Boisduval has prevented his falling. That entomologist discovers, "that the most common species of insects of the gypsiferous beds of Aix are a species of Diptera of the genus *Bibio* or *Cecidomya*, several species of *Tipulariæ*, large *Curculionites* allied to the *Otiorhynchus*, larvæ or nymphs of *Libellulæ*, *Blattæ*, *Ichneumonidæ*, *Formicidæ* and *Arachnida*. All these fossils belong to extinct species, but their genera, which still exist, do not occur in Europe.

"The diurnal lepidopterous insect belongs to one of those genera the species of which are not numerous, and are at present confined to the islands of the Indian Archipelago or the warmest countries of the Asiatic continent. According to M. Blum of Leyden, they hover around the palm-trees, on which perhaps they feed in the state of caterpillars. The individual which has been named *sepulta*, to recall its antediluvian origin, belongs to the genus *Cyllo*, and is allied to the *Rohria*, *Camnus*, and other neighbouring species; but it cannot be referred to any of those known at the present day.

"The outline and form of this insect are so well-preserved, that one might imagine it lithographed on a schist: only the right side is alone preserved, which is perfectly untouched, with a portion of the thorax and a slight impression of the abdomen. The upper wing is in great part hidden by the under one, and it is impossible to say whether it presents other delineations than an apical ocellus surmounted by a white point; the other, the whole surface of which is seen, is of a brownish gray colour, as in the allied species, with a white costal spot, a sinuated, median transverse band, of the same colour, followed by two black ocelli bordered in white, connected exteriorly with two white spots. The extremity of this same wing is rather paler, almost whitish, and divided, as in most of the living species, by two parallel brown marginal lines. The caudal appendix is rather longer than in the *Rohria*, but situated in the same manner. The preservation of the specimen admits of distinguishing the outline, and probably the true colour of the butterfly as it was before its incrustation."

I am not sufficiently acquainted with the species of exotic frogs to be able to compare them with the *Rana aquensis*, but I can assert that it differs entirely from those which exist in Europe. I await a favourable opportunity to allow me to describe and publish the fossil insects which for the last ten years I have collected in the gypsiferous beds of Aix; the number of the species I possess at the present time amounts to more than sixty.—*Bulletin de la Société Géologique de France*, April 21st, 1845.

On a curious appearance presented by the contents of the Capsules of a Moss from Chili, extracted from a Letter to the Rev. M. J. Berkeley, *by* Dr. Montagne.

"I was engaged in describing for the Cryptogamic flora of Chili a new genus allied to *Weissia*, and in consequence was desirous of ascertaining the form and structure of the spores in the species which I had before me. What was my surprise to find, instead of spores in every capsule which I opened, a kind of gemmæ analogous to those which occur in the cups of *Marchantia*! They have not indeed the same form, but their structure is the same, or at least appeared to me to be so. They are wedge-shaped or parallelogrammic, about $\frac{7}{100}$ths of a millimetre in length, and from $\frac{4}{100}$ths to $\frac{6}{100}$ths in breadth. It is very difficult to ascertain their thickness, but I believe it to be about a third of their length. They are composed of at least two layers of two or three rows of broad cells on either surface, as visible under the microscope. Their colour is a deep green verging on bistre. I know of nothing at all similar in the family of Mosses, and at least in a physiological point of view, the fact is not unimportant. It must be observed that the capsules were quite ripe, having already lost their opercula, so that the question is not one of unripe spores. The species in which this curious structure was observed is *Eucamptodon perichætialis*, Mont."

Dr. Montagne kindly accompanied his observations with specimens, which has enabled me to confirm their correctness.—M. J. B.

M. Agassiz *on the Geological Development of Animal Life.*

The Zoophytes, Mollusca and Articulata existed in the earliest period of the earth's development, although all their classes were not numerously represented in the oldest members; but they do not allow of our supposing that any progressive perfection to the present creation occurred. This is the case with the Vertebrata only, among which fish appeared in the first period, reptiles in the second; mammalia and birds did not appear for a long time after the former; lastly came man, as lord of all: hence M. Agassiz denominates the corresponding periods, those of fish, reptiles and mammalia.

The greatest change in the fish occurred at the end of the Jura period. All fish which existed prior to the chalk have a peculiar aspect and belong in general to extinct families; those of the later epochs resemble those now living, and many of them belong to families and genera at present in existence; but they all differ specifically, just as *all* Vertebrata in different geological epochs differ in species.—*Jahrbuch für Mineralog. Geolog.* &c., Part 3. 1845.

EXPLORATIONS OF DR. SCHRENK.

The extreme limits of the wild and remote regions of south-eastern Siberia and along the Chinese frontier have been successfully explored by an able and enterprising botanist, Dr. Schrenk, who has recently returned to St. Petersburg. Remote and unfriended, this ardent naturalist has passed four years in a country, the greater part of which was never before trodden by an European foot. In addition to copious materials with which he will soon enrich botany, geology, and other branches of science, he has made most important observations on the eastern extension of the mass of land which forms a portion of that vast depressed area so vividly brought before our consideration by Humboldt, and which is now found to extend eastward from the shores of the Aral to the Saissar and Balkash lakes; though in approaching the latter region the ground rises to a few hundred feet above the sea. Thence penetrating to the lake of Issikul, surrounded by lofty mountains considerably south of the range of the

Altai chain, and obtaining from one of them a view of the Thian-Chan, whose height he estimates from 16,000 to 17,000 feet, nearly one-half being covered with eternal snows, Dr. Schrenk won for himself the proud title of being the first European who had pushed his researches to the northern foot of the "celestial mountains" of the Chinese empire. It is indeed quite clear, from what I already know of them, that Dr. Schrenk's researches must materially change all earlier maps; for though the lake Balkash is laid down, the Issikul does not appear, at least not by that name. Again, the sources of the Tchu river, and its course into the Telekul lake, and the occasional communication between that lake and the Jaxartes (Sir Daria); the true course of the latter stream is the country watered by the upper streams of the Sara Su-a-Ishein, where alone the beautiful mineral "dioptase" is found.—*From the Anniversary Address of the President of the Royal Geographical Society.*

Description of three new species of Bivalve Shells, of the genera Cytherea *and* Venus, *by* Sylvanus Hanley, Esq.

Cytherea Ovum. *Cy. testâ ovatâ, solidissimâ, æquivalvi, ventricosâ, nitidâ, lævigatâ, albidâ, epidermide fulvâ indutâ; margine ventrali integro, arcuato; dorsali, utrinque convexiusculo et subdeclivi; latere antico rotundato; postico obtusè subangulato, supernè glauco-cineraceo; natibus rectè incurvatis, sæpè erosis; lunulâ obsoletâ; superficie internâ albidâ, posticè livido-purpurascente infectâ; dente postico leviter crenulato; sinu palliari vix ullo.* Long. 0·90; lat. 1·20 poll.

Index Test., sup. t. 15. f. 21. Mus. Cuming, Hanley.

Hab. —— ?

Remarkable for its peculiar solidity and the equality of its sides. It bears a slight resemblance to the true *casta* of Chemnitz, but is a more ovate shell.

Venus Bruguieri. *Ven. testâ oblongâ, solidiusculâ, subnitidâ, convexâ, valdè inæquilaterali, aut pallidè brunneâ, radiis paucis albis ornatâ, aut fusco-cineraceâ, radiis saturatioribus angustis remotis interruptim pictâ; radiatim sulcatâ; sulcis in medio subimbricatis, utrinque subdecussatis, et posticè in costellas (plerumque subgranosas) mutatis; margine ventrali subrecto aut paulò convexiusculo; dorsali, posticè vix declivi, subrecto aut convexiusculo, anticè subdeclivi et convexiusculo; extremitate anticâ rotundatâ; latere postico producto, obtusè et obliquè biangulato; margine postico magis minusve convexo; natibus curvatis et radio brevi livido posticè ornatis; lunulâ subobsoletâ; ligamento subinfosso; margine cardinali intus purpureo; dentibus angustis, recurvis, parallelis.* Long. 0·85; lat. 1·40 poll.

Index Test., sup. t. 15. f. 59. Mus. Cuming, Hanley.

Hab. —— ?

Belonging to the section *Pullastra*, and allied to *decussata*, but easily distinguishable by its shape and peculiar sculpture. It has however been figured for that species in the 'Encyclopédie Méthodique,' pl. 283. f. 4.

VENUS MAGNIFICA. *Ven. testâ suborbiculari, subcordatâ, tumidâ aut ventricosâ, solidissimâ, valdè inæquilaterali; margines versùs purpureo tinctâ, umbones versùs albidâ brunneo sparsim maculatâ; lineis concentricis, sulcisque radiantibus decussatâ; lineis, anticè undosis et paulò elevatis, posticè obsoletis, mediò planulatis et sursùm spectantibus; sulcis frequentibus, profundis; margine ventrali arcuato, intusque crenato; dorsali, anticè convexo et declivi, posticè convexo et vix declivi; latere postico majore, obtuso; natibus maximè curvatis; pube, lunulâque prominente cordiformi, livido-purpureis; ligamento infosso; superficie internâ albidâ, immaculatâ; dentibus ut in* V. puerperâ. Long. 5·; lat. 5 poll.

Hab. Ticao, on the sands; Cuming. Mus. Cuming.

This splendid shell is most closely allied to *puerpera*, but the cessation of the concentric ridges on the posterior side, the tinge of purple which environs the whole margin, and the absence of any coloured rays, enable us at once to separate them. The concentric lines gradually become less elevated and more distant towards the lower margin, and finally (in the adult) entirely disappear. The radiating sulci in aged specimens are so broad at their extremity as to give the interstitial spaces the appearance of costellæ.

ON THE LARUS CAPISTRATUS, TEMM.

At the meeting of the Zoological Society, May 27, Mr. W. Thompson read a paper to prove that the *Larus capistratus*, Temm., is not a distinct species from *L. ridibundus*, and exhibited a series of specimens of both forms in different states of plumage obtained in the neighbourhood of Belfast. The differences between these supposed species are—

1st. In size; but a female specimen of *L. ridibundus*, with black *hood*, bill and legs arterial blood-red, was exhibited, agreeing in the size of body, tarsi, &c. with *L. capistratus*.

2nd. The colour of the tarsi and toes attributed to *L. capistratus*, and as distinguishing it from *L. ridibundus*, is a mere transition shade, through which all individuals of the latter pass before the arterial blood-red hue is attained.

3rd. The disposition of black or brown on the head, its taking the form of a mask, as in *L. capistratus*, or as a hood, as in *L. ridibundus*, is either transitional or accidental*, and the shade of colour commonly varies from the "broccoli-brown" of the former to the deeper tint of the ordinary *L. ridibundus*.

A specimen of the *L. capistratus*, purchased at the sale of Bullock's collection by Dr. Leach, and believed to have been one of the first birds seen by Temminck, to which he gave this name, is now in the British Museum. By the kindness of Mr. George R. Gray, the author was enabled to make a critical comparison of this bird with the specimens exhibited, and, excepting in the smaller size of the toes and webs of feet, there was no difference between it and some of them;

* Mr. Thompson stated that he had known it to be both transitional and accidental, i. e. for birds to exhibit the mask the *first* summer of their attaining adult plumage, and others the hood in their first assumption of the black hood.

and from the adult female, *L. ridibundus*, in full summer plumage it differed in the most trivial manner only.

ON THE DISEASE OF POTATOES. BY PROF. KÜTZING.

The diseases of potatoes have of late years attained so unusual an extent of diffusion, that their investigation must become of universal importance, especially when we recollect that this is the only means of ascertaining the cause of the disease.

During the present year a disease has appeared in the potatoes growing around Nordhausen with which the author of this communication was not previously acquainted; nor is it mentioned in the writings which have in modern times treated of the diseases of potatoes.

It is of a totally different nature from the so-called dry-rot (caries of the tubers), in which the starch granules become so altered as to exhibit minute brown fungi similar to those of corn-smut, and the cellular tissue which surrounds these bodies becomes destroyed or dissolved at a subsequent period only. In the disease of the present year an alteration and solution of the cellular tissue alone is visible, the starch granules remaining within it in a sound and unaltered state. For this reason I have called it cell-rot.

The cell-rot at first appears just beneath the cuticle of the tubers, and always extends from thence towards the interior. It constantly commences with a brownish discoloration of the substance, which at first is still firm and solid, but gradually assumes a lighter and darker colour until it is dissolved and forms a greasy, soft, dark brown (sometimes verging to violet) mass, which possesses a fœtid odour.

On microscopic examination perfectly healthy starch granules may be detected in all the stages of the disease, a proof that the true nutritious ingredient is not destroyed by this change. But the cells, which contain these starch granules, and which in the healthy substance are clear, colourless and extraordinarily transparent, even in the earliest stage of the disease appear of a yellowish colour, and the membrane exhibits a finely granular structure which impairs their transparency. As the disease progresses the colour and granular structure of the surface of the cells increase, until at last they are either partially or completely dissolved, the starch granules pass out of them and become mixed with the decomposed mass. At this period we find in the fluid decomposed cellular mass a fine filamentous fungus, which frequently extends to the surface of the diseased cells, and is diffused through the soft mass in a ramified form or united into bundles. Its formation, as I have satisfactorily observed, is a consequence of the decomposition of the cells, for it is not present in the earliest stage of the disease.

The cause of this disease appears to depend partly upon too great an amount of moisture, partly on too copious a supply of manure to the soil: both induce too rapid a growth of the tubers, which renders the formation of a strong and durable cellular membrane impossible. Moreover, all the potatoes which have experienced the cell-rot contain a much larger amount of aqueous constituents than the sound ones. It may be expected that the disease of the tubers which are laid up for winter store will extend itself and finally destroy them, if care be not taken to preserve them in a dry place, whereby a portion of the excess of moisture may be removed. The author has found that the disease remains stationary when they are dried; at least at the end of several weeks it had not attacked the neighbouring parts. These diseased potatoes might be used to obtain potatoe-starch, as also for distillation, without there being any necessity for throwing away the diseased portions or even those which have become putrid; in the preparation of starch, however, the washing must be continued longer than usual. They may also be used without injury, after having been boiled, to feed cattle upon, but the water in which they are boiled should be thrown away. They are perfectly useless for planting, for the disease is found generally to extend from those points at which the young buds are situated; the germ is also frequently destroyed.—*Bot. Zeitung*, Oct. 10, 1845.

METEOROLOGICAL OBSERVATIONS FOR SEPT. 1845.

Chiswick.—September 1. Thick haze: fine. 2, 3. Overcast. 4. Dense dark clouds: clear. 5. Cold and overcast. 6. Hazy: fine. 7. Cloudless and very fine. 8. Foggy: clear and fine. 9. Foggy: clear. 10. Foggy: uniformly overcast: slight rain. 11. Overcast throughout. 12. Slight haze: clear. 13. Thick fog: very fine. 14. Densely overcast: showery. 15. Hazy: very heavy rain: clear at night. 16. Thickly overcast: heavy rain: boisterous at night. 17. Overcast: rain: boisterous throughout. 18. Very boisterous, with showers: clear at night. 19. Boisterous. 20. Fine: rain at night. 21. Densely overcast: rain. 22. Clear: partially overcast and fine. 23. Cloudy: frosty at night. 24. Clear and frosty: very fine, with bright sun: clear. 25. Densely overcast: drizzly. 26. Slight haze: cloudless and fine. 27. Uniformly overcast: slight drizzle: rain at night. 28. Cloudy throughout: clear. 29. Densely overcast: rain. 30. Cloudy and fine.—Mean temperature of the month $4\frac{8}{10}°$ below the average.

Boston.—Sept. 1—5. Cloudy. 6—9. Fine. 10, 11. Cloudy. 12. Fine. 13. Foggy. 14. Rain: rain early A.M. 15. Cloudy: rain, with thunder and lightning P.M. 16. Fine: rain early A.M. 17. Rain: rain early A.M. 18. Cloudy. 19. Windy. 20. Fine. 21. Cloudy: rain early A.M.: rain P.M. 22. Cloudy: rain early A.M. 23, 24. Fine. 25. Cloudy. 26. Fine. 27. Cloudy: rain A.M. 28. Cloudy. 29, 30. Fine.

Sandwick Manse, Orkney.—Sept. 1. Haze: clear. 2. Clear. 3. Cloudy*: clear. 4. Cloudy. 5. Clear. 6. Fog: cloudy. 7. Bright: cloudy. 8. Rain. 9. Damp. 10. Fine: clear. 11. Bright: clear. 12. Cloudy. 13. Bright: cloudy. 14. Damp: clear. 15. Cloudy: clear. 16. Bright: clear. 17. Bright: cloudy. 18. Rain: cloudy. 19. Bright: clear. 20. Bright: cloudy. 21, 22. Showers: cloudy. 23. Bright: cloudy. 24. Cloudy. 25. Rain: clear: aurora borealis. 26, 27. Showers. 28. Hail-showers: showers: sleet. 29. Showers. 30. Cloudy: showers.

Applegarth Manse, Dumfries-shire.—Sept. 1—4. Fine, though cloudy. 5. Fine, but clear. 6. Fair, but cloudy. 7. Fair and clear: raw frost. 8. Fair, but cloudy. 9. Rain all day. 10. Fair, but cloudy. 11. Fair and fine. 12. Very fine. 13. Moist and cloudy. 14. Showers. 15. Hoar-frost: shower A.M. 16. Fair, but cloudy. 17. Heavy rain. 18. Very heavy rain. 19, 20. Rain P.M. 21. Fair and drying. 22, 23. Very fine: hoar-frost. 24. Wet A.M.: cleared up. 25, 26. Fair and clear. 27, 28. Heavy rain. 29, 30. Showers P.M.

Mean temperature of the month	52°·4
Mean temperature of Sept. 1844	54 ·0
Mean temperature of Sept. for 23 years	53 ·0

* This morning there was a fall of ashes over all Orkney apparently volcanic, and supposed to be wafted from Iceland.

Meteorological Observations made 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.			
	Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8¾ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. Sept.	Max.	Min.		9 a.m.	9 p.m.	9¼ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9¼ a.m.	8½ p.m.								
● 1.	30·278	30·200	29·79	30·27	30·19	30·27	30·27	66	50	59	69½	54½	54½	51½	ne.	ne.	w.	nw.	......	......	......	·05
2.	30·179	30·168	29·79	30·16	30·18	30·27	30·26	64	47	59	66	56½	52½	52	ne.	calm	ne.	nw.	......	......	......	......
3.	30·201	30·185	29·79	30·20	30·14	30·27	30·22	63	41	57	64	43½	53	51½	ne.	calm	ne.	nw.	......	......	......	......
4.	30·205	30·180	29·80	30·17	30·17	30·26	30·22	64	43	54	61	50	54	52	ne.	calm	ne.	......	......	......	......	......
5.	30·140	30·103	29·78	30·16	30·16	30·24	30·24	60	50	54·5	62	47½	53	49	ne.	calm	e.	......	·01	......	......	......
6.	30·149	30·131	29·75	30·19	30·19	30·24	30·28	63	38	59	58½	40½	52	51	ne.	e.	sw.	s.	......	......	......	......
7.	30·137	30·122	29·75	30·20	30·10	30·23	30·13	69	40	60	62	42½	56½	50	ne.	e.	e.	......	......	......	0·10	......
8.	30·115	30·098	29·70	30·04	30·01	29·93	29·88	71	37	57	62	48½	52	56	ne.	calm	s.	sw.	......	......	......	·12
☽ 9.	30·102	30·002	29·63	29·90	29·85	29·74	30·00	78	40	58	59	51	61	51	sw.	calm	s.	n.	......	......	......	......
10.	30·085	29·971	29·57	30·10	30·11	30·23	30·24	70	53	62	59	51½	53	48	ne.	ne.	ne.	ese.	·01	......	......	......
11.	30·038	29·966	29·55	30·05	29·95	30·13	30·08	61	54	56	60	47	51½	50	ne.	calm	ne.	se.	......	......	......	·26
12.	29·955	29·934	29·45	29·93	29·91	30·08	30·03	70	42	61	65	49	53½	49	ne.	calm	nw.	se.	......	......	......	......
13.	29·930	29·750	29·50	29·80	29·55	29·85	29·61	71	53	52·5	58½	51½	53	54	se.	calm	s.	se.	·04	......	......	......
14.	29·599	29·470	29·05	29·38	29·31	29·38	29·36	71	39	57	57	53	55½	51	sw.	calm	wsw.	nw.	·02	·06	0·15	......
○ 15.	29·611	29·353	28·93	29·35	29·38	29·40	29·40	57	43	52	61	36	52½	50	ne.	calm	s.	sw.	·45	·07	......	......
16.	29·699	29·487	29·19	29·44	29·32	29·44	29·41	64	54	54	60½	40	56½	49½	se.	calm	w.	......	·47	·24	......	·21
17.	29·476	29·397	28·90	29·14	28·97	29·34	29·26	64	55	60	60	52	56	52	sw.	calm	e to s.	e.	·19	·34	......	......
18.	29·498	29·271	28·78	28·94	29·04	29·14	29·25	65	48	60	58	52½	52	49½	sw.	calm	e.	nne.	·07	·04	......	·26
19.	29·996	29·681	29·00	29·37	29·72	29·46	29·77	65	34	56	58	47	47	44½	sw.	w.	wnw.	wnw.	......	......	......	......
20.	29·982	29·690	29·50	29·74	29·49	29·78	29·68	62	52	52	58½	37½	48½	48	s.	calm	s to se.	nw.	·29	......	......	......
21.	29·538	29·315	29·09	29·34	29·30	29·43	29·62	65	49	55	59½	51	45½	44½	s.	calm	wnw.	nnw.	·12	·09	1·58	·12
22.	29·946	29·682	29·65	29·58	29·88	29·68	29·85	64	42	51	56	43½	45	44	w.	w.	wnw.	nw.	......	·39	......	·08
☾ 23.	30·223	30·011	29·66	30·08	30·18	30·06	30·15	54	30	48	53½	31½	44	50½	ne.	calm	se.	w.	......	......	......	......
24.	30·242	30·016	29·85	30·10	29·83	29·99	29·68	62	37	42·5	55	32	51	50	e.	calm	sw.	s.	......	......	......	......
25.	29·852	29·692	29·43	29·49	29·48	29·38	29·39	62	38	51	58½	47½	50½	48	s.	calm	w.	ssw.	·01	......	......	·31
26.	29·945	29·740	29·30	29·53	29·68	29·47	29·58	65	40	49	56½	44½	53½	48	w.	calm	s.	w.	......	......	......	......
27.	29·914	29·790	29·45	29·40	29·45	29·12	29·08	60	48	50	60	45½	52	50	sw.	calm	s.	w.	·02	......	......	·08
28.	29·937	29·854	29·33	29·50	29·60	29·24	29·37	63	36	56	54½	44½	48½	47	w.	calm	sw.	w.	......	·03	......	·46
29.	29·949	29·753	29·47	29·60	29·45	29·43	29·32	62	48	48·5	56½	44½	46½	46	sw.	calm	sw.	ssw.	·06	......	0·92	·35
30.	29·800	29·704	29·22	29·40	29·42	29·27	29·23	62	41	50	55	46	49½	45	sw.	calm	sw.	sw.	·01	......	......	·52
Mean.	29·957	29·823	29·45	29·751	29·737	29·758	29·762	64·57	40·63	54·7	59·4	46·0	51·78	49·41					1·77	1·26	2·75	2·82

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XXXIX.—*Remarks on some forms of* Rubus. By T. Bell Salter, M.D., F.L.S. &c.*

The object of the present communication is to bring forward the results of some extended rather than any very elaborate observations on several forms of the fruticose *Rubi*, as well as to make some general observations on the group itself. With the latter considerations my remarks more naturally commence.

It is not a little striking, and it has already called forth many stringent and some severe remarks, that out of what was so long considered as one, two or three species, so many new ones should in such quick succession be enumerated; that—while all admit the difficulty of distinguishing species and estimating the value of their characters, and agree as to the fact of many different forms appearing to pass into each other,—yet every one who comes to the work should appear thus ready and eager to add new species, and with them, it may be thought, new difficulties to the task.

That in this eager endeavour to distinguish forms and establish them by definite names, an undue value—that of enumerating mere forms as species—has been given to many of them, there can be no doubt; and it is one of the objects of this paper to reduce some of these to their respective species. In some cases, where the enumerated so-called species are rather numerous and the forms variable, it has required a careful analysis to arrive at anything like a satisfactory conclusion. The reason of the difficulty in this kind of analysis, is one which applies fundamentally to the study of the group, and which has cast the greatest slur on the labours of its students. It is this :—

That the *different characters* are often *not coincident*; that while some several observed characters have been assumed to constitute one species, and other several characters another,—certain of these in other forms are found otherwise combined, and this in

* Read before the Botanical Society of Edinburgh, Nov. 13, 1845.

almost endless variety. Where such can be distinctly proved to be the case, we consider that all these forms must be received as constituting one species, and the former so-called species be considered as varieties merely, with their former names as convenient synonyms. True, there will yet be the parallel difficulty, that all of the forms cannot always be referred to one of these named varieties, without presenting some characters which would rather indicate them as belonging to another; in other words, there will yet be intermediate forms; but we hold that while these intermediates in varieties prove the species, intermediates in species are the very opprobrium of classification.

We cannot leave this point without adding, that we wish to make no reflection on the work of those who may, and we think have, thus too much divided; their labours have done too much to assist their followers to admit of this; and we would add, while we agree with those who believe that there yet remain many, separated as species which should be united, that it is only the part of sound philosophy, where distinctions have been made, to receive them as they stand, until by further observation we can satisfactorily prove them to be erroneous.

Independently of, and quite different from, on the one hand the gradual development and growth, and the final assumption of the adult form in both the animal and vegetable kingdoms; and on the other hand equally distinct from the changes of form known as metamorphoses in some tribes of the former, is a certain other development consisting of successions of arrested minor developments, some of which though not final, inasmuch as they are in some sort mature or even adult, may occasion and have occasioned difficulties in the distinguishing of species. This fact, as referring in the animal kingdom to some tribes of birds, is sufficiently familiar. An analogous case is afforded in the *Polypodiaceæ,* many species of which, in addition to the few successions of early fronds which mature and perish, each succeeding one developing itself to a greater degree than its predecessor, produce some so far adult as to fructify and appear in every respect perfect plants, before the existence of that form which is more properly the adult and permanent form of the plant,—a fact which has in that natural family been the cause of some confusion*.

The above remarks are introduced in this place to illustrate what appears to be the course of development in the *Rubi.* The *surculi* from young roots, like fronds from young rhizomata, have very little the appearance of those of the same species which are truly adult; indeed so little, that, as in them, the species cannot with certainty be determined. The analogy holds further; for

* Newman's British Ferns, p. 208. Phytologist, ii. p. 194.

anteriorly to the appearance of shoots of the final form, are yet some which even flower and mature their fruit, and it is these which may be most apt to mislead. There is reason too to believe that in some instances, the plants, from local causes, become arrested permanently at this stage of their development. I shall have an instance of this nature to record in one of the forms I propose describing in this paper.

On the subject of the growth and development of *Rubi* I hope ere long to have more certain information, as through the kindness of Mr. Lawrence of St. John's, Isle of Wight, I already have numerous species under cultivation, many of which are raised from seed. By this means also I have the advantage of perceiving the effect of situation on these plants. Already some, which coming from different situations were in some degree varieties, have acquired the same form.

For observations on the effects of soil and situation, I may refer to some remarks of my own which have appeared in the 'Phytologist'*. Observation in St. John's Garden has already proved the identity of *R. leucostachys* (Sm.) and *R. vestitus* (W. and N.), since these extremes planted together last year are this year nearly identical.

To the remarks on the effects of soil and situation I may now add, that I have since observed that these plants are also much modified by season.

All the preceding remarks tend rather to point out the difficulties to be met with in distinguishing the species of this group, than to offer any method by which to meet them. As regards any *general rule* for distinguishing species, applicable to the whole group, or even to the single sections of it, I regret to say that I have none to offer. An habitual observation of them accustoms the eye to recognise the various forms, and I am sanguine that it has also enabled me, to some extent, correctly to unite many of these as single species; but as regards the artificial characters by which to define them, and especially such as shall render them easy to be recognised by others, it must be admitted that in this there is much difficulty. It is on this account that good figures are so truly valuable for illustrating *Rubi*, a fact which has rendered the elaborate and well-executed 'Rubi Germanici' of Weihe and Nees of such essential service.

The clothing of the barren shoot and every character presented by the calyx appear to be hitherto those mostly depended on. Most of the other parts afford some characters of more or less value; doubtless however some might be very much more employed than they have been, such as the form of the petal and

* Vol. ii. pp. 105, 106.

their degree of expansion; also the form and surface of the *seed,* and that of the form of the fruit. This latter has, I am aware, been employed in the descriptions of many; but in this genus, as in *Rosa,* it is desirable to describe the *primordial fruit,* it having been pointed out to me by Mr. Thomas Meehan, that the form of it is far more characteristic, and frequently differs very considerably from the other fruit.

The date and duration of the flowering period afford somewhat characteristic distinctions; some species flowering much earlier and some much later than others; some also passing very quickly out of flower, while others continue in bloom during nearly the whole fruiting season, or till actually cut off by the early frosts.

With respect to the value of the characters depending on the calyx, it may not be out of order to mention in this place, that though in general constant as to form and vestiture, there is one particular in which it is by no means so, and that is in the foliaceous point, in the species in which this appendage exists. When this is found in any species, as in the genus *Rosa,* so also in *Rubus,* it is extremely variable in degree, sometimes being little more than rudimentary, while at others it is developed extremely. This remark applies to some of the forms we shall presently have to notice.

The *leaves,* though often presenting a form highly characteristic in certain species, are yet unfortunately by no means constant, and this both as respects the number of the leaflets and the form of the latter. With respect to form, there are two kinds of change to which they are peculiarly liable; changes which I have seen in so many species, that I can believe that *all* may be subject to them. And they are, moreover, such complete removes from what may be considered the normal form of the leaflets, that several supposed species have been built on these characters. The one of these alterations is that of being *laciniated.* This sometimes takes place to a very considerable degree, so as almost completely to mask the species. The other alteration is one I have been in the habit of calling the *abrupt* form of leaf: it consists in the leaflets, the terminal one more particularly, being abruptly contracted below the point, or nearly truncated with a slender acuminated point. This latter variation has led to the naming of several mere varieties as species.

Having premised these general observations, I would proceed to notice several forms, some of which are now described for the first time, others as *British* for the first time; and notices of others are introduced for the sake of expressing what appears to have been misunderstood respecting them, and to refer them to their true position either as species or as varieties only. The majority of the forms, eighteen in number, are of the value of *varieties* only, and where this is the case it does not appear needful to give any description of the character of the species, but only of those points in which the variety differs from the normal form. This applies to the first six plants; for the description of the species to which these belong I would refer to Babington's 'Manual.' The last two forms constitute a species which I have long observed in the Isle of Wight; and the ten intermediate ones, which now appear grouped as three species, are plants about which the greatest confusion has existed, both as to the number of species they really constitute—each being by many held to be a species—and also as to the naming of them, their names having been transposed in almost every supposable change.

The forms noticed are numbered continuously.

1. *Rubus idæus* (L.), var. *trifoliatus.*—*Stem* polished. *Prickles* few. *Leaves* ternate.

   Hab. Morton Lane, Isle of Wight.

This form of *Rubus* is deserving of notice as a distinct variety. In addition to the difference of the leaves, it is remarkable for the extreme freedom from prickles and the bright polish of the stem. It is mostly interesting from its analogy to the form next to be noticed.

2. *Rubus suberectus* (And.), var. *trifoliatus.*—*Stem* polished. *Prickles* very few, small and straight. *Panicle* lax. *Fruit* bright red.

   Hab. Apse Castle Wood, Isle of Wight.

A most beautiful form of this variable species, growing abundantly in the wood above-named, and with extreme luxuriance, sometimes attaining the height of eight or ten feet. The *stem* is almost entirely destitute of prickles and highly polished. It is very rarely that the *leaves* divide so as to be quinate, but this occasionally occurs. Were it not that I have been enabled to trace a complete series from the occasionally quinate specimens of this variety to the ordinary form, it would be almost impossible to believe that the extremes of this species could possibly belong to the same;—that the Isle of Wight plant with its smooth polished stem and ternate flaccid leaves could be of the same species with the vastly prickly plant with stiff pinnate leaves which is found in the north. There is however almost as much difference in the extremes of *R. idæus,* and it is from the analogy of the form of it above-mentioned to the present one, that I was so much interested in meeting with it.

3. *Rubus plicatus* (W. and N.), var. *carinatus.*—*Prickles* uncinate. *Leaves* elliptic-lanceolate, acute at both ends, carinated and

strongly veined beneath. *Panicle* simple, peduncles very long. *Fruit* deep red.

Hab. Boggy ground at Burnt House, Isle of Wight.

This plant at the first glance has a very distinct appearance, being considerably smaller than the ordinary forms of *R. plicatus,* to which its narrow leaves afford a very strong contrast. The *panicle* is very lax, the *peduncles* remarkably long, and the *flowers* large and white, so that when in bloom, with its showy long-stalked flowers among the shining simple leaves of its racemed panicle, it has very much the appearance of *Prunus Cerasus.* The *fruit* is of a claret- or blood-red.

Distinct as this appears from the other extremes of *R. plicatus,* I have yet traced a continuous series of specimens.

4. *Rubus leucostachys* (Sm.), var. *argenteus.*—*Stem* clothed with a thick, short tomentum. *Prickles* strong, silky. *Leaflets* abrupt or orbicular-acuminate. *Panicle* tomentose, branched, often corymbose.

Hab. Near Albourne and Cowford, *Mr. Borrer;* hedges, Isle of Wight.

Syn. R. argenteus, *Borrer,* Herb.

Though this variety passes insensibly into the ordinary form of *leucostachys,* yet in its most marked state it is sufficiently remarkable to deserve notice. It wants the loose shaggy hairs of the ordinary *R. leucostachys,* which are replaced by a dense silvery tomentum. The *leaf* is not jagged and very silvery white beneath. The *panicle* is ordinarily a branched corymb with large showy rose-coloured flowers.

Intermediate forms approaching to this variety are extremely common.

5. *Rubus discolor** (W. and N.), var. *macroacanthus.*—*Stem* clothed with scattered, patent, silky hairs. *Prickles* very strong. *Panicle* branched, pubescent.

Hab. Quarr Wood, Isle of Wight.

Syn. R. macroacanthus, *W. and N.* Rubi German. p. 44. tab. 18.

The stem in this variety has not the close glaucous silkiness of the common *R. discolor,* nor the absence of hairs like the variety *thyrsoideus*†, but a few scattered weak hairs which still leave the stem a shining appearance. The clothing of the *panicle* also is

* For the description of the species in Babington's 'Manual' see *R. fruticosus* (L.).

† Phytologist, ii. p. 104.

looser than in the ordinary forms of this plant, not being, as it usually is, a close tomentum, but a loose pubescence. The *leaves* are not recurved as in the common form, but are coriaceous and acuminate, rather abrupt, pale, but not white beneath. The panicle is much broader than in the normal plant. Still however the forms are osculant.

6. *Rubus discolor* (W. and N.), var. *argenteus.*—*Stem* with scattered patent hairs. *Prickles* weak, straight. *Panicle* branched, pubescent.

Hab. Bog at Burnt House, Isle of Wight.

Syn. R. argenteus, *W. and N.* Rubi Germ. p. 45. tab. 19.

This variety very nearly resembles the last. The *stem* is more silky, the *panicle* weaker, the *leaves* narrower and less coriaceous.

We now come to the consideration of several forms, including Nos. 7 to 13, which are very nearly allied, but the arrangement and naming of which have hitherto been very contradictory. They have been generally known of late as constituting the "*Rudis* or *Radula group*," which is characterized by a stem, hispid with numerous short broad-based aciculi, and by pointed, and usually jagged leaves. This group has by most been divided into as many species as it contains forms, while on the other hand the opinion has been hazarded that all might be united as forming but one.

The following analysis, after some considerable observation, is offered with the belief that it will be found the correct grouping of the forms, and prove available for reference.

7. *Rubus rudis* (Weihe).—*Stem* arched, angled. *Prickles* strong, decurved, equal, mostly confined to the angles of the stem. *Hairs, setæ* and *aciculi* numerous, equal. *Leaves* quinate; *leaflets* obovate, acuminate, doubly and coarsely serrated, green and plain above, white beneath. *Panicle* large, branched and leafy, hairy and very setose, with numerous long straight prickles. *Calyx* lanceolate, prickly and setose, strongly reflected in fruit. *Flowers* in July.

Hab. Hedges and sunny places in the south.

Syn. R. rudis, *W. and N.* p. 91. tab. 40. *Bell Salter* in Phytol. ii. p. 137. R. Radula, *Leighton,* Fl. Shrop. p. 232. R. Radula, γ. Hystrix, *Bab.* Man. p. 96.

8. β. *Leightonii.*—*Leaflets* abrupt. *Prickles* of the panicle stout.

Hab. Almond Park, Shropshire, *Mr. Leighton.*

Syn. R. Leightoni (*Lees*), *Leight.* Fl. Shrop. p. 233.

9. γ. *Reichenbachii.—Aciculi* and *setæ* few on the barren stem. *Leaflets* suborbicular.

Hab. Spring Vale near Ryde, *Mr. Thomas Meehan.*

Syn. R. Reichenbachii (*Köhler*), Rubi German. p. 87. tab. 37.

This is a very remarkable bramble, characterized generally by the darkness of the *stem,* which may be described as of a *fusco-ater* tint, and except in the form γ. by the extreme jaggedness of the *leaves,* which are of a deep dark green above; also by the length of the *pedicels* of the leaflets, in some cases little less than that of the leaflets themselves. The *prickles* are pungent, generally clothed with silky hairs, nearly equal, not passing into setæ or aciculi. *Aciculi* short, equal both among themselves and to the dense clothing of *hairs* and *setæ.* The *panicle* is extremely large, much-branched and leafy. The *prickles* of the panicle are long, and except in β. slender and nearly horizontal. *Rachis* very setose. *Leaves* of the panicle ternate below, passing by means of broad simple leaves with large stipules into leafy ternate bracteas. *Bracteas* hairy, upper ones very setose. The *calyx* has a few prickles, is thickly clothed with dark-coloured setæ, and has most generally a leafy point, is much reflected, and even strongly repressed on the peduncle when in fruit. This long reflected calyx gives a decisive character to the plant. The fruit is oblong, large and shining. The flowers are small, usually white.

The var. β. *Leightonii* is characterized by that form of *leaflet* spoken of in the general observations above as the abrupt form. The *prickles* of the panicle have broader bases, and are falcate or decurved, and those of the *barren shoot,* which is not so dark as in the other forms, are slightly unequal. Though these differences in the well-marked variety are considerable, yet I have specimens, collected in the Isle of Wight, which I scarcely know whether to refer to the first form or to β. The descriptions of both, in Leighton's 'Flora,' under the synonyms above given, are excellent.

The var. γ. *Reichenbachii* is the most distinct form, and regarding only the barren shoot, might appear, from the different shape of the *leaf,* which is of a *corylifolius* form, and from the paucity of *setæ,* to be a separate species. All the parts however of the inflorescence and fructification accord with the normal form, and there are intermediate states.

10. *Rubus Radula* (Weihe).—*Stem* arched, slightly angled and striated. *Prickles* with thick bases, unequal, declining, passing insensibly into setæ. *Aciculi, setæ* and *hairs* numerous and unequal. *Leaves* quinate; *leaflets* obovate, acuminate, finely and unequally serrated, green and channeled above, pale and

strongly nerved beneath. *Panicle* leafy below, branched. *Rachis* tomentose, sparingly prickly. *Calyx* ovate, tomentose, reflected in fruit. *Flowers* July and August.

Hab. Hedges near Poole in Dorsetshire.

Syn. R. Radula, *W. and N.* p. 89. tab. 39.

11. *β. Hystrix.—Glands* and *setæ* fewer. *Leaves* less channeled above, and less strongly nerved beneath.

Hab. Shady woods in the south.

Syn. R. Hystrix, *W. and N.* p. 92. tab. 41. R. Kœhleri, var. pallidus, *Borrer.*

12. *γ. pygmæus.—Stem* terete, slender. *Prickles* slender, declining.

Hab. Killarney, Kerry, *Mr. Babington.* Leigh Wood near Bristol, *Mr. H. O. Stephens.*

Syn. R. pygmæus (*Weihe*), *W. and N.* p. 93. tab. 42.

13. *δ. foliosus.—Panicle* more leafy with simple leaves.

Hab. Glen Falloch, Perthshire, and Braid Hills near Edinburgh, *Mr. Babington.*

Syn. R. foliosus (*Weihe*), *W. and N.* p. 74. tab. 28.

This bramble may be distinguished from the last species, with which however it has been often confounded, by the more slender *stem,* which is of a pale colour, either green or purplish green; by the gradual transition of the *prickles* into setæ; by the pale green of the *leaf,* which is less jagged; by the *calyx,* which is broader and shorter than in *rudis,* has never as in that species the leafy point, and is clothed with a whitish tomentum instead of the dark setæ; there are however on the calyx a few scattered glands. Other points of difference are, that the *panicle* is less branched, leafy only below, except in δ, with ternate leaves. *Rachis* sparingly prickly and not setose; the *peduncles* however are glandulose. The *petals* are large and of a bright rose-colour. The first form is the *R. Radula* of the author of the species. It is that of exposed situations, and has the characters of the species best developed. It is the most glandulose, and has the beautiful channeling of the leaves in the course of the ramifications best marked,—a character pointed out to me by my friend Mr. Babington.

The var. *β. Hystrix* is the form of shaded woods, and is the most common. The *glands* are much fewer, and the *leaves* less grooved and less pale beneath.

The var. *γ. pygmæus* is altogether a more feeble plant.

The var. *δ. foliosus,* which was first brought under my notice by Mr. Babington, appears to be the northern form of the species, and though quite distinct in appearance, possesses no remarkable artificial character by which to distinguish it from the other forms. The following are probably the readiest:—the *leaves* are nearly concolorous on both sides; terminal *leaflet* subcordate, much-acuminated; *panicle* leafy to the summit with simple leaves; *petals* smaller and paler.

It is a matter of doubt whether further observation will not unite *R. Lingua* (Weihe) and *R. scaber* (Weihe) to this species.

The next three forms I was originally disposed to consider as so many distinct species, and with that opinion recorded two of them in my remarks on the "*Rubi* of Selborne," in the second volume of the 'Phytologist.' My reasons for now coming to a different conclusion, that they are but so many forms of one, I will mention after describing them.

14. *Rubus glandulosus* (Bellardi).—*Stem* arched, terete or slightly angular, prickly with small straight unequal *prickles*, hairy and very setose. *Leaves* ternate; *leaflets* oval, cuspidate, green on both sides, pilose above, hairy and rather paler beneath. *Panicle* branched, leafy below, densely setose. *Calyx* lanceolate, reflected or patent, often with a leafy point. *Flowers* July and August.

a. Bellardi.—*Stem* terete. *Prickles* small, straight, nearlyequal, declining. *Leaflets* finely and evenly serrated.

Hab. Terrington Car, Yorkshire, *Mr. Borrer.*

Syn. R. glandulosus (*Bellardi*), *Borrer* in Eng. Bot. Suppl. 2883. R. Bellardi (*Günt.*), *W. and N.* p. 97. tab. 44.

15. *β. Lejeunii.*—*Stem* slightly angular. *Leaflets* obovato-lanceolate, unequally but finely serrated. Whole plant less glandulose.

Hab. Temple near Selborne, Hampshire, and near Guildford, Isle of Wight. Near Twycross, Leicestershire, *Rev. A. Bloxam.*

Syn. R. Lejeunii (*Weihe*), *W. and N.* p. 79. tab. 39; *Bell Salter* in Phytol. ii. p. 135.

16. *γ. rosaceus.*—*Stem* angular. *Prickles* unequal, larger ones hooked and decurved. *Leaflets* obovato-lanceolate, cuspidate, unequally and coarsely serrated.

Hab. Selborne, Hampshire; South Molton, Devonshire, *Mr. Borrer.* Channel Islands, *Mr. Babington.*

Syn. R. rosaceus (*Weihe*), *W. and N.* p. 85. tab. 36; *Bell Salter* in Phytol. ii. p. 133. R. Lejeunii, *Bab.* Man. p. 97.

In all its forms this is a most beautiful plant. It is one of very elegant growth, while the lively green of the foliage, which is veined with purple, and the bright red of the almost moss-like clothing of glands, add much to its beauty of appearance. The forms marked β. and γ. are those published as distinct species, in the account of "Three days' botanizing at Selborne," published in the 'Phytologist'*. The discovery of the form β. in the Isle of Wight this year, and the opportunity of seeing the forms *a*. and γ. growing together in St. John's Garden, have since enabled me to become better acquainted with these plants. These two last-named forms, now they are growing in the same situation, have become considerably approximated, and I cannot longer do otherwise than consider them as varieties of the same species, while β, which is the least glandulose, is in all other points the connecting link. The distinctions made in the 'Phytologist' are still applicable to these as *varieties*; I would add, however, that the β. of Selborne, having grown in the shade, was, as I then supposed, deficient in vestiture. In all the varieties the leaves are sometimes quinato-pedate—more often in β. than the other forms, but in this too it is the exception. The *calyx* is variable in all the forms, both in respect to the amount of foliaceous appendix, and also as to its direction, which is reflected or erecto-patent in various degrees.

The remaining two forms are those which constitute the species appearing now for the first time as British.

17. *Rubus Wahlbergii* (Arrhenius).—*Stem* arched, round. *Prickles* numerous, with thick bases, very unequal, hairy. *Hairs* on the stem and glands very few. *Leaves* quinato-digitate. *Leaflets* subrotund, cordate acuminate, pale green beneath. *Panicle* branched, leafy, tomentose and prickly. *Prickles* of the panicle numerous, very strong and decurved. *Calyx* broadly ovate, tomentose and glandular, patent in fruit. *Fruit* of few large grains.

Hab. Eastern parts of the Isle of Wight in hedges.

Syn. R. Wahlbergii (*Arrhenius*), Monogr. Rub. Suec. p. 43.

18. β. *frustratus.*—*Stem* suberect.

Hab. St. Helens and Bembridge, Isle of Wight.

This is a very remarkable plant, which has attracted my notice for many years as one of very peculiar appearance. I had thought it an undescribed one, until Mr. Babington pointed out to me the description of Arrhenius in his excellent 'Monograph' under

* Vol. ii. pp. 133–137.

the name above given. The Isle of Wight plant appears certainly to be the same as that of Sweden, and as in that country, so in this, it is a very variable one. Its nearest alliance appears to be with *R. cæsius* and *R. dumetorum,* but it is very much stouter than either of those, having, in its strongest state, a *stem* of about an inch in diameter, and so thickly set with *prickles* on very dilated bases, that they may be said to be actually confluent. In the hollows between the bases or on the latter are a few scattered *hairs* and *glands,* with an occasional *aciculus.* The *stem* is occasionally slightly glaucous. The *leaves* are very large and rugose, and soft with hairs beneath. The *flowers* are on long, branched and excessively-armed *panicles,* are very large and of a beautiful deep rose-colour. As far as I have hitherto observed, they seldom mature their *fruit,* which is composed of a few large grains, of an acid taste, black and slightly glaucous. As observed by Mr. Babington, the prickles on the summer growth of the plant are nearly horizontal, while those on the autumnal portion are more slender and much-hooked.

In the weaker states of the plant, the prickles are far less numerous than described above.

The young plants are suberect, and before arriving at the fully-developed arching form, flower and mature their seed, quite as freely as the stronger plants. In some instances, where light or nutriment is deficient, it does not become developed beyond this point, when it constitutes the var. *β.* above enumerated. In this form the *panicle* is very short, with large leaves among the flowers.

XL.—*Notice of the Fœtus of* Zygæna laticeps, *Cantor.* By Dr. Cantor, Civil Surgeon, Prince of Wales Island.

Library, East India House, Nov. 5, 1845.

[Dear Sir,—Dr. Theodor Cantor, who has for several years zealously prosecuted his researches relating to the zoology of Penang and the opposite Malayan coast, has entrusted to me a notice on the *Zygæna laticeps,* Cantor, to which Dr. John Richardson has, at my request, added an explanatory note, giving an account of the history of this fish, since the period of Dr. Cantor's departure from England, with a remark on the most important points of this communication. Should you find it a proper subject for the 'Annals of Natural History,' I wish to leave it at your disposal.

Yours very truly,
Thomas Horsfield.]

Richard Taylor, Esq.

Of the genus *Zygæna* two species occur in the Malayan seas: *Z. Tudes,* Valenciennes ("*Koma Sorra,*" Russell), which is but seldom seen, and attains to about eleven feet in length, and *Z. laticeps*, which is exceedingly numerous, and apparently of smaller size than the former. On the 15th of September 1844, some Chinese fishermen captured off Prince of Wales Island a gravid female *Z. laticeps*, by far the largest which has come under my observation, of the following dimensions:—

Entire length of the fish	4 ft. 4 in.
Breadth of the head (the anterior margin) ...	2 ft. $1\frac{1}{2}$ in.

On being opened there appeared eighteen living young ones, of which number seven were males, distinguishable by the anal appendages, and eleven females. All eighteen were of nearly equal size, and of the following dimensions:—

Entire length of the body	1 ft. $1\frac{1}{2}$ in.
Breadth of the head (anterior margin)	6 in.

The relative proportions of the head and body consequently remain nearly the same in every stage of growth. The lateral processes of the head were in the fœtus considerably bent in a backward and inward direction, imparting to the head the shape of a broad arrow, whereas these processes after birth form with the body a right angle, which makes the fish resemble a double hammer, or the letter T. In the fœtus the lateral processes are entirely membranous, except a narrow cartilaginous cylinder which encases the optic nerves, and which is so pliable that it does not prevent each lateral process from lying in close contact with the sides of the body, and thus they take up but comparatively small room, and offer no obstacle under parturition. None of the fœtuses were provided with branchial filaments. The teeth, in the adult fishes comparatively small, were barely perceptible to the touch. The colours were precisely similar to those of the adult. *Zygæna laticeps* in its fœtal state, and shortly after birth, answers in every respect to the description, and resembles so exactly the delineation of *Z. Blochii*, represented by M. Valenciennes, Mém. du Mus. ix., that in all probability the original of Bloch, pl. 117, and of M. Valenciennes, which has afterwards been copied by myself and lately by Mr. Yarrell, was a fœtus or very young specimen of *Z. laticeps*. As neither Bloch nor M. Valenciennes appear to have given the dimensions of the fish figured, it is impossible to decide the question till the actual size of their original has been ascertained. The smallest specimen which I have observed of *Z. laticeps* in its perfect state—I mean in which the lateral processes of the head form a right angle with the body—measured $1\frac{1}{2}$ ft. in total length. From this I infer, that the lateral processes of the head, which in the fœtus branch off from the head under a sharp angle, pointing backwards, change their position and acquire firmness at no remote period from the birth.

If therefore no specimen of *Z. Blochii* exists exceeding $1\frac{1}{2}$ ft. in length, little doubt can remain that this species is *Z. laticeps* in its fœtal or very young state.

In the principal part of this paper, viz. in the remarks on the identity of *Sphyrna Blochii* with the fœtal state of *laticeps*, Dr. Cantor has been forestalled by Müller and Henlè, who quote Dr. Cantor's *Zygæna laticeps* as a synonym of their *Sphyrna Blochii.* In another point noticed in the commencement of the paper, viz. the identity of the *Koma sorra* of Russell with the *Zygæna Tudes* of Valenciennes, Dr. Cantor differs from Müller and Henlè, who refer Russell's figure to the *Sphyrna Zygæna* or the *malleus* of Valenciennes, and their authority is deservedly the highest as to Malacopterygian fish. The fact however of the fœtal fish with the head doubled back being taken from the mother shark with the long transverse head of *laticeps* is worth recording, as is also the habitat, for the range of *Sphyrna Blochii* is not well known.—J. R.

XLI.—*On the Dissolution and Re-calcification of the Shell in* Cypræa, *a genus of Pectinibranchiate Mollusca.* By Lovell Reeve, A.L.S. &c.*

The formation of a new shell in the Cowry at an advanced period of its existence is a phænomenon which modern naturalists have hesitated to receive. Bruguière first introduced the fact, but in a manner which appeared to savour of the marvellous; and even Lamarck says, "I possess observations which tend to prove that the Cowry, arrived at the power of forming a complete shell, has still the faculty of enlarging its habitation, and is then obliged to quit the shell in order to form a new one. It results from this, that the same individual has the power of forming a successive number of shells during both the second and third stages of growth; and which accounts for our often meeting with so many different sizes of the same species†"!

M. Deshayes, after furnishing us with an excellent account of the zoological characters of *Cypræa*, derived mainly from the observations of MM. Quoy and Gaimard (Zoologie, Voyage de l'Astrolabe), argues against the possibility of any re-modelling of the shell taking place, and regards the statement of Lamarck as a theory opposed to the common laws of organization. To the supposition of Bruguière that the Cowries cast their shells after the manner of Crabs, M. Deshayes very properly replies, that there can be no analogy between them. The new shell of the Crustacea is formed by a secretion of equal consistency from

* Written for a forthcoming monograph of the genus *Cypræa* in the 'Conchologia Iconica,' and communicated by the author.

† Animaux sans Vertèbres (Deshayes' edit.), vol. x. p. 482.

every part of the body; whereas the Mollusca have a muscular attachment to the columella, and increase the growth of their shell by an exudation, not from the whole body, but from a particular organ;—the mantle being the sole agent charged with that faculty. It is further argued by the same distinguished naturalist that the Cowry must lose the power of forming the inner chambers of the columella anew, after having once passed that early process of development which induces their formation. How is it possible, asks M. Deshayes, that the animal can, under the circumstances of its nature, secrete a new shell from all parts of the body at once, and with all the different phases of colour exhibited in the original, when it has reached to an advanced condition of its existence?*

It is however certain that the *Cypræa* is enabled to effect a very important change in the shell during one or more periods of its life; and I think that the fact may be fully established without prejudice to the excellent arguments of my illustrious contemporary. From the testimony of a gentleman who worthily employs the opportunities afforded him as a Naval Officer to the advancement of science, whose veracity is beyond all question, and whose communication (given verbatim†) contains nothing more than a simple narrative of the phænomena of which he was himself an eye-witness, it may I think be deduced that it is the outer wall of the shell only which is re-constructed, the columella with its spiral compartments remaining undisturbed.

* Animaux sans Vertèbres (Deshayes' edit.), vol. x. p. 486.

† *Lieut. Hankey, R.N., to Lovell Reeve.*

H.M.S. Collingwood, Aug. 6th, 1844.

My dear Sir,—Will you allow me to offer you a few remarks on the habits of the *Cypræa* as regards the fact of its making a new shell at an advanced age, of which process I have been, myself, in more than one instance an eye-witness? I have seen the Cowry crawl into some hollow or sheltered place evidently for some predetermined purpose. The growth of the animal appears to increase too large for its cell; it gradually swells and cracks the shell, and I think that some powerful solvent or decomposing fluid is distributed over the outer surface by the mantle of the fish, for it gets thinner in substance and the colours duller in appearance. The shell then entirely disappears, the Cowry becomes to all appearance a naked mollusk, with no other covering than its membranous mantle, and in a short time secretes a thin layer of glutinous matter which in a few days obtains the fragile consistency of shell-lac. From this step its growth is more rapid, and it becomes more and more consolidated into the adult shell. When in the first stage of renewal it has the appearance of shell-lac it is always of the *Cymba* form, but I have never succeeded in preserving any specimens in this state on account of their extreme fragility.

Trusting that you may make some use of these notes, and that (as I have a good dredge with me) I may, like your friend Mr. Cuming, succeed in bringing home something worthy of notice, I shall conclude myself, my dear Sir, yours very truly, John B. Hankey.

The animal does not quit the shell as Lamarck supposed, but dissolves the outer portion with its acetous juices. All visible trace of the shell may be thus removed without weakening M. Deshayes' proposition, founded on the circumstance of the mantle being the only organ charged with the secretive fluid. The mantle is always capable of extension over the shell; and the same power which furnishes the adult with its last coating of enamel can be exerted to the formation of as many superincumbent layers as may be necessary to replace all that has been decomposed. That a dissolution takes place there can be no doubt; the shell gradually swells, says Lieut. Hankey, and cracks, becomes thinner and duller in colour, and finally disappears; a circumstance which may be easily credited when it is remembered that the *Murex* possesses the faculty of removing spines, or any similar obstacles to its advancement of growth, and that the *Pholades* and other terebrating mollusks exercise a power of absorbing which enables them to penetrate the hardest limestone rocks. The microscopical structure of the Cowry shell is, moreover, of a nature peculiarly tenacious of absorption; it is composed of a large quantity of carbonate of lime in proportion to the amount of membranous substance; and this accounts for its surface becoming vitrified, as it were, to such a highly polished state of enamel, in contact with the acidity of the soft parts.

There is another circumstance in Lieut. Hankey's narrative to which attention should be given, respecting the formation of the new shell:—the glutinous matter which has the appearance of shell-lac, and is so fragile that it yields to the touch, does not assume the narrow cylindrical *Bulla* form,—it does not follow the original plan of revolving round a columellar axis, but is of the wide ventricose shape of a *Cymba*, and rapidly consolidates into the adult shell.

With these generalizations I think it may be assumed that the *Cypræa* possesses the faculty of decomposing, during one or more periods of its existence, any portion of the shell that is liable to resist its advancement of growth; that the renewal of the shell is accomplished within a comparatively short space of time; and that the columella with its internal spiral partitions remains undisturbed. It may, however, be inferred that it is an operation of extremely rare occurrence, and one which only happens under peculiar conditions.

Note.

Since writing the above, I have observed that Mr. Gray's opinion on the subject at the time of the publication of his "Monograph on the *Cypræidea*" ran as follows:—

"In this family I have often observed full-grown specimens of

C. arabica from one to three inches long; this peculiarity is attempted to be explained by Lamarck and others, who assert that when the animal has formed a complete shell, as it has not the faculty of enlarging its size, it is obliged to quit its shell and form a new one, in the same manner as the *Annulosa* cast their skins, and by that means the same animal forms many shells; but I believe there is not the slightest ground for this notion, for these several reasons: 1. If it happens in this genus, it certainly should do so in several of the other genera, as the *Strombi* and *Pterocerata*, where the mouth is fully formed in the small shell, and there is no appearance of varices in the large specimens. 2. The muscular attachment of the shell to the animal is one of the best conchological characters that distinguish this class of animals from the shelly and sandy cases of the *Annulosa*; as the *Dentalia* and *Sabellæ*, where the animals can withdraw themselves at pleasure; but in the Mollusca I do not think it possible to be done, but by such force as would destroy the individual. 3. There is no analogy between the *crust* of the *Crustacea* and *Annulosa*, and the *shells* of *Mollusca*; so that it is false reasoning to judge of the possibility of one from the other."—*Zoological Journal*, vol. i. p. 73.

XLII.—*Researches on the Primary Modifications of Organic Matter, and on the Formation of Cells.* By M. Coste*. (Part the 1st.)

Every one is acquainted with the celebrated experiment of Duhamel, who, after having bent the summit of a tree towards the earth, inserted the extremities of its branches into the soil, and afterwards turned the trunk so that the roots projected externally, found that these same roots, which had become aërial, shot out branches, whilst the branches which had become terrestrial sent off roots.

This experiment, the result of which a host of experiments known to agriculturists would have enabled us to foretell, since it was an established fact, that a root which was exposed by any inequality of soil produced a shoot, and that a stem which had been sliced off produced a root, provided that the wound was sheltered from exposure to the air and surrounded with moist earth; this experiment, I say, furnished so decisive a proof of the identity of the roots and stems, that the objections which were at first made to it have neither prevented our taking advantage of the fertile idea which it reveals, nor arrested the progress of the revolution which the development of its consequences introduced into the science of organization.

* Translated from the Comptes Rendus for October 20, 1845.

Thus, as soon as the demonstration of this identity was apparently obtained, and, under the influence of this conviction, naturalists sought for the explanation of so remarkable a phænomenon, science seemed to acquire fresh vigour, and all those facts which now form the base of phytogeny appeared to emanate from the attempts which were made to solve this interesting problem.

In fact, how could it happen that the same part of a vegetable, under the influence of external circumstances, produced organs which then appeared so different as a stem, a root, a bud, or a leaf? To what structural cause could the possibility of so remarkable a metamorphosis be attributed? Such was the idea which observers entertained, and which directed their researches in the new path opened to them.

Success speedily crowned their endeavours, and their earliest labours in unveiling the true structure of plants led them to the important result, that a vegetable, be the complication of its organs ever so great, is essentially nothing more than a collective being, composed of an assemblage of vesicles, utricles or cells, which are so many living individuals, originally identical, enjoying the power of growth, multiplication and capability when occasion requires of reproducing the plant of which they form the constituent materials. If these vesicles, utricles or cells are not excited to any further development, they continue simply to form part of the tissue of the plant they constitute; or they may be absorbed to serve for the nutrition of those cells, which, being more advantageously placed, are destined for new transformations: but if, on the contrary, the influence of more favourable circumstances is felt, we then find that their original aptitude is aroused, and is called into action under the most varied forms; *without however ever exceeding the assigned limits of the species to which they belong.*

The original identity of vegetable cells, and the power attributed to them of being transformed in so varied a manner, is not an hypothesis created by the necessity of any theory; it is a fact confirmed by experiment, and which can be reproduced at pleasure; but this is not the place for studying the mechanism by which such metamorphoses as these are to be accomplished. It is sufficient to know at present that vegetable tissue is exclusively composed of cells, to understand how physiologists, guided by analogy, when direct observation had put them in possession of this fact, were necessarily led to inquire whether the animal organization was not similarly placed as regards structure.

This problem was much more difficult of solution, for the organs in animals are capable of attaining so great a degree of complication, that it frequently becomes impossible to penetrate into their structure as observed in the adult; but if precaution be taken to study the tissues in the germ itself, and at the time of their earliest origin, we can then clearly recognise that their structure is for the most part composed, like those of vegetables, of cells, which are so much the more easily recognised the less their forms are obscured by development.

Now, from the moment at which it was demonstrated that the cell constitutes the base of all the organic tissues, that it is as it were the integral molecule, we could not fail to attach the utmost value to the discovery of the mechanism of its formation. This was, in fact, one of the most curious and most secret phænomena in nature which direct observation could unfold; for by this new conquest science extended the limits of its dominion so far as to observe living matter, still diffuse, commencing to individualize itself in one of the most simple forms which organization is capable of assuming, that is, in that of a vesicle, utricle or cell.

The honour of the commencement is due to M. Mirbel. This physiologist first investigated the origin of the cell from the cambium, and the formation of its walls at the expense of this mucilage. In fact, in the large interstices which the vegetable utricles leave between them, or even in the cavity of these utricles, there exists a mucilaginous matter comparable to gum-arabic, in which the most perfect instruments cannot recognise any trace of visible organization, but which becomes the generating element of every organic form. This diffused matter, which Grew discovered more than 150 years ago, and the use of which he surmised, has been traced by M. Mirbel through the principal modifications which it undergoes in certain vegetables, and the following exhibits the succession of phænomena through which he has seen it pass in producing the cells of which vegetables are composed.

In a series of sections of the extremity of a root of the date-tree, consequently at the point of that root where the cambium is in progress of increasing elaboration, he saw in the mucilaginous substance a multitude of irregularly-spheroidal homogeneous masses, evidently resulting from a concentration of the mucilage, which in each condensed mass already exhibited the earliest rudiments of future organization. In the centre of each mass a cavity is soon formed, which gradually enlarges, and accumulates around it the matter by which it is bounded; and this matter, thus moulded, being expanded into a membrane by the dilatation of the central cavity, finally represents a hollow sphere, which is nothing more than a vesicle moulded by the cavity which it circumscribes. In this manner, by a kind of eccentric condensation of the mucilaginous cambium, the walls of the vegetable cells are formed, and the amorphous matter passes, under the observer's eye, from the state of diffusion into active life, and thus becomes susceptible of playing a more or less active part in the organization of plants. But this mode of formation of the walls of the cells not being the only one observed by M. Mirbel, this physiologist has been induced to admit, that in vegetables nature attains her object by different means.

However, this manner of viewing and judging of the phænomena of which the cambium is the seat was soon accompanied by a diametrically opposite system, the exclusive foundation of which does not admit of the possibility of an exception. This system, contrived by Schleiden to explain the formation of the vegetable tissue, and applied by Schwann to the organization of animals, as we shall presently see, is essentially no more than a generalization *à priori* of Purkinje's theory of the development of the egg in the ovary,—a theory, a large part of which has unfortunately lost much of its value from new discoveries which have diminished its importance, or even reduced it to the level of the most rare exceptions.

Purkinje, after having recognised that the germinal vesicle, among all the component parts of the bird's egg, was that which from its origin had a proportionately more considerable development, supposed that it was first formed, and considered it as a centre around which were successively deposited, first the *vitellus*, and then the vitelline membrane, which, in its turn, coagulated at the periphery of the yolk to complete the ovarian egg, and to inclose its elements in an enveloping membrane. This successive union of concentric parts, mechanically superadded around each other, so that the most external are the most recent, having appeared to Schleiden and Schwann the most simple means of conceiving the formation of the vesicular walls, these naturalists formed it into a general theory of the development of the cell; and with them the enunciation of the special fact, modified as we shall presently show, has become the foundation of a universal principle.

Consequently they admitted, that in the diffuse and structureless homogeneous substance, the *cytoblastema*, by means of a concentration of this substance, corpuscles were formed; these were so extremely minute, that even the highest powers of the microscope did not allow of their always being detected. These corpuscles, called *nucleoli*, are so many centres around each of which a layer of finely-granular matter is deposited, which is not at first distinctly limited in its circumference, but which finally becomes more clearly outlined, and forms more or less regularly spheroidal, elliptical or lenticular agglomerations.

Each of these minute accumulations of amorphous matter around one or even several *nucleoli*, which they unite, is called a *cytoblast* or *nucleus*, and forms the second phase of the process of organization, which, according to this theory, prepares the way for the cell-wall, of which all the anterior phænomena are indispensable precursors.

Lastly, when the cytoblast or nucleus is formed around the nucleolus, and the total mass represented by their assemblage has assumed a certain volume, we find deposited on its exterior a new layer of substance, the fragile margins of which, at first vaguely defined, are soon consolidated and strengthened by the addition of new molecules. This more or less thin and delicate mass, which is sometimes homogeneous and gelatinous, sometimes granular, is nothing more than the cellular wall which is developed on the surface of the cytoblast, as it were around a temporary frame-work, the presence of which becomes useless as soon as the structure which it supports is completed.

But, when deposited around the cytoblast or nucleus, the new cell does not inclose this cytoblast in the centre of the cavity which it is about to circumscribe, as we should suppose; on the contrary, it fixes it between the molecules which are about to form its generating wall, retains it inclosed amongst these molecules, and forms of it an integral part of the parietal membrane. This incorporation renders the cell-wall much thicker at that part which the cytoblast occupies than in any other part of its extent; and it is for the purpose of expressing the appearances produced by this inequality of thickness, that the statement has arisen that the new cell resembled a watch-glass placed upon its dial. In this comparison, the watch-glass represents the thin and diaphanous portion of the wall; the dial corresponds to that part which the presence of the nucleus renders thicker; and the space comprised between these two parts, which must be considered as continuous, is intended to give an idea of the cellular cavity which is forming.

When the new cell has acquired sufficient solidity, the persistence of an internal frame-work not being any longer necessary to support the strengthened walls, the cytoblast or the nucleus, attached to one point of the thickness of the parietal membrane, has no longer any part to play, and hence it should be atrophied and disappear. Then, in proportion as the cell enlarges, a peculiar liquid is introduced into its cavity and entirely fills it. This liquid, in which more or less abundant granulations may arise, forms the cell-contents, properly so called. But the cellular contents have nothing in common with the cytoblast or nucleus, and would in no case be required to fulfil the generating function which theory attributes to this same nucleus, since, according to this theory, the appearance of the cellular contents is always subsequent to the production of the parietal membrane. Now we shall show, in opposition to this view, that the cellular contents, in a great number of cases, have a direct influence, and that the vesicle which incloses them is generally developed around them.

Finally, when the phases of a first generation are accomplished, new cells are formed in the cellular contents by the same mechanism by which the maternal cells are developed from the primitive cytoblast. In this manner, by an incessantly-renewed repetition of the same phænomenon, the organic tissues, according to this theory, prepare the materials of their growth and multiplication.

Such is the theory, deprived of the vagueness and the obscurities which manifestly arise from the uncertainties which a deficiency of precise observations leaves in the minds of its authors; such is the theory which it is proposed to elevate to the rank of a universal principle. Let us see how far an attentive examination of the facts will authorize the pretensions of such a doctrine. The fundamental character of this doctrine consists, as we have seen, in the succession of four distinct periods, of which the evolution of each cell should always consist.

The first is represented by the appearance of the nucleolus, which is the basis of the structure, and itself results from a simple agglomeration of the molecules of the cytoblastema.

The second corresponds to the deposit and to the coagulation of the cytoblast or nucleus around the nucleolus, considered as the unique and exclusive centre of all cell-formation.

The third, to the deposition and coagulation of the cell-wall around the cytoblast, which it grasps at one point of its substance, and on one side of which it appears at first applied like a watch-glass upon its frame.

The fourth is expressed by the absorption of the nucleus and by the admission of cellular contents, which, being subsequently introduced, cannot consequently have taken any part in the formation of the parietal membrane.

Now if this is the sole mechanism by means of which all organic cells are developed,—if it be true that the four fundamental modifications which prepare the way for their walls are always produced in the order of succession which we have pointed out, it should result that wherever there are cells in the course of formation,—the cytoblastema should present in the metamorphoses of its substance, each of the material modifications which constitute the terms of this essential succession. If then the theory is to aspire to the rank of a general doctrine, it will be necessary that in the self-organizing mucus we should always be able to meet with the free nucleolus, the nucleolus inclosed by the cytoblast, the cytoblast at the moment at which the cell-wall is deposited on its periphery; and finally the cytoblast, inclosed in the thickness of the parietal membrane, disappearing in proportion as the cell-contents are introduced into the cavity of the latter.

But when we search for the facts upon which so radically exclusive a theory is founded, we experience the twofold astonishment of not meeting, in those authors who originated it, with a single example the value of which we cannot seriously contest, and of not finding in nature those abundant proofs which cause a system to prevail, or at least allow the formula to remain, as the most faithful expression of the most numerous category. Thus, in examining the proofs cited by Schwann in support of this hypothesis, we find that they may be reduced, as M. Vogt has remarked*, to a single observation directly made on cartilage; and yet this observation, presented by Schwann himself as very doubtful, has been shown to be false by the researches of M. Vogt on the cartilage of the accoucheur-toad. In fact, in a very large number of cases, the nucleolus, to which the theory attributes the exclusive privilege of causing the amorphous matter to produce the cell-walls; in a very large number of cases, I say, the nucleolus never appears free and isolated in the midst of the cytoblastema. On the contrary, we always find that this corpuscle, even from the first commencement of its appearance, is still inclosed in the cavity of the cell, which is previously formed, frequent instances of which we find in the tissues of the embryo of osseous fishes; it is evident that in these cases at least the nucleolus has taken no part in the formation of the cell, as it was not in existence when the latter was produced. In other cases, this corpuscle did not appear at any period of the existence of the cells, and consequently we should have no motive for making it intervene as a determining cause, since it does not leave to the theory even the pretext of co-existence. This may be easily verified by studying the development of the large cells which form the internal expansion of the umbilical vesicle of serpents.

Hence the tardy appearance of the nucleolus in certain cases,

* "In examining the proofs cited by Schwann in support of his opinion, we find," says M. Vogt, "that they resolve themselves into a single observation made upon cartilage; and moreover it must be remarked that M. Schwann himself presents it to us as very doubtful. In fact, I believe that I have shown in my researches on the accoucheur-toad, that this opinion is probably erroneous, and that an old cellular cavity almost closed, or the half-absorbed nucleus of an old cell, had been taken for the nucleolus of a cell in process of formation. I have then no doubt, from the observations which we now possess, that the nucleolus, far from being the primitive rudiment of the cell, is, on the contrary, nothing more than a formation resulting from one of the last metamorphoses which the cells undergo. . . . . These various facts could not fail to excite doubts in my mind regarding Schwann's theory, and I concluded by considering that it was based upon few facts only, and these were mostly susceptible of another interpretation."

and its total absence in others, form a serious impediment to the theory which locates the exclusive determining cause of all cell-formation in the pre-existence of this corpuscle. This also shakes the very foundations of the doctrine, and tends at the least to restrain its application.

As regards the cytoblast or nucleus, M. Vogt has already shown that it has no influence on the formation of the cell-walls of the embryo of the osseous fishes: I have been enabled to convince myself that the large diaphanous vesicles in the spinal cord of the Batrachia do not appear until after the production of the parietal membrane of these vesicles.

But because the intervention of the nucleolus is not always necessary for the formation of the cells, and because the cytoblast or the nucleus does not itself, in a certain number of cases, retain the function assigned to it by theory, must we necessarily conclude that the cells are never developed around a centre upon which the forming walls would mould themselves? Undoubtedly we shall have frequent opportunities of observing limited masses of matter becoming coated with an envelope, and thus constituting the contents of the pouch which is formed at their periphery; but we shall then remark, that in most of these cases this happens in a very different manner from what the theory supposes; for the matter which has constituted the centre, instead of being absorbed by the parietal membrane, to make room for the cellular contents subsequently introduced, itself forms the cellular contents, fills the cavity of the new cell, may there be applied to different prolonged functions, may live longer than the cell itself, or remain in reserve in the cavity of the latter, to serve the further purposes of nutrition or generation of new cells. The egg, in the two united vesicles of which it is composed, presents us with striking examples of a survival of the matter which has served as a generating centre, because we there see the germinative corpuscles persist when the parietal membrane which incloses them is dissolved, and take part in the new formations after it has been completely absorbed. The yolk there survives the vitelline membrane, and whilst the latter is gradually destroyed from the earliest period of its development, we see the yolk continue to nourish the embryo until after its birth.

Such are the grave, numerous and decisive objections which arise against a doctrine, which must rather be considered as a bold invention of the mind than the carefully-considered expression of satisfactory observation; but although the bases of this doctrine are uncertain, it has not the less rendered an eminent service to science, because in the commencement it gave rise *à priori* to the conception of the possibility that cells might be developed around a centre; and its influence has been very great in directing observers in a fruitful path and in exciting important researches, among which we may mention those of Valentin, Vogt, Bergmann, Reichert, Bischoff, Barry, Lebert and Henle. In my turn I shall make known the result of the observations which I have made upon so disputed a subject—observations which during several years have been many times detailed in the course of instruction which I give in the College of France.

XLIII.—*Anatomical and Physiological Observations on some Zoophytes.* By John Reid, M.D., F.R.C.P.E., and Chandos Professor of Anatomy and Medicine in the University of St. Andrews.

[With a Plate.]

In the following observations upon the structures and actions of some of the Zoophytes obtained from the shore of the bay of St. Andrews, I have confined myself to those points which are either new, or which appeared deserving of additional illustration. In using the terms *superior* and *inferior, upper* and *lower* in reference to the *relative* position of different parts of the polypidom, in the descriptive parts of this paper, the polypidom is supposed to be in the erect position, so that these terms correspond to *anterior* and *posterior* when the polypidom is placed horizontally. In using the term *anterior surface,* I mean the surface on which the apertures of the polype-cells are placed, so that this corresponds to the upper surface when the polypidom is laid horizontally for examination.

Cellularia reptans. This polype grows in considerable abundance close upon low-water mark, on the exposed surface of a stratum of clay-slate and conglomerate, interposed among strata of sandstone belonging to the carboniferous series. Growing along with it, but in much smaller quantities, are *Cellularia scruposa, Crisia chelata, C. eburnea, Pedicellina echinata, Vesicularia spinosa, Valkeria imbricata* and *Plumularia falcata,* none of which have I hitherto found adhering to the surrounding strata of sandstone.

The polypidom of this polype possesses some structures which as far as I am aware have not yet been described. At the external and upper angle of the cell, and posterior to the two spines attached to this angle (Pl. XII. fig. 1 *a,* fig. 2 *c, a, b*), three of these structures are found*. The uppermost of these is a hollow process (fig. 2 *b*), the superior extremity of which is free, looks outwards and a little forwards, and has an aperture notched on the

* Part of this process is seen on looking at the anterior surface of the polypidom, as is represented in Plate XII. fig. 3 *b*.

lower and upper edges, but more deeply in the former than the latter. From this aperture a hair-like prolongation (fig. 2 *d*), about the length of the cell, and slightly curved, projects. The interior of the process is filled with a fibrous contractile substance which moves this hair-like prolongation. Its movements occur at irregular, occasionally very short intervals, and it sweeps downwards over all the posterior surface of the polypidom within its reach. It then turns back upon its former track, ascending upwards until it reaches again the outer edge of that part of the polypidom lying above the process to which it is attached; it now descends in the opposite direction over the outer part of the polypidom, and places itself along the outer edge of that portion of the polypidom lying below it. From this it re-ascends in the course just described. The extent of these movements is increased by the presence of the notches in the edges of the aperture through which the hair-like prolongation passes. These movements are perfectly independent of the polype and continue for days after its death. The upper and outer edge of the polype-cell is prolonged into a process (fig. 1 *a*, and fig. 2 *c*) mucronated at its external and upper angle. This process is hollow and is filled with a pale fibrous contractile substance, which I have frequently seen become elongated and rise in the form of a short conical eminence above the upper edge of the process, and then after a while it contracted suddenly and retired within the process. This process was in some cells metamorphosed into a strong spine (fig. 1 *b*), and in such cases three spines were attached to the external angle of the cell instead of two the normal number. It has an affinity with the tooth-like process of *Cellularia scruposa*, as both contain a similar contractile substance. Placed between the bases of the above two processes and overlapping the latter, is a rounded small cavity with a distinct circular aperture (Pl. XII. fig. 2 *a*). In some cells all these three appendices are wanting; in others only one of the two former is present. The polype protrudes itself through a small aperture directed outwards and upwards, placed at the upper end of the cell and towards its outer edge, and immediately in front of the process bearing the hair-like prolongation (fig. 3 *a*). This aperture is crossed anteriorly by a pretty strong rim which forms the upper edge of the anterior surface of the cell, and posteriorly by the still stronger rim forming the upper edge of the posterior surface of the cell. Below this aperture there is a considerable portion of the anterior wall of the cell formed by a transparent membrane, and bounded by a thick edge, constituting the large oval opening in the anterior wall of the cell in dead or dried specimens. In the greater number of cells this space is crossed by bars of calcareous matter, growing from its inner margin by one stem which generally divides dichotomously into four, and these increasing in length reach its outer margin (fig. 3 *a*). These bars are hollow, are lined internally by a fine membrane, and almost entirely disappear when the polypidom is immersed in dilute muriatic acid. Neither these bars nor the three appendices to the cells above described, present themselves until the body of the cell and its containing polype have been fully formed. The spines attached to the cell are almost always four in number,—two to each superior angle of the cell,—are hollow, and the external two are longer and stronger than the internal. The two former are of considerable thickness, and are generally as long, sometimes more than twice as long, as the cell.

The polype has from fourteen to sixteen ciliated tentacula, of a light orange-colour, rather more than three-fourths of the length of the cell. The animal when retracted within its cell is folded up as in *Flustra foliacea*. Fig. 5 is a representation of the polype when expanded, and fig. 4 represents its appearance as seen from the posterior surface when it withdraws and folds itself within the cell. In this polype the part marked *a* in the figures had more of the appearances of an appendix of the stomach (*b*), or of a separate organ, than in some of the other ascidian polypes*. Its inner surface is so thickly covered with reddish brown granules, or more properly speaking, minute cells, that it is quite opake. Similar granules also adhered to the inner surface of the œsophagus (*d*) and stomach, and sometimes in greater number to the former than the latter. The inner surface of the pharynx (*f*), the œsophagus, the stomach, and a portion of the intestine (*c*) next the stomach are covered with cilia. A mass of dark-coloured egesta, apparently principally composed of the cells and granules thrown off from the inner surface of the digestive tube, is frequently observed about or above the middle of the intestine, and this part of the intestinal tube presents a dilatation frequently considerably larger than what is necessary to contain the inclosed mass. The polype in protruding itself first pushes out a short flexible tube attached to the inner margin of the aperture through which the tentacula pass. The muscles by which it withdraws itself within its cell are two in number,—one proceeding from the lower and outer part of the cell, and dividing into two bundles as it passes upwards, which are attached to the sides of the lower part of the pharynx; the other arising from the lower part of the cell and attached to the lower end of the appendix of the stomach (fig. 5 *a*). The muscular bundles by which it protrudes itself cannot be distinctly traced from their proximity

* From the contractility of these parts the form is not uniform, and in some individuals we find the stomach less and the appendix larger than they are here represented.

to the tentacula and intestine, but are seen passing downwards from the upper part of the cell along the sides of the tentacula to reach the gullet, and probably also the upper edge of the stomach. The flexible tube or operculum is retracted by two muscular bundles, one on each side, arising from the inner sides of and a little below the aperture of the polype-cell, and are inserted into the inner surface of the flexible tube. The young polype-cells, formed at the upper end of the branches, grow from the posterior surface of the polype-cells last formed a little below their upper margin. Their first appearance is that of a rough transverse line occupying the inner portion of that surface. Several specimens presented the bodies frequently termed opercula, but which we shall call *ovary-capsules,* placed as usual at the upper end of the polype-cells, and were here somewhat nearer their inner than their outer margins. The contents of these we shall describe in a subsequent part of this communication.

Cellularia scruposa. This polype is found, as I have already mentioned, in the same locality with *C. reptans,* and it is also thrown ashore from deep water, sometimes in considerable quantities and of more luxuriant growth, chiefly adhering to *Flustra foliacea* and *F. truncata.* A perpendicular hollow process springs from the upper and outer edge of the cell immediately above the already well-known tooth-like process, and adheres to the lower part of the outer edge of the cell immediately above (fig. 6 *a,* and fig. 7 *b*). The aperture of this process is pretty deeply notched before and behind, and its interior is filled with a contractile fibrous substance which moves a curved hair-like prolongation (fig. 7 *b*) about the length of the cell, which sweeps at intervals over both the anterior and posterior surfaces of the polypidom within its reach. It rises up slowly over the anterior surface, makes a sudden jerk over the outer edge of the polypidom, and proceeds slowly downwards over the posterior surface as far as the notch in the aperture permits, and after remaining at rest for a longer or shorter time, it returns along the same course to the position from which it started. In this movement it performs a slight rotatory motion, so that its concavity is always directed towards the surface of the polypidom. This hair-like prolongation, in this as in *Cellularia reptans,* tapers gradually towards its free extremity, and is not rounded but flattened. In the *C. reptans* I never observed this hair-like prolongation cross the anterior surface of the polypidom, except when placed at the angle of the bifurcation of a branch. The use of these hair-like prolongations may probably be to keep the surface of the polypidom clear of substances which would otherwise adhere to it. Their motions are executed with more force than we should at first suspect. I have seen one of them in its course encounter the stalk of a *Pedicellina echinata,* and press it aside. The tooth-like process (fig. 7 *c*) is hollow, has an aperture in its upper edge, and in several specimens I have observed it filled with a fibrous contractile substance which expands and rises upwards through the aperture, and after remaining stationary for a time it re-enters the process. It rises only a short distance above the aperture, and when expanded presents the appearance of the upper and outer angle of the containing process with the curve turned in the opposite direction. When expanding it moves from without inwards, gradually rising above the edge of the aperture, and it re-enters the process by a sudden jerk in the opposite direction. These movements of expansion and contraction commonly occur after long intervals, and it is in general only by watching a portion of the polypidom for a considerable time under the microscope that they can be detected. More rarely these movements occur in rapid succession. I can form no conjecture regarding the function of this curious contractile substance. At the root of the process bearing the hair-like prolongation there is a small rounded cavity with an aperture in its posterior wall, exactly like that described in the corresponding position in *C. reptans* (fig. 7 *a*). Each cell has four small hollow spines attached to its upper edge, two adhering to each angle. These spines are very considerably smaller than those in *C. reptans,* and in old specimens are generally broken off. The position of the aperture in the cell through which the polype protrudes is similar to that in *C. reptans,* and is also provided with a short flexible tube, which acts as an operculum when the polype retires within its cell. Many specimens are provided with ovary-capsules placed as in *C. reptans.* The polype has generally twelve tentacula of a light orange-colour, and has in other respects a great resemblance to that in *C. reptans,* and is provided with the same muscular bundles for effecting its movements and closing the operculum.

Cellularia avicularis. I lately obtained a large and very perfect specimen of this polype. The shape of the polype-cell, as Dr. Johnston remarks, is similar to that in *Flustra avicularis.* The bird-process is also exactly alike in both. It can, however, be readily distinguished from the latter by all the branches being composed of two rows of semi-alternate cells, and each cell having only two conical spines directed upwards or in the line of the long axis of the cells, and a little outwards and forwards, and attached to the angles of the superior margin of the cell. In a small number of cells an additional small spine, making three in all, projected from the outer angle in the same direction as the normal one. On the other hand, almost all the cells in *Flustra avicularis* have four spines, which differ in appearance from those of *Cellularia avicularis.* This specimen when dried assumed only a very faint ash-colour, very different from the much deeper ash-colour in all the dried specimens of *Flustra avicularis* I have seen.

These two polypes ought certainly to be classed as two different species of the same genus, and not under two different genera. A new genus should perhaps be instituted for their reception, as their general character, and more especially the possession of those remarkable appendices, the bird-head processes, separate them from *Acamarchis, Flustra* and *Cellularia,* the genera to which they are most allied.

Pedicellina echinata. This polype is found in considerable quantities in front of the Castle of St. Andrew and near low-water mark, adhering to *Cellularia reptans,* to *Sertulariæ,* and to the surface of stones. It is more hardy than most of the other ascidian polypes, and can be kept alive at home for a long time. The number of tentacula varies from fourteen to twenty. In some specimens the stalk is nearly smooth, in others several spinous-looking processes project from it, and in others both stalk and body are covered with a long, fine and sparse down. In the young animal the body is relatively longer and narrower. The body in the older animal is very decidedly compressed from before backwards and elongated transversely, and is considerably narrower and more bulging at the edge in which the intestine lies (fig. 8 *d*) than at the edge next the gullet (fig. 8 *a*). The upper part of the body is bounded by a slender rim to which the tentacula are attached. This rim slopes slightly from the narrow towards the broad end of the body. The tentacula at the extremity of the narrow end are shorter than the others, and all of them become considerably broader as they approach the rim. They are connected together at their lower third by a contractile membrane, partly composed of circular fibres. The body itself is not contractile. The inner surface of the edges of the tentacula and the inner surface of the rim are provided with strong cilia, and in the older animals the external surface of the tentacula is frequently covered with a layer of pretty large granules or cells. On examining the animal under the microscope when placed in water containing a quantity of carmine, the movements of the currents of water produced by the cilia can be more distinctly observed. The two rows of cilia attached to each tentaculum do not produce currents in opposite directions, but both strike downwards and towards the mesial line of the tentaculum to which they are attached, and cause a current down the centre of its internal surface, by which the particles of carmine are carried downwards to the rim. When all the currents carried down the tentacula arrive at the rim, they are rapidly conveyed along its upper edge by the action of the cilia with which this portion of the inner surface is so abundantly provided, towards the mouth (fig. 8 *a*). At this part all the currents converge, and thus produce an upward central current, by which the particles of carmine are carried outwards. None of the carmine, as far as I could observe, entered the œsophagus. The particles of carmine sometimes collected in considerable masses around the mouth before they were floated outwards. As the termination of the intestine opens near to the mouth, and at a point within the influence of this outward central current, the egesta when voided are rapidly carried away. It would thus appear that when substances not fitted for the nourishment of the animal are conveyed towards the mouth, the walls of this aperture are endowed with a specific property of irritability by which they are thrown into contraction and prevent its entrance. Such substances on the other hand as are capable of nourishing the animal do not act as excitants to this property of contractility, and they may be carried inwards. The possession of such a property is probably necessary for the existence of the animal. In this animal, as is well-known, the whole digestive tube and the ciliary motions on its inner surface can be distinctly seen through the transparent body. The walls of the stomach (fig. 8 *b*) and the first portion of the intestine (duodenum ?) (fig. 8 *c*) are very much thicker than the rest of the digestive tube, and were never observed to contract; and this last circumstance, viz. the non-contractility of these parts of the digestive tube, does not exist, as far as I am aware, in any other ascidian polype. A slight contractile movement was observed in a few cases at the upper part of the gullet. The last part of the intestine (fig. 8 *d*), which is not provided with cilia, contracts and expels the egesta which have previously accumulated there, frequently in considerable quantity. Brownish masses, apparently chiefly composed of the granules and cells which so abundantly line the inner surface of the stomach, are frequently seen in rapid rotatory motion in the stomach and duodenum.

The life of the body is of shorter duration than that of the stalk, and I have observed in several specimens the body fade and fall off, and a new one reproduced in its place. A few days before this takes place, the tentacula are permanently bent inwards and the membrane surrounding their lower part remains contracted, so as to completely, or nearly completely, cover the upper surface of the body, presenting in fact the appearance which the animal temporarily assumes when disturbed. The body then becomes more opake and at last falls off. After this the stalk retains its property of alternately contracting and relaxing its different surfaces at intervals, upon which its movements depend. After the lapse of a few days the top of the stalk enlarges, and a minute head presents itself in which the different parts of the body are developed. In the beginning of October I procured several specimens in which a large mass of cells (ova) was placed in the space between the gullet, intestine and upper edge of the stomach (fig. 8 *h*), extending downwards to the entrance of the gullet into the stomach, and depressing the stomach and forcing it considerably downwards. In two of these this mass of cells projected into the interior of the gullet near its lower part, and exceedingly minute ciliated ova were seen escaping from the upper part of the cellular mass, and several were also seen swimming in the interior of the gullet and stomach. Portions of this mass of cells were after a time extruded outwards, and were composed of the ciliated ova, and of very minute nucleated cells connected together by a structureless substance. Many of these ova formed a single cell, broader at one end than at the other, with a circle of cilia longer than the cell placed around the margin of the broad end (fig. 9 *a*), while others presented one, two or more very minute cells attached to its lower or narrow extremity (fig. 9 *b* & *c*). The nucleated cells consisted of a cell-membrane with two or more nuclei, and appeared to be undeveloped ova. The ciliated ova swam actively about, sometimes bending all their cilia in the same direction, forming a curved bundle and striking in the same line for some time together, at other times spreading their cilia and moving them in different directions. These ova are so minute as to require very high magnifying powers for their examination. It would thus appear that this polype, supposing all the individual animals whose stalks are attached to the same creeping stem to form one aggregate animal, extends and prolongs the life of the individuals composing it in two ways; viz. by renewal of the individual bodies after they have dropt off, and by offsets of new individuals from the creeping stem; and that it reproduces and extends the species, or forms new aggregate animals, by the formation of ciliated cells. I have never been able to detect any circulation of nutritious juices in the stalk, though examined under the most favourable circumstances.

Crisia chelata. This polype when extruded affords a good view of the membrane connecting the outer surface of the pharynx and rectum together (fig. 10 *a*). It would be more correct to say, connecting the *supporting part* of the tentacula and rectum together, for the pharynx, as in the other ascidian polypes, lies loose, and can be seen contracting, within this supporting part. It protrudes itself through a small opening at the upper margin of the cell, and the large opening seen in the dead specimen on the anterior surface of the cell, is in the living specimen covered in by a membrane. The polype has from ten to twelve ciliated tentacula about half the length of the cell. The dilatation of the digestive tube (stomach) at the termination of the gullet and commencement of the intestine is smaller, and that part marked *a* in fig. 4 and 5 is relatively larger in this polype than in *Cellularia reptans* and *C. scruposa*, and has less the appearance of an appendix of the stomach*. Its inner surface, however, is covered with a greater number of brownish granules than any other portion of the intestinal tube.

Campanularia dumosa. I have procured some live specimens of this polype thrown ashore after a storm attached to *Flustra foliacea.* The polypes and pith of the stalk are of a yellow colour. The polypes were sluggish, had twelve short tentacula not ciliated, and presented all the characters of the *Zoophyta hydroida.* Dr. Johnston writes me that he has also some time ago procured live specimens, so that he must be now aware that this polype cannot be a *Cornularia* as he once supposed (British Zoophytes, p. 192, 1838), and that the characters of the polypidom separate it from the genus *Campanularia.*

Alcyonidium parasiticum. Abundance of this polype is occasionally thrown ashore chiefly adhering to *Sertularia argentea.* I have procured several specimens alive, and have satisfied myself that it consists of cells composed of animal and calcareous matter, and that the polype resembles the ascidian polypes in every respect. Mr. Hassall (Annals of Natural History, vol. vii. p. 370) first satisfactorily ascertained the true nature of this polype. On placing a portion of the polypidom under the microscope, and then bringing a quantity of dilute muriatic acid in contact with it, innumerable bubbles of gas are seen rising from all parts of its surface. On immersing another portion in aqua potassæ so as to destroy the animal matter, it lost its dirty brown colour, and the form and arrangement of the cells were then distinctly observed. Figure 11 is a magnified view of a few of the cells in the portion of the polypidom thus treated. Each cell is provided with a flexible tube attached to its margin, which the polype extrudes before it emerges from the interior of the cell, and retracts when it re-enters, thus serving the purpose of an operculum. The first portion of this operculum extruded, forms a small conical eminence with the apex truncated. When the polype withdraws itself within its cell, it frequently does not retract this portion of the operculum, so that the surface of the polypidom occasionally presents under the microscope a papillose appearance. The next stage in the protrusion of the polype is the elongation of this conical eminence by the eversion through it of a second portion, surmounted by pretty long setæ. The tenta-

* As has already been stated, I have observed individual polypes both in *Cellularia reptans* and *scruposa*, but more especially the latter, where the difference between the size of the stomach and appendix was less marked than in figs. 4 and 5.

cula, by the upward motion of which the eversion of this flexible tube is effected, are now seen lying within it. The third stage in the protrusion of the polype is the passage of the tentacula and pharynx through the upper aperture of the flexible tube. The greater part of this tube appears to be composed of setæ connected together by a membrane. The polype has fifteen or sixteen tentacula. By breaking up a number of the cells I procured two of the polypes nearly entire, and the stomach and its appendix had nearly the same relative size as in *Crisia chelata*. Several bodies, each composed of reddish brown nucleated cells inclosed in a membrane (ova), were seen among the broken-down cells.

Flustra avicularis. This polype is thrown ashore in great quantities after storms, chiefly adhering to the roots of *Flustra foliacea* and *F. truncata*. The cells have almost always four hollow spines, adhering to the upper margin of the cell, two to each angle. The two superior spines are pretty long and project upwards and outwards, and the two inferior, which are placed close to the two superior at their origin, are considerably shorter and less thick, and project generally inwards, forwards and a little downwards. In a few cells I have seen five spines attached to the superior margin, three of these adhering to the outer angle. The bird-head processes attached to the outer edges of the branches of the polypidom are generally very considerably larger than those nearer their centres. Each bird-head process may be described as being composed of a *body* (fig. 12 *f*), of a *hinge-process* (fig. 12 *e*), and of a *pedicle* (fig. 12 *b*). By the pedicle it is attached to the interior of a round hollow process projecting slightly from the anterior surface of the polypidom (fig. 12 *a*). The body of the bird-head process* is very convex along the lower edge, and it is elongated from below upwards and somewhat flattened transversely. It is divided by an oblique ridge on its interior surface into two chambers (fig. 12 *d*), which communicate freely at the superior and middle parts at least. The hinge-process is articulated to the superior or concave surface of the body by a hinge-joint, along the line of the superior termination of the internal ridge which divides the body into two parts. The edges of the concave surface are thickened at this part, and present a slight depression on each, for receiving the two articular processes of the hinge-process. The body of the bird-head process is hollow, and its concave surface presents three apertures; the largest of these is the uppermost, and is separated from the middle by a bar stretched across between the articular cavities

* In describing this moveable bird-head process, I have supposed the polypidom to be erect, and the concave surface of this process to be looking upwards in the direction of the long axis of the cells.

for receiving the hinge-process; and the smallest is placed at the lower end, and affords a passage to the posterior part of the pedicle into the interior of the body. The hinge-process is concave on its upper surface, and terminates below in a curved point. Its superior wall forming its concave surface is deficient in two-thirds of its length at the upper part or that next the articulation, and its inferior or convex wall is very thin over the same extent. It is hollow, and communicates with the body through the upper and middle apertures seen in its concave or upper surface. Its upper or articulating end is bounded by a thickened portion or bar passing between the edges of the superior surface, and a similar bar passing between the edges of the inferior or convex surface. The articulating processes are placed upon the superior of these bars, at its junction with the edges of the superior surface. I have described, with what may appear very unnecessary minuteness, the skeleton of these bird-head processes, because it would be impossible to understand their movements without a previous knowledge of the different parts described. The lateral portions of the lower chamber of the body are occupied by two radiating muscles, presenting somewhat of the appearance of the temporal muscle in the human species, which converge at the articulating or upper edge of the hinge-process, and terminating in a denser, thicker and narrower structure, which I shall call tendons, are attached to and move this process (fig. 12 *c*). One of these muscles, which is the stronger, terminates in a tendon which runs above the transverse bar which separates the upper from the middle aperture in the concave surface, and running down the centre of the hinge-process is inserted into the inner surface of its inferior or convex wall a little above its apex or free extremity. When this muscle contracts, the hinge-process is tilted up. The other muscular bundle, which is strongest at the upper and lower edges, terminates in a tendon which passes beneath the bar, and is inserted into the hinge-process close to and a little above the tendon of the other muscle. When this muscle contracts, the hinge-process, if elevated, is drawn down. The first-described muscle is the *elevator*, the second is the *depressor* muscle of the hinge-process. The movements of the hinge-process are in general slight, but I have frequently observed it to be tilted up with considerable force, and closely applied over the superior surface of the anterior chamber, so that its concave, which was before its superior, became its inferior surface, and its convex became its superior surface. In this state it may remain for hours, and affords an excellent opportunity for observing the arrangement of the fibres of the two muscles, especially that of the elevator, as its lower fibres run more directly upwards, and its tendon is raised and separated from that of the depressor muscle. In dead specimens the hinge-process is not unfrequently found in the position into which it is brought by the action of the elevator muscle. These muscular fibres present no transverse striæ, can contract and relax with rapidity, and become shorter and thicker during their contraction. The movements of the body upon the polypidom are effected by the pedicle, and are as follows:—Suppose it to be attached to one of the edges of the polypidom, and the concave or upper surface to be looking upwards in the line of the long axes of the cells, it can turn slowly outwards over the edge of the polypidom until its concave surface looks directly outerward, and it then returns to its former place: it may also turn inwards until the concave surface looks across the cells. This movement being suspended, it exhibits at intervals a nodding motion, the concave and convex surfaces being alternately depressed towards the anterior surface of the polypidom. When the concave surface is carried downwards, the hinge-process is slightly separated from the body; but when the convex surface is depressed, it is again approximated. These last movements of the hinge-process are probably in a great measure mechanical, and occasioned by it rubbing over the surface of the polypidom during the downward motion of the concave surface. The pedicle consists of two parts: a posterior and dense portion which is attached to the internal surface of the inferior edge of the process of the polypidom to which it is fixed, and passes inwards through the inferior aperture in the concave surface of the body to be inserted into the lower part of the internal surface of the convex surface of the body; and an anterior portion, more translucent and less dense, which is prolonged downwards into the process, and forwards to the middle aperture in the concave surface of the body and the attached end of the hinge-process. In the nodding movements when the convex surface is moved downwards, the posterior edge of the pedicle contracts and becomes bent so as to form an acute angle; and it relaxes while the concave surface of the body is moved downwards, resembling the contractile movements of the stalks in *Pedicellina echinata*. I have never had an opportunity of observing the changes in the pedicle during the other movements of the body under a high magnifying power, as this can only be done under certain conditions not easily to be obtained. The anterior portion of the pedicle has more of the appearance of a membranous than a contractile structure, and contains several small nucleated cells. A similar structure is found in the upper chamber of the body, and is prolonged through the upper aperture in the concave surface into the hinge-process. I have not been successful in observing contractile movements in this structure, if it really possesses this function, and I believe that it is more connected with the nutrition of these bird-head processes than with their movements. It would be very interesting to ascertain the functions of these complex appendices to the polypidom. Their movements are quite independent of the polypes, and continue for days after these are dead. The hollow processes of the polypidom, at least those next the outer edges, to which these bird-head processes are attached, spring from the upper surface of canals which communicate with the interior of the spines, the ovary-capsules, and also by lateral apertures with the interior of the cells next them. Can these organs assist in circulating water along these canals ?*

The body of the polype is very small when compared with the length of the cell, so that when it enters the cell, the gullet and intestine are not folded upon themselves as in *Cellularia reptans* and so many other of the ascidian polypes, but are simply thrown into a curve. It has fifteen or sixteen ciliated tentacula considerably longer than the body: the cilia are short, thick and numerous. In this polype, as in the *Crisia chelata* and *Alcyonidium parasiticum,* there is not so marked a division between the stomach and the part which has been termed the appendix, as in *Cellularia reptans* and *C. scruposa.* Brownish granules and minute cells are observed on the inner surface of the stomach, the gullet and commencement of intestine. Ciliary movements are distinctly seen in this as in the other ascidian polypes examined on the inner surface of the pharynx, gullet, stomach and first portion of intestine. In some specimens the polypes were very active, darting back into their cells when disturbed, and immediately after again protruding themselves. When left undisturbed, they at short intervals partially withdrew into their cells, and immediately after again emerged and spread out their tentacula. The movements of the cilia attached to the tentacula appear to be in this, as in other ascidian polypes, under the control of the animal. They remain quiescent when the tentacula are withdrawn within the cell; and even when extruded their movements are occasionally for a time suspended. There can be no doubt that they can act also involuntarily, for they may be seen in full action upon detached portions of the tentacula. Very extensive contractile movements were very frequently observed in the pharynx, gullet and stomach. The arrangement of the muscles, by the action of which the polype protrudes and withdraws itself within the cell, appears, as far as I could trace them, similar to those in *Cellularia reptans* and *scruposa.* The greater number of specimens were provided with ovary-capsules, placed upon the thickened superior margin of the cells. In some specimens pro-

* This is a mere conjecture thrown out for future investigation.

cured about the middle of October, these ovary-capsules were more or less filled with opake bodies (ovaries) of a slightly yellowish colour. Each of these bodies was composed of small nucleated cells inclosed in a membrane. The external surface of this membrane was in many of them provided with cilia in motion, causing some of them to perform a rapid rotatory motion within the ovary-capsules. These ova in the first stage of their growth adhere to the upper end of the lining membrane of the capsule. This lining membrane stretches across the aperture in the capsule, and also sends a reflection across the cell immediately below the ovum so as to inclose it in a kind of sac, leaving however, in the young ovum, a space between them. In the more advanced ova, this membranous partition was much thickened, especially at the central part, forming a considerable projection in the direction of the aperture in the capsule, and contained a number of nucleated cells. When the ovum enlarges so as to fill the interior of the capsule, it pushes this membranous partition before it. This membrane was observed in a few instances where the ova were fully formed to contract and relax at intervals, and in this way it may assist in the escape of the ovum. On detaching some of the ovary-capsules with the view of examining their contents under a high power, one of the ova was seen partially extruded from the aperture in the capsule. It was divided by a deep fissure into two unequal parts, the largest of which was nearly entirely outside the capsule (fig. 13 *a*). The extremity of the largest portion (fig. 13 *c*) was distinctly prolonged, more translucent than the rest of the ovum, and presented along its free edge a row of hairs resembling cilia, which, however, remained quite motionless, while along the whole of the rest of the external surface of both portions, except upon the edges of the fissure, cilia were in such vigorous action that it was impossible to distinguish them individually, and they produced the appearance of the rim of a wheel in very rapid rotation. After the lapse of an hour the fissure had extended through the whole body of the ovum, and the larger portion (fig. 13 *b*) being set free, swam about very actively in the water; but all this time the hairs attached to the prolonged anterior portion remained motionless. The smaller portion continued in the capsule, and performed very rapid rotatory movements. This was the only ovum I observed in the act of escaping from the interior of the capsule, but I had an opportunity of watching three other bodies exactly similar to the larger portion of the ovum already described, when examining other portions of the same polypidom. One of these had become fixed, by the hairs attached to the anterior extremity, to a minute portion of sea-weed, and the cilia were in active motion. When examined ten hours after, the cilia were acting very languidly. I saw another while swimming about become entangled by its cilia to the setæ projecting from the body of a small annelide. During the movements of the annelide, the hairs on the prolonged anterior extremity came in contact with some small fragments of sea-weed, and the annelide after some struggles detached itself from the ovum, which continued to adhere to the sea-weed. In all of these I never observed the least movement of the hairs attached to the anterior extremity. I was not able to ascertain that the smaller portion of the ovum left in the capsule underwent any change, as I presume it does, before it escaped from its interior. Several bodies, having one portion of their surface ragged and devoid of cilia, and in every other respect resembling the smaller portion of the ovum, and also other bodies exactly similar to the entire ovum, were observed swimming about; but as in all these cases the portions of the polypidom had been injured immediately before, and some of the ovary-capsules broken, it was presumed that these had been mechanically displaced from the capsules. The larger portions of the ova were, like the entire ova, composed of minute nucleated cells, and did not, as far as I could discover, possess any internal cavity.

In several specimens of *Cellularia reptans* and *C. scruposa*, and one specimen of *C. avicularis* procured at the same time, the ovary-capsules were filled with ova; in the two former of a deep orange colour, composed of nucleated cells, having the same number and arrangement of membranes and provided with cilia as in *Flustra avicularis*. Some of these ova were in rapid rotatory motion; others, as in *Flustra avicularis*, were motionless, though the cilia were acting, being kept quiescent by the more close apposition of the inclosing membrane. I did not succeed in observing the escape of any of these ova from their capsules. In many of the polype-cells of all of the above-mentioned polypes, dark red bodies composed of nucleated cells inclosed in a membrane were present. These nucleated cells are generally considerably larger than those entering into the formation of the ova in the ovary-capsules. The greater number of polype-cells contained one only of these bodies, and it was connected to the inner surface of the cell by a membrane having a number of detached nucleated cells of a light colour adhering to it. These bodies occupied different positions between the bottom and aperture of the cells, but in none were distinct ciliary motions observed. These bodies are also probably ova, and it is possible that more extended observations may enable us to detect cilia on their surface at a more advanced stage of development, though none in the present case were seen even on those lying at the aperture of the polype-cells. I have satisfied myself that in the polypes mentioned above, the inner surfaces of the polype-cells, of the appendices of those processes described in the *Cellularia reptans* and *scruposa,* of the bird-head processes, of the spines, and of the canals running along the lateral surfaces of the polypidom in *Flustra avicularis,* are all lined by a fine membrane. This membrane in old specimens, and when the polypes are dead, often presents numerous and pretty large cells, generally of a pale colour, at other times having a slightly yellowish or brownish tinge, adhering to its free surfaces. In one specimen these cells had accumulated in such quantities within some of the spines in *Flustra avicularis,* as to produce considerable bulgings and excrescences. The growth and nutrition of the hard parts of the polypidom must be chiefly due to this membrane.

EXPLANATION OF PLATE XII.

Fig. 1. Magnified view of the posterior portion of the upper end of a branch of the polypidom in *Cellularia reptans.* It is slightly elevated on the left side, so that the polype-cells of that side are better seen than on the other.

Fig. 2. Three appendices to the cells in *Cellularia reptans.*

Fig. 3. Magnified view of four polype-cells of *Cellularia reptans* seen on the anterior surface.

Fig. 4. Magnified view of polype in *Cellularia reptans* when folded up in its cell.

Fig. 5. Magnified view of this polype when expanded.

Fig. 6. Magnified view of the anterior surface of the upper part of one of the branches of the polypidom in *Cellularia scruposa.* The polype-cells are in this drawing also more distinctly seen on one side than on the other.

Fig. 7. Magnified view of three appendices to the polype-cell in *Cellularia scruposa* ; *b, b, bis,* views of the process bearing the hair-like prolongation in two different positions.

Fig. 8. Greatly magnified view of head and upper part of stalk in *Pedicellina echinata.*

Fig. 9. Greatly magnified view of the ciliated ova of *Pedicellina echinata.*

Fig. 10. Magnified view of polype in *Crisia chelata.*

Fig. 11. Magnified view of polype-cells in *Alcyonidium parasiticum.*

Fig. 12. Magnified view of bird-head process in *Flustra avicularis.*

Fig. 13. Magnified view of ova in *Flustra avicularis.*

XLIV.—*Observations on the* Spongiadæ, *with descriptions of some new genera.* By J. S. Bowerbank, F.R.S., L.S. &c.

[With two Plates.]

The microscopical examination of several hundred species of the *Spongiadæ* has led me to believe it possible that a series of characters may be obtained from the anatomical structure of the skeleton, which, from their constancy and striking peculiarities, will enable us to establish genera, based upon more certain characters than those which have hitherto designated the numerous and extraordinary species of these singular animals.

Lamouroux, in his 'Histoire des Polipiers Coralligènes Flexibles,' has described 163 species of *Spongiadæ* under the common generic designation of *Spongia*, basing his descriptive characters principally upon form and colour. It is almost unnecessary for me to say, that there is scarcely one of these descriptions which can be applied with any degree of certainty when we attempt to identify specimens of recent sponges.

Dr. Fleming, in his 'History of British Animals,' taking advantage of the valuable labours of Dr. Grant, has divided the *Spongiadæ* into a series of genera founded, to a certain extent, upon their anatomical structure, and taking the common officinal sponges as his type, has described the characters of the genus *Spongia* in the following words:—"Porous, the cartilaginous skeleton simple or destitute of earthy spicula."

Dr. Johnston, in his admirable 'History of the British Sponges and Lithophytes,' has added considerably to these characters, and has thus designated the genus:—"Body multiform, very porous, elastic, composed of a network of corneous fibres inosculating in every direction, and traversed by tortuous canals opening on the surface by wider orifices; the fibres often contain imbedded spicula: gelatine fugacious: marine." This series of characters would perhaps be sufficiently definite if we had to consider the British species of the *Spongiadæ* only, but when we launch into the wide field of exotic species, it ceases to be sufficiently descriptive and definite to enable us to hope to arrange these extraordinary and protean forms of animal life in such a manner as to allow the student to recognise a species, or to refer it to its proper genus with anything approaching to the same degree of certainty that we find the constant practice in the science of botany.

It is true that in the latter science we have a much more extended series of determinate structural characters than we can ever hope to find among the *Spongiadæ*, and that among plants these characters are of such a nature as to be readily available either to the unassisted vision or by the aid of a low microscopical power; while among the *Spongiadæ*, from the minuteness of many of the most essential organs, we can scarcely hope to make any great degree of progress in the knowledge and development of such characters without the aid of the best modern microscopical powers; but with such assistance there is little doubt in my own mind, from the great and permanent varieties of the structures of the skeleton especially, that we shall be enabled to establish such a series of well-defined new genera, and to subdivide and arrange those already established, as very materially to lessen the now almost insuperable difficulty that exists under the present circumstances, in determining species by description. I therefore propose in the first place to limit the genus *Spongia* to such species only as strictly agree in the anatomical structure of the skeleton with the two well-known species of the sponge of commerce.

In January 1841* I had the honour of reading before the Microscopical Society of London, a paper "On the keratose or horny Sponges of commerce," in which I have proved the solidity of the fibre and the occurrence of spicula in certain portions of it; but at that time I had not been able to obtain the sight of a specimen of either the Mediterranean or West Indian species, in the precise condition in which they are, immediately after being taken from their native element. Since then I have been furnished by my friend Dr. Veronge with specimens of the West Indian sponges of commerce, which were undoubtedly alive when taken by him from the sea in the harbour at Bermuda, and some of which were immediately immersed in spirit to prevent the rapid discharge of the gelatinous interstitial matter.

In addition therefore to my former observations on these animals, I may state, that in a living condition the West Indian sponge is furnished with a thin, simple, and pellucid investing membrane, in which there is imbedded, without any definite arrangement, numerous simple single-pointed and simple double-pointed spicula, among which triradiate spicula are occasionally to be seen.

In one of the specimens obtained by my friend Dr. Veronge and preserved in spirit, the interstitial fleshy matter is very abundant and of a considerable degree of density. It abounds with siliceous simple single-pointed, simple double-pointed, triradiate and other forms of spicula agreeing precisely in character with those I have described in my paper published in the Microscopical Society's 'Transactions,' as occurring imbedded in the large flattened fibres of the sponge. There is no definite arrangement of these bodies, but they appear thickly and irregularly dispersed amid the gelatinous matter which fills up the whole of the interstices of the fibre, excepting those spaces which form the tortuous canals of the sponge.

With this additional information regarding their anatomical structure, I propose that the genus *Spongia* shall be limited to those species only which shall strictly agree with the well-known and legitimate types of the true *Spongiæ*, and that the following characters be adopted to limit and distinguish the members of the genus.

Gen. Char. Skeleton composed of a network of keratose fibres

* Transactions of the Microscopical Society, vol. i. p. 32.

inosculating in every direction without order. Fibre solid, cylindrical, without spicula, with the exception of a few large compressed fibres, which contain them in the centre. Investing membrane thin, pellucid and simple. Interstitial substance gelatinous, containing siliceous spicula.

There are many of the *Spongiadæ* which approach very closely to the true *Spongia* in the external appearance of the skeleton and in many of the prominent generic characters, but which nevertheless vary in their structural peculiarities in so marked and decided a manner as to render it advisable to arrange them in other genera, and foremost among these stands the group of which *Spongia fistularis*, Lamarck, is the type, and which I proposed in my former paper to make the type of a new genus, and to designate it *Fistularia*; but upon reconsideration I find, that although a most appropriate designation for the proposed genus, it has already been applied as a generic term in botany, so that it were better to abandon it altogether and to adopt another name, which, although it may not be so expressive of the leading character of the genus, will be more distinctive as regards other genera; and as I have been in a great measure indebted to my friend Dr. Veronge for a correct knowledge of this very interesting natural group of the *Spongiadæ* in the condition in which they exist in their native element, I shall be doing but an act of justice in commemorating his exertions in the cause of science by naming it in honour of him, and the following I propose as the characters of the genus

Verongia.

Gen. Char. Skeleton composed of a network of keratose fibres inosculating in every direction without order. Fibre cylindrical, continuously fistular, without spicula. Cavity of the fibre simple.

The external character of the fibre of this group is widely different from that of the great mass of the true *Spongia*. While in the latter they are usually flexible, fine in texture, and of a colour approaching to light amber; in the former, on the contrary, the fibre is rigid, coarse in texture, and very deeply coloured. The great central cavity of the fibre usually occupies about one-third of its diameter, but in some species it is of much larger dimensions. It is generally nearly uniform in its size in all parts of the same species, but occasionally it dilates considerably for a short space and then resumes its original diameter. It is also usually somewhat increased in its dimensions at the anastomosing portion of the fibre, as shown in Pl. XIII. fig. 7, which represents a piece of the fibre at one of the anastomosing points, seen with a power of 100 linear.

The great central cavity is lined with a thin pellucid membrane, thickly overspread with minute semi-opake granules: such is its appearance in specimens which have been preserved in spirit immediately on being removed from the sea; but after having been dried, the membrane and its granulated coat is usually fractured in every direction, and then presents an appearance as if the cavity were lined with irregular, minute flocculent masses, or the membrane separating from the surface of the canal may be seen reposing in it in the form of a contracted tube. Portions of it may also be occasionally seen projecting from the fractured ends of the fibres, especially in the examinations of dried specimens.

I have been unable to detect any communication between the great central cavity and the outer surface of the fibre, the projecting ends of which are always naturally hermetically sealed.

I have been favoured by my friend Dr. Veronge with a very beautiful species of this genus which was immersed in spirit immediately on being removed from the sea. This specimen is in the form of a cluster of cylindrical tubes about twelve inches in height and two in diameter, the thickness of the tube being about half an inch.

The whole of the external and internal surface of the sponge is closely covered with a strong investing membrane, and I have observed the remains of a similar tissue upon several other dried species of this genus in my possession. In all the cases the membrane was simple in structure, semi-opake, and had the internal surface abundantly furnished with tessellated cellular structure.

The interstitial fleshy matter of the specimen presented to me by Dr. Veronge exhibits a high degree of organization. When a section was made at right angles to the axis of the sponge, it cut as firmly, and presented as close a texture as a section of the liver of a quadruped does.

When minute fragments were examined by transmitted light and a microscopic power of 300 linear, it was found to consist of closely compressed tessellated cellular structure, varying somewhat in its general aspect in different parts of the specimen, but in the best-defined portions it presented the appearance represented by Pl. XIII. fig. 8.

A few minute vessels were observed in the most transparent portions of this tissue meandering amid the cells, but in other species in which portions of the remains of the interstitial fleshy matter were found, they were observed to exist in a much greater abundance.

I have been unable to detect more than a few accidental spicula in the investing membrane of any of this family, and I believe that they do not naturally exist in any part of any one of the species of this group.

The *Verongiæ* have existed at former periods in great abundance, as by far the larger number of the fossilized *Spongiadæ* are composed of this description of tissue, especially in the agates of the neighbourhood of Oberstein, and in the green agates, mis-called in commerce jaspers, from India. The boulder formation of the Yorkshire coast and the shingle of the Sussex coast also produce siliceous pebbles, containing perforated spongeous fibre in abundance, and I have similar specimens from various other localities.

In the fossilized state the remains of true *Spongia* are very much less common than those of *Verongia*, but this difference in their comparative numbers in this condition may possibly arise in some measure from the greater degree of strength and rigidity of the fibre of the latter tribe enabling them to resist the effects of accident and decomposition until they were imbedded in the silt of the ancient ocean and ultimately fossilized.

Auliskia.

Gen. Char. Skeleton composed of a network of keratose fibre. Fibre cylindrical, rigid, continuously fistular, having minute cæcoid canals radiating from it in every direction.

The external characters of the fibre of the skeletons of this genus are exceedingly like those of *Verongia*. The colour, the degree of rigidity and the mode of inosculation agree precisely with each other, and it is only when submitted to a careful microscopical examination by transmitted light with a power of 100 linear that the distinguishing character becomes apparent. Under these circumstances we find that the fibre is furnished with a continuous central canal as in *Verongia*; but in addition to this organ, which permeates every fibre of the skeleton, there are numerous minute cæcoid canals, radiating at irregular distances from all parts of the great central cavity, as represented by Pl. XIII. fig. 1. with a linear power of 100, and by figure 2 with a power of 300 linear.

These secondary canals are given off at nearly right angles to the great central one. They are very unequal in length, few, comparatively, reaching to near the external surface of the fibre, and none that I have been able to discover perforating it. The greater portion of them pursue nearly a straight line from the axis of the fibre, a few have a tortuous direction, and a still fewer number bifurcate or branch.

Within the great central canal there were frequently to be observed one or two long simple vessels, which might be seen traversing the cavity for a considerable distance, as represented in Plate XIII. fig. 1. *a* and *b*.

When there are more than one, as represented at *b*, they do not appear to unite, but run side by side until they reach one of the anastomosing points of the fibre into which one of them will pass, while the other pursues the direct course of the great canal. They appear to be invested by a gelatinous coat or sheath, as seen at *c* in fig. 3, which represents a portion of the great central cavity of a fibre and its contents by transmitted light and a power of 800 linear. The cavity within the vessel is small compared with its external diameter, the parietes being so thick that it does not exceed a third or a fourth of the whole diameter, as represented by Pl. XIII. fig. 4. with a linear power of 1020.

I have never found a similar tissue in such a situation in any other recent sponge; but it is a remarkable circumstance, that the first indication of the existence of such vessels in the interior of sponge fibres was afforded me in the sponge tissues which abound in the moss agates of the neighbourhood of Oberstein, and which I have described and figured in a paper "On the Spongeous Origin of Moss Agates and other Siliceous Bodies," in the 'Annals and Magazine of Natural History' for September and October 1842.

The external surface of the fibre is frequently covered with a complex reticulated vascular tissue, a small portion of which is represented by Pl. XIII. fig. 5. with a power of 800 linear. It is probable, if the fibre were in its natural condition, that this tissue would be found to surround the whole of the fibrous skeleton.

A few minute portions of the remains of the fleshy interstitial substance were found adhering to some of the fibres. Upon immersing these in water, and submitting them to examination with a power of 300 linear, they proved to consist of a series of well-developed regular cells, represented by Pl. XIII. fig. 6. The parietes of the greater portion of them were thickly coated with deep amber-coloured, fleshy or gelatinous matter, and in some of them there was a large round or oval mass of the same description of substance, which in many cases nearly filled the whole of the interior of the cell.

It is much to be regretted that the specimen from which these details are drawn is but a fragment. It has evidently been part of a series of tubular bodies, cemented together by approximation, or of a series of tubular branches; the outer diameter of the tubes being about three-fourths of an inch, and the inner diameter about half an inch, so that the parietes do not exceed one-eighth of an inch in thickness.

Stematumenia.

Gen. Char. Skeleton composed of solid, compressed, keratose fibre, in which siliceous spicula and grains of sand are occasionally imbedded. Interstitial substance fibro-membranous. Investing membrane simple.

S. scyphus. Sponge sessile; when immature massive, when adult cup-shaped; surface coriaceous, spinous. Excurrent oscula large, usually dispersed over the interior of the cup.

The fibres of the skeleton of the members of this genus are rigid when dry, but in a wet condition they possess a considerable degree of elasticity. The smaller ones are nearly cylindrical, and are usually without either spicula or grains of sand; but the larger and more mature fibres are considerably compressed, and have frequently grains of sand and spicula imbedded in the substance of the horny structure.

The most remarkable character in this tribe is the singular nature of the interstitial matter of the sponge, which is constructed of a beautiful interlacement of elongated fibres with little or no gelatinous substance intervening, as represented by Pl. XIV. fig. 1, and these are covered by others similarly disposed with their axes in a different direction, the mass being bound firmly together by other fibres running in tortuous directions so as to cement the whole into a membrane, as it were, of great strength and tenacity. Each fibre is of considerable length, but from their matted condition I have been unable to separate an unbroken one from the mass. They appear usually to have obtuse terminations without any attenuation towards the ends, but occasionally fibres are observed with large cytoblastic terminations, as represented by Pl. XIV. figs. 3 and 4.

The origin of this description of tissue appears to be similar to that of the sacculated tissue of *Cellepora pumicosa*, which I have described and figured in a paper "On the Organic Tissues in the Bony Structure of the Corallidæ," published in the 'Philosophical Transactions of the Royal Society,' part ii. 1844, p. 220, pl. 17. figs. 3 and 4, and also to the mode of the production of the primary vascular tissue in the new basement membrane of *Solen vagina*, described in a paper "On the Structure of the Shells of Molluscous and Conchiferous Animals," in the 'Transactions of the Microscopical Society of London,' vol. i. p. 144, and figured in pl. 18. fig. 4. *a* and *b*.

The fibres have usually a number of gelatinous-looking molecules, imbedded in the surface, which vary much in their size and form, as seen in Pl. XIV. fig. 5, which represents a portion of one of them examined by transmitted light with a linear power of 1020; and the cytoblastic terminations also are thickly studded with them, as represented in Pl. XIV. fig. 4.

This description of fibrous tissue is the more remarkable when we view its occurrence among the *Spongiadæ* in connexion with its production in other and higher orders of the animal kingdom. Thus we find it in the foliated portions of a coral (*Pavonia lactuca*) when deprived of its earthy matter by dilute hydrochloric acid. In this case, the tissue occurs in the form of shorter and stouter filaments than in the sponge, and there is an attenuation of the fibre towards each of its ends; nor are the fibres so closely matted together as in the sponges, but on the contrary, there are frequently but a few filaments irregularly disposed amid the decalcified tissues of the coral. I have also found it in the remains of a fleshy mass of what appeared to be an Ascidian, which was attached to a group of zoophytes from Algoa Bay. It has also been shown, by Dr. Carpenter, that the decalcified shell of the common egg, and its *membrana putaminis,* are entirely composed of this peculiar tissue. In the latter instance the similarity is so great, both in the form of the structure and the mode of disposition, that it would be exceedingly difficult to distinguish between that derived from the sponge and the tissue of the *membrana putaminis,* if it were not that the fibres of the latter are somewhat less in diameter than those of the former.

The investing membrane is generally exceedingly thin and pellucid, and without any trace of fibres or other forms of organisation.

Cartilospongia.

Gen. Char. Fibre cartilaginous, imperforate, containing oat-shaped cavities thickly dispersed, from each of which numerous minute canals radiate to unequal distances.

C. rigida. Sponge free, compressed, discoid. Fibre rigid, compressed; longitudinal fibres radiating from the centre towards the circumference; lateral fibres at right angles to the longitudinal ones, forming square or oblong interstices. Excurrent canals, on the marginal edge of the sponge, few and irregularly disposed.

The general aspect of the fibre of this sponge is very like that of decalcified fœtal human bone from the cranium, but the fibre is somewhat more compressed.

When a few fibres, immersed in water, are examined by transmitted light with a power of 100 linear, it is seen that every part of their substance contains minute oat-shaped cavities, represented by Pl. XIV. fig. 7, and which correspond exactly, in form and mode of disposition, with the analogous minute cavities, miscalled corpuscles, which abound in such quantities, and are so well known to every anatomist as peculiarly characteristic of true animal bone. In the latter, when viewed with a high microscopic power, there may be observed a profusion of exceedingly minute radiating canals, which are said to communicate with the

Haversian canals. In the sponge, these minute radiating canals are also present, but they are much fewer in number, and require a power of 1000 linear to render them distinctly apparent. Under these circumstances they are seen, as represented in Pl. XIV. fig. 6, radiating from the oat-shaped cavities, and usually decreasing in diameter until they terminate at unequal distances from the parent cavity, in exceedingly minute points. In many cases, the commencement of these minute canals is expanded in the form of a funnel, so as beneath a power of about 500 linear to cause the oat-shaped cavities to appear fringed with a series of projecting points.

The surface of the fibre is covered with nucleated cytoblasts and tessellated cellular structure in various stages of development, and in the centre of some of the more fully-developed of these cells, in place of their being entirely filled up by the secretion of cartilaginous matter, there is frequently an elongated cavity remaining, which probably becomes one of these peculiar organs, after having been immersed in the cartilaginous substance of the fibre by successive layers of cellular structure. Occasionally, but by no means frequently, there are small patches of ramifying canals situated immediately beneath the surface of the fibre, as represented at Pl. XIV. fig. 7 *a*, as seen with a linear power of 100. It is difficult to imagine what office these canals perform in the œconomy of the animal, as they do not appear with the same degree of constancy or regularity as in other sponges where similar tissues occur in like situations.

In some of the expanded portions of the fibre, there are often small round or oval holes, and around these the oat-shaped cavities are arranged in a series of concentric rings, exactly representing the mode of arrangement of the corresponding organs in true bone, in the vicinity of the Haversian canals.

It is much to be regretted that there are no remains whatever of spicula or of fleshy interstitial substance to be found in this interesting specimen, nor am I aware of the part of the world of which it is a native, as it was procured from a dealer in natural curiosities, who could afford no clue to its previous history. The specific characters, therefore, must be considered as provisionally given, until other specimens may be found from which fuller and better characters may be established.

The form of the sponge is that of a thick disc, the diameter being five and a quarter inches, and the thickness, one inch and three quarters. The two broad surfaces correspond exactly in form and structure; a portion of one of them is represented by Pl. XIV. fig. 8.

There is no appearance, at any part of the sponge, of a point of attachment or base.

The fibre in the dry state is exceedingly rigid and brittle, and preserves much of its rigidity even after having been soaked many hours in water. The radiation of the fibres from the centre of the sponge towards the outer surface is in a series of straight lines, and the interstices rarely exceed half a line in length.

The great excurrent canals are found only on the extreme edge of the sponge; they are few in number, and are disposed in a single line at unequal distances throughout the whole of the circumference of the sponge, the largest not exceeding two lines in diameter.

This sponge is remarkable for its approximation, in the structure of its skeleton, to the highest orders of animal organization.

BIBLIOGRAPHICAL NOTICES.

A History of the British Freshwater Algæ, including descriptions of the Desmideæ *and* Diatomaceæ, *with upwards of* 100 *Plates.* By A. H. Hassall, F.L.S. 2 vols. 8vo. London, 1845.

We consider the publication of this work as likely to promote in a great degree the study of the freshwater Algæ of Britain; a tribe which, owing to its great obscurity and the want of good magnified figures, has been almost universally neglected by our botanists. Whilst the Mosses, the Lichens, the Fungi, and even the marine Algæ have had valuable and elaborate works devoted to their elucidation, we are not acquainted with any extensive English work on the freshwater tribes since that of Dillwyn, which, although highly valuable, having appeared before the structure of the Algæ was much understood, cannot be considered as supplying the deficiency. The figures contained in Mr. Hassall's work will be found of the utmost value to the student of this curious tribe of plants, as they appear in most cases to have been carefully drawn and to be faithful representations of the species. It is unfortunate that the author has not pointed out the cases in which his figures are not the result of his own observations, but copied from published plates. The appearance of "*Hass. delt.*" at the bottom of all the plates leads us to suppose that they are all of them original, but a more careful examination shows that not a few are copies. We shall notice some of these as we proceed, previously however reminding our readers that the parts of the book which it falls to our lot to blame are only a small portion of the whole. As a whole, there can be no doubt that it is a proof of its author being possessed of very considerable abilities; more especially of extensive powers of discrimination, although not of definition. We consider these powers as quite distinct and frequently existing separately, although both are essential to a writer on descriptive natural history.

In the preface we find it stated that "the characters developed in the state of reproduction are relied upon in the framing not merely of the families and genera, but also in the definition of species" in the present work. There cannot be a doubt that the best, perhaps the only certain characters, are obtainable from those parts, and we wish that Mr. Hassall had universally followed the plan which he appears to have laid down for himself; but in several of the families the specific characters are almost wholly derived from the relative diameter of the filaments. The size of the filaments would doubtless be a valuable and most convenient mode of distinguishing the plants if it could be described in such a manner as to be always determinable, but comparative size can at no time be depended upon, unless the object with which the comparison is made be previously known. To show the absurdity of such comparative characters, and how totally useless a considerable portion of Mr. Hassall's definitions of numerous species becomes, we will take a single series of species of the genus *Zygnema*.

Species 41 of the genus *Zygnema* is *Z. dubium* (Hass.); it has the "filaments rather more slender than those of *Z. Jenneri*," in which they are slenderer than in *Z. vesicatum*, when they equal those of *Z. diductum*, in it equalling *Z. intermedium*, and so on through twelve species to *Z. orbiculare* (Hass.), in which their diameter and length is "very considerable." This is not a selected instance, but the first which occurred to us, and might be backed by numerous others. It is true that this forms only a part of the character, but to our mind the remainder is not much better defined, and, at any rate, these useless expressions ought not to have occupied so conspicuous a position.

We have felt it our duty to point out the very great fault just noticed, and must now, in justice to our author, call attention to the excellent mode in which he has divided that same genus *Zygnema* into sections, by the "truncated," not inverted, and "inverted extremities of the cells:" even here the figures are not all quite correct; the dissepiments of the separated and connected cells being figured similarly—the latter quite correctly; but when the cells are separated the central part is always protruded, not inverted, as represented on these plates.

In many cases, such as in the genera *Vaucheria*, *Draparnaldia*, *Rivularia*, &c., where the magnified figures seem well-deserving of praise, the want of a small portion of the plant represented of the natural size is very observable.

Algologists will be much struck by the union of the long-known *Conferva glomerata* and *C. ægagropila* under the name of *Cladophora glomerata*. Mr. Hassall's theory of the formation of the latter is, that "a specimen by the force of some mountain stream swollen by recent rains becomes forced from its attachment; as it is carried along by the current, it is made to revolve upon itself, until at last a perfect ball is formed of it, which finally becomes deposited in some basin or reservoir." We cannot deny that this may be a correct view of the facts—indeed it may be doubted if any person is qualified to do so; but we may observe, that the very still lakes and pools in which *C. ægagropila* is usually found are not all of them supplied by swift streams, and that therefore some doubts may be allowed.

The figure of *Botrydium granulatum* is evidently a reversed copy of part of Dillwyn's plate of *Conferva multicapsularis*, and yet Mr. Hassall quotes that synonym doubtfully; thus allowing that, even in his own opinion, his figure may not represent *B. granulatum*. Why not state this; and also why not copy Greville's figure, which certainly represents the true plant?

We now come to the *Desmideæ*, to our mind the least satisfactory part of the book, for we suspect that here the author is far less at home than in the preceding families. A more prominent reference might have been made to the very successful labours of Mr. Ralfs upon this family, and also the *Diatomaceæ*, which have appeared in our pages, and are now published in a collected form in the 'Transactions' of the Edinburgh Botanical Society. From these papers Mr. Hassall has avowedly transcribed the remarks on several of the species, and has apparently copied by far the greater number of the figures of the *Desmideæ*. He does state that "several of the figures of this family, especially those of the genera *Euastrum* and *Cosmarium*" are so obtained, but might have added, that nearly if not quite every figure of *Staurastrum*, *Scenedesmus*, *Pediastrum*, *Xanthidium* and *Tetmemorus* have the same origin. We do not blame him for copying these beautiful drawings, but he ought to have taken better copies, and also acknowledged his obligation to their author. Nearly all the figures of *Closterium* we think are derived from Ehrenberg; the figure named *Cl. lunula* is not that species, but a variety of *Cl. Ehrenbergi*. In this case an acknowledgement was the more necessary, since it is more than probable that some of the figures do not represent British species; for instance, our *Cl. margaritaceum* differs from Ehrenberg's figure in not being granulated, and is perhaps distinct; Ehrenberg's *Cl. digitus* is not the same as the species so called in Britain.

We cannot however afford time or space to hunt out and record all these errors, nor indeed the very many erroneous references to synonyms, but merely observe that Mr. Ralfs is frequently made to have used a nomenclature quite different from that which really exists in the 'Annals' and 'Transactions'; and that the references to Mr. Jenner's 'Flora of Tunbridge Wells' are incorrect in numerous cases. This is really too bad, as a very little ordinary care would have prevented it. We readily forgive an author for mistakes, for to them we are all liable; but carelessness of this kind and to this extent is unpardonable.

Mr. Hassall justly remarks, that our knowledge of these plants is far from being complete. We believe that the number of *Closteria* is much greater than is supposed by him, and know of many additional species in some of the other genera.

In the present infancy of our knowledge, much difference of opinion may exist as to the characters which should constitute genera; many may agree with Mr. Hassall in considering *Desmidium*, for example, to have been too much dismembered by previous writers; and some will probably think that he has himself introduced unnecessary divisions, as for example, *Arthronema* (p. 238) and *Hassallia*, originally proposed by Mr. Berkeley but relinquished by that eminent algologist as "frustrated by Kützing's genus *Sirosyphon*," which Mr. Hassall remarks (p. 231), "I cannot think it is."

We have not space to allow of our noticing Mr. Hassall's peculiar views upon the cytoblast and its uses as a "laboratory or stomach in which the materials necessary for the growth and vitality of the cell and its contents are received and digested" (p. 5), or as an organ of fertilization (p. 6), or on the "vegetable structure which secretes the raphides;" but this is of less consequence, as they have been remarked upon in rather strong terms of reprobation in the 'Botan. Zeitung' for Aug. 25, 1843; that reviewer considers them to be made up of "phantasies and absurdities."

In conclusion, we would again remind our readers, that although we have found much to censure, that in a much greater number of instances praise is due. It is unfortunately our duty to point out the errors rather than the beauties of such a work as the present, which with all its faults is an acquisition to the British botanist.

British Libellulinæ *or Dragon-flies.* By W. F. Evans, M.E.S. 8vo. London, 1845.

A little book containing characteristic figures of all the known British species of *Libellulæ*, but devoid of that artistical beauty to which we are accustomed in entomological works. The figures seem sufficient by which to identify the species and are apparently very accurate. The letter-press is very little more than an explanation of the plates, not containing the generic and specific characters—a very great omission. Neither do we see any reference to the labours of M. Selys de Longchamps in this tribe of insects.

A Flora of Tunbridge Wells, being a List of Indigenous Plants within a radius of fifteen miles around that place. By Edw. Jenner, A.L.S. 8vo. Tunbridge Wells, 1845.

The most perfect local flora that we have seen, if we take that term as describing a mere list of plants. It is very full in the department of flowering plants, but peculiarly so in that of the cryptogamic tribes. Mr. Jenner's well-known acquaintance with those obscurer tribes had led us to expect a very valuable list, and we have not been disappointed.

Circumstances over which the author had no control have delayed the publication of this volume so as to make some of the earlier pages appear rather obsolete; this will not however be found so much the case as to affect the convenient use of the book, which we can strongly recommend.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

May 6, 1845.—The Lord Bishop of Norwich, President, in the Chair.

Il Cavaliere Giambattista Amici, M. G. P. Deshayes, and Prof. Karl Friedrich von Ledebour, were elected Foreign Members.

Read the conclusion of Prof. Kölliker's memoir on the *Hectocotylæ* of *Tremoctopus violaceus* and *Argonauta Argo.*

In this paper Prof. Kölliker gives a detailed description of the external form and anatomical structure of two remarkable parasites referable from their characters to the genus *Hectocotyle* of Cuvier, and bearing much resemblance to the *Hect. Octopodis* of that author. Of one of these, that which is parasitic on the *Argonaut,* Delle Chiaje has given an unsatisfactory account in his Memoirs on Comparative Anatomy, under the name of *Trichocephalus acetabularis*; and Costa has endeavoured, in the sixteenth volume of the second series of the 'Annales des Sciences Naturelles' to prove that it is only a separated portion of the animal on which it is found. But this opinion is, according to Prof. Kölliker, quite erroneous, all its characters indicating beyond a doubt that it is a distinct animal. The two species described were found by Prof. Kölliker at Messina, and are severally named by him *Hect. Tremoctopodis* and *Hect. Argonautæ,* from the animals on which they parasitically live.

Prof. Kölliker enters into a particular statement of the reasons which have induced him to believe that these *Hectocotylæ* are in reality the males of the *Cephalopods* on which they are found; of which reasons he gives the following summary:—

1. The *Hectocotylæ* have arteries and veins, a heart and branchiæ; and hence it is improbable that they should be Epizootic Worms.
2. *Hect. Argonautæ* and *Hect. Tremoctopodis* bear a close relation to the *Cephalopoda* in general, and more especially to the genera on which they are found; inasmuch as they have—
    - *a.* The same *spermatozoa*;
    - *b.* Contractile pigment-cells;
    - *c.* Similarly formed and similarly organized suckers;
    - *d.* The same remarkable arrangement of the muscular fibres —the *Hectocotylæ* in the muscular envelope of the body, the *Cephalopoda* in their arms.
3. Among 280 *Argonauts* examined not a single male was found.
4. Nevertheless the males must be very numerous, inasmuch as nearly all the *Argonauts* carry impregnated ova.
5. The *Hectocotylæ* live in the neighbourhood of the female sexual organs of their *Cephalopods,* and are all males.
6. The eggs of the *Argonaut* contain, according to Madame Power and Maravigna, embryos perfectly similar to the *Hect. Argonautæ.*

If this last statement be correct, adds Dr. Kölliker, there can be no doubt that the *Hect. Argonautæ* is the male of the *Argonaut.*

Read also a continuation of Dr. J. D. Hooker's "Enumeration of the Plants of the Galapagos Islands."

Anniversary Meeting.

May 24.—The Lord Bishop of Norwich, President, in the Chair.

The President opened the business of the Meeting, and the list of the Members whom the Society had lost during the past year having been first read, the Secretary proceeded to read the following notices of some among them.

The deaths among the Fellows amounted to thirteen. The first name is that of

Francis Baily, Esq., one of the founders and the first Secretary of the Astronomical Society, of which he was afterwards four times President; and in everything connected with that Society and with its objects he took a leading, an active, and a most efficient part. His labours in these departments were multifarious, and demanded both intense thought and incessant application. They are too little connected with natural history to admit of detailed consideration here; but a summary of them has been given by Sir John F. W. Herschel in an eloquent memoir of their author, published in the Philosophical Magazine for January 1845, which contains an ample record of the life, character and labours of this eminent man.

Mr. Baily became a Fellow of our Society in 1817: he was also a Fellow of the Royal, Geological and Geographical Societies, an Honorary Member of the Royal Irish Academy, and a Correspondent of the Academy of Sciences of the Institute of France and of various other Foreign Academies. In 1835 the University of Dublin conferred on him the honorary title of D.C.L., and the same honour was awarded to him by that of Oxford in 1844. He died on the 30th of August last in the 71st year of his age.

Charles Cordeaux, Esq., M.D.

The Very Rev. Edmund Goodenough, D.D., F.R.S., Dean of Wells, was the son of the Right Rev. Samuel Goodenough, Bishop of Carlisle, an original Member of this Society, for many years one of its Vice-Presidents, and well-known by his memoirs on British *Carices* and British *Fuci*, published in early volumes of our 'Transactions.' Dr. Goodenough the son was himself much attached to the study of natural history: he was for many years head-master of Westminster School.

William Griffith, Esq., the youngest son of the late Thomas Griffith, was born on the 4th of March 1810, at his father's residence at Ham Common, near Kingston-upon-Thames, in the county of Surrey.

He was educated for the medical profession, and completed his studies at the London University, where he became a pupil of Prof. Lindley, under whose able instructions, assisted by the zealous friendship of Mr. R. H. Solly, and in conjunction with two fellow-pupils of great scientific promise, Mr. Slack and Mr. Valentine, he made rapid progress in the acquisition of botanical knowledge. The first public proofs that he gave of his abilities are contained in a microscopic delineation of the structure of the wood and an analysis of the flower of *Phytocrene gigantea,* in the third volume of Dr. Wallich's 'Plantæ Asiaticæ Rariores'; and in a note on the development and structure of *Targionia hypophylla,* appended to M. de Mirbel's Dissertation on *Marchantia polymorpha,* both published in 1832. So highly were his talents as an observer appreciated at this early period, that Dr. Wallich speaks of him as one "whose extraordinary talents and knowledge as a botanist entitle him to the respect of all lovers of the science;" and M. de Mirbel characterizes him as "jeune Anglois, très instruit, très zélé et fort bon observateur."

His note on *Targionia* is dated Paris, April 2nd, 1832, and in the month of May of the same year, having finished his studies at the London University with great distinction, he sailed from England for India, which was destined to be the scene of his future labours. He arrived at Madras on the 24th of September, and immediately received his appointment as Assistant-Surgeon in the service of the East India Company.

His first appointment in India was to the coast of Tenasserim; but in the year 1835 he was attached to the Bengal Presidency, and was selected to form one of a deputation, consisting of Dr. Wallich and himself as botanists, and Mr. MacClelland as geologist, to visit and inspect the Tea-forests (as they were called) of Assam, and to make researches in the natural history of that almost unexplored district.

This mission was for Mr. Griffith the commencement of a series of journeys in pursuit of botanical knowledge, embracing nearly the whole extent of the East India Company's extra-peninsular possessions, and adding large collections in every branch of natural history, but especially botany, to those which, under the auspices of the Indian Government, had previously been formed. He next, under the directions of Capt. Jenkins, the Commissioner, pushed his investigations to the utmost eastern limit of the Company's territory, traversing the hitherto unexplored tracts in the neighbourhood of the Mishmee Mountains which lie between Suddiya and Ava. Of the splendid collection of insects formed during this part of his tour, some account has been given by Mr. Hope in the Transactions of the Entomological Society and in the eighteenth volume of our own Transactions.

His collection of plants was also largely increased on this remarkable journey, which was followed by a still more perilous expedition, commenced in February of the following year, from Assam through the Burmese dominions to Ava, and down the Irawaddi to Rangoon, in the course of which he was reported to have been assassinated. The hardships through which he passed during the journey and his excessive application produced, soon after his arrival in Calcutta, a severe attack of fever, on his recovery from which he was appointed Surgeon to the Embassy to Bootan, then about to depart under the charge of the late Major Pemberton. He took this opportunity of revisiting the Khasiya Hills, among which he formed a most extensive collection; and having joined Major Pemberton at Goalpara, traversed with him above 400 miles of the Bootan country, from which he returned to Calcutta about the end of June 1839. In November of the same year he joined the army of the Indus in a scientific capacity, and penetrated, after the subjugation of Cabool, beyond the Hindoo Khoosh into Khorassan, from whence, as well as from Affghanistan, he brought collections of great value and extent. During these arduous journeys his health had several times suffered most severely, and he was more than once reduced by fever to a state of extreme exhaustion; but up to this time the strength of his constitution enabled him to triumph over the attacks of disease, and the energy of his mind was so great, that the first days of convalescence found him again as actively employed as ever.

On his return to Calcutta in August 1841, after visiting Simla and the Nerbudda, he was appointed to the medical duties at Malacca; but Dr. Wallich having proceeded to the Cape for the re-establishment of his health, Mr. Griffith was recalled in August 1842 to take, during his absence, the superintendence of the Botanic Garden near Calcutta, in conjunction with which he also discharged the duties of Botanical Professor in the Medical College to the great advantage of the students. Towards the end of 1844 Dr. Wallich resumed his functions at the Botanic Garden. In September Mr. Griffith married Miss Henderson, the sister of the wife of his brother, Captain Griffith, and on the 11th of December he quitted Calcutta to return to Malacca, where he arrived on the 9th of January in the present year. On the 31st of the same month he was attacked by hepatitis, and notwithstanding every attention on the part of the medical officer who had officiated during his absence and who fortunately still remained, he gradually sunk under the attack, which terminated fatally on the 9th of February. "His constitution," says his attached friend, Mr. MacClelland, in a letter to Dr. Horsfield, "seemed for the last two or three years greatly shattered, his energies alone remaining unchanged. Exposure during his former journeys and travels laid the seeds of his fatal malady in his constitution, while his anxiety about his pursuits and his zeal increased. He became care-worn and haggard in his looks, often complaining of anomalous symptoms, marked by an extreme rapidity of pulse, in consequence of which he had left off wine for some years past, and was obliged to observe great care and attention in his diet. In Affghanistan he was very nearly carried off by fever, to which he had been subject in his former travels in Assam. No government ever had a more devoted or zealous servant, and I impute much of the evil consequences to his health to his attempting more than the means at his disposal enabled him to accomplish with justice to himself."

The most important of Mr. Griffith's published memoirs are contained in the Transactions of the Linnean Society. Previous to starting on his mission to Assam, he communicated to the Society the first two of a series of valuable papers on the development of the vegetable ovulum in *Santalum, Loranthus, Viscum,* and some other plants, the anomalous structure of which appeared calculated to throw light on this still obscure and difficult subject. These papers are entitled as follows:—

1. On the Ovulum of *Santalum album*. Linn. Trans. xviii. p. 59.
2. Notes on the Development of the Ovulum of *Loranthus* and *Viscum*; and on the mode of Parasitism of these two genera. Linn. Trans. xviii. p. 71.
3. On the Ovulum of *Santalum, Osyris, Loranthus* and *Viscum*. Linn. Trans. xix. p. 171.

Another memoir, or rather series of memoirs, "On the Root-Parasites referred by authors to *Rhizantheæ*, and on various plants related to them," occupies the first place in the Part of our Transactions which is now in the press, with the exception of the portion relating to *Balanophoreæ*, unavoidably deferred to the next following Part. In this memoir, as in those which preceded it, Mr. Griffith deals with some of the most obscure and difficult questions of vegetable physiology, on which his minute and elaborate researches into the singularly anomalous structure of the curious plants referred to will be found to have thrown much new and valuable light.

In India, on his return from his Assamese journey, he published in the 'Transactions of the Agricultural Society of Calcutta,' a "Report on the Tea-plant of Upper Assam," which, although for reasons stated avowedly incomplete, contains a large amount of useful information on a subject which was then considered of great practical importance. He also published in the 'Asiatic Researches,' in the 'Journal of the Asiatic Society of Bengal,' and in the 'Transactions of the Medical and Physical Society of Calcutta,' numerous valuable botanical papers; but the most important of his Indian publications are contained in the 'Calcutta Journal of Natural History,' edited jointly by Mr. MacClelland and himself. Of these it may be sufficient at present to refer to his memoir "On *Azolla* and *Salvinia*," two very remarkable plants which he has most elaborately illustrated, and in relation to which he has entered into some very curious speculations; and his still unfinished monograph of "The Palms of British India," which promises to be a highly important contribution to our knowledge of a group hitherto almost a sealed book to European botanists.

But the great object of his life, that for which all his other labours were but a preparation, was the publication of a General Scientific Flora of India, a task of immense extent, labour and importance. To the acquisition of materials for this task, in the shape of collections, dissections, drawings and descriptions, made under the most favourable circumstances, he had devoted twelve years of unremitted exertion. His own collections (not including those formed in Cabool and the neighbouring countries) he estimated at 2500 species from the Khasiya Hills, 2000 from the Tenasserim provinces, 1000 from the province of Assam, 1200 from the Himalaya range in the Mishmee country, 1700 from the same great range in the country of Bootan, 1000 from the neighbourhood of Calcutta, and 1200 from the Naga Hills at the extreme east of Upper Assam, from the valley of Hookhoong, the district of Mogam, and from the tract of the Irawaddi between Mogam and Ava. Even after making large deductions from the sum-total of these numbers on account of the forms common to two or more of the collections, the amount of materials thus brought together by one man must be regarded as enormous. The time was approaching when he believed that he could render these vast collections subservient to the great end which he had in view. He had some time since issued an invitation to many eminent botanists in Europe to co-operate with him in the elaboration of particular families; and he purposed after a few years' additional residence in India to return to England with all his materials, and to occupy himself in giving to the world the results of his unwearied labours. But this purpose was not destined to be fulfilled, his collections have passed by his directions into the hands of the East India Company, and there can be no doubt, from the well-known liberality of the Directors, which this Society in particular has so often experienced, that they will be so disposed of by that enlightened body as to fulfil at once the demands of science and the last wishes of the faithful and devoted servant by whom they were formed. It is hoped too that the most important of his unpublished materials, both in drawings and manuscripts, will be given to the world in a manner worthy of the author and of the rank in science which he filled.

John Lewis Guillemard, Esq., was well known to this Society as a very amiable and worthy man, who took considerable interest in the pursuits of science. In early life he resided in America, and was chosen as their umpire by the British and American Commissioners for the arrangement of the debts due by American citizens to British subjects. He died at his house in Gower-street in December last at a very advanced age.

Robert Hills, Esq., was an artist of great and original talent, especially in the delineation of deer and antelopes; and some of his labours in this department of his art have ornamented our own Transactions and those of the Zoological Society.

Joseph Hurlock, Esq.

Sir John Jamison, M.D.

John Leonard Knapp, Esq., one of the oldest Fellows of the Society, was born at Shenley in Buckinghamshire, of which parish his father, the Rev. Primatt Knapp, was rector, on the 9th of May 1767. He was educated at the grammar-school of Thame in Oxfordshire, but being destined for the navy, left school at an early age. The sea, however, disagreeing with his health, he left the navy and afterwards served both in the Hereford and Northampton Militia, in the latter of which he commanded a troop. Previous to the death of his father he resided principally at Powick near Worcester, from which place he usually made botanical excursions during the summer months, one of which extended into Scotland, where, in company with the late Mr. George Don, he collected several of the rarer grasses figured in his 'Gramina Britannica, or Representations of the British Grasses, with Remarks and occasional Descriptions,' published in 4to in 1804. This volume contains coloured figures of 119 species or remarkable varieties; and offers many useful observations on the agricultural and other properties of the grasses figured. It was printed by Bensley, and the whole impression, with the exception of 100 copies in the hands of the binder, was destroyed by the fire which consumed the establishment of that printer soon after its completion. To this accident Mr. Knapp alludes in a poem, entitled "Progress of a Naturalist," printed at the end of the third edition of his 'Journal of a Naturalist,' and in the preface to a new edition of the 'Gramina Britannica,' which he issued in 1842, with little alteration of the original text and no addition of species.

In 1818 Mr. Knapp published anonymously a poem in 8vo, entitled "Arthur, or the Pastor of the Village," and between 1820 and 1830 he contributed a series of articles called "The Naturalist's Diary" to 'Time's Telescope.' In 1829 he also published without his name a little work entitled 'The Journal of a Naturalist,' which gives a pleasing idea of the pursuits by which a country gentleman imbued with a taste for natural history may amuse his leisure. Of this work a second and a third edition have since appeared.

In 1804 he married Lydia Frances, the daughter of Arthur Freeman, Esq., of Antigua, by whom he had seven children, three only of whom, two sons and a daughter, survive. Shortly afterwards he took up his residence at Llanfoist near Abergavenny, where he continued until 1813, when he removed to Alveston in the neighbourhood of Bristol, at which place he died on the 29th of April in the present year. His latter years were spent almost entirely in the pursuit of his favourite study of natural history and in the cultivation of his garden. His unpublished drawings of British *Fungi* occupy five 4to volumes. He became a Fellow of the Linnean Society in the year 1796, and was also a Fellow of the Society of Antiquaries.

The Earl of Mountnorris (more generally known by the title of his youth, *Lord Valentia*) was born at Arley Castle, Staffordshire, on the 7th of December 1770, and educated at Oxford. In 1789 he visited France and Germany; and in 1802, accompanied by Mr. Salt as his draughtsman and secretary, he commenced the interesting journey, of which he subsequently published an account, in three volumes 4to, under the title of 'Voyages and Travels in India, the Red Sea, Abyssinia and Egypt,' 1802–6. He sat for a short time in parliament, and succeeded to the earldom on the death of his father in 1816. His own death took place at the seat of his birth on the 23rd of July last, in the 74th year of his age.

His lordship became a Fellow of the Linnean Society in 1796, and of the Royal Society also in the same year. During his travels he paid some attention to natural history and made a small botanical collection.

The Marquis of Sligo.

John Smirnove, Esq.

John Wedgewood, Esq., of Seabridge, Staffordshire, was conversant with various branches of natural history, and especially botany. He was also much attached to chemistry and horticulture, and contributed several papers to the 'Transactions of the Horticultural Society,' and the 'Gardener's Chronicle.' Mr. Wedgewood was held in great esteem as a man of high moral worth and amiable and generous disposition. He was born about March 1766, and died on the 26th of January 1844.

The Society has also lost by death three of its *Foreign Members*.

Richard Harlan, M.D., was of Quaker parentage and born in the city of Philadelphia about the year 1795. He studied medicine under Dr. Joseph Parrish, one of the surgeons of the Pennsylvania Hospital, whose anatomical assistant he became, dissecting extensively himself and directing the dissections of the younger pupils. In 1817, at which time he was settled in practice, he had already commenced the study of comparative anatomy with zeal and success; and there is reason to believe that his devotion to natural history interfered greatly with the brilliant prospect that was opened to him as a medical practitioner. But he had made his choice, and was quite prepared to sacrifice fortune and professional eminence to his favourite pursuit. As early as 1819 he delivered a course of lectures on Comparative Anatomy at the Philadelphia Museum (Peale's), where he had amassed a considerable stock of materials for demonstration, but the attendance was small, and he gave up lecturing in disappointment.

About this period the return of MacLure to the United States, accompanied by Lesueur, gave a new stimulus to the cultivation of natural history, and the complete establishment of the Academy of Natural Sciences of Philadelphia under the Presidency of MacLure brought together the most distinguished names in the science that America had produced. Among Dr. Harlan's claims to remembrance, not the least are derived from his zeal in the early constitution of this Society, and from his example of sedulous devotion to its pursuits. To the pages of its Journal he contributed numerous valuable papers.

In 1825 he published his 'Fauna Americana; being a Description of the Mammiferous Animals inhabiting North America,' a work partly compiled from Desmarest's 'Mammalogie' and from other less-known publications, but containing in addition much useful original matter.

In 1832, when the Asiatic cholera made its first appearance at Quebec and Montreal, considerable apprehension was excited in the public mind, and Dr. Harlan was appointed by the City Councils of Philadelphia one of a Commission of three, consisting of himself, Dr. Jackson and Dr. Meigs, to proceed to Canada, "to inquire into the origin, nature, progress, &c. of the prevailing epidemic." After making extensive inquiries, the Commission returned to Philadelphia with such a mass of information on the subject as enabled them to give to the people of that city ample warning of the nature of the premonitory symptoms and of the precautions to be adopted, and thereby greatly to mitigate the severity of the disease and to reduce the number of its victims. For his tripartite share in this service Dr. Harlan received a handsome gratuity from the municipal authorities, together with a piece of silver plate bearing an inscription in record of its object; and he was also appointed to the charge of one of the local hospitals, in the conduct of which he was most successful.

He subsequently married the daughter of a Quaker merchant in Philadelphia, by whom he had several children. His first visit to England was made about this time; but he afterwards returned to Europe with the design of establishing himself in practice in Paris. In this object, however, he was disappointed, and he once more sought refuge in his native city. Here again he was doomed to disappointment, and he was at length led to believe that a better chance of success was opened for him at New Orleans, in which city he fell a victim to disease when there was just reason for thinking that he was on the point of meeting with that success which his talents and acquirements so well deserved. He became suddenly hemiplegic, and died in the course of a few days from the time of his attack in the autumn or late summer of 1844.

He was elected a Foreign Member of the Linnean Society in 1835; and in the same year he collected his various scattered memoirs into an 8vo volume, entitled 'Medical and Physical Researches; or Original Memoirs in Medicine, Surgery, Physiology, Geology, Zoology and Comparative Anatomy.' The greater part of this volume consists of papers previously published; but it also contains several not before given to the world. Those relating to natural history occupy a very considerable portion of the work, and contain much valuable information.

Etienne Geoffroy St. Hilaire was born at Étampes on the 15th of April 1772, and destined for the ecclesiastical profession; but an early introduction to Haüy, whose pupil he became, entirely changed the character of his pursuits, and for a time he gave himself up almost entirely to the study of mineralogy. When, in consequence of the events of the 10th of August 1792, Haüy was thrown into prison, and placed, in common with so many others, in extreme peril of his life, young Geoffroy ardently exerted himself to procure the liberation of his teacher, which he succeeded in accomplishing, and was repaid for his exertions by the zealous friendship of the great mineralogist. On the warm recommendation of Haüy, Daubenton procured for him on the 13th of March 1793 the appointment of Assistant Keeper and Demonstrator of the Museum of Natural History, vacated by the resignation of Lacépède; and on the 10th of June in the same year, when the *Jardin des Plantes* was re-organized in conformity with a decree of the Convention, Geoffroy, then only 21 years old, was appointed to the Professorship of Zoology for the Vertebrated Animals, the duties of which he afterwards shared with Lacépède. From this period he devoted his whole attention to zoology, and several valuable papers which he published in the 'Décade Philosophique' and 'Magazin Encyclopédique' attest the rapidity of his progress in his new pursuit.

In 1798 he was appointed one of the scientific Commission which accompanied the French army into Egypt, and whose labours have added so much celebrity to that expedition. Of these labours M. Geoffroy contributed an important share, and to his firmness science in all probability owes their preservation. When the French army were about to evacuate the country, the papers and drawings belonging to the Commission were demanded by the English general; but a resolute intimation of their determination to commit the whole to the flames, if the demand were persisted in, delivered through the mouth of M. Geoffroy, had its proper effect—Lord Hutchinson withdrew his orders, and the Commission were left in possession of the fruits of their researches.

On his return to Paris from this expedition M. Geoffroy resumed his lectures at the *Jardin des Plantes,* and occupied himself assiduously in adding to the zoological collections of the museum and in improving their arrangement. He was elected a Member of the Institute in 1807; and in 1810 was again despatched on a mission to Portugal. After encountering great dangers on his road through Spain, arising from the excited state of the country, he arrived in Portugal, where he succeeded in accumulating large collections of minerals and animals, chiefly obtained from the cabinets of the Palace of Ajuda and of the Academy of Lisbon. In pursuance of the capitulation for the evacuation of Portugal by the French, the restoration of these collections was demanded by General Beresford and Lord Proby; but M. Geoffroy claiming them as his private property, and the conservators of the collections from which they were obtained declaring that they had been given to him in exchange for other specimens and in return for services, he was suffered to retain them, and in 1815 they were not reclaimed by Portugal. In this last-named year M. Geoffroy was elected Member of the Chamber of Deputies for his native town. He had been a Member of the Legion of Honour from the establishment of the order; and became gradually associated with a large number of scientific Societies throughout the world. His election as a Foreign Member of the Linnean Society took place in 1824, and he died on the 19th of June 1844.

A mere list of his zoological writings would occupy a considerable space. Besides a number of important papers in the 'Annales' and 'Mémoires du Muséum d'Histoire Naturelle,' in the 'Bulletin de la Société Philomathique,' in the 'Annales des Sciences Naturelles,' in the 'Dictionnaire des Sciences Naturelles,' and in other scientific miscellanies, he published separately several works which have contributed in no small degree to the progress of zoological and anatomical science. Among these the most important is his 'Philosophie Anatomique,' in two vols., published in 1818 and 1823; the first entitled 'Des Organes Respiratoires sous le rapport de la détermination et de l'identité de leurs pièces osseuses,' the second 'Des Monstruosités Humaines.' In this work he endeavours to demonstrate throughout the animal kingdom a uniform plan of organization, recognizable by the existence, not of the same organs, but of the materials of the same organs in all. From the period of the publication of his 'Philosophie Anatomique,' this "unity of composition" became the leading idea of all his writings. It was the subject of a lengthened discussion between him and Cuvier; and presides over his 'Système Dentaire des Mammifères et des Oiseaux,' published in 1824, his 'Considérations Générales sur les Monstres,' in 1826, his 'Cours de l'Histoire Naturelle des Mammifères,' of which only one volume appeared in 1829, as well as over numerous notes and memoirs on the structure of *Marsupialia* and *Monotremata*, published at various times. To him, conjointly with Cuvier, France is indebted for the elevated position in zoology which she has occupied for the last half century. Following up with equal zeal and success the career of anatomical investigation opened for them by Daubenton, Vicq d'Azyr and others, and adding to the habits of minute investigation of those excellent observers a spirit of philosophical generalization, these two great zoologists created a school in which the study assumed a really scientific character. From this school have emanated the most valuable contributions that zoology has received in our times, and it will long continue to exercise a salutary influence over the labours of succeeding generations.

Karl Bernhard von Trinius was born at Eisleben on the 7th of March 1778. He devoted himself at an early age to the study of botany, and especially of the grasses, on which he published numerous highly important works. Of these the principal separate publications are: 'Fundamenta Agrostographiæ, sive Theoria constructionis Floris Graminei, adjectâ Synopsi Generum Graminum hucusque cognitorum,' 8vo, Viennæ, 1820; 'Clavis Agrostographiæ Antiquioris,' Coburgi, 1822; 'De Graminibus unifloris et sesquifloris Dissertatio Botanica,' 8vo, Petropoli, 1824; and 'Species Graminum Iconibus et Descriptionibus illustratæ,' in three vols. folio, Petropoli, 1828, 1829 and 1836. His contributions on the same subject to the Memoirs of the Academy of St. Petersburgh were numerous and important, including a revision of the genera and species of *Paniceæ* in the restricted sense of that tribe, of *Stipeæ*, of *Bambuseæ*, &c.

In these works he propounded a theory of the structure of the gramineous flower, which although supported with much ingenuity, has met with little acceptation among botanists. But his systematic labours on the family have contributed in no small degree to its elucidation, and his patient and elaborate investigations will ensure him a distinguished position among that valuable class of observers who devote themselves to the study of a single family of large extent.

M. Trinius had long been resident at St. Petersburgh, where he became a Corresponding Member of the Academy in 1810, and an Effective Member in 1823. He was also for many years Director, as indeed he was in a great degree the founder, of the Botanical Museum; with which in 1843 he incorporated his own collection of grasses, estimated by M. Meyer to contain from 35,000 to 40,000 specimens belonging to 5000 species. These numbers may well be regarded as enormous, when we reflect that M. Kunth's Enumeration of the family, including a great number of doubtful species, scarcely exceeds 3000. With such vast resources at his disposal, we may expect from M. Ruprecht, who has been associated with M. Trinius in several of his later memoirs, and who has attached himself particularly to the study of the Grasses, large contributions to our knowledge of this important family.

M. Trinius was, as we are informed, an intimate friend of Chamisso, and like him mingled a genius for poetry with his botanical pursuits.

He was admired for his varied accomplishments and for his depth of intellect, and loved for his amiable disposition and agreeable manners. He died at St. Petersburgh on the 12th of March 1844.

And lastly we have to lament the death of one Associate.

Thomas Charles Hope, M.D., F.R.S., V.P.R.S.E. &c., Professor of Chemistry in the University of Edinburgh.

His earliest contribution to the Transactions of the Royal Society of Edinburgh was "An Account of a Mineral from Strontian, and of a peculiar species of Earth which it contains," published in the third and fourth volumes. But his most important researches were on the subject of Heat, and on the Phænomena of Freezing, an object which occupied his attention almost to the period of his death, his last communication to the Royal Society of Edinburgh, read on the 1st of May 1843, being "An Attempt to explain the Phænomena of the Freezing-cavern at Orenburg." On the 3rd of April in the same year he had laid before the same Society a paper entitled "Chemical Observations on the Flowers of the *Camellia Japonica, Magnolia grandiflora* and *Chrysanthemum Leucanthemum*; and on three proximate principles which they contain," thus connecting his later chemical with his earlier botanical pursuits.

Dr. Hope was the oldest surviving Member of the Linnean Society, having been elected an Associate on the 18th of March 1788. In the same year he was elected a Fellow of the Royal Society of Edinburgh, and in 1810 of the Royal Society of London. In 1843, he found himself unequal to the continuance of his lectures, which were delivered for him by Dr. Traill, and he shortly afterwards resigned the Chemical Chair. He died on the 13th of June 1844, having nearly completed his 78th year.

At the election which subsequently took place, the Lord Bishop of Norwich was re-elected President; Edward Forster, Esq., Treasurer; John Joseph Bennett, Esq., Secretary; and Richard Taylor, Esq., Under-Secretary. The following five Fellows were elected into the Council in the room of others going out: viz. C. C. Babington, Esq., Secretary of the Cambridge Philosophical Society; Thomas Bell, Esq., Professor of Zoology in King's College, London; Bracy Clark, Esq.; Edwin John Quekett, Esq.; and Richard Horsman Solly, Esq.

ZOOLOGICAL SOCIETY.

July 8, 1845.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. Gould exhibited to the Meeting five new species of Mammals:—

Mus lineolatus. *M. vellere longo, molli fusco-cinereo corpore subtùs cinerascenti-albo indistinctè flavo-lavato; auribus mediocribus extus pilis nigris posticè cinerascentibus vestitis; pedibus albis; caudâ albâ suprà nigrescentibus.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	5	4
——— *caudæ*	4	5
——— ab apice rostri ad basin auris	1	2
——— *auris*	0	7½
——— *tarsi digitorumque*	1	2¾

Hab. Open plains, Darling Downs, New South Wales.

Fur long and very soft; the hairs of the back of a deep slate-grey, with the exposed portion of a dirty yellowish hue, and the points black; long interspersed black pointed hairs are abundant on the back, and give a deep general tint to that part; sides of the body greyish yellow, under parts grey-white, faintly suffused with yellowish; the hairs on these parts of a deepish grey, excepting at the point; hairs of the moustaches rather small and black; eye encircled with black; ears of moderate size and well-covered with minute hairs; those on the outer side black, excepting on the hinder part, where they assume a greyish white tint, like those on the inner side of the ear; feet rather small and white; the fore-ones greyish at the wrist, and the tarsi indistinctly suffused with yellowish; tail about equal in length to the head and body, well-clothed with smallish hairs, which do not perfectly hide the scales; those on the upper surface chiefly brownish black, slightly pencilled with whitish in parts; on the sides and under part white.

MUS GRACILICAUDATUS. *M. vellere longo molli cinerascenti-fusco; corpore subtùs albo, indistinctè flavo-lavato; auribus parvulis pilis obscuris plerumque obsitis; pedibus sordidè albis; caudâ fusco-nigrâ, subtùs sordidè albâ.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	5	0
———— *caudæ*	3	5
———— ab apice rostri ad basin auris	1	2½
———— *auris*	0	5
———— *tarsi digitorumque*	1	1

Hab. Oakley Creek, Darling Downs, east coast of Australia.

This species greatly resembles the *Mus lineolatus*, but differs in having the ears smaller, and clothed internally with dusky hairs instead of white; the incisor teeth rather broader; the tarsi smaller; the fore-feet much smaller; the tail more sparingly clothed with hairs, which are of a less pure white on the under side, and the darker hairs of the upper surface extending somewhat on to the sides of the tail, and in not presenting that strongly-marked line of separation between the colouring of the upper and under surface. The fur is rather less soft, less tinted with yellow on the upper parts, and more so on the sides of the body.

MUS ALBOCINEREUS. *M. vellere longo permolli, pallidè cinereo, in dorsum pallidè fusco tincto; corpore subtùs, caudâ, pedibusque albis; caudâ suprà indistinctè nigro penicillatâ; auribus mediocribus pilis albescentibus vestitis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	3	9
———— *caudæ*	3	6
———— ab apice rostri ad basin auris	1	1½
———— *auris*	0	5½
———— *tarsi digitorumque*	0	10

Hab. Moore's River, in the interior of Western Australia.

This mouse is rather larger than the *Mus musculus*, and considerably stouter in proportion; has the head large, the ears moderate;

the tail nearly equal to the head and body in length; the tarsi very slender; the fur very long and soft, and its general hue pale ashy grey; on the hinder part of the back a slight brownish tint, produced by a very fine and indistinct pencilling of dusky or pale greyish yellow; the lower part of the sides of the body and the whole of the under parts white, but not quite pure, having a faint greyish hue; the head grey-white, pencilled with black; the sides of the muzzle white; the ears well-clothed with minute greyish white hairs; the feet white, and if we except some scattered blackish hairs on the upper surface, the tail also white.

Hapalotis murinus. *Hap. vellere permolli, corpore suprà pallidè flavo, nigroque penicillato, lateribus corporis flavis; gulâ abdominis, caudâ, pedibusque albis; caudâ suprà indistinctè nigro penicillatâ; auribus magnis, subovatis, pilis minutis albis vestitis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	5	6
——— *caudæ*	3	9
——— ab apice rostri ad basin auris	1	3
——— *auris*	0	10
——— *tarsi digitorumque*	1	$0\frac{2}{3}$

Hab. Plains near the Namoi, New South Wales.

This animal is remarkable for the extreme softness and delicate colouring of its fur, which on both the upper and under parts of the body is of a slate-grey tint next the skin, but on the under parts of a pure white colour externally, except on the mesial line of the abdomen, where there is a slight yellow tint; on the upper parts and sides of the body the exposed portions of the hairs are of a delicate ochreous yellow, but on the back there is a considerable admixture of black, the points of the hairs being of that colour; ears rather large and nearly of an oval form, tolerably well-clothed with small hairs, of a white colour, excepting on the fore-part of the outer surface, where they assume a dusky greyish hue; tail nearly equal in length to the body, tolerably well-clothed with hairs, but not so thickly as to hide the scales; these hairs, though short, are longer, more numerous and much less harsh than is usual in the true Rats; on the sides and under part of the tail they are pure white, and on the upper surface some are white and others blackish, but chiefly white on the apical portion; sides of the muzzle white; hairs of the moustaches moderate, black at the root, but greyish at the point.

Podabrus macrourus. *Pod. cinereus nigro penicillatus; lateribus corporis flavescentibus, gulâ, abdomine pedibusque albis; capite suprà lineâ nigrâ longitudinali notato; oculis nigro cinctis; auribus mediocribus intus pilis flavis, extus nigrescentibus obsitis; caudâ crassissimâ ad apicem attenuatâ, pilis minutis, suprà nigro flavoque variegatis, subtùs albescentibus, vestitâ.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	3	9
——— *caudæ*........................	3	2
——— ab apice rostri ad basin auris	1	$0\frac{1}{2}$
——— *auris*	0	5
——— *tarsi digitorumque*	0	$8\frac{1}{2}$

Hab. Open plains, Darling Downs, New South Wales.

Fur very soft, and both on the upper and under parts of the body of a slate-grey colour next the skin; general hue of the upper parts of the body ashy grey, much pencilled with black; on the sides of the body there is but little of the black pencilling, and hence the general hue is paler; and on these parts, as well as on the sides of the head, is a faint yellow tint; under parts of the body white, very indistinctly suffused with yellow on the mesial portion of the abdomen; between the white of the under parts and the greyish hue of the sides of the body is a narrowish space of an almost uniform pale yellow hue, and the same tint is observable on the outer side of the legs; feet white, obscurely tinted with pale yellow; on the upper surface of the head is a mark, narrow on the muzzle, but becoming expanded behind, which is almost entirely black, and immediately around the eyes the hairs are also black; ears of moderate size, their posterior margin nearly straight, clothed internally with small pale yellowish, and externally with black hairs, excepting on the hinder part, where they are pale; tail very thick at the base (about $3\frac{1}{2}$ lines in diameter), becoming gradually slender to the apex, and clothed throughout with very minute hairs, between which the scaly skin is visible; those on its upper part and sides partly black and partly yellow, and on the under surface dirty white. The specimen described is a male.

MISCELLANEOUS.

On the Existence of Tetraspores in a genus of Algæ, belonging to the Zygnemata. By M. Montagne.

"Reproductive bodies of two kinds have for a long time been observed in those Algæ which are denominated *Florideæ.* Those which constitute the spores are inclosed in variable but distinct conceptacula, which are especially remarkable from the place which they occupy in different individuals. The others, nestling in the cortical stratum, or placed in rows in the transformed branches, are at first entire, globose or ellipsoidal, but at maturity separate into four spores, either crucially or horizontally.

"Messrs. Cronan of Brest, during the course of the last year only, observed in the spores of certain *Fucaceæ,* and amongst other species *Fucus nodosus,* where they had never been before ascertained to be otherwise than simple, that they also at maturity separated into four distinct spores. Dr. J. D. Hooker and Dr. Dickie in Great Britain, and Messrs. Decaisne and Thuret in France, not only confirmed this fact by their own observations, but studied it in some other species. We have then the two first families of the great class of Algæ provided with spores divided quaternally.

"Amongst the hydrophytes of Algiers there is one of great interest gathered by M. Durieu in the marsh of Ali-Labrack near La Calle. It belongs to the little tribe of *Zygnemata* distinguished by the copulation of the threads. At first it does not seem to differ from other species, but examined under the microscope it exhibits the spores, which in other individuals of the family are simple, divided crucially into four distinct spores, precisely as in *Florideæ*. The family then of *Zoospermeæ*, like the two others, exhibits this peculiarity."

The Alga of course belongs to a new genus, and Dr. Montagne has in consequence dedicated it to Mr. G. H. K. Thwaites, who has facilitated the study of Algæ so much by his admirable mode of preparing specimens. M. J. B.—*From a Letter presented to the French Academy*, October 20, 1845.

HASSALL'S 'FRESHWATER ALGÆ.'

To the Editors of the Annals of Natural History.

GENTLEMEN,—I beg to call your attention to an omission in the preface of the 'History of the British Freshwater Algæ,' of which I was not conscious until the work was placed in my hands ready bound, and which I much regret.

In making my acknowledgments to those gentlemen who kindly afforded me assistance in the preparation of the work, I have, most unfortunately and unaccountably, omitted all reference to the respected name of Mr. Dillwyn, one of the earliest and most successful cultivators of a knowledge of the Algæ.

In a future issue of the book I will take care that this error be rectified, and in the meantime I should feel obliged by your insertion of these few lines in explanation of what might seem a strange omission to many, and to Mr. Dillwyn a slight, the commission of which never entered into my thoughts.

I remain, Gentlemen, your very obedient servant,

ARTHUR H. HASSALL.

Norland Villa, Addison Road North, Sept. 10, 1845.

NATURAL HISTORY IN IRELAND.

Among the signs of good times for natural history, one of the most promising is the encouragement given to that science in the University of Dublin, and which contrasts favourably with the apathy, and even opposition shown towards it by Oxford and Cambridge, and the indifference displayed by the senators of the University of London, a body too fondly attached to the traditions of the older universities. In a printed notice of the present state of the natural-history collections in Trinity College, Dublin, now under the charge of one of the first among British zoologists, Mr. Robert Ball, we find that the university professors give courses of lectures, free to the public, on comparative anatomy, botany, mineralogy and geology, besides demonstrations in their respective departments by the keepers of the botanical and zoological collections. When we read the name of Harrison in connexion with comparative anatomy, of Allman and Harvey with botany, of Ball with zoology, and of Apjohn and Oldham with mineralogy and geology, it is very evident that Dublin possesses the only university in the British empire which can boast of a complete school of natural history, conducted by competent professors and *freely open* to all who wish to learn. Honour, then, to the Provost, Fellows and Professors of Trinity College! Their museums, too, are thrown open at proper times to all who wish to enter,—all members and students of the university having power to admit visitors, and all strangers, without introduction, on entering their names. That the public are not ungrateful for such generous privileges, is evident from the long list of valuable donations recorded in the document which has given rise to these remarks. When a great and learned college thus sets so honourable an example, the spirit of science is sure to diffuse itself far and wide. We find it at work in Ireland among those who are to instruct the poor as well as among the educators of the higher classes. One of the many active naturalists of Belfast, Mr. R. Patterson, has just been delivering a course of lectures on the Invertebrate animals to a class of 200 masters of the national schools—more than all the members of natural-history classes in London collected together! Yet there is no want of either zeal, ability or eloquence on the part of our English professors.

Occurrence of the Belted Kingfisher, Alcedo Alcyon, *Linn., in Ireland.*

I have the pleasure to record the occurrence of this North American bird in Ireland; a specimen, as I learn by letter from T. W. Warren, Esq. of Dublin, dated Nov. 21, 1845, having been shot by Capt. Smith at Annsbrook, county of Meath, about the first of the present month. It has fortunately been preserved, and on being shown to Mr. R. Ball (from whom also a letter respecting it has been received) was at once identified as *A. Alcyon.* Mr. Warren adds, that when at Mr. Glennon's, the well-known bird-preserver, on the day before the date of his letter, the gamekeeper of Mr. Latouche of Luggela (county of Wicklow) called to mention that he had lately seen a very large kingfisher at a stream connecting two lakes in that neighbourhood. He saw the bird very well, as it admitted of his approach within twenty yards: his description agreeing with the *A. Alcyon*, the specimen was shown to him, which he at once identified as being of the same species as that which he had seen.

This kingfisher—said to be the only species inhabiting North America—is migratory there, and like other birds from the same continent which have visited Ireland and Great Britain, has appeared here about the migratory period. As an American bird it is fully treated of by Wilson*, Audubon† and Richardson‡. The last author states that in summer "it frequents all the large rivers in the fur countries up to the 67th degree of latitude." It retires to winter in the Southern States and the West India islands (Wilson and Richardson). Audubon remarks that "it is extremely hardy, and those individuals which migrate northward to breed, seldom return towards our Southern States, where they spend the winter, until absolutely forced to do so by the great severity of the weather," vol. v. p. 548. This is I believe the first notice of the species being met with on the eastern side of the Atlantic.

Belfast, Nov. 22, 1845. Wm. Thompson.

* Sir W. Jardine's edit., vol. i. p. 348. † Orn. Biog. vols. i. and v.
‡ Fauna Bor. Amer. p. 339.

MR. GOADBY.

It will be in the recollection of the Fellows of the Royal Society, and of those distinguished persons present at the evening parties of the Marquis of Northampton during the last season, that great admiration was excited by Mr. Goadby's beautiful anatomical preparations of the lower classes of animals, preserved in fluids discovered by him after years of laborious and expensive experiments, and displayed in glass cases, also of his own invention and manufacture, admitting the full examination of every part of the animal, either by the eye or microscope. These preparations, on more than one occasion, attracted the especial attention of His Royal Highness Prince Albert, whose knowledge of natural history enabled him to appreciate their value. They were also seen and much admired by Sir Robert Peel, and it is with the utmost satisfaction we are able to state, that, with the discriminating patronage of science and its cultivators, which distinguishes him, and which he lately evinced in regard to Mr. Peach, he has recently presented Mr. Goadby with one hundred and fifty pounds from the Royal Bounty Fund as a reward for his labours in this department of natural history.

METEOROLOGICAL OBSERVATIONS FOR OCT. 1845.

Chiswick.—October 1. Very fine. 2, 3. Rain. 4. Cloudy and fine. 5. Cloudy and fine: clear. 6. Foggy: cloudy: rain. 7. Rain: cloudy: clear. 8. Foggy: fine. 9. Rain: clear. 10. Heavy rain. 11. Rain, with fog: showery: clear: slight frost. 12. Dense fog: cloudy: fine. 13—16. Very fine. 17—19. Overcast and fine. 20. Densely overcast: clear and fine. 21, 22. Fine. 23. Fine: clear and frosty at night. 24. Dense fog: very fine. 25, 26. Foggy: partially overcast. 27. Overcast: clear. 28—30. Very fine. 31. Overcast—Mean temperature of the month $\frac{1}{2}^{\circ}$ below the average.

Boston.—Oct. 1. Fine. 2. Rain: rain early A.M. 3. Cloudy: rain A.M. and P.M. 4. Fine: rain P.M. 5. Fine. 6. Fine: rain P.M. 7. Rain: rain early A.M.: rain A.M. 8, 9. Fine: rain P.M. 10. Fine. 11. Rain: rain early A.M. 12. Fine. 13. Cloudy: rain early A.M. 14—16. Fine. 17, 18. Cloudy. 19. Cloudy: rain A.M. 20. Cloudy. 21. Fine. 22—24. Cloudy. 25, 26. Fine. 27. Cloudy. 28. Fine. 29. Cloudy. 30, 31. Fine.

Sandwick Manse, Orkney.—Oct. 1. Showers. 2. Bright: clear. 3. Cloudy: drops. 4. Showers. 5, 6. Bright: clear. 7. Rain. 8. Rain: damp. 9, 10. Rain. 11. Showers: rain. 12. Bright: cloudy: halo large. 13. Rain. 14. Cloudy: rain. 15. Cloudy. 16. Showers. 17. Showers: sleet: cloudy. 18. Showers: clear. 19. Cloudy: rain. 20. Rain: showers. 21. Cloudy: damp. 22. Damp: drizzle. 23. Damp: cloudy. 24. Bright: rain. 25. Bright: cloudy. 26. Showers: rain. 27. Showers: bright: cloudy. 28. Rain. 29. Drizzle: cloudy. 30, 31. Showers: clear.

Applegarth Manse, Dumfries-shire.—Oct. 1. Fair, but threatening. 2. Dull: rain. 3. Deluge of rain: flood. 4. Soft rain all day. 5, 6. Fair and clear: hoar-frost. 7. Fair, but cloudy. 8. Fair A.M.: rain P.M. 9. Rain early A.M.: cleared. 10. Slight showers P.M. 11. Fine: rain. 12. Fair, but cloudy: halo. 13. Rain. 14. Fair and fine. 15. Wet A.M.: cleared. 16. Fair and clear. 17. Rain all day. 18. Frequent showers. 19. Rain. 20. Bitter showers. 21. Moist, but no fall. 22. Fair and fine. 23. Fair and fine: cloudy. 24. Drizzling P.M. 25. Beautiful day: one slight shower. 26. Fair, but chilly: rain P.M. 27, 28. Wet. 29. Wet: very wet P.M. 30. Wet early A.M.: fine P.M. 31. Fair and fine.

Mean temperature of the month .... 49°·6
Mean temperature of Oct. 1844 .... 47 ·2
Mean temperature of Oct. for twenty-three years . 46 ·4

Meteorological Observations made 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.			
	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. Oct.	Max.	Min.		9 a.m.	9 p.m.	9¼ a.m.	8½ p.m.	Max.	Min.		Max.	Min.	9¼ a.m.	8½ p.m.								
● 1.	29·946	29·844	29·50	29·60	29·54	29·35	29·45	61	46	50	56½	43	51	48	sw.	calm	sw.	w.	·03	.....	.....	·53
2.	29·744	29·680	29·23	29·52	29·52	29·61	29·75	64	58	53	55½	48	48	43	sw.	calm	sw.	n.	·07	·08	.....	·31
3.	29·594	29·510	29·08	29·40	29·35	29·83	29·72	67	45	61	49½	43½	46½	45	s.	calm	e.	ne.	·17	.....	.....	.....
4.	29·568	29·528	29·03	29·40	29·45	29·64	29·59	65	47	56·5	49½	45½	44	42	sw.	w.	ne.	nw.	.....	·33	.....	.....
5.	29·969	29·891	29·39	29·74	29·80	29·76	29·87	60	29	50	52	32	47	39	w.	calm	w.	se.	.....	·03	.....	·22
6.	29·871	29·404	29·50	29·76	29·63	29·84	29·79	52	46	44	55	34	50	48	e.	calm	e&sw.	se.	·22	.....	.....	.....
7.	29·491	29·433	28·93	29·38	29·24	29·73	29·32	65	47	53	53½	44½	46	48	sw.	calm	sse.	e.	·01	·36	2·10	.....
☽ 8.	29·450	29·339	29·04	29·23	29·07	29·35	29·39	61	34	45	55	38	39	48½	sw.	calm	sse.	e.	·01	·08	.....	·92
9.	29·394	29·295	28·92	29·15	29·20	29·38	29·43	52	33	48·5	55	43	47	49½	s.	calm	s.	e.	·35	·08	.....	·63
10.	29·431	29·389	29·02	29·19	29·17	29·48	29·52	58	38	45	53½	41	48	48½	sw.	calm	s.	e.	·43	·11	.....	·20
11.	29·851	29·399	29·06	29·26	29·55	29·57	29·69	58	29	50·5	54	45	49	46	w.	calm	sw.	ese.	·09	·06	.....	·21
12.	30·213	30·083	29·72	29·82	29·97	29·87	30·03	61	39	47	55	40	48	47	sw.	calm	sw.	e.	.....	·17	.....	·50
13.	30·419	30·282	29·86	29·94	30·06	29·95	29·94	67	38	50	57½	46½	49½	53	sw.	calm	s.	sse.	.....	·02	.....	·12
14.	30·435	30·304	29·90	30·14	30·02	30·03	29·87	76	36	54	63½	54	55	55	s.	w.	sw.	s.	.....	.....	0·53	·52
○ 15.	30·242	30·030	29·72	29·90	29·89	29·82	29·70	66	51	51	60	53½	53	50	s.	sw.	wsw.	ssw.	·01	.....	.....	·19
16.	30·196	30·099	29·59	29·88	29·84	29·61	29·45	62	37	51	55	46½	49	49	w.	calm	wsw.	sw.	.....	.....	.....	·25
17.	30·126	30·031	29·60	29·73	29·65	29·54	29·54	58	48	48·5	58	50	48	48	sw.	calm	sw.	w.	.....	.....	.....	·24
18.	30·218	30·111	29·55	29·76	29·93	29·38	29·85	60	48	56·5	60	53½	50½	48	w.	w.	wsw.	nw.	.....	.....	.....	·28
19.	30·253	30·123	29·68	29·96	29·80	29·95	29·53	61	51	56	56½	46½	48	48½	w.	w.	w.	se.	.....	.....	.....	·20
20.	30·148	30·020	29·39	29·66	29·91	28·79	29·78	61	38	54	56	46½	49	45	w.	w.	wnw.	nw.	.....	·07	.....	·28
21.	30·341	30·254	29·77	30·13	30·18	30·00	30·08	57	34	46	52	41½	49	50	w.	w.	w.	w.	.....	.....	0·73	·07
22.	30·477	30·405	29·93	30·24	30·30	30·09	30·11	57	44	50	54½	45	50	50	w.	calm	w.	w.	.....	.....	.....	·04
☾ 23.	30·510	30·477	30·00	30·28	30·25	30·08	30·00	55	27	50	58	46½	51½	51	w.	calm	w.	sw.	.....	.....	.....	·24
24.	30·402	30·144	29·95	30·13	29·94	29·96	29·69	59	29	48	53½	48½	51½	47½	s.	calm	sw.	w.	.....	.....	.....	.....
25.	30·318	30·176	29·79	30·13	30·18	30·03	29·90	57	29	44	52	38½	45	47½	n.	calm	w.	wsw.	.....	.....	.....	·12
26.	30·321	30·230	29·90	30·03	29·87	29·74	29·52	50	35	38	50½	37½	45½	42	sw.	calm	sw.	.....	.....	.....	.....	·16
27.	30·113	30·060	29·60	29·75	29·70	29·70	29·79	54	40	47	53½	48	43	37½	w.	w.	sw.	.....	.....	.....	.....	·53
28.	30·069	30·036	29·57	29·78	29·78	29·59	29·55	60	48	52	56	52	47	52½	sw.	calm	sw.	sw.	.....	.....	.....	·48
29.	29·970	29·859	29·52	29·71	29·55	29·65	29·59	59	36	51·5	53½	50	52	50	s.	calm	sw.	se.	.....	.....	.....	·29
● 30.	29·966	29·884	29·40	29·65	29·93	29·53	29·81	63	43	50	54½	50	50	49	sw.	calm	wnw.	wsw.	.....	.....	0·83	·13
31.	30·159	30·118	29·74	30·00	30·00	29·77	29·87	55	34	43	54½	35	50	49½	ne.	calm	wnw.	w.	.....	.....	.....	·16
Mean.	30·039	29·917	29·51	29·750	29·750	29·697	29·713	60·03	39·90	49·8	55·9	44·7	48·38	47·59					1·39	1·39	4·19	7·82

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

SUPPLEMENT TO VOL. XVI. JANUARY 1846.

XLV.—*An Index to the British Annelides.* By GEORGE JOHNSTON, M.D., LL.D., Fellow of the Royal College of Surgeons of Edinburgh.

[With a Plate.]

Class ANNELIDES *.

VERS A SANS ROUGE, Cuv. Règ. Anim. iii. 182.
ANNELIDES, Lam. Anim. s. Vert. v. 274 ; 2nde edit. v. 499. Flem. Phil. Zool. ii. 599. Latr. Fam. Nat. 235. Aud. et M. Edw. Hist. Nat. du Litt. de la France, ii. 1. Stark, Elem. ii. 127.
VERMES, Leach in Suppl. Encyclop. Brit. i. 450.
ANNELIDA, M. Edwards in Cyclop. Anat. and Phys. i. 164. Roget, Bridgew. Treat. i. 269. Grant, Outl. Comp. Anat. 31. Jones, Anim. Kingd. 188—223. Griffith's Cuvier, xiii. 6.
ANNULATA, MacLeay in Ann. Nat. Hist. iv. 385.

Order 1. APODA.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Tribe NEMERTINA.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Family GORDIUSIDÆ †.

Les *Dragonneaux*, Cuv. Règ. Anim. iii. 217.—*Enterobranchia filiformia*, Latr. Fam. Nat. 246.

Gordius.

Gordius, *Linn.* Syst. 1075. *Lam.* Anim. s. Vert. iii. 219 ; 2nde edit. iii. 671. *Flem.* Phil. Zool. ii. 605. *Schweigg.* Handb. 590.

1. *G. aquaticus.*

Seta aquatica, Merr. Pin. 207.
Gordius aquaticus, Linn. Syst. 1075. Turt. Gmel. iv. 57. Turt. Brit. Faun. 130. Stew. Elem. ii. 353. Penn. Brit. Zool. iv. 73. Flem. Phil. Zool. ii. 605. Baird in Trans. Berw. Nat. Club, i. 23.

* The true limits of this class were first indicated by Pallas in his 'Miscellanea Zoologica,' p. 74, Lugd. Bat. 1778. Lamarck conferred upon it the name *Annelides* in 1812.

† This family should be referred to the class Entozoa. See Reports on Zoology and Botany, translated for the Ray Society, p. 292.

A worm, presumed to be identical with the *Mermis nigrescens* of Dujardin, has been found in great abundance at Fairford in Gloucestershire. An account of it will be soon published, we have reason to believe, by the Rev. L. Jenyns.

Templeton in Loud. Mag. N. Hist. ix. 236. Drummond in ibid. ix. 241. Johnston in ibid. ix. 355. fig. 52. Encyclop. Brit. xi. 226.

2. *G. argillaceus.*
Gordius argillaceus, Linn. Syst. 1075. Turt. Gmel. iv. 57. Turt. Brit. Faun. 130. Stew. Elem. ii. 353. Penn. Brit. Zool. iv. 73. Flem. Phil. Zool. ii. 605.

Obs. Dr. Fleming says this "is only a variety" of the preceding. I know of no description of it taken from British specimens. Species of *Filariæ* have been frequently described as *Gordii.*

Family Planariadæ.

Des *Planaires,* Cuv. Règ. Anim. iii. 266.—*Mollusca Parenchymata,* Swainson, Malacology, 35.

Subfamily *Lininæ.*

Borlasia.

Borlasia, subgenus, *Johnston* in Mag. Zool. and Bot. i. 536.

1. *B. rufifrons.*
Nemertes B. rufifrons, Johnston in Mag. Zool. and Bot. i. 538. pl. 18. fig. 5.

2. *B. purpurea.*
Nemertes B. purpurea, Johnston in lib. cit. i. 537. pl. 18. fig. 3.

3. *B. alba.*
Borlasia ? alba, W. Thompson's Report, p. 271 ; and in Ann. Nat. Hist. xv. 320.

4. *B. octoculata.*
Nemertes B. octoculata, Johnston in lib. cit. i. 537. pl. 18. fig. 2.
Planaria octoculata, Johnston in Zool. Journ. iv. 56.

5. *B. olivacea.*
Nemertes B. olivacea, Johnston in lib. cit. i. 536. pl. 18. fig. 1.
Planaria bioculata, Johnston in Zool. Journ. iv. 56.

6. *B. ? filiformis.* Plate XV. fig. 1, *a, b.*
Planaria filiformis, Johnston in Zool. Journ. iv. 56.

Desc. Body very slender, elongate, about the thickness of common sewing thread, of a uniform white or yellowish white colour, soft, smooth, contractile, thickest in front and subcylindrical, tapered insensibly backwards and flattened : mouth terminal, sometimes protruded like a papilla : eyes none : anus terminal. Under a magnifier the sides appear minutely crenulate : the skin is transparent, and the centre dusky from a straight intestine which runs from one extremity to the other, and has on each side of it a series of oblong cells so closely approximated that they might seem almost to be formed by the convolutions of a single vessel.

When lying at ease and contracted, this worm is from 1 to 2 inches in length, but it can, and does often voluntarily, extend itself until it is upwards of 6 inches, when it becomes a mere thread-like white line. In this state, the anterior extremity, from being obtuse, is thrust out into a needle-like point. It lives under stones, in muddy places, between tide-marks.

7. *B.? flaccida.*
Planaria flaccida, Johnston in Zool. Journ. iii. 488.
Obs. Not *Planaria flaccida* of Muller.

8. *B.? unicolor.*
Planaria unicolor, Johnston in Zool. Journ. iii. 488.

Lineus.

Lineus, *Sowerby*, "Brit. Misc. tab. 8." *Flem.* Phil. Zool. ii. 605.—Borlasia, *Oken* in Schweigg. Handb. 591.—Nemertes, *Cuv.* Règ. Anim. iii. 259.—Notospermus? *Huschke* in Edin. Journ. Nat. and Geogr. Sc. iii. 305.

1. *L. longissimus.*
Lineus longissimus, "Sowerby, Brit. Misc. tab. 8." Jameson in Wern. Mem. i. 557. Turt. Brit. Faun. 130.
Gordius marinus, Penn. Brit. Zool. iv. 74. Montagu in Linn. Trans. vii. 72. Davies in Linn. Trans. xi. 292.
Borlasia Angliæ, Schweigg. Handb. 591.
Nemertes Borlasii, Cuv. Règ. Anim. iii. 259. W. Thompson in Charlesw. Mag. ii. 21. Griffith's Cuv. xii. 468.
Borlasia longissimus, Templeton in Loud. Mag. N. Hist. ix. 236.

2. *L. gracilis.*
Nemertes, H. D. S. Goodsir in Ann. N. Hist. xv. 378. pl. 20. fig. 3.

Serpentaria.

Serpentaria, *H. D. S. Goodsir* in Ann. N. Hist. xv. 377.

1. *S. fragilis.*
Serpentaria, Goodsir in Ann. N. Hist. xv. 377. pl. 20. fig. 1, 2.

Meckelia.

Meckelia, *Leuckart* = Carinella, *Johnston.*

1. *M. trilineata.*
Gordius annulatus, Montagu in Linn. Trans. vii. 74. Turt. Brit. Faun. 130. Penn. Brit. Zool. iv. 73.
Carinella trilineata, Johnston in Loud. Mag. N. Hist. vi. 232. fig. 24. W. Thompson in Ann. and Mag. N. Hist. vii. 482.

Obs. As this is distinct from the *Meckelia annulata* of Grube (Actin. &c. p. 58. pl. 1. fig. 7.), I have changed the specific name of Montagu.

Prostoma.

Prostoma, *Dugès*: v. Mag. Zool. and Bot. ii. 471.—Nemertes, *Johnston* in Mag. Zool. and Bot. i. 534.

1. *P. gracilis.*
Nemertes gracilis, Johnston in Mag. Zool. and Bot. i. 534. pl. 17. fig. 1. W. Thompson in Ann. and Mag. N. Hist. vii. 482.

2. *P. lactiflorea.*
Planaria lactiflorea, Johnston in Zool. Journ. iii. 489.
Nemertes lactiflorea, Johnston in Mag. Zool. and Bot. i. 535. pl. 17. fig. 2. W. Thompson in Ann. and Mag. N. Hist. vii. 482.

3. *Pl.? rosea.*

Planaria rosea, Mull. Zool. Dan. Prod. 221. Zool. Dan. ii. 31. tab. 64. fig. 1, 2. W. Thompson in Ann. Nat. Hist. xv. 321.
Fasciola rosea, Mull. Verm. ii. 58.

4. *P. quadrioculata.*

Planaria quadrioculata, Johnston in Zool. Journ. iv. 56.
Nemertes quadrioculata, Johnston in Mag. Zool. and Bot. i. 535. pl. 17. fig. 4.

5. *P. melanocephala.*

Nemertes melanocephala, Johnston in Mag. Zool. and Bot. i. 535. pl. 17. fig. 5.

6. *P. pulchra.*

Nemertes pulchra, Johnston in Mag. Zool. and Bot. i. 536. pl. 17. fig. 6.

7. *P. armatum.*

Prostoma armatum, Templeton in Loud. Mag. N. Hist. ix. 236. fig. 29. Edin. Journ. Nat. and Geogr. Sc. iii. 379.

Subfamily *Planarinæ.*

Planaria, *Mull.* Zool. Dan. Prod. xxviii.—Planariadæ, *Flem.* Phil. Zool. ii. 604.

Planaria.

Planaria, *Lam.* Anim. s. Vert. iii. 176. *Flem.* Phil. Zool. ii. 604. *Schweigg.* Handb. 593 (v. Edin. Journ. Nat. and Geogr. Sc. iii. 380).

* *Marine.*

1. *P. vittata.*

Planaria vittata, Montagu in Linn. Trans. xi. 25. tab. 5. fig. 3. W. Thompson in Ann. and Mag. Nat. Hist. v. 247.

2. *P. atomata.*

Planaria punctata, Mull. Zool. Dan. Prod. 2706.
——— atomata, Mull. Zool. Dan. i. 37. tab. 32. fig. 3, 4. Turt. Gmel. iv. 65. Fleming in Edin. Phil. Journ. viii. 297.

3. *P. cornuta.*

Planaria cornuta, Mull. Zool. Dan. Prod. 2681. Zool. Dan. i. 37. tab. 32. fig. 5–7. Johnston in Loud. Mag. N. Hist. v. 344. fig. 79. W. Thompson in Ann. Nat. Hist. xv. 320.

4. *P. tremellaris.*

Planaria tremellaris, Mull. Zool. Dan. i. 36. tab. 32. fig. 1, 2. W. Thompson in Ann. and Mag. N. Hist. v. 247.

5. *P. subauriculata.*

Planaria subauriculata, Johnston in Loud. Mag. Nat. Hist. ix. 16. fig. 2.

6. *P. flexilis.*

Planaria flexilis, Dalyell on Planariæ, 5. pl. 1. fig. 1, 2. Johnston in Loud. Mag. N. Hist. ix. 17.

7. *P. stagnalis.*

Fasciola stagnalis, Mull. Verm. i. ii. 53.

Planaria stagnalis, Mull. Zool. Dan. Prod. 221. Templeton in Loud. Mag. N. Hist. ix. 239.

8. *P. macrocephala,* oblonga, fusca, antice dilutior truncata, postice attenuata; oculis ocellisve nullis; long. corp. 2 lin. Pl. XV. fig. 2, *a, b.*

Hab. Amongst Confervæ in Berwick bay.

Desc. Body brown, oblong, truncate before and paler coloured, narrowed posteriorly; no eyes nor eye-like points. The anterior extremity, in some positions, appears marked with a pale subcircular spot, while in others a light-coloured line runs down the centre, while the margins seem folded in so as to form almost a tube, as is well represented in our figure *b.* From this circumstance I conclude that the worm is thin with involute margins, but I never saw it spread itself out. There are two ventral pores, similar to those of the genuine *Planariæ.*

I have named this species *macrocephala* because of the bluntness of its head, for the enlarged end is the anterior one, a fact which the mere examination of the figure would never resolve, since the part is distinguished by none of its usual appendages or organs: it has neither mouth, eyes, nor tentacula. But all unfurnished as it is, there is no species of its genus that I have met with that excels it in activity. Ever-restless, it glides along the surface of the vessel with great celerity, varies its course with ease, and sometimes leaving the bottom, it swims in the bosom of the water, but with a tardier pace. With the obtuse anterior end, which is in constant motion and change, it feels the way, and pushing aside the floating particles that annoy it, it guides itself with as much safety, and appears as careful of obstacles as if indeed eyes and feelers were sentinels in front.

9. *P. Hirudo,* lineari-elongata, fusca, antice puncta lineaque nigra signata; maculis supra caudam orbicularem duabus pallidis. Long. corp. 4 lin. Pl. XV. fig. 3.

Hab. The sea amongst Confervæ.

Desc. Body linear, lengthened, brown, marked in front with a black point and line; two pale spots above the circular tail. Length 4 lines.

This little worm was also found in Berwick bay, and it is little less active than the preceding. It glides along in a continuous motion, and when inclined to turn or change the direction of its course, it forms the tail into a disc-like sucker to give itself the advantage of a fixed point. The body is of a uniform light brown colour excepting the two pale spots near the tail, and, when fully stretched, is of a narrow linear figure, slightly tapered in front. There is a small black dot about half a line behind the anterior end, and a dark line runs from it forward to the tip. These are not formed by an eye, or a cluster of eye-like points, but the line seems rather to be produced by some internal tube, and the dot by some harder, perhaps horny, substance.

This worm is of a doubtful genus. The black stria at the anterior end may perhaps indicate the existence of a proboscis; and the soft disc at the tail has some resemblance to the sucker of a leech. I retain it in the genus *Planaria* because the body is smooth without trace of wrinkles or rings, and because there are two obvious pore-like spots near the posterior extremity. The specific name, however, may serve to mark its affinity to some of the leech tribe.

** *Freshwater.*

10. *P. nigra.*

Planaria nigra, Mull. Zool. Dan. Prod. 221. Zool. Dan. iii. 48.

tab. 109. fig. 3, 4. Turt. Brit. Faun. 128. Dalyell on Planariæ, 23. fig. 3–5 and 15.
Planaria fusca, Penn. Brit. Zool. iv. 68.
Fasciola nigra, Mull. Verm. i. ii. 54.
Hirudo nigra, Kirby in Linn. Trans. ii. 317.

11. *P. fusca.*
Planaria fusca, Pallas, Templeton in Mag. N. Hist. ix. 239.
Fasciola torva, Mull. Verm. i. ii. 62.
Planaria torva, Mull. Zool. Dan. Prod. 2688. Zool. Dan. iii. 48. tab. 109. fig. 5, 6. Turt. Gmel. iv. 64.
Planaria fusca, Turt. Gmel. iv. 64. Stew. Elem. ii. 355.
Planaria Arethusa, Dalyell on Planariæ, 85. fig. 11–14.

Obs. I have reduced *Pl. fusca* and *torva* to one species on the authority of Dugès.

12. *P. lactea.*
Fasciola lactea, Mull. Verm. i. ii. 61.
Planaria lactea, Mull. Zool. Dan. Prod. 2687. Zool. Dan. iii. 47. tab. 109. fig. 1, 2. Turt. Gmel. iv. 64. Stew. Elem. ii. 355. Edin. Journ. Nat. and Geogr. Sc. iii. 242 and 243.
Hirudo alba, Kirby in Linn. Trans. ii. 316.
Planaria alba, Turt. Brit. Faun. 129.

13. *P. panniculata.*
Planaria panniculata, Dalyell on Planariæ, 37. fig. 6, 7.

14. *P. felina.*
Planaria felina, Dalyell on Planariæ, 42. fig. 8.

Dalyellia.

Dalyellia, *Flem.* Phil. Zool. ii. 605.

1. *D. graminea.*
Hirudo viridis, Shaw in Linn. Trans. i. 92. Johnson on Med. Leech, 19.
Planaria viridis, Turt. Brit. Faun. 129. Stew. Elem. ii. 355.
Planaria graminea, Dalyell on Planariæ, 114. fig. 16.

Obs. Distinct from the *Pl. viridis* of Muller, but surely identical with his *Pl. Helluo.*

2. *D. velox.*
Planaria velox, Dalyell on Planariæ, 127. fig. 17.

3. *D. edinensis.*
Planaria edinensis, Dalyell on Planariæ, 133. fig. 18.

Tribe Hirudina.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Les *Hirudinées*, Lam. Anim. s. Vert. v. 289. Flem. Phil. Zool. ii 603–4.

Family Phyllinidæ.

Udonella.

Udonella, *Johnston* in Loud. Mag. N. Hist. viii. 498.

1. *U. caligorum.*

Udonella caligorum, Johnston in Loud. Mag. N. Hist. viii. 497. fig. 45. W. Thompson in Ann. and Mag. N. Hist. xv. 320.

Obs. Closely allied to, but distinct from, the *Nitzschia elegans* of K. E. v. Baer in Nov. Act. Acad. Cæs. Nat. Cur. xiii. pl. 32. fig. 1–4.

Malacobdella.

Malacobdella, *Blainville* in Cuv. Règ. Anim. iii. 217.

1. *M. grossa.*

Hirudo grossa, Mull. Zool. Dan. Prod. 2668. Zool. Dan. i. 21. tab. 21. fig. 1–5, copied in Encyclop. Méthod. pl. 52. fig. 6–10. Turt. Gmel. iv. 70.

Phylline grossa, Johnston in Loud. Mag. N. Hist. vii. 587. fig. 67.

Tristoma.

Tristoma, *Cuv.* Règ. Anim. iii. 265.

1. *T. coccineum.*

Tristoma coccineum, Cuv. Règ. Anim. iii. 265. pl. 15. fig. 10. Yarrell, Brit. Fish. 2nd edit. ii. 468. vign. Griffith's Cuv. xii. 473. pl. 9. fig. 10.

Phylline coccinea, Schweigg. Handb. 474.

Phylline.

Phylline, *Lam.* Anim. s. Vert. v. 295 ; 2nde edit. v. 526.

1. *Ph. Hippoglossi.*

Lernææ species, Bast. Opusc. Subs. ii. 138. pl. 8. fig. 11.

Phylline Hippoglossi, Johnston in Ann. N. Hist. i. 431. pl. 15. fig. 1–3. W. Thompson in Ann. and Mag. N. Hist. vii. 482.

Obs. The synonyms will be found in the 'Annals.' Muller's figures are copied in Encyclop. Méthod. pl. 52. fig. 11–14.

Family Hirudinidæ.

Hirudo, Linn. Syst. 1079.—Les *Sangsues,* Cuv. Règ. Anim. iii. 212.—*Hirudinea,* Latr. Fam. Nat. 246.—*Annelides suceuses,* Aud. et M. Edwards, Litt. de la France, ii. 50.

Erpobdella.

Erpobdella, *Blainville* in Lam. Anim. s. Vert. v. 296 ; 2nde edit. v. 527.—Nephelis, *Savigny*: v. Lam. 2nde edit. v. 527.—Heluo, *Oken*: v. Schweigg. Handb. 593.

1. *E. vulgaris.*

Hirudo octoculata, Linn. Syst. 1079. Turt. Gmel. iv. 69. Turt. Brit. Faun. 129. Penn. Brit. Zool. iv. 71.

Hirudo vulgaris, Mull. Verm. i. ii. 40. Stew. Elem. ii. 356. Johnson on the Med. Leech, 33. Furth. Obs. 29, with a plate.

Erpobdella vulgaris, Lam. Anim. s. Vert. 2nde edit. v. 528. D. Chiaje, An. s. Vert. Nap. i. 49.

Nephelis vulgaris, Brightwell in Ann. and Mag. N. Hist. ix. 13. pl. 1. fig. 9–14.

Nondescript Leech ? Ure's Rutherglen, 236.

2. *E. tessulata.*

Hirudo tessulata, Mull. Verm. i. ii. 45. Johnson on the Med. Leech, 33. Fleming in Wern. Mem. iii. 400.

Erpobdella tessulata, Flem. Phil. Zool. ii. 604.

Nephelis tessulata, Brightwell in Ann. and Mag. N. Hist. ix. 13. pl. 1. fig. 15–17.

3. *E. lineata.*

Hirudo lineata, Mull. Verm. i. ii. 39. Johnson on the Med. Leech, 34. Fleming in Wern. Mem. iii. 400.

Erpobdella lineata, Flem. Phil. Zool. ii. 604.

Glossopora.

Glossiphonia, *Johnson* on the Med. Leech, 25.—Glossopora, *Johnson*, Furth. Obs. 48.—Clepsine, *Savigny*.—Glossobdella, *Blainville*: see Lam. Anim. s. Vert. 2nde edit. v. 528.

1. *G. complanata.*

Hirudo complanata, Linn. Syst. 1079. Mull. Verm. i. ii. 47. Turt. Gmel. iv. 69. Turt. Brit. Faun. 129. Stew. Elem. ii. 357. Penn. Brit. Zool. iv. 72. Ure's Rutherglen, 233.

Hirudo crenata, Kirby, Linn. Trans. ii. (his description is copied in Johnson, Med. Leech, p. 21). Turt. Gmel. iv. 71. Penn. Brit. Zool. iv. 71. Turt. Brit. Faun. 129.

Clepsina crenata, Encyclop. Brit. xi. 226. pl. 276. fig. 13.

Glossiphonia tuberculata, Johnson on the Med. Leech, 25.

Glossopora tuberculata, Johnson's Furth. Obs. 49. pl. 17. fig. 1–10. Stark, Elem. ii. 142. W. Thompson in Ann. and Mag. N. Hist. vii. 482.

Erpobdella complanata, Lam. Anim. s. Vert. 2nde edit. v. 528. Templeton in Loud. Mag. N. Hist. ix. 235.

Erpobdella crenata, Templeton in Loud. Mag. N. Hist. ix. 235.

Glossopora complanata, Flem. Phil. Zool. ii. 604.

Clepsina complanata, Brightwell in Ann. and Mag. N. Hist. ix. 14. pl. 1. fig. 18, 19.

2. *G. bioculata.*

Hirudo stagnalis, Linn. Syst. 1079. Turt. Gmel. iv. 69. Turt. Brit. Faun. 129. Penn. Brit. Zool. iv. 71.

Hirudo bioculata, Mull. Verm. i. ii. 41. Stew. Elem. ii. 357. Ure's Rutherglen, 234.

Glossiphonia perata, Johnson on the Med. Leech, 26.

Glossopora punctata, Johnson's Furth. Obs. 50. pl. 17. fig. 11–13.

Erpobdella bioculata, Lam. Anim. s. Vert. 2nde edit. v. 528.

———— stagnalis, Templeton in Loud. Mag. N. Hist. ix. 235.

Glossopora bioculata, Flem. Phil. Zool. ii. 604.

Clepsina stagnalis, Brightwell in Ann. and Mag. N. Hist. ix. 14.

3. *G.? circulans.*

Hirudo circulans, Sowerby: see Johnson on Med. Leech, 27. Turt. Brit. Faun. 129. Penn. Brit. Zool. iv. 72.

4. *G.? hyalina.*

Hirudo heteroclita, Linn. Syst. 1080. Johnson on Med. Leech, 34.

Un ver plat et blanc, Tremb. Polyp. 147. pl. 7. fig. 7.
Hirudo hyalina, Mull. Verm. i. ii. 49. Stew. Elem. ii. 357.
Clepsina hyalina? Brightwell in Ann. and Mag. Nat. Hist. ix. 15. pl. 1. fig. 20.

Piscicola.

Piscicola, *Lam.* Anim. s. Vert. 2nde edit. v. 525.—Hæmocharis, *Savigny.* (See Ann. and Mag. N. Hist. ix. 11.)

1. *P. geometra.*

Hirudo geometra, Linn. Syst. 1080. Turt. Gmel. iv. 70. Turt. Brit. Faun. 129. Johnson on the Med. Leech, 35. Brightwell in Ann. and Mag. N. Hist. ix. 11. pl. 1. fig. 1–8.
Hirudo piscium, Mull. Verm. i. ii. 43. Penn. Brit. Zool. iv. 70. pl. 21. fig. 3. Stew. Elem. ii. 357.
Piscicola piscium, Lam. Anim. s. Vert. 2nde edit. v. 525. Stark, Elem. ii. 142.
Piscicola geometra, Flem. Phil. Zool. ii. 604.

2. *P. Percæ.*

Ichthyobdella Percæ, Templeton in Loud. Mag. N. Hist. ix. 236. fig. 28.

3. *P. marina.* Plate XV. fig. 4–6.

Hab. Parasitical on the *Aspidophorus cataphractus.*

Desc. Body one inch in length and a line in diameter, slightly tapered forwards, terminated at each end with a plain circular sucker, of a uniform chestnut-brown colour, or red and mottled (for the colour varies according to the intestinal contents), smooth, rather soft and compressed; the margins minutely crenulate under a magnifier.

Fig. 4. *P. marina* of the natural size. 5. The same magnified. 6. An outline figure drawn from an individual which had the genital organs extruded.

Obs. Mr. W. Thompson has, in his Catalogue of the Irish Worms, a *Piscicola marina* (Rep. p. 272), but no description of it has been published.

Pontobdella.

Pontobdella, *Leach* in Suppl. Encyclop. Brit. i. 451. *Lam.* Anim. s. Vert. v. 293.

1. *P. muricata.*

Hirudo piscium, Bast. Opusc. Subs. i. 82. tab. 10. fig. 2.
Hirudo muricata, Linn. Syst. 1080. Turt. Gmel. iv. 71. Turt. Brit. Faun. 130. Stew. Elem. ii. 357. Penn. Brit. Zool. iv. 71. pl. 21. fig. 4. Johnson on the Med. Leech, 38. Dalyell in Edin. New Phil. Journ. 1827, p. 391. Grant in Edin. Journ. of Science, no. 14.
Hirudo verrucosa, Fleming in Wern. Mem. ii. 245. Johnson on the Med. Leech, 39.
Pontobdella muricata, Lam. Anim. s. Vert. v. 293; 2nde edit. v. 524. Stark, Elem. ii. 142. Templeton in Loud. Mag. N. Hist. ix. 236.
Albione muricata, D. Chiaje, An. s. Vert. Nap. i. 49.

2. *P. spinulosa.*

Pontobdella spinulosa, Leach, Zool. Misc. ii. tab. 65; and in Suppl. Encyclop. Brit. i. 451. pl. 26. Lam. Anim. s. Vert. v. 294; 2nde edit. v. 525. Stark, Elem. ii. 142.

Obs. I doubt the distinctness of this from the preceding.

Hæmopsis.

Hæmopsis, *Savigny* in Lam. Anim. s.Vert. 2nde edit. v. 520. Encyclop. Brit. xi. 226. pl. 176. fig. 15.

1. *H. vorax.*

The Horse-Leech, Sibb. Scot. ii. 3, 34. Quekett in the Zoologist, i. 17 and 88.

Hirudo Sanguisuga, Merr. Pin. 207. Linn. Syst. 1079. Turt. Gmel. iv. 68. Turt. Brit. Faun. 129. Stew. Elem. ii. 356. Penn. Brit. Zool. iv. 70. Johnson on the Med. Leech, 30. Mull. Verm. i. ii. 38. Stark, Elem. ii. 356. Templeton in Loud. Mag. N. Hist. ix. 235. Ephem. Acad. Leop. c. viii. 346. tab. 5. fig. 4. D. Chiaje, An. s. Vert. Nap. i. 48.

Hirudo sanguisorba, Lam. Anim. s. Vert. 2nde edit. v. 521.

Hirudo vorax, Johnson on the Med. Leech, 62.

Hæmopsis sanguisorba, Brightwell in Ann. and Mag. N. Hist. ix. 12. Encyclop. Brit. xi. 226.

2. *H. nigra.*

Hirudo nigra, Johnson on the Med. Leech, 32.

Obs. In the last edit. of Lamarck this is considered as identical with the preceding.

Hirudo.

Sanguisuga, *Savigny* in Lam. Anim. s.Vert. 2nde edit. v. 520. Encyclop. Brit. xi. 225.

1. *H. medicinalis.*

Hirudo medicinalis, Linn. Syst. 1079. Mull. Verm. i. ii. 37. Turt. Gmel. iv. 68. Turt. Brit. Faun. 129. Stew. Elem. ii. 356. Penn. Brit. Zool. iv. 69. Stark, Elem. ii. 143. Leach in Suppl. Encyclop. Brit. i. 451. pl. 26. Johnson on the Med. Leech, 29. Lam. Anim. s. Vert. 2nde edit. v. 520. Home, Comp. Anat. iv. pl. 39. fig. 3; ibid. ii. 70. Ephem. Acad. Leop. cent. viii. 338. tab. 5. fig. 1, 2, 3. D. Chiaje, An. s. Vert. Nap. i. 47.

Sanguisuga medicinalis, Brightwell in Ann. and Mag. N. Hist. ix. 13. Encyclop. Brit. xi. 225. pl. 176. fig. 14.

Tribe Lumbricina.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Annelides abranches setigères, Cuv. Règ. Anim. iii. 209.—*Lombricini*, Latr. Fam. Nat. 246.—*Annelides terricoles*, Aud. et M. Edwards, Litt. de la France, ii. 50; and in Lam. Anim. s. Vert. 2nde edit. v. 513.

Family Naïdes.

Les *Naïdes*, Cuv. Règ. Anim. iii. 211.—*Vers hispides*, Lam. Anim. s. Vert. iii. 221. (See Rep. trans. by Ray Society, p. 282.)

Nais.

Nais, *Mull.* Zool. Dan. Prod. xxviii. Verm. i. ii. 20. *Turt.* Gmel. iv. 91. *Lam.* Anim. s. Vert. iii. 222. *Leach* in Suppl. Encyclop. Brit. i. 451.

1. *N. vermicularis.*

Nais vermicularis, Mull. Verm. i. ii. 20. Lam. Anim. s. Vert. 2nde edit. iii. 674. Templeton in Loud. Mag. N. Hist. ix. 235. (Vide Zool. Journ. v. 380.)

2. *N. serpentina.*

Nais serpentina, Mull. Verm. i. ii. 20. Mull. Wurm. 84. tab. 4. fig. 1–4. Turt. Gmel. iv. 91. Turt. Brit. Faun. 137. Stew. Elem. i. 390. Penn. Brit. Zool. iv. 97. Templeton in Loud. Mag. Nat. Hist. vii. 130. fig. 26; and ix. 235.

3. *N. Lurco.*

The Lurco or Glutton, a diaphanous species of *Nais*, Pritchard, Micros. Cabinet, 78. pl. 8. fig. 1.

4. *N. digitata.*

Nais digitata, Mull. Verm. i. ii. 22. Wurm. 90. tab. 5. fig. 1–4. Turt. Gmel. iv. 91. Turt. Brit. Faun. 137. Stew. Elem. i. 391. Penn. Brit. Zool. iv. 98. Bosc, Vers, i. 239.

Stylaria.

Stylaria, *Lam.* Anim. s. Vert. iii. 223.

1. *S. lacustris.*

Mille-pied à dard, Trembl. Polyp. 144. pl. 6. fig. 1.

Nereis lacustris, Linn. Syst. 1085.

Nais proboscidea, Mull. Zool. Dan. Prod. 2649. Wurm. 14. tab. 1. fig. 1–4. Verm. i. ii. 21. Turt. Gmel. iv. 91. Turt. Brit. Faun. 137. Stew. Elem. i. 390. Penn. Brit. Zool. iv. 97. Baker, Employm. Micros. 317. pl. 12. fig. 24.

Stylaria paludosa, Lam. Anim. s. Vert. 2nde edit. iii. 675.

——— lacustris, Templeton in Loud. Mag. N. Hist. ix. 235.

Tubifex.

Tubifex, *Lam.* Anim. s. Vert. iii. 224. *Schweigg.* Handb. 590.

1. *T. rivulorum.*

Vermes minimi rubri aquam stagnalem colore sanguineo inficientes, unde vulgus dira portendit, Merr. Pin. 207.

Vers qu'on trouvent souvent rassemblés en grande quantité au fond de l'eau, Trembl. Polyp. 98, 99 and 147. pl. 7. fig. 2.

Small red Water-worms found plentifully in the mud of the river Thames, Baker, Polype, 62.

Lumbricus tubifex, Mull. Zool. Dan. Prod. 2605. Wurm. 62. Verm. i. ii. 27. Zool. Dan. iii. 4. tab. 84. Bosc, Vers, i. 255.

Tubifex rivulorum, Lam. Anim. s. Vert. 2nde edit. iii. 676. Templeton in Loud. Mag. N. Hist. ix. 235.

Family Lumbricidæ.

Lumbricus, Linn. Syst. 1076.—Les *Lombrics*, Cuv. Règ. Anim. iii. 209.—Les *Echiurées*, Lam. Anim. s. Vert. v. 297.

Lumbricus.

Lumbricus, *Cuv.* Règ. Anim. iii. 209. *Lam.* Anim. s. Vert. v. 298. *Schweigg.* Handb. 590. *Leach* in Suppl. Encyclop. Brit. i. 451.

* *Marine.*

1. *L. lineatus.*

Faden-Wurm, Mull. Wurm. 118. dritte taf. fig. 4, 5.
Lumbricus lineatus, Mull. Verm. i. ii. 29. Johnston in Zool. Journ. iii. 329; and in Loud. Mag. Nat. Hist. viii. 259. fig. 24.

2. *L. capitatus.*

Lumbricus capitatus, Johnston in Loud. Mag. Nat. Hist. viii. 258. fig. 23.
Lumbricus littoralis, Johnston in Zool. Journ. iii. 328.

3. *L. minutus.*

Lumbricus minutus, Fabric. Faun. Groenl. 281. pl. 1. fig. 4. Lam. Anim. s. Vert. 2nde edit. v. 533. Johnston in Zool. Journ. iii. 328.

4. *L. rufescens.*

Lumbricus rufescens, Johnston in Zool. Journ. iii. 327.

** *Subaquatic.*

5. *L. vermicularis.*

Lumbricus vermicularis, Mull. Verm. i. ii. 26. Flem. Phil. Zool. ii. 603. Johnston in Zool. Journ. iv. 421.

6. *L. variegatus.*

Lumbricus variegatus, Mull. Verm. i. ii. 26. Flem. Phil. Zool. ii. 603. Johnston in Zool. Journ. iii. 326. Bosc, Vers, i. 255.

7. *L. pellucidus.*

Lumbricus? Clitellio? pellucida, Templeton in Loud. Mag. N. Hist. vii. 131. fig. 27.
Clitelis minutus, Templeton in Loud. Mag. N. Hist. ix. 235.

Obs. The *Lumbricus pellucidus* (Johnston in Zool. Journ. iii. 327. comp. with iv. 421) is probably a larva.

*** *Terrestrial.*

8. *L. omilurus.*

Lumbricus omilurus, Templeton in Loud. Mag. N. Hist. ix. 235.

9. *L. lividus.*

Lumbricus lividus, Templeton in Loud. Mag. N. Hist. ix. 235.

10. *L. gordianus.*

Lumbricus gordianus, Templeton in Loud. Mag. N. Hist. ix. 235.

11. *L. xanthurus.*
Lumbricus xanthurus, Templeton in Loud. Mag. N. Hist. ix. 235.

12. *L. annularis.*
Lumbricus annularis, Templeton in Loud. Mag. N. Hist. ix. 234.

13. *L. terrestris.*
Earth-Worm, Sibb. Scot. ii. 3, 33.
Vermes terrestres majores, Merr. Pin. 206.
Lumbricus terrestris, Willis, Oper. Omn. ii. 18. tab. 4. Linn. Syst. 1076. exclus. γ. Mull. Verm. i. ii. 24. Turt. Gmel. iv. 58. Turt. Brit. Faun. 128. Home, Comp. Anat. iv. pl. 40. fig. 4, and pl. 145, 146, 147, 148, 149. Penn. Brit. Zool. iv. 63. pl. 20. fig. 1, and fig. 2. var. minor. Stew. Elem. ii. 354. Stark, Elem. ii. 141. Leach in Suppl. Encyclop. Brit. i. 451. pl. 26. Templeton in Loud. Mag. N. Hist. ix. 234.
Common Earth-Worm, White's Selborne, ii. 14 and 279. Edin. Phil. Journ. iii. 412. Loudon's Suburb. Hortic. 94. Gray in Ann. Nat. Hist. ii. 479.
"De Lumbrici terrestris historia naturali necnon Anatomia tractatus. Auctore Carolo-F.-A. Morren." Bruxellis, 1829. In reference to this excellent work, see Edin. Journ. Nat. and Geogr. Sc. iii. 375; Loud. Mag. Nat. Hist. ix. 240.

Cirratulus.

Cirratulus, *Lam.* Anim. s. Vert. v. 300. *Aud. and M. Edwards*, Litt. de la France, ii. 268. *Johnston* in Mag. Zool. and Bot. ii. 71.

1. *C. medusa.*
Cirratulus medusa, Johnston in Mag. Zool. and Bot. ii. 71. pl. 3. fig. 7–12.

2. *C. tentaculatus.*
Terebella tentaculata, Montagu in Linn. Trans. ix. 110. pl. 6. fig. 2, copied in Encyclop. Brit. xi. pl. 276. fig. 4. Penn. Brit. Zool. iv. 111.
Cirrhatula tentaculata, Templeton in Loud. Mag. N. Hist. ix. 234.
Cirrhatulus tentaculatus, Mag. Zool. and Bot. ii. 73; and Encyclop. Brit. xi. 221.

Trophonia.

Trophonia, *Johnston* in Ann. Nat. Hist. iv. 371.

1. *T. Goodsirii.*
Trophonia Goodsirii, Johnston in Ann. Nat. Hist. iv. 371. pl. 11. fig. 1–10.

Travisia.

Travisia, *Johnston* in Ann. Nat. Hist. iv. 373.

1. *T. Forbesii.*
Travisia Forbesii, Johnston in Ann. Nat. Hist. iv. 373. pl. 11. fig. 11–18.

Order II. POLYPODA.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Gymnobranchia, Leach in Suppl. Encyclop. Brit. 450.

Tribe SERPULINA.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Les *Tubicoles*, Cuv. Règ. Anim. iii. 189.—*Annelides sédentaires*, Lam. Anim. s.Vert. v. 332.—*Cephalobranchia*, Latr. Fam. Nat. 241. (See Pallas, Misc. Zool. 114.)

Family AURICOMIDÆ.

Les *Amphitrites*, Cuv. Règ. Anim. iii. 194.

Pectinaria.

Pectinaria, *Lam.* Anim. s. Vert. v. 348.—Cistena, *Leach* in Suppl. Encyclop. Brit. i. 452.

1. *P. belgica.*
Nereis cylindraria belgica, Pallas, Misc. Zool. 122. pl. 9. fig. 3–13.
Sabella granulata, Linn. Syst. 1268. Mont. Test. Brit. 544. Stew. Elem. ii. 423. Penn. Brit. Zool. iv. 369. Turt. Brit. Faun. 202.
Sabella tubiformis ? Penn. Brit. Zool. iv. 372. pl. 95. fig. 2.
Nereis pectinata, Sowerby. Turt. Br. Faun. 134.
Sabella belgica, Turt. Gmel. iv. 611.
Amphitrite auricoma, Mull. Zool. Dan. Prod. 2622. Zool. Dan. i. 26. pl. 26. fig. 1–6. Fabric. Faun. Groenl. 289. Cuv. Règ. Anim. iii. 195. Penn. Brit. Zool. iv. 91. Stew. Elem. i. 389. pl. 12. fig. 1, 2.
Pectinaria belgica, Lam. Anim. s.Vert. 2nde edit. v. 602. Templeton in Loud. Mag. Nat. Hist. ix. 234.
Cistena Pallasii, Leach in Suppl. Encyclop. Brit. i. 452. pl. 26.

2. *P. ? arenaria.*
Sabella arenaria, Mont. Test. Brit. 552. Penn. Brit. Zool. iv. 371. Turt. Brit. Faun. 203.

3. *P. ? subcylindrica.*
Sabella subcylindrica, Mont. Test. Brit. 552. Turt. Brit. Faun. 203. Penn. Br. Zool. iv. 371.

4. *P. ? setiformis.*
Sabella setiformis, Mont. Test. Brit. 553. Turt. Br. Faun. 203. Penn. Br. Zool. iv. 371.

Sabellaria.

Sabellaria, *Lam.* Anim. s. Vert. v. 350.

1. *S. alveolata.*
Tubularia arenosa anglica, Ellis, Corall. 90. pl. 36.
Sabella alveolata, Linn. Syst. 1268.
Amphitrite alveolata, Cuv. Règ. Anim. iii. 195.
Sabellaria alveolata, Lam. Anim. s.Vert. 2nde edit. v. 605. Stark, Elem. ii. 133. Templeton in Loud. Mag. N. Hist. ix. 234.

2. *S. crassissima**.

Sabella alveolata, Penn. Brit. Zool. iv. 368. pl. 95. fig. sup. Mont. Test. Brit. 540.

Sabellaria crassissima, Lam. Anim. s.Vert. 2nde edit. v. 605. Templeton in Loud. Mag. ix. 234.

Flemingia.

1. *Flemingia plumosa.*

Amphitrite plumosa, Mull. Zool. Dan. Prod. 2621. Fabr. Faun. Groenl. 288. Mull. Zool. Dan. ii. 16. tab. 90. fig. 1, 2. Turt. Gmel. iv. 83.

Flemingia muricata, Johnston in Berw. Trans. i. 15 (1832).

Obs. I do not know where to place this singular worm. My specimen was sent to the British Museum.

Desc. Body an inch long, cylindrical, tapered at the posterior end, of a dirty light brown colour, annulose, rough with numerous papillæ and hairy. No head nor eyes. Tentacula projected from the anterior extremity, completely retractile, of two kinds; for two of them are filiform, equal, yellowish and fleshy; and eight of them—placed above and within the first—are setaceous, bristle-like, and of a bright grass-green colour. There are likewise about the anterior end numerous long bristles in indistinct fascicles, which, when magnified, appear distinctly jointed similar to a Conferva. Along each side a row of about sixty feet, one pair to each ring. The feet are papillary, each bearing about four unequal bristles, not retractile : those of the two or three anterior pairs are longer than the others. Anus terminal, simple. The animal can inject a green-coloured liquid into a central vessel of the fleshy tentacula.

One specimen found amongst the entangled roots of *Laminaria digitata.*

Family Terebellidæ.

Terebella.

Terebella, *Cuv.* Règ. Anim. iii. 193. *Lam.* Anim. s. Vert. v. 353.

1. *T. conchilega.*

Nereis conchilega, Pall. Misc. Zool. 131. tab. 9. fig. 14–22. "Penn. Brit. Zool. iv. 47."

Terebella conchilega, Turt. Gmel. iv. 84. Turt. Brit. Faun. 132. Penn. Br. Zool. iv. 112. Lam. Anim. s. Vert. 2nde edit. v. 607. Edin. Journ. Nat. and Geogr. Sc. iii. 244. Templeton in Loud. Mag. N. Hist. ix. 233.

Sabella rudis, Penn. Br. Zool. iv. 368.

——— conchilega, Mont. Test. Brit. 547. Stew. Elem. ii. 423. Turt. Brit. Faun. 203.

2. *T. chrysodon.*

Sabella chrysodon, Mont. Test. Brit. 546. Penn. Brit. Zool. iv. 370. Turt. Brit. Faun. 202. Hogg's Stockton, 29.

* *Sabella alveolata*—Turt. Gmel. iv. 610.—Turt. Brit. Faun. 202.—Stew. Elem. ii. 423.—embraces both species.

3. *T. lumbricalis.*

Sabella lumbricalis, Mont. Test. Brit. 549. Turt. Brit. Faun. 203. Stew. Elem. ii. 423. Penn. Brit. Zool. iv. 370.

4. *T. cristata.*

Amphitrite cristata, Mull. Zool. Dan. Prod. 2620. Zool. Dan. ii. 40. tab. 70. fig. 1–4. Jameson in Wern. Mem. i. 558. Stew. Elem. i. 389. Penn. Brit. Zool. iv. 91.

Terebella cristata, Lam. Anim. s.Vert. 2nde edit. v. 607. Templeton in Loud. Mag. N. Hist. ix. 233.

5. *T. cirrhata.*

Terebella cirrhata, Montagu in Linn. Trans. xii. 342. tab. 12. fig. 1.

Sabella cirrata, Mont. Test. Brit. 550. Penn. Brit. Zool. iv. 370. Turt. Brit. Faun. 203.

6. *T. nebulosa.*

Terebella nebulosa, Montagu in Linn. Trans. xii. 343. tab. 12. fig. 2.

7. *T. constrictor.*

Terebella constrictor, Montagu in Linn. Trans. xii. 343. tab. 13. fig. 1.

8. *T. venustula.*

Terebella venustula, Montagu in Linn. Trans. xii. 344. tab. 13. fig. 2.

9. *T. gigantea.*

Terebella gigantea, Montagu in Linn. Trans. xii. 341. tab. 11.

Family Sabellidæ.

Les *Sabelles,* Cuv. Règ. Anim. iii. 191.

Othonia.

Fabricia, *Blainville.*—Othonia, *Johnston* in Loud. Mag. N. Hist. viii. 183.

1. *O. Fabricii.*

Tubularia Fabricia, Mull. Zool. Dan. Prod. 254. Fabr. Faun. Groenl. 440. fig. 12. Turt. Gmel. iv. 668.

Tubularia stellaris, Sars in Ann. des Sc. Nat. 2nde sér. vii. 274.

Othonia Fabricii, Johnston in Loud. Mag. N. Hist. viii. 181. fig. 19.

Sabella.

Sabella, *Cuv.* Règ. Anim. iii. 191. *Schweigg.* Handb. 599.—Amphitrite, *Lam.* Anim. s. Vert. v. 354.

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1. *S. amœna.*

Sabella amœna, Johnston in Loud. Mag. N. Hist. vi. 406. fig. 53.

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2. *S. reniformis.*

Nieren-formige Amphitrite, Mull. Wurm. 194. tab. 16.

Tubularia penicillus, Mull. Zool. Dan. Prod. 3063. Zool. Dan. tab. 89.

fig. 1, 2. Fabric. Faun. Groenl. 438. Fleming in Edin. Phil. Journ. viii. 295.

Amphitrite reniformis, Turt. Gmel. iv. 82.

——— penicillus, Lam. Anim. s. Vert. v. 356; 2nde edit. v. 610.

3. *S. infundibulum.*

Amphitrite infundibulum, Montagu in Linn. Trans. ix. 109. tab. 8. Penn. Br. Zool. iv. 89. Lam. Anim. s. Vert. 2nde edit. v. 611.

4. *S. vesiculosa.*

Amphitrite vesiculosa, Montagu in Linn. Trans. xi. 19. tab. 5. fig. 1. Stark, Elem. ii. 133. Lam. Anim. s. Vert. 2nde edit. v. 610.

5. *S. Penicillus.*

Scolopendra major tubularia, Bast. Opusc. Subs. i. ii. 77. tab. 9. fig. 1.

Sabella penicillus, Linn. Syst. 1269. Mont. Test. Brit. 541. Penn. Brit. Zool. iv. 369.

Nereis lutaria, Pall. Misc. Zool. 116. tab. 10. fig. 1.

Amphitrite ventilabrum, var. 2, Turt. Gmel. iv. 82. Jameson in Wern. Mem. i. 558. Turt. Brit. Faun. 136. Stew. Elem. i. 389. Penn. Brit. Zool. iv. 90. Dalyell in Edin. New Phil. Journ. xvii. 415. Lam. Anim. s. Vert. 2nde edit. v. 610.

6. *S. carnea.*

A Sabella resembling the Penicillus, Mont. Test. Brit. 544.

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7. *S. tubularia.*

Serpula tubularia, Mont. Test. Brit. 513, and Suppl. 171. Turt. Brit. Faun. 202. Fleming in Edin. Encyclop. vii. 67. pl. 204. fig. 9. Penn. Br. Zool. iv. 362. Dillw. Rec. Sh. 1083. Fleming in Edin. Phil. Journ. xii. 243. Johnston in Loud. Mag. N. Hist. vii. 126. fig. 23. Berkeley in ibid. vii. 421. Laskey in Wern. Mem. i. 413. Brown, Illust. pl. 2. fig. 9, 10. Turt. Conch. Dict. 154. fig. 84.

Serpula arundo, Turt. Conch. Dict. 155. Berkeley in Zool. Journ. iii. 229.

Sabella tubularia, Berkeley in Zool. Journ. v. 426.

8. *Serpula Cordineri.*

Serpula Cordineri, Fleming in Edin. Phil. Journ. xii. 244.

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9. *S. volutacornis.*

Amphitrite volutacornis, Montagu in Linn. Trans. vii. 80. tab. 7. fig. 10. Lam. Anim. s. Vert. 2nde edit. v. 611. Turt. Brit. Faun. 136. Penn. Brit. Zool. iv. 89. Stark, Elem. ii. 133. Leach in Suppl. Encyclop. Brit. i. 452. pl. 26.

Sabella curta, Mont. Test. Brit. 554. Penn. Br. Zool. iv. 372. Turt. Brit. Faun. 203.

Sabella compressa, Mont. Test. Brit. 555. Turt. Br. Faun. 203. Penn. Brit. Zool. iv. 372.

Amphitrite rosea, Sowerby. Penn. Brit. Zool. iv. 90. Turt. Br. Faun. 136.

Family Serpulidæ.

Serpula, Linn. Syst. 1264.—Les *Serpules,* Cuv. Règ. Anim. iii. 190. —Les *Serpulées,* Lam. Anim. s. Vert. v. 357.—*Serpulæa,* Latr. Faun. Nat. 242. (See Philippi in Ann. & Mag. N. Hist. xiv. p. 153.)

Obs. In this family (*Serpulidæ*) I incline to arrange all the *Dentalia* included in the genus *Brochus* of Brown, the *Cæcalium* of Fleming, the microscopic or minute *Orthocera,* and the greater part of our multilocular shells arranged in the genus *Nautilus.*

Lobatula.

Lobatula, *Flem.* Phil. Zool. ii. 602. *Flem.* Brit. Anim. 232.

1. *L. vulgaris.*

Nautilus lobatulus, Turt. Gmel. iv. 307. Turt. Brit. Faun. 166. Penn. Br. Zool. iv. 248. Dillw. Rec. Sh. 343. Turt. Conch. Dict. 120. Fleming in Encyclop. Edin. vii. 85.

Serpula lobata, Mont. Test. Brit. 515, and Suppl. 160. Lowe in Zool. Journ. iii. 78.

Lobatula farcta, Flem. Phil. Zool. ii. 602.

Lobatula vulgaris, Flem. Br. Anim. 232.

Discorbis vesicularis, Clark in Zool. Journ. iii. 341.

Truncatulina tuberculata, Morris, Cat. Br. Foss. p. 64.

2. *L. concamerata.*

Serpula concamerata, Mont. Test. Br. Suppl. 160. Penn. Br. Zool. iv. 366. Lowe in Zool. Journ. iii. 79.

Nautilus concameratus, Fleming in Edin. Encycl. vii. 85.

Lobatula concamerata, Flem. Brit. Anim. 233.

Spirorbis.

Fleming in Edin. Encyclop. vii. 68. *Lam.* Anim. s. Vert. v. 358. *Leach* in Suppl. Encyclop. Brit. i. 452. *Schweigg.* Handb. 601.

*Spirorbis, *Flem.* Phil. Zool. ii. 602.

1. *S. communis.*

Vermiculus exiguus albus nautiloides algæ fere adherens, List. Conch. 553. 5.

Planorbis minimus, Petiv. Gazophy. tab. 35. fig. 8.

Serpula spirorbis, Linn. Syst. 1265. Da Costa, Brit. Conch. 22. tab. 2. fig. 11. Fabric. Faun. Groenl. 377. Mull. Zool. Dan. iii. 8. tab. 86. fig. 1–6. Turt. Gmel. iv. 603. Mont. Test. Brit. 498. Laskey in Wern. Mem. i. 412. Brown in ibid. ii. 534. Penn. Brit. Zool. iv. 358. pl. 94. fig. 1. Stew. Elem. ii. 422. Turt. Brit. Faun. 201. Turt. Conch. Dict. 149.

Spirorbis communis, Fleming in Edin. Encyclop. vii. 68; and in Edin. Phil. Journ. xii. 245.

Spirorbis nautiloides, Lam. Anim. s. Vert. 2nde edit. v. 613. Stark, Elem. ii. 132. Templeton in Loud. Mag. N. Hist. ix. 233. Brown, Illust. pl. i. fig. 45. Griffith's Cuv. xiii. pl. 8. fig. 6.

2. *S. spirillum.*

Serpula spirillum, Linn. Syst. 1264. Fabric. Faun. Groenl. 376. Mont. Test. Brit. 499. Turt. Gmel. iv. 602. Turt. Brit. Faun. 200. Laskey in Wern. Mem. i. 412. Brown in ibid. ii. 534. Stew. Elem. ii. 421. Penn. Br. Zool. iv. 358. Turt. Conch. Dict. 150.

Spirorbis spirillum, Flemiug in Edin. Encyclop. vii. 68; and in Edin. Phil. Journ. xii. 245. Lam. Anim. s. Vert. 2nde edit. v. 614. Stark, Elem. ii. 132. Templeton in Loud. Mag. N. Hist. ix. 233. Brown's Illust. pl. 1. fig. 41, 42, 53 and 54.

3. *S. granulatus.*

Serpula granulata, Linn. Syst. 1266. Fabric. Faun. Groenl. 380. Mont. Test. Brit. 500. Laskey in Wern. Mem. i. 412. Brown in ibid. ii. 534. Turt. Brit. Faun. 201. Dillw. Rec. Sh. 1074. Penn. Brit. Zool. iv. 359. Turt. Conch. Dict. 150.

Serpula sulcata, Adams in Linn. Trans. iii. 255.

Spirorbis granulatus, Flem. in Edin. Encyclop. vii. 68; and in Edin. Phil. Journ. xii. 244. Templeton in Loud. Mag. N. Hist. ix. 233. Brown's Illust. pl. 1. fig. 47.

4. *S. carinatus.*

Serpula carinata, Mont. Test. Brit. 502. Dillw. Rec. Sh. 1074. Penn. Brit. Zool. iv. 360. Turt. Conch. Dict. 151. Turt. Br. Faun. 201.

Spirorbis carinatus, Fleming in Edin. Encyclop. vii. 68; and in Edin. Phil. Journ. xii. 244. Brown's Illust. pl. 1. fig. 48.

5. *S. corrugatus.*

Serpula corrugata, Mont. Test. Brit. 502. Penn. Brit. Zool. iv. 360. Turt. Brit. Faun. 201. Turt. Conch. Dict. 151. Dillw. Rec. Sh. 1075.

Spirorbis corrugatus, Fleming in Edin. Encyclop. vii. 68. pl. 204. fig. 13; and in Edin. Phil. Journ. xii. 245. Brown's Illust. pl. 1. fig. 46.

6. *S. Montagui.*

Serpula, new species, Mont. Test. Brit. 502.

Spirorbis Montagui, Fleming in Edin. Phil. Journ. xii. 245.

7. *S. incurvatus.*

Serpula incurvata, Turt. Gmel. iv. 609. Turt. Conch. Dict. 156. Dillw. Rec. Sh. 1071.

Vermiculum incurvatum, Mont. Test. Brit. 518. Turt. Br. Faun. 199.

Spirorbis incurvatus, Fleming in Edin. Phil. Journ. xii. 245.

8. *S. pervius.*

Vermiculum pervium, Mont. Test. Brit. 518.

Spirorbis pervius, Fleming in Edin. Phil. Journ. xii. 245.

Obs. By Turton and Dillwyn this is registered as a variety of the preceding.

9. *S. retortus.*

Serpula retorta, Turt. Gmel. iv. 609 Turt. Conch. Dict. 158. Penn. Brit. Zool. iv. 365.

Vermiculum retortum, Mont. Test. Brit. 524.
Spirorbis retorta, Fleming in Edin. Phil. Journ. xii. 245.

10. *S. annulus.*
Spirorbis annulus, Brown's Illust. pl. 1. fig. 44.

11. *S. heterocliticus.*
Spirorbis heterocliticus, Brown's Illust. pl. 1. fig. 57.

12. *S. striatulus.*
Spirorbis striatulus, Brown's Illust. pl. 1. fig. 59.

**Heterodisca, *Flem.* Phil. Zool. ii. 602.

13. *S. heterostrophus.*
Serpula heterostropha, Mont. Test. Brit. 503. Turt. Brit. Faun. 201. Dillw. Rec. Sh. 1075. Penn. Brit. Zool. iv. 359. Turt. Conch. Dict. 151.
Spirorbis heterostrophus, Fleming in Edin. Encyclop. vii. 68. pl. 205. fig. 1. Brown's Illust. pl. 1. fig. 55.
Heterodisca heterostropha, Fleming in Edin. Phil. Journ. xii. 247.

14. *S. minutus.*
Serpula minuta, Mont. Test. Brit. 505. Turt. Brit. Faun. 200. Dillw. Rec. Sh. 1072. Penn. Br. Zool. iv. 359. Turt. Conch. Dict. 150.
Spirorbis minutus, Fleming in Edin. Encyclop. vii. 68.
Heterodisca minuta, Fleming in Edin. Phil. Journ. xii. 247.

15. *S. conicus.*
Spirorbis conicus, Fleming in Edin. Encyclop. vii. 68. pl. 205. fig. 3. Brown's Illust. pl. 1. fig. 58.
Heterodisca conica, Fleming in Edin. Phil. Journ. xii. 247.

16. *S. lucidus.*
Serpula lucida, Mont. Test. Brit. 506. Laskey in Wern. Mem. i. 412. Brown in ibid. ii. 534. Turt. Br. Faun. 201. Penn. Br. Zool. iv. 360. Dillw. Rec. Sh. 1075. Turt. Conch. Dict. 151.
Serpula reflexa, Adams in Linn. Trans.
Spirorbis lucidus, Fleming in Edin. Encyclop. vii. 68. Brown's Illust. p. 1. fig. 56, 60.
Serpula sinistrorsa, Mont. Test. Brit. 504.
Heterodisca lucida, Fleming in Edin. Phil. Journ. xii. 247.

Obs. The *Serpula sinistrorsa* is made a variety of *Serp. spirillum* by Turton, Dillwyn and Pennant.

17. *S. reversus.*
Serpula reversa, Mont. Test. Brit. 508. Turt. Br. Faun. 201. Penn Brit. Zool. iv. 361.
Spirorbis reversus, Fleming in Edin. Encyclop. vii. 69. Brown's Illust. pl. 1. fig. 52.
Heterodisca reversa, Fleming in Edin. Phil. Journ. xii. 248.

Obs. Dillwyn and Turton make this a variety of their *Serpula vermicularis.*

Serpula.

Serpula, *Fleming* in Edin. Encyclop. vii. 67.—Serpula et Vermilia, *Lam.* Anim. s. Vert. v. 360 and 368.—Vermilia, *Fleming,* Phil. Zool. ii. 601 ; and in Edin. Phil. Journ. xii. 242.

1. *S. intricata.*

Serpula intricata, Linn. Syst. 1265. Turt. Gmel. iv. 603. Stew. Elem. ii. 422. Dillw. Rec. Sh. 1073.

Serpula vermicularis, Mull. Zool. Dan. iii. 9. tab. 86. fig. 9. (animal.) Mont. Test. Brit. 509. Laskey in Wern. Mem. i. 413. Brown in ibid. ii. 534. Stew. Elem. ii. 422. Turt. Brit. Faun. 201. Fleming in Edin. Encyclop. vii. 67. Turt. Conch. Dict. 152.

Vermilia intricata, Fleming in Edin. Phil. Journ. xii. 242.

Serpula Mulleri, Berkeley in Loud. Mag. Nat. Hist. vii. 421.

2. *S. vermicularis.*

Tubus vermicularis, Ellis, Corall. pl. 38. fig. 2.

Serpula vermicularis, Linn. Syst. 1267. Penn. Brit. Zool. iv. 361. Stark, Elem. ii. 132. Berkeley in Loud. Mag. Nat. Hist. vii. 421. Templeton in ibid. ix. 233. Turt. Gmel. iv. 605. Brown's Illust. pl. 2. fig. 2, 3.

Serpula triquetra, Bast. Opusc. Subs. i. ii. 79. tab. 9. fig. 3. Mont. Test. Brit. 511. Stew. Elem. ii. 422. Fleming in Edin. Encyclop. vii. 67. Laskey in Wern. Mem. i. 413. Brown in ibid. ii. 534. Penn. Brit. Zool. iv. 361. Turt. Brit. Faun. 202.

Serpula contortuplicata, Cuv. Règ. Anim. iii. 190. Griffith's Cuv. xiii. 10. pl. 8. fig. 1.

Vermilia vermicularis, Fleming in Edin. Phil. Journ. xii. 242.

Vermilia triquetra, Brown's Illust. pl. 2. fig. 1.

Amphitrite campanulata, Sowerby. Turt. Brit. Faun. 137. Penn. Br. Zool. iv. 91.—Amphitrite penicillus, Gmel. fide Cuv.

3. *S. triquetra.*

Serpula triquetra, Linn. Syst. 1265. Mont. Test. Brit. Suppl. 157. Sowerby, Gen. tab. fig. 2. (opt. !) Turt. Conch. Dict. 152. Berkeley in Loud. Mag. Nat. Hist. 421. Turt. Gmel. iv. 603.

Vermilia triquetra, Lam. Anim. s. Vert. 2nde edit. v. 633. Stark, Elem. ii. 131. Templeton in Loud. Mag. Nat. Hist. ix. 233. Brown's Illust. pl. 2. fig. 5.

Var. α. Lid testaceous and conical. Vermilia conica, Fleming in Edin. Phil. Journ. xii. 243.—Patella extinctorium, Turt. Conch. Dict. 138.

Var. β. Lid testaceous, armed with two or three spines. Serpula vermicularis, Zool. Dan. tab. 86. fig. 8. Cuv. Règ. Anim. iii. 191. —Vermilia armata, Fleming, sup. cit. 243.—Patella tricornis, Turt. Conch. Dict. 139.

Var. γ. Lid with a produced central forked process. Mont. Test. Brit. Suppl. 157. No. 4. Vermilia triquetra, Fleming in Edin. Phil. Journ. xii. 242.—Serpula triquetra, Sowerby, Brit. Misc. i. 63. tab. 31.

Var. δ. Lid smooth and slightly concave. Mont. Test. Brit. Suppl. 157. No. 1.

See also the observations of J. B. Harvey in Charlesw. Mag. i. 477.

4. Serpula contortuplicata, Linn. Syst. 1266. Templeton in Loud. Mag. Nat. Hist. ix. 233. Turt. Gmel. iv. 604.

Obs. Turton makes this his var. B. of *Serpula vermicularis.* The character of it given by Linnæus is very applicable to some varieties of *S. triquetra.*

Serpula contortus, Brown's Illust. pl. 2. fig. 4. S. spiralis, ibid. fig. 6, and S. perversa, ibid. fig. 7, are common states of *Serpula triquetra,* found on *Sertulariæ* and other corallines.

5. *S. serrulata.*

Serpula serrulata, Fleming in Edin. Encyclop. vii. 67. pl. 204. fig. 8, copied in Brown's Illust. pl. 2. fig. 8.

Vermilia serrulata, Fleming in Edin. Phil. Journ. xii. 243.

Vermilia tricuspidata, Morris, Cat. Br. Foss. p. 67.

6. *Serpula filiformis.*

" Serpula filiformis, Rees, Cyclop. vol. 10." Templeton in Loud. Mag. Nat. Hist. ix. 233. Mr. Morris mentions a fossil *Serpula filiformis,* Cat. Brit. Foss. p. 66. The species intended by Templeton may be *Filograna implexa* ?

7. *Serpula rugosa.*

Serpula rugosa, Turt. Conch. Dict. 154.

Filograna.

Filograna, *Berkeley* in Zool. Journ. v. 427.—Filipora, *Flem.* Brit. Anim. 530.

1. *Filograna implexa.*

Filograna, Planc. Conch. 46.

Serpula corallifica, Pall. Elench. Zooph. 239.

Serpula filograna, Linn. Syst. 1265. Berkeley in Zool. Journ. iii. 230.

Serpula complexa, Turt. Conch. Dict. 153.

Tubipora fascicularis, Stew. Elem. ii. 426.

Filipora filograna, Flem. Brit. Anim. 530.

Filograna implexa, Berkeley in Zool. Journ. v. 427.

Serpula minima ? Lam. Anim. s. Vert. 2nde edit. v. 625. Templeton in Loud. Mag. Nat. Hist. ix. 233.

Ditrupa.

Ditrupa, *Berkeley* in Zool. Journ. v. 426.

1. *D. subulata.*

Dentalium subulatum, Deshayes in Zool. Journ. iv. 194.

Ditrupa subulata, Berkeley in Zool. Journ. v. 425–6. Morris, Cat. Br. Foss. p. 65.

Obs. Mr. Berkeley, at one time, was led to refer the *Dentalium* *gadus* of Montagu to this genus (Zool. Journ. v. 425), but this location remains to be proved. Vide Corrigenda ad finem of the above vol. of the Zool. Journal.

Family Arenicolidæ.

Les *Arenicoles,* Cuv. Règ. Anim. iii. 197.—*Telethusæ,* Latr. Fam. Nat. 244.—*Arenicoliens,* Aud. and M. Edw. Litt. de la France, ii. 282.—*Arenicolidæ,* Johnston in Loud. Mag. Nat. Hist. viii. 566.

Arenicola.

Arenicola, *Lam.* Anim. s. Vert. v. 335. *Schweigg.* Handb. 594. *Aud. and M. Edw.* sup. cit. 283. *Leach* in Suppl. Encyclop. Brit. 452.

1. *A. piscatorum.*

For the synonyms see Loud. Mag. Nat. Hist. viii. 567; and add Arenicola piscatorum, Edin. Journ. Nat. and Geogr. Sc. iii. 245. Aud. and M. Edw. Litt. de la France, ii. 285. pl. 8. fig. 8–12.
Arenicola marina, Templeton in Loud. Mag. Nat. Hist. ix. 234.
Lumbricus marinus, Rathke in Zool. Dan. iv. 39. pl. 155. fig. B. 1–4.

2. *A. ecaudata.*

Arenicola ecaudata, Johnston in Loud. Mag. Nat. Hist. viii. 566. fig. 54.

Tribe Nereidina.

(MacLeay in Ann. Nat. Hist. iv. 385.)

Nereides vagæ, Pallas, Misc. Zool. 113.—*Dorsibranches,* Cuv. Règ. Anim. iii. 197.—*Annelides antennées,* Lam. Anim. s. Vert. v. 302.—*Notobranchia,* Latr. Fam. Nat. 238.—*A. errantes,* Aud. and M. Edwards, Litt. de la France, ii. 27. (See also Johnston in Ann. Nat. Hist. ii. 424.)

Family Eunicæ.

Les *Eunices,* Cuv. Règ. Anim. iii. 199.—*Eunicæ,* Lam. Anim. s. Vert. v. 320.—*Eunicæa,* Latr. Fam. Nat. 239.—*Euniciens,* Aud. and M. Edw. Litt. de la France, ii. 131.

Eunice.

Leodice, *Lam.* Anim. s. Vert. v. 322.—Eunice, *Schweigg.* Handb. 597.—*Aud. and M. Edw.* Litt. de la France, ii. 137.

1. *E. sanguinea.*

Nereis sanguinea, Montagu in Linn. Trans. xi. 20. tab. 3. fig. 1.
Leodice sanguinea, Lam. Anim. s. Vert. 2nde edit. v. 563. Stark, Elem. ii. 137.
Eunice sanguinea, Aud. and M. Edw. Litt. de la France, ii. 147.

2. *E. pinnata.*

Nereis pinnata, Mull. Zool. Dan. i. 31. tab. 29. fig. 4–7. Aud. and M. Edw. Litt. ii. 145. Fleming in Edin. Phil. Journ. ix. 254.

Onuphis.

Onuphis, *Aud. and M. Edw.* Litt. de la France, ii. 151.

1. *O. tubicola.*

Nereis tubicola, Mull. Zool. Dan. Prod. 2625. Zool. Dan. i. 18. tab. 18. fig. 1–6. Turt. Gmel. iv. 87. Aud. and M. Edw. Litt. de la France, ii. 154.

Onuphis tubicola, Johnston in Ann. and Mag. N. Hist. xvi. 6.

Obs. "The first British specimens of the species recognised were dredged off Sana Island by Mr. G. C. Hyndman from forty fathoms. I exhibited the specimens at the Cork meeting of the British Association 1843."—*W. Thompson.*

Family Nereides.

Nereides, Lam. Anim. s. Vert. v. 310. Johnston in Ann. Nat. Hist. iii. 289.—*Nereidæa,* Latr. Fam. Nat. 240.—*Nereidiens,* Aud. and M. Edw. Litt. de la France, ii. 179.

Nereis.

Nereis, *Linn.* Syst. 1085. *Cuv.* Règ. Anim. iii. 201. *Aud. and M. Edw.* Litt. de la France, ii. 184. *Johnston* in Ann. Nat. Hist. iii. 289, and v. 168.—Lycoris, *Lam.* Anim. s. Vert. v. 311.

1. *N. brevimanus.*

Nereis brevimanus, Johnston in Ann. Nat. Hist. v. 170.

2. *N. viridis.*

Nereis viridis, Johnston in loc. cit. 171.

3. *N. pelagica.*

Nereis pelagica, Johnston in Ann. Nat. Hist. v. 172.

4. *N. bilineata.*

Nereis bilineata, Johnston in lib. cit. iii. 295.

5. *N. Dumerillii.*

Nereis Dumerillii, Johnston in lib. cit. v. 174.

6. *N. fucata.*

Nereis fucata, Johnston in lib. cit. v. 175.

7. *N. renalis.*

Nereis renalis, Johnston in lib. cit. v. 176.

8. *N. longissima.*

Nereis longissima, Johnston in lib. cit. v. 178.

9. *N. margaritacea.*

Nereis margaritacea, Johnston in Ann. Nat. Hist. iii. 294.

10. *N. pulsatoria.*

Nereis pulsatoria, Montagu. Aud. and M. Edw. Litt. de la France, ii. 194. pl. 4. f. 8–13.

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1. *Nereis iricolor,* Montagu, Linn. Trans. vii. 82. Penn. Brit. Zool. iv. 94. Turt. Br. Faun. 135.

2. *Nereis margarita,* Montagu, Linn. Trans. vii. 82. Penn. Brit. Zool. iv. 94. Turt. Brit. Faun. 135.

3. *Nereis lineata,* Montagu, Linn. Trans. vii. 83. Penn. Br. Zool. iv. 95. Turt. Br. Faun. 135.

4. *Nereis maculosa,* Montagu in Linn. Trans. xi. 21. pl. 3. fig. 4.

5. *Nereis rufa.*

Nereis rufa, Penn. Brit. Zool. iv. 96. pl. 27. fig. 2, 3. Hogg's Stockton, 29.

6. *Nereis mollis.*

Nereis mollis, Linn. Syst. 1085. Turt. Gmel. iv. 86. Jameson in Wern. Mem. i. 557. Penn. Br. Zool. iv. 96. Bosc, Vers, i. 168.

7. *Nereis octentaculata.*

Nereis octentaculata, Montagu in Linn. Trans. vii. 84. Penn. Brit. Zool. iv. 95. Turt. Brit. Faun. 135.

8. *Nereis punctata.*

Nereis punctata, Encyclop. Méthod. Vers, tab. 56. fig. 19, 20!

Desc. Body $\frac{6}{10}$ths long, $\frac{1}{8}$th broad, linear, nearly equal at both extremities. Back rounded, brown, marked with three rows of light-coloured circular spots arranged longitudinally, and with eight similarly coloured transverse lines placed at unequal distances. The middle series of these spots is the faintest; and besides the three dorsal there is another series on each side placed on the foot-like processes. Head small, quadrangular, corneous, pale, with four black eyes, two on each side and approximate. Anterior margin of the head furnished with five conical setaceous two-jointed tentacula, two on each side and one in the centre, which is the shortest and inferior. Mouth terminal, with a large projectile proboscis unarmed with any teeth. Feet forty on each side. Each foot is divided at the apex into two processes; the superior terminated with a very long setaceous filament, and furnished with a retractile brush of fine hairs; the inferior has three short setaceous filaments, and a large brush of equally fine hairs. The filaments are not retractile. Ventral surface brownish. Tail abrupt, terminated with two setæ like the lateral filaments. Anus terminal.

This is a beautiful worm, and often glows with a metallic lustre of a light blue reflected from its pale spots. Its motions are very rapid. I have seen only one specimen, and this was many years ago. I had no doubt of its being the *Nereis punctata* figured in the work referred to, but it is not the *Nereis punctata* of Muller. The species is not noticed by Audouin and Milne-Edwards; nor am I able to refer it to any defined genus.

Syllis.

Syllis, *Savigny* in Cuv. Règ. Anim. iii. 203. *Lam.* Anim. s. Vert. v. 317. *Aud. and M. Edw.* Litt. de la France, ii. 204. (Vide Ann. Nat. Hist. xiii. p. 235.)

1. *S. armillaris.*

Nereis armillaris, Mull. Wurm. 150. tab. 9. fig. 1–5; copied in Encyclop. Méthod. pl. 55. fig. 13–17. Turt. Gmel. iv. 86. Bosc, Vers, i. 168. Johnston in Ann. and Mag. Nat. Hist. xv. 145. pl. 9. fig. 1, 2.

2. *S. prolifera.*

Nereis prolifera, Mull. Zool. Dan. ii. 15. tab. 52. fig. 5–9; copied in Encyclop. Méthod. pl. 56. fig. 12–15. Turt. Gmel. iv. 90. Bosc, Vers, i. 174. Aud. and M. Edw. in Ann. des Sc. Nat. xxix. 231. note 3; and Litt. de la France, ii. 209. Johnston in lib. cit. 146. pl. 9. fig. 3, 4.

3. *S.? noctiluca.*
Nereis noctiluca, Linn. Syst. 1085. Turt. Gmel. iv. 86. Penn. Brit. Zool. iv. 93. Turt. Br. Faun. 134. Stew. Elem. i. 390. Abildgaard in Zool. Dan. iv. 31. tab. 148. fig. A. 1–3. Aud. and M. Edw. Litt. de la France, ii. 209.

Myriana.

Myriana, *Aud. and M. Edw.* Litt. de la France, ii. 216.

1. *M.? pennigera.*
Nereis pennigera, Montagu, Linn. Trans. ix. 111. tab. 6. fig. 3. Penn. Brit. Zool. iv. 95. Aud. and M. Edw. Litt. de la France, ii. 219.

Phyllodoce.

Phyllodoce, *Cuv.* Règ. Anim. iii. 202. *Lam.* Anim. s. Vert. v. 316. *Aud. and M. Edw.* Litt. de la France, ii. 219. Johnston in Ann. Nat. Hist. iv. 224.

1. *P. lamelligera.*
Phyllodoce lamelligera, Johnston in Ann. Nat. Hist. iv. 225. pl. 6. fig. 1–6.

2. *P. maculata.*
Phyllodoce maculata, Johnston in Ann. Nat. Hist. iv. 227. pl. 7. fig. 1–3.

3. *P. bilineata.*
Phyllodoce bilineata, Johnston in Ann. Nat. Hist. iv. 227. pl. 6. fig. 7–10.

4. *P. viridis.*
Phyllodoce viridis, Johnston in lib. cit. iv. 228. pl. 6. fig. 11–15.

Psamathe.

Psamathe, *Johnston* in Loud. Mag. Nat. Hist. ix. 14; and in Ann. Nat. Hist. iv. 229.

1. *P. fusca.*
Psamathe fusca, Johnston in Loud. Mag. ix. 15. fig. 1; and in Ann. Nat. Hist. iv. 230. pl. 7. fig. 4.

Ioida.

Ioida, *Johnston* in Ann. Nat. Hist. iv. 231.

1. *I. macrophthalma.*
Ioida macrophthalma, Johnston in Ann. N. Hist. iv. 231. pl. 7. fig. 5.

Nephtys.

Nephtys, *Cuv.* Règ. Anim. 203. *Lam.* Anim. s. Vert. v. 313. *Aud.*

and M. Edw. Litt. de la France, ii. 232. *Johnston* in Loud. Mag. N. Hist. viii. 341.

1. *N. margaritacea.*

Nephtys margaritacea, Johnston in Loud. Mag. Nat. Hist. viii. 341. fig. 33.

Pollicita.

Pollicita, *Johnston* in Ann. and Mag. N. Hist. xvi. 4.

1. *P. peripatus.*

Bebryce peripatus, Johnston, Mr. Thompson's Rep. 273.
Pollicita peripatus, Johnston in Ann. and Mag. N. Hist. xvi. 5. pl. 2. fig. 1–6.

Glycera.

Glycera, *Lam.* Anim. s. Vert. v. 314. *Aud. and M. Edw.* Litt. de la France, ii. 241.

1. *G. alba.*

Nereis alba, Mull. Zool. Dan. Prod. 217. Zool. Dan. ii. 29. tab. 62. fig. 6, 7. Turt. Gmel. iv. 89. Aud. and M. Edw. Litt. ii. 243. Bosc, Vers, i. 172. Johnston in Ann. and Mag. Nat. Hist. xv. 147, pl. 9. fig. 1–9.

Family Ariciadæ.

Ariciens, Aud. and M. Edw. Litt. de la France, ii. 252.—*Ariciadæ,* Johnston in Mag. Zool. and Bot. ii. 63.

Leucodore.

Leucodore, *Johnston* in Mag. Zool. and Bot. ii. 66.

1. *L. ciliatus.*

Leucodore ciliatus, Johnston in Mag. Zool. and Bot. ii. 67. pl. 3. fig. 1–6.

Obs. In Griffith's 'Cuvier' (vol. xiii. *Annelida*, pl. 4. fig. 2) there is a figure of our *Leucodore ciliatus* under the name of *Spio seticornis.* It is not said from what work this figure is copied. I cannot reconcile the description of the *Spio seticornis* of authors in general with the worm before us.

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1. *Spio seticornis.*

Nereis minima tentaculis longissimis, Bast. Opusc. Subs. ii. 134. tab. 12. fig. 2.
Spio seticornis, Turt. Gmel. iv. 81. Turt. Brit. Faun. 137. Penn. Brit. Zool. iv. 92. Stark, Elem. ii. 138.

2. *Spio crenaticornis.*

Spio crenaticornis, Montagu in Linn. Trans. xi. 199. tab. 14. fig. 6.
Spio quadricornis, Lam. Anim. s. Vert. 2nde edit. v. 559. Stark, Elem. ii. 138.

3. *Spio calcarea.*

Spio calcarea, Templeton in Loud. Mag. Nat. Hist. ix. 234. fig. 27.
Obs. Probably the same as *Spio seticornis.*

Nerine.

Nerine, *Johnston* in Mag. Zool. and Bot. ii. 68.

1. *N. vulgaris.*
Nerine vulgaris, Johnston, Mag. Zool. and Bot. ii. 70. pl. 2. fig. 1–8.
Spio vulgaris, Johnston in Zool. Journ. iii. 335 and 487.

2. *N. coniocephala.*
Spio viridis, Johnston in Zool. Journ. iii. 486.
Nerine coniocephala, Johnston in Mag. Zool. and Bot. ii. 70. pl. 2. fig. 9–13.

Obs. This species is nearly allied to the *Lumbricus cirratulus* of Delle Chiaje, Anim. s. Vert. Nap. iv. p. 196. tab. 64. fig. 16.

Family Aphroditaceæ.

Aphroditæ, Pallas, Misc. Zool. 75.—Les *Aphrodites,* Cuv. Règ. Anim. iii. 206.—*Aphroditæ,* Lam. Anim. s. Vert. v. 304.—*Aphroditæa,* Latr. Fam. Nat. 239.—*Aphrodisiens,* Aud. and M. Edw. Litt. de la France, ii. 58.—*Aphroditaceæ,* Johnston in Ann. Nat. Hist. ii. 424.

Spinther.

Spinther, *Johnston* in Ann. and Mag. N. Hist. xvi. 8.

1. *S. oniscoides,* Johnston, lib. cit. 9. pl. 2. fig. 7–14.

Sigalion.

Sigalion, *Aud. and M. Edw.* Litt. ii. 103. *Johnston* in Ann. N. Hist. ii. 428 and 438.

1. *S. Boa.*
Sigalion Boa, Johnston in Ann. N. Hist. ii. 439.

Pholoë.

Pholoë, *Johnston* in Ann. N. Hist. ii. 428.

1. *P. inornata.*
Pholoë inornata, Johnston in Ann. N. Hist. ii. 437.

Polynoë.

Polynoë, *Lam.* Anim. s. Vert. v. 308. *Aud. and M. Edw.* Litt. de la France, ii. 74. *Johnston* in Ann. N. Hist. ii. 428 and 431.—Lepidonotus, *Leach* in Suppl. Encyclop. Brit. i. 452.

Obs. Dr. Leach's name has the claim of priority.

1. *P. squamata.*
Polynoë squamata, Johnston in Ann. Nat. Hist. ii. 432; and v. 307. Templeton in Loud. Mag. N. Hist. ix. 234.
Lepidonotus clavatus? Leach in Suppl. Encyclop. Brit. i. 452.

2. *P. cirrata.*
Polynoë cirrata, Johnston in lib. cit. ii. 434; and v. 307. (Ann. N. Hist. xvi. 183.)

Obs. Halithæa clava, Templeton in Loud. Mag. N. Hist. ix. 234, may not be distinct from this species.

3. *P. impar.*
Polynoë impar, Johnston in lib. cit. ii. 436.

4. *P. viridis.*
Polynoë viridis, Johnston in lib. cit. ii. 437.

5. *P. scolopendrina.*
Polynoë scolopendrina, Johnston in lib. cit. v. 307.

Aphrodita.

Aphrodita, *Linn.* Syst. 1084. *Aud. and M. Edw.* Litt. de la France, ii. 63. *Leach* in Suppl. Encyclop. Brit. i. 452. *Johnston* in Ann. N. Hist. ii. 427.—Halithea, Lam. Anim. s. Vert. v. 306.

1. *A. aculeata.*
Aphrodita aculeata, Johnston in Ann. N. Hist. ii. 429; and v. 305. —Templeton in Loud. Mag. N. Hist. ix. 234.

2. *A. hystrix.*
Aphrodita hystrix, Johnston in Ann. N. Hist. v. 305; and iv. 370.

3. *A. borealis.*
Aphrodita borealis, Johnston in lib. cit. iv. 370. pl. 10. fig. 1–13.

Species of Doubtful Place.

Campontia.

C. eruciformis.
Campontia eruciformis, Johnston in Zool. Journ. iii. 325; and iv. 421; and in Loud. Mag. N. Hist. viii. 179. fig. 18. M. Edwards in Lam. Anim. s. Vert. 2nde edit. v. 575; and in Litt. de la France, ii. 290.

Obs. MacLeay first suggested that this might be the larva of a dipterous fly,—a suggestion which Mr. Green thinks he has converted into a certainty (Charlesw. Mag. i. 279). But Mr. Green has evidently never seen our *Campontia,* and his conclusion is hence of no weight.

Branchiarius.

Branchiarius, *Montagu* in Linn. Trans. xi. 202.

1. *B. quadrangularis.*
Branchiarius quadrangularis, Montagu in Linn. Trans. xi. 202. pl. 14. fig. 1.

Diplotis.

Diplotis, *Montagu* in Linn. Trans. xi. 203.

1. *D. hyalina.*
Diplotis hyalina, Montagu in Linn. Trans. xi. 203. pl. 14. fig. 5.

Derris.

Derris, *Adams* in Linn. Trans. ii. 67.

1. *D. sanguinea.*

Derris sanguinea, Adams in Linn. Trans. ii. 67. tab. 13. fig. 1, 2. Turt. Gmel. iv. 108. Turt. Brit. Faun. 132. Penn. Br. Zool. iv. 101.

XLVI.—*Journey through Java, descriptive of its Topography and Natural History.* By Dr. Fr. Junghuhn*.

[Continued from p. 332.]

Journey to the Merapi.

We ascended from the Sawungang towards Andong, and at a height of 3000 feet came to a district which was covered with *Saccharum Klaga* growing to a height of from 15 to 20 feet. The forests then again appeared which had already been passed lower down. Here begins a frightful wilderness: high vaulted trees, covering the whole country far and wide, rose up from the deepest clefts and pressed against the steepest acclivities: climbers and densely interwoven shrubs filled up all the interstices between the stems. One while we came to a narrow mountain ridge scarcely two feet broad, between steep disrupted masses of rock covered with trees; then we mounted up these steep acclivities, climbing from the stem of one tree to another; then, again, we found ourselves in deep, moist, rocky clefts, vaulted over by the foliage of the trees and shrubs so thickly that not a ray of the sun could penetrate to us. The clouds had settled low on the mountains, and enveloped us in their damp and cold mists, which brought with them a peculiar odour. These deep forests are formed of hundreds of species of trees, which belong to the most various families. Preeminent are the species of *Ficus*, easily distinguished by their white, tenacious, milky sap, which flows from the injured bark; and next to these, the *Magnoliaceæ* and *Urticeæ*. In the thicket which fills up the spaces between their gigantic stems, the beautiful flowers of species of *Medinella* and other *Melastomaceæ* shine forth; and *Scitamineæ* (*Amomum*, *Zingiber*, &c.) raise their luxuriant leaves to a height of 20 feet, whilst their variegated cones of blossoms only half appear above the moist ground. *Urtica ? dichotoma*, Bl. 'Bydragen,' a small tree with beautiful leaves which on their under surface have white and parallel veins, adorns these thickets†. A little higher up occurs a beautiful social *Lycopodium*, which attains a height of scarcely three feet, and covers the moist parts of the woods, like our mosses, as a kind of coherent cushion.

* From the *Botanische Zeitung*, Sept. 5th and 12th, 1845.

† Arbor est elegans, trunco gracili, 30—40 pedes alto, cinereo, ramisque gracilibus; foliis in ambitu ramulorum collectis.—Silvulas constituit visu singulares, declivia montis Merapi ex altitudine 4000 pedum ad 6000 tegentes.—Trunci, quo magis in altum montis adscendunt, eo humiliores evadunt, denique vix 20 pedes alti, Usneis tecti, e ramis longe dependentibus.

But its beautiful green did not long refresh our eyes, for it soon disappeared, and species of oaks, especially *Qu. pruinosa*, Bl., began to predominate in the woods. These are immense trees, 100 feet high, whose branches are thickly covered up to the highest tops with succulent parasites, *Orchideæ*, mosses, *Usneæ*, and numerous other lichens. The whitish *Usneæ* hang down many feet long from the branches. In company with the oaks we find the *Areca humilis*, W., a palm with slender stems scarcely as thick as an arm, whose red bunches of fruit adorn the steep acclivities. Here were seen on every side the beautiful umbrella-shaped, palm-like foliage of the tree-ferns upon a little stem 30 feet high, which grow at this elevation most luxuriantly (*Chnoophora glauca*, Bl.).

The oaks gradually become less frequent, and another kind of tree, Kaju-Angring (a species of *Celtis*), by degrees becomes more and more predominant, and at last exclusively constitutes the woods. These are trees of a moderate height, with gray slender stems and slender branches, which are only partially clothed with scanty foliage. With these occur species of *Rubus*, whose red berries reminded us agreeably of Germany and our own Hartz forests. The mists became thicker and the cold more piercing (60° F., 12° R.), and the rocky clefts thickly overgrown with weeds became more frightful. In one of these clefts we met with a cavern (rather a fissure in the rock) in which species of *Rubus* (*R. javanicus*, Bl., *R. lineatus*, *R. moluccanus*, L.) grew most luxuriantly; we here noticed the last stems of the *Musa paradisiaca*, which up to the present time had accompanied us. The steepness of the acclivities, the rocks of which rise in steps, increased. The angring-trees became lower, and their stems more thin and slender; but the *Usneæ*, which hang down from their branches, were more frequent. Here began to appear a small fern (*Polypodium vulcanicum**), and higher up it became more numerous. It grew luxuriantly from the crevices of the boulders of rock, which, cemented by a softer earth, cover the ground†. The luxuriant climbing plants and tropical shrubs had now disappeared; but plants succeeded which reminded us more of the flora of the temperate climate of Europe, especially bushes of red-berried species of *Rubus*, and the *Hypericum javanicum*, Bl., a shrub covered with yellow blossoms.

We now arrived, all the while enveloped in thick mists, at a rocky headland overgrown with the before-mentioned ferns and with grass; here blackish gray masses of trachyte of very various sizes projected from the soil, and many little channels descended straight down the mountain's side four feet broad and four to six feet deep. It was already 3 o'clock; I doubted of being able to reach the top of the mountain that day, especially as the Javanese had lain down and lighted some fires, for which the dry leafless branches of the angring-trees yielded

* Described and figured under this name by Prof. Blume in the Flora of Java.

† It is peculiar to all the high mountains in Java, and characterizes all acclivities situated at above 5000 feet, covered with boulders of rock: I found it at a later time, just as plentiful as upon the Merapi, on the mountains in Cheeribon and in the Preangerlanden (West Java).

a useful fuel. In the whole circuit of this small headland (or less steep acclivity) the trees were barren and killed by the former action of fire. Our Kapola Gunong told me, that he had fired them on a former journey.

At a short distance eastward of this spot, one of the deep clefts in the rock, which are generally dry and only after rain form thundering torrents, descends the mountain. On the steep mountain-wall which rises on the other side of the cleft, I noticed the last tree-ferns; I also still saw here *Melastoma malabaricum,* L.,—a shrub which occurs in similar luxuriance on the sea-shore. The small stems of the angring-tree are here already very slender and narrow, hung with *Usneæ* and divided above into slender twigs, between which the transparent loose foliage expands.

The height above Djocjokarta amounts to 5231 feet; the thermometer stood at 64° F., a temperature at which the Japanese trembled and shook with cold; but after they had warmed themselves by the fire, they were merry again, to which some opium and brandy, which last they do not despise in the cold climate, contributed. They boiled some coffee, ate rice, and urged me, after I had put in order the plants I had collected, to continue our journey at once. I agreed, and all arose with renewed strength.

The angring-trees became gradually smaller, and in a short time we lost them altogether. But there still grew here small young shrubs of the *Acacia montana* (the Kamalandingan of the Japanese), for a short distance higher up, and then they also disappeared to make place for another beautiful and very peculiar vegetation, which gives to the barren rocky mountain-walls a more northern aspect. This consists in small bushes, a few feet high, which take root in the clefts of the rocks, and some of which appeared also lower down in the woods, but only isolated, whilst here they are the only plants which cover the gray rock with an uninterrupted clothing. Most prominent is a *Gnaphalium* with pale blossoms (*G. javanicum,* Bl.?), and the *Gaultheria punctata,* Bl., from whose sweet-smelling leaves the Japanese prepare an oil which fetches a high price in the market. With these are associated *Polygonum paniculatum,* Bl., *Thibaudia varingiæfolia,* Bl.*, *Hypericum javanicum,* Bl., *Rhododendron tubiflorum,* Bl., with scarlet umbelliform flowers, and several other *Ericaceæ*. *Gaultheria repens,* Bl., whose black berries my companions ate, and several species of *Lycopodium,* clothe the rocks luxuriantly, from which they often hang down in festoons; out of their clefts, filled with *Orthotrichum* and other mosses, grows plentifully the *Polypodium vulcanicum,* Bl., whilst a crust-like lichen with a yellowish thallus and reddish apothecia covers the smoother parts. Continuing to climb, we soon came to the heights of the ridge, where boulders of stone of all sizes lie strewn about, only imper-

* *Thibaudia varingiæfolia,* Bl. The normal form of the leaves is elliptico- (broad-) lanceolate. But they pass over (generally on one and the same bush) into the elongate- (narrow-) lanceolate, ovate-lanceolate, obovate, and even into the cuneiform; nor is the hairiness of the calyx more constant (*T. floribunda, Varingiæfolia cuneifolia,* and *mystoides,* Bl.).

fectly held together by a little earth and moss; not unfrequently they rolled away from under our feet and struck those who were climbing lower down. We were soon obliged to descend in the deep bed of the torrent itself, the rocky bottom of which is frequently so steep and smooth, that, although with naked feet, we often lost our footing and slid down for many yards. The mountain became gradually more naked, barren and steep; the little shrubs were more and more scattered and apart; and soon the ash-gray naked mountain wall lay before us, sterile and destitute of all verdure, and interrupted only by green fissures. Only *Gaultheria repens* and climbing *Lycopodia* accompanied us still higher up; the above-mentioned lichens, some mosses, and the *Polypodium vulcanicum* reach in fact to the rim of the crater.

Ascent of the Mud-Volcano Galungung.

On the flatter and smoother tract spread out between the hills and the foot of the mountain, commences a frightful jungle. Everything, as far as the eye can reach, is covered with *Saccharum Klaga*, a juncaceous species of grass, which reaches a height of fifteen feet, and the stalk of which is so thick that it is only possible to make a way through it with the greatest effort. The intermediate spaces are filled up with a species of *Equisetum*, which rises ten feet high, and in the midst of which some species of *Vanilla* and other *Orchideæ* unfold their blossoms. At the same time all the ground is soaked with moisture, so that at every moment one steps into little puddles or black channels of mud, which diffuse a mouldy smell, or into brooks and little ditches, which with a depth of several feet are often scarcely a foot wide, and which cross the jungle in all directions. These communicate with larger rivulets, which wind slowly, and often quite hidden by the jungle, through this lower tract, and are only discovered by their noise. They quickly overflow their banks, when more water falls down the mountains after a heavy rain than can flow off in a short time from the slightly inclined rush-covered soil, which moreover is shut in by some low hills in front.

An idea may be formed of the impenetrability of such a thicket, from the fact, that since yesterday more than three hundred Japanese have been engaged in cutting a small path for us, not wider than one or two feet. We here found a fresh proof of what we had already previously experienced, that such jungles in Java are much more impassable than the thickest primitive forests. At one time we were obliged to make our way along little furrows or ditches, filled with water; at another, to wade through deep rivulets covered with loose masses of rock; at another, to wade through boggy parts, which were only covered with spongy layers of klaga; again, at another time, we had to follow the path just before hewn out, where we ran the risk, from an insecure footing, of being impaled on the sharp cut-off stems of the klaga.

The little paths which had been formed by the tigers and rhinoceroses in the klaga were very serviceable to us, so that towards eleven o'clock we had passed the most wearisome and boggy portion of the thicket, and came to a more open tract, where we were most agreeably surprised by the appearance of a European species of rush. It was *Typha angustifolia*, in appearance quite identical with the European narrow-leaved *Typha*, which grows here in luxuriant abundance between the klaga, and whose light brown heads waving to and fro reminded us forcibly of home. The Japanese, who give a particular name to every small plant, had none for this one; they had never seen it, and only a few, who lived in villages in this district, appeared to know it. How does this European plant come here upon the volcanic district which has only been formed fourteen years, and over which no traveller has since that time passed?

The ground now rose gradually steeper, became drier, and was covered with layers of loose stone and rocks, which were here and there covered with groups of young angring-trees (*Celtis montana*, J.). Tree-like *Urticeæ* also grow here, and alternate with patches of klaga, which had as yet not lost any of their luxuriance. At that part where, at the entrance to the large crater, the land rises remarkably, there commences a peculiar forest vegetation, filling the entire cavity (several miles in breadth), which gradually rises and becomes more narrow towards W.N.W. It consists of young trees, seldom exceeding thirty feet in height, of the families of *Urticeæ*, *Artocarpeæ*, *Magnoliaceæ*, and others, which occasionally alternate with bamboos, forming a leafy vaulted shade. Numerous tree-ferns, thirty feet high, are scattered among them, and *Aroideæ*, *Musaceæ* and *Scitamineæ* blossom in their shade. But there are still many patches of klaga which interrupt the continuous extent of the little woods, and reach high up into the crater. Thus the thicket is composed of young trees, shrubs and species of reeds, which fill up the hilly uneven ground of the crater, intersected with numerous clefts, and only become thinner and more scattered beneath a hill which runs like a wall straight across the highest point of the crater.

It is interesting to see what giant steps vegetation has made in the short space of fourteen years. We find this new volcanic tract, from the plains at Tassik-malayo up to the hollow of the crater, a height of 3700 feet, overgrown with the most luxuriant and dense vegetation, formed of *Typha angustifolia* (?), *Saccharum Klaga*, and a species of *Equisetum* in the lower region, but higher up of tree-ferns and trees of the families of *Urticeæ* and *Artocarpeæ*, interlaced with numerous *Scitamineæ* (*Elettaria*, *Amomum*, &c.) and *Lianæ*. Some trees have already attained a height of fifty feet. This luxuriance is the more striking, when we compare other mountains; for example the Merapi, the higher parts of which (although more than fourteen years have elapsed since its last eruption) are not yet clothed with vegetation. But these tracts lie at a greater height than 5000 feet, whilst those (of the Galungung) belong to the warmer region, where nature is more luxuriant and active; these consist of debris of bare rocks, covered with lapilli of trachyte and pumice-stone, whilst those of the Galungung were flooded with a fruitful blackish mud.

In the rhinoceros-paths mentioned above, the Japanese are accustomed to kill these animals by fixing in the earth sickle-shaped knives, so that the belly of the animal, sliding along the ground, is ripped up by them when it passes that way.

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END OF THE SIXTEENTH VOLUME.

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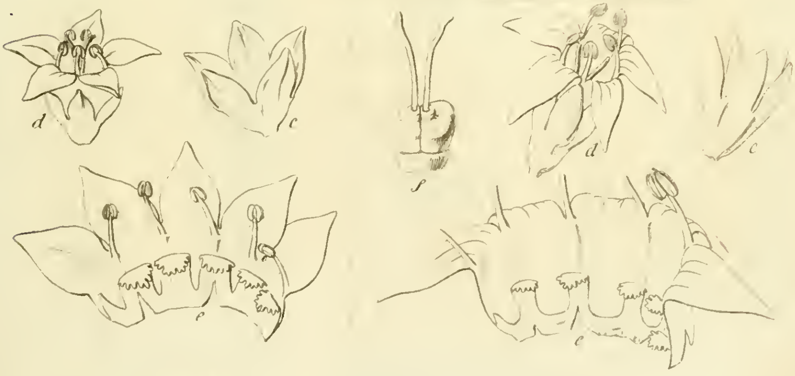
1 C. approximata.



2 C. Epithymum.

3 C. Trifolii

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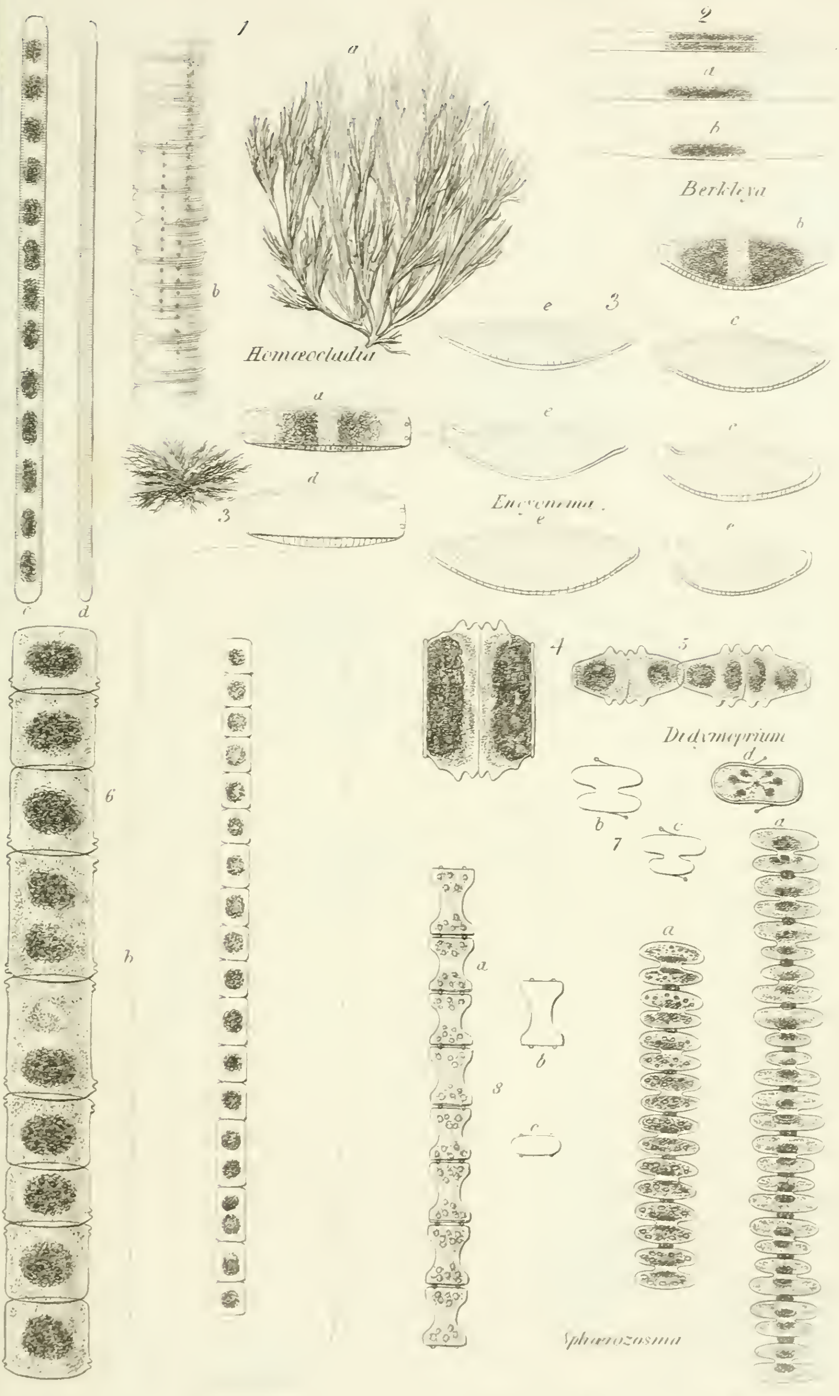
J. del.

J. D. C. Sowerby



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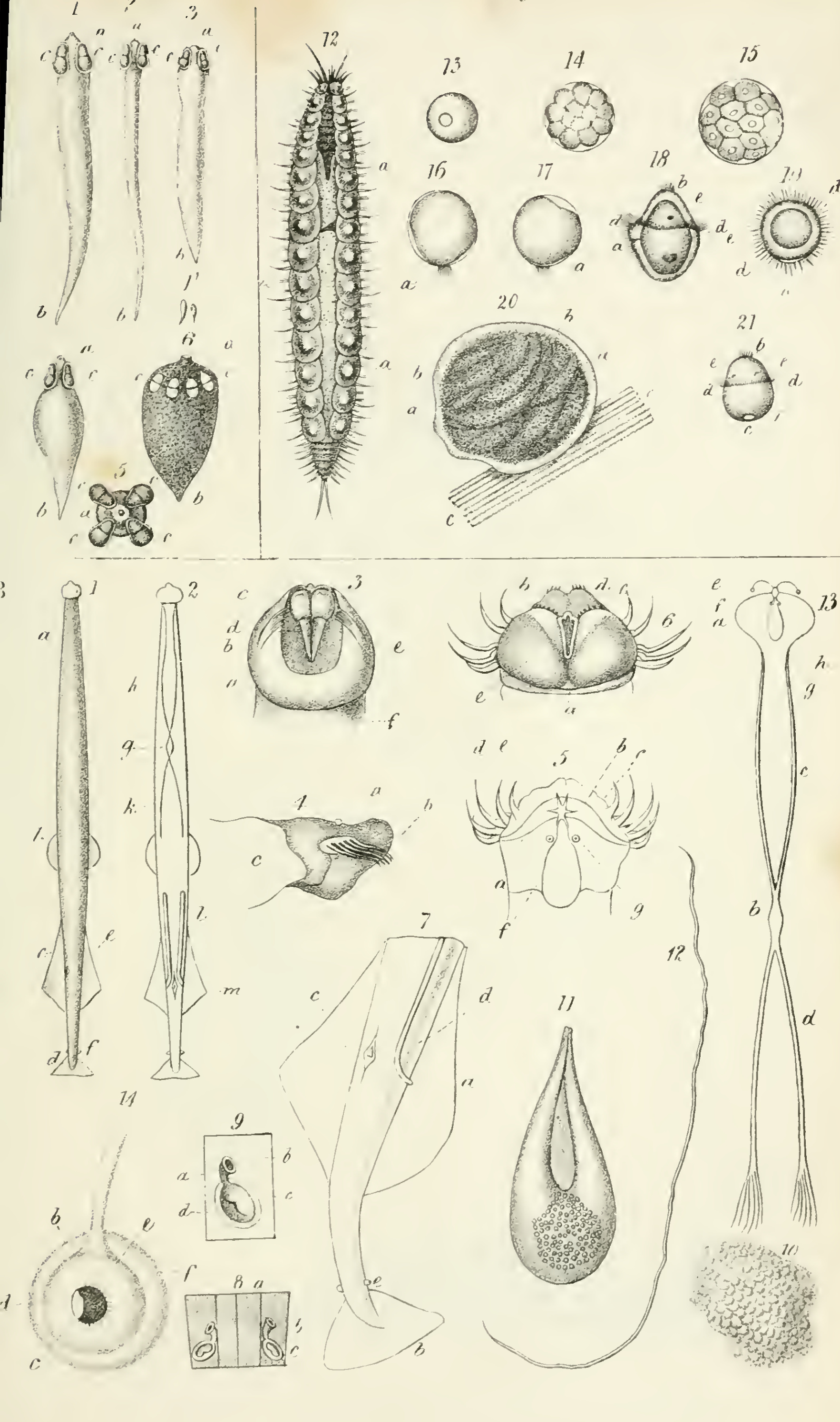

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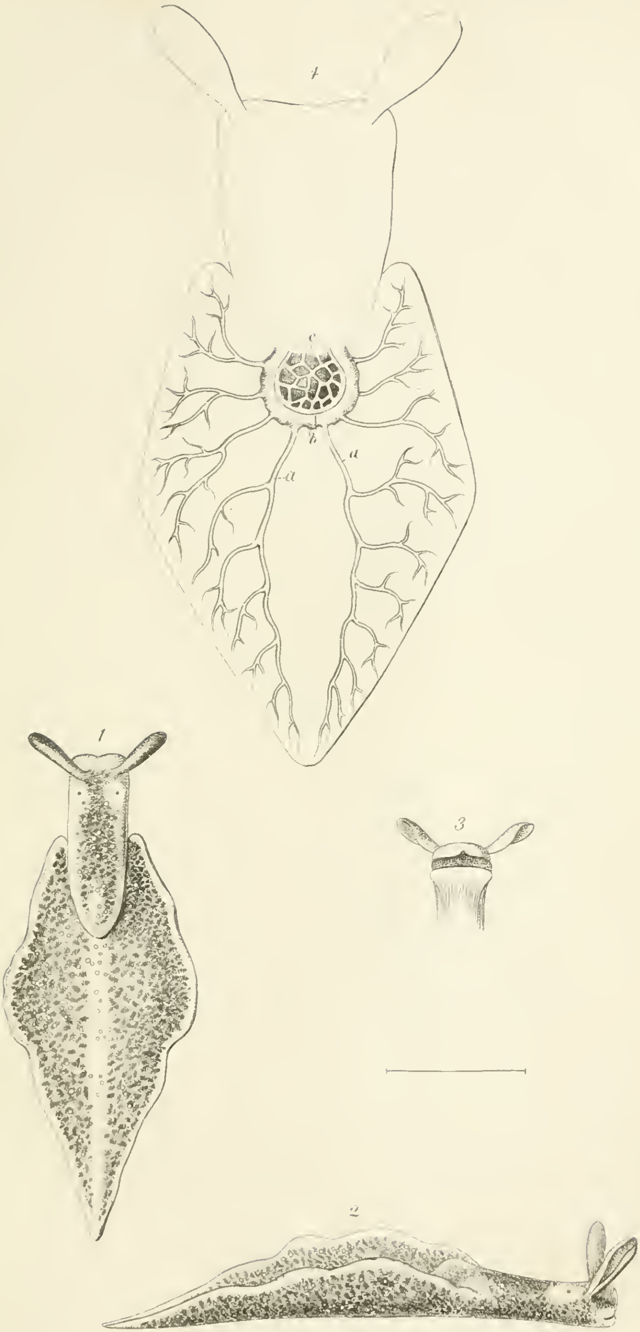

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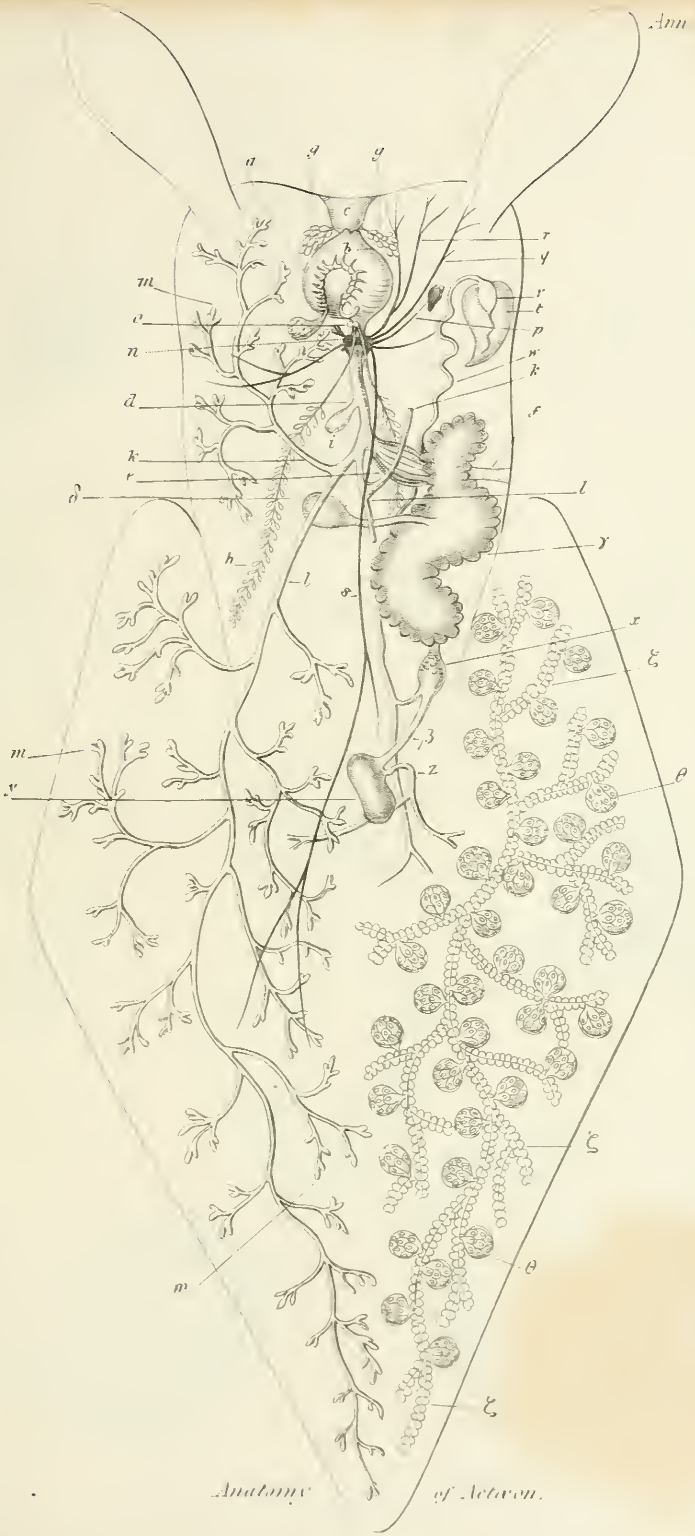

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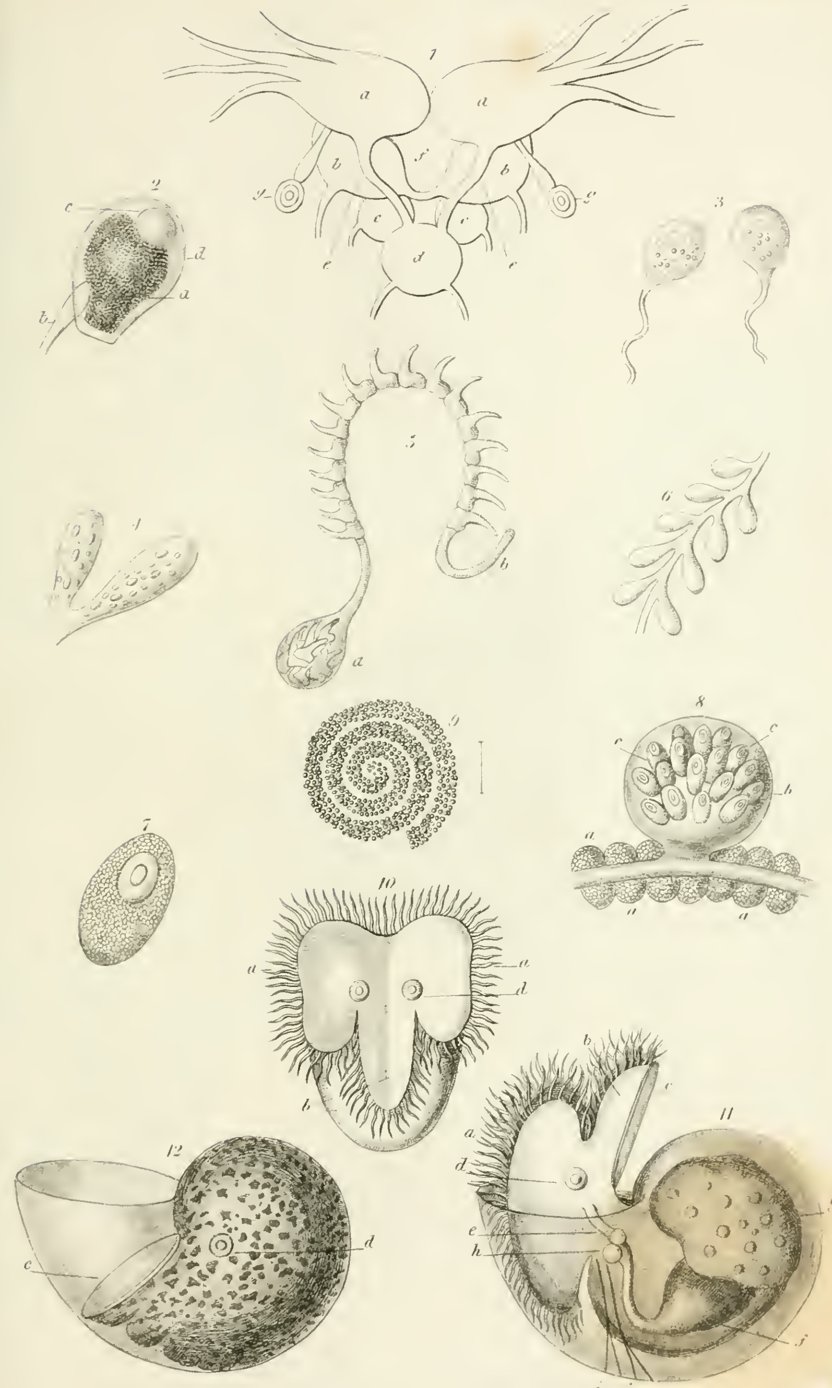

Anatomy of Actæon.

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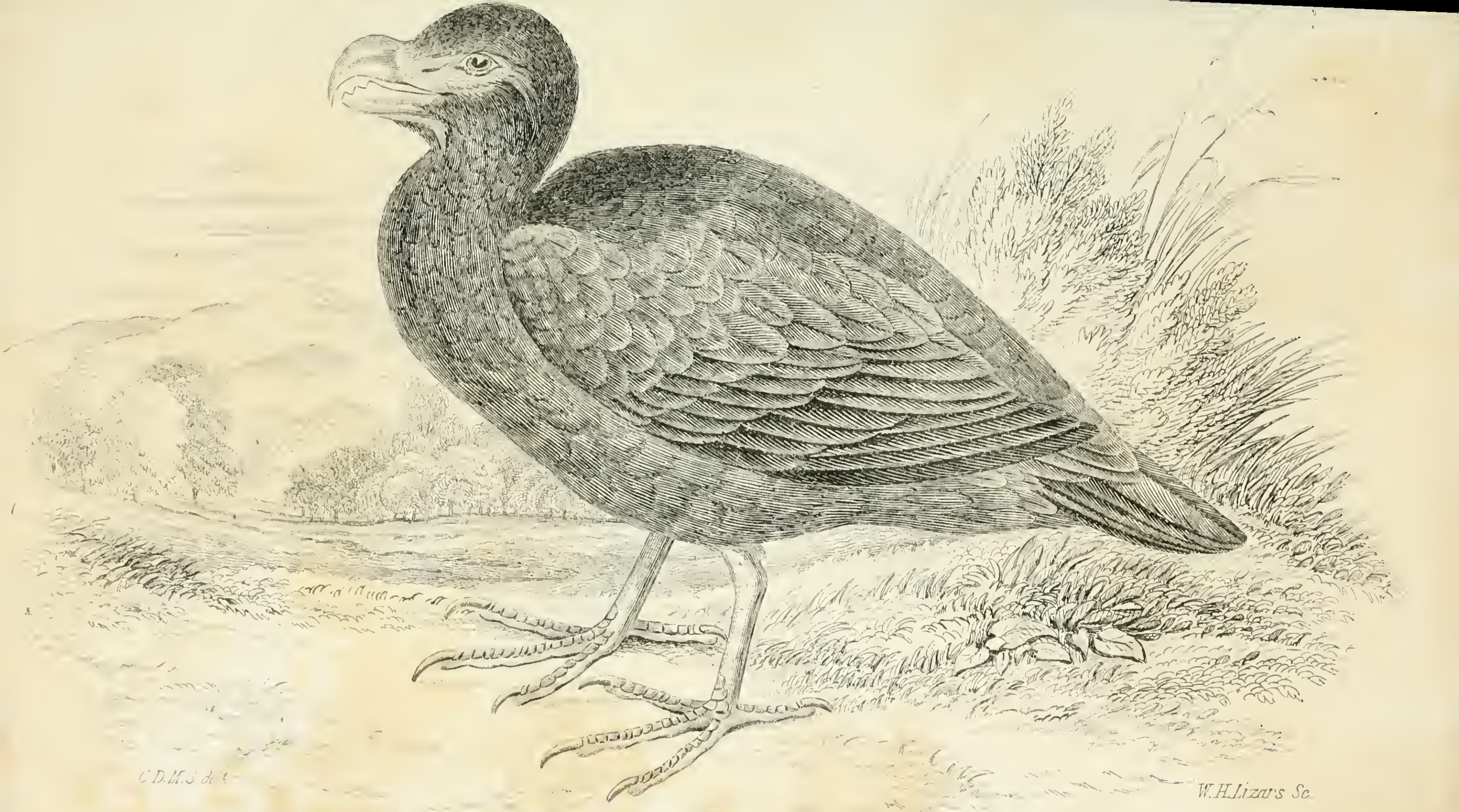

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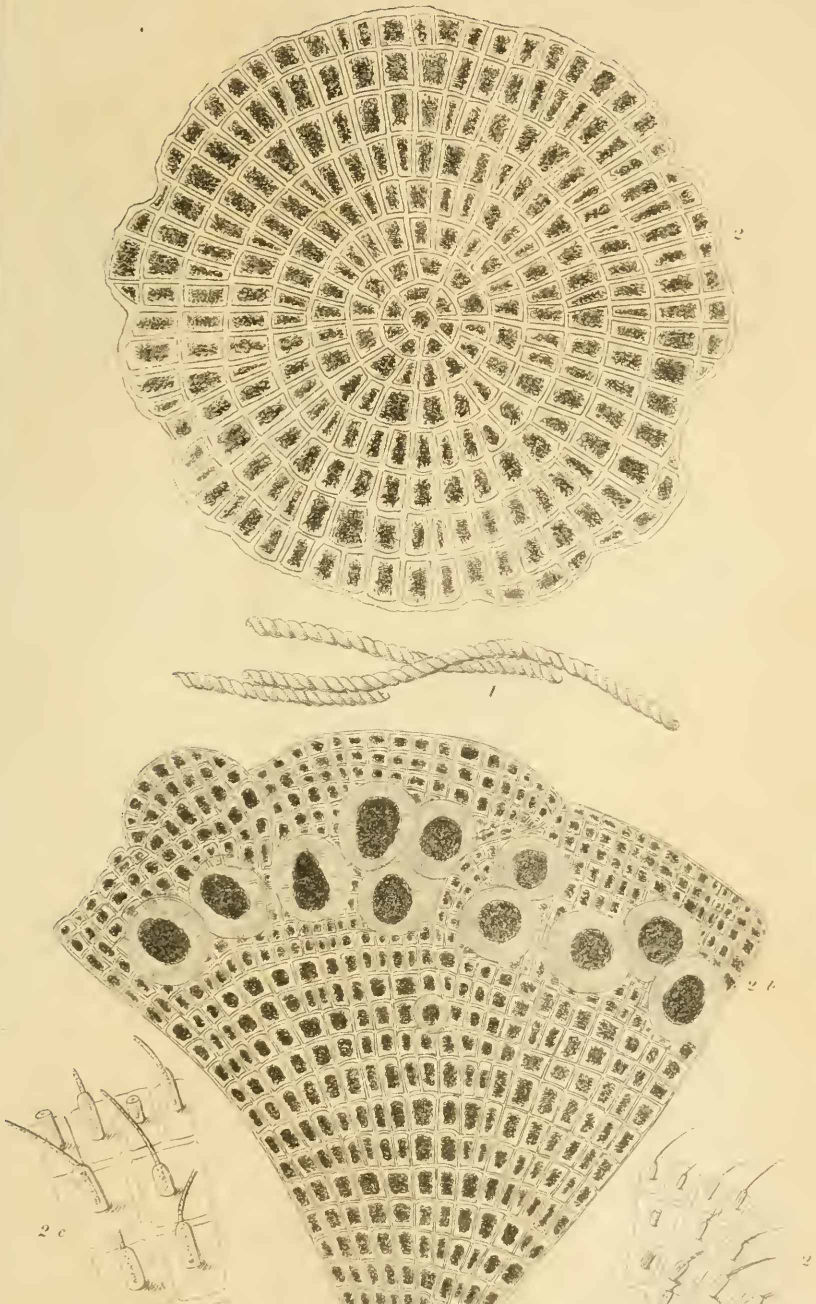

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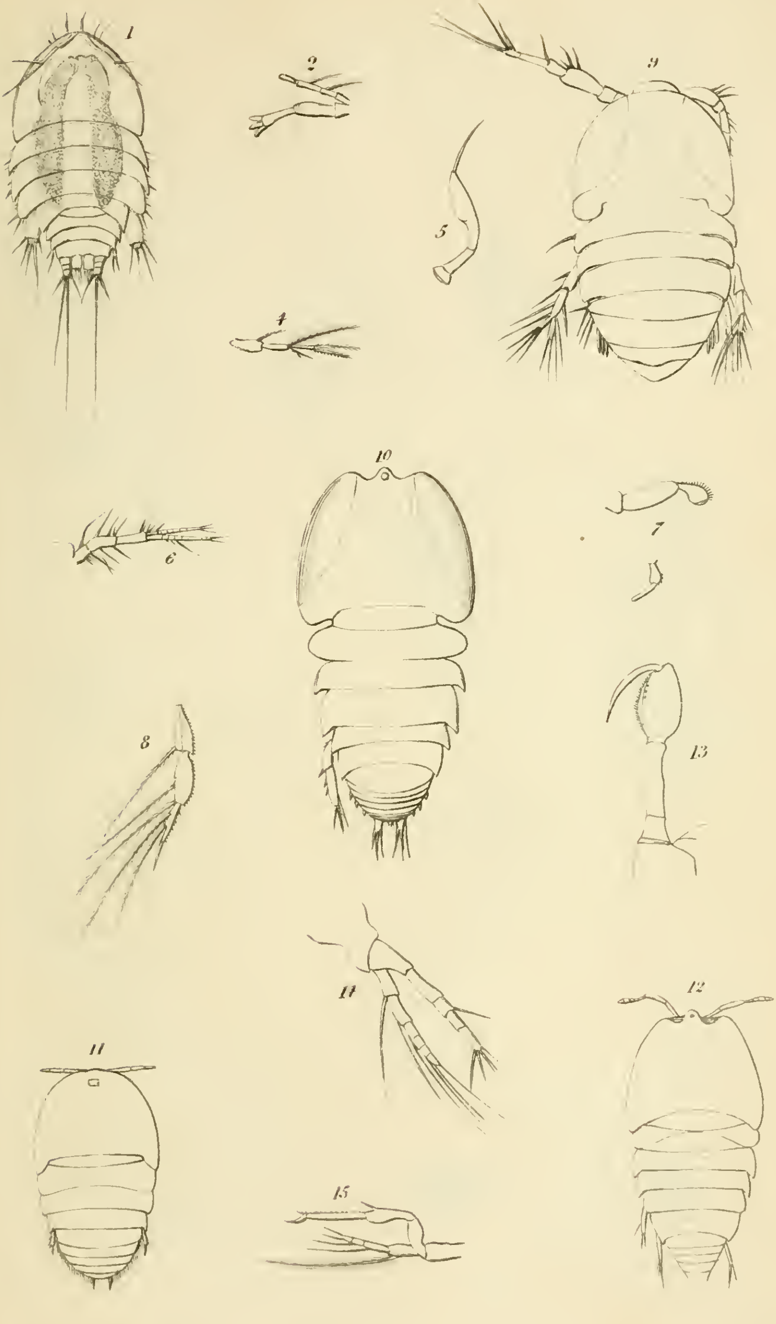

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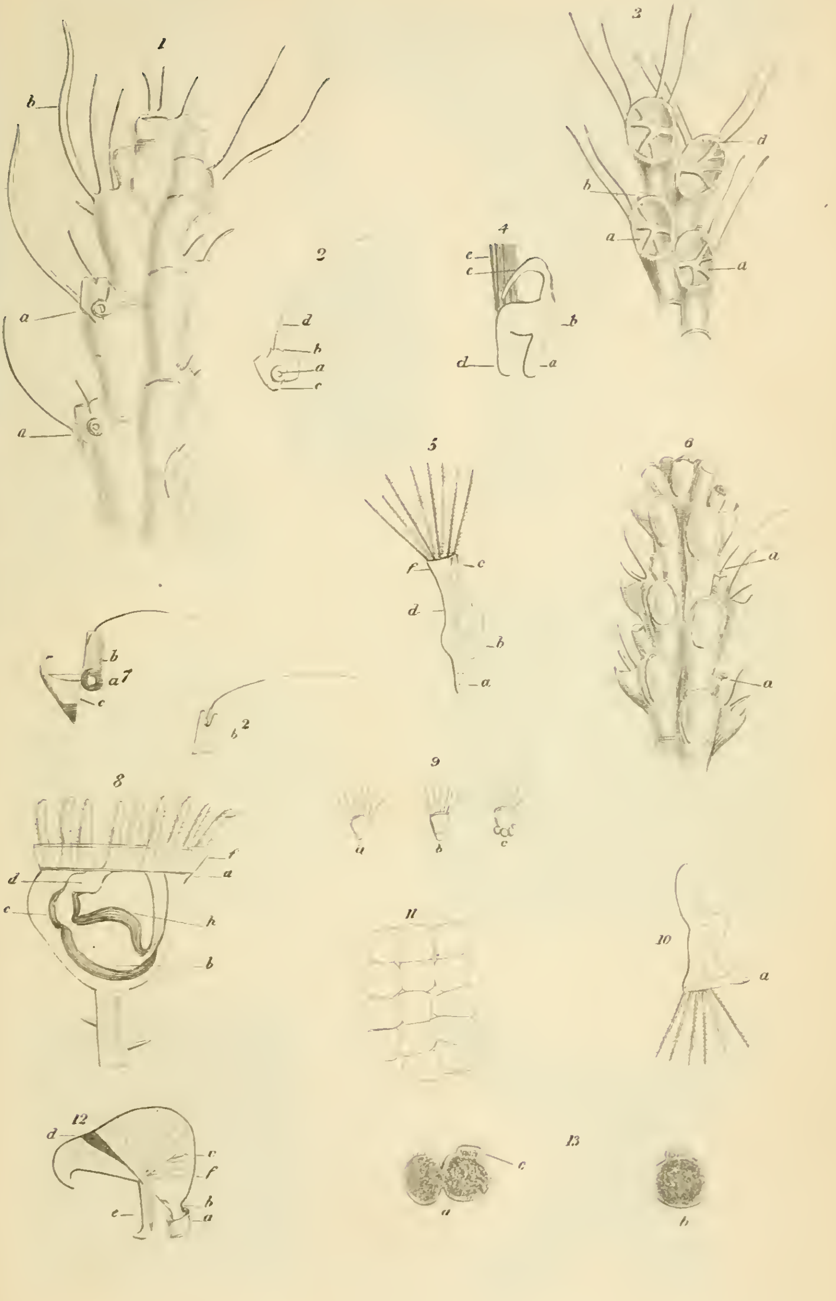

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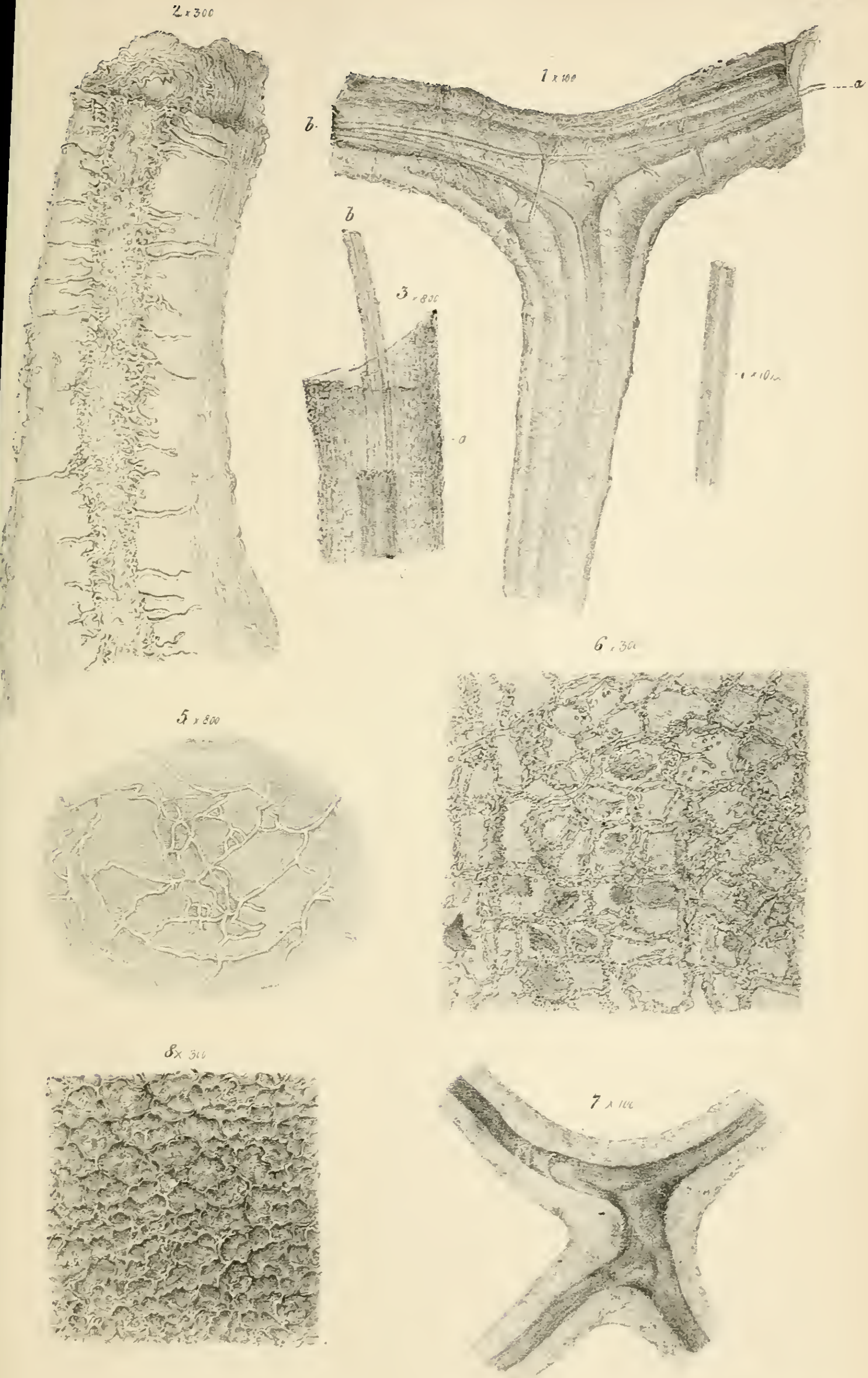

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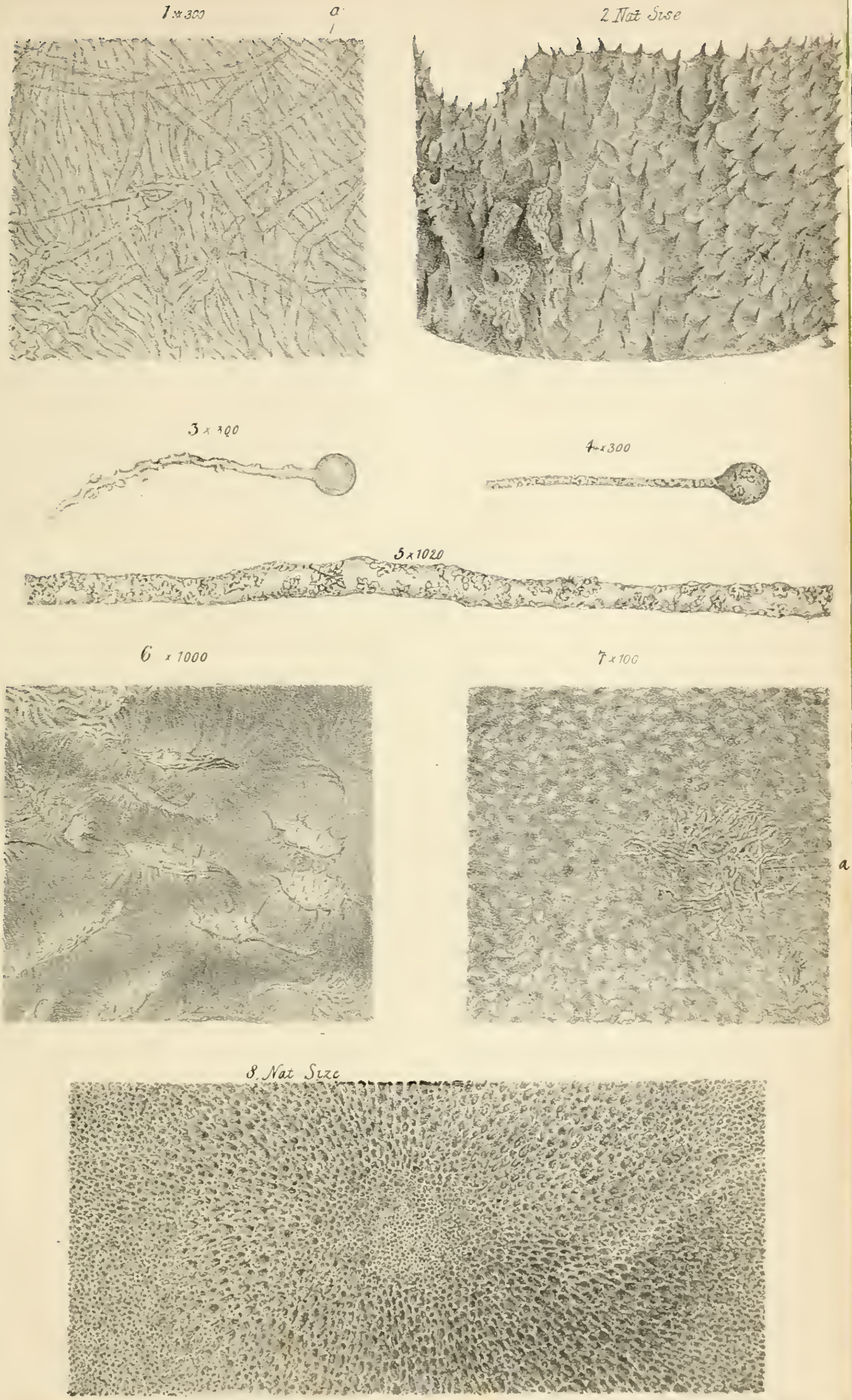

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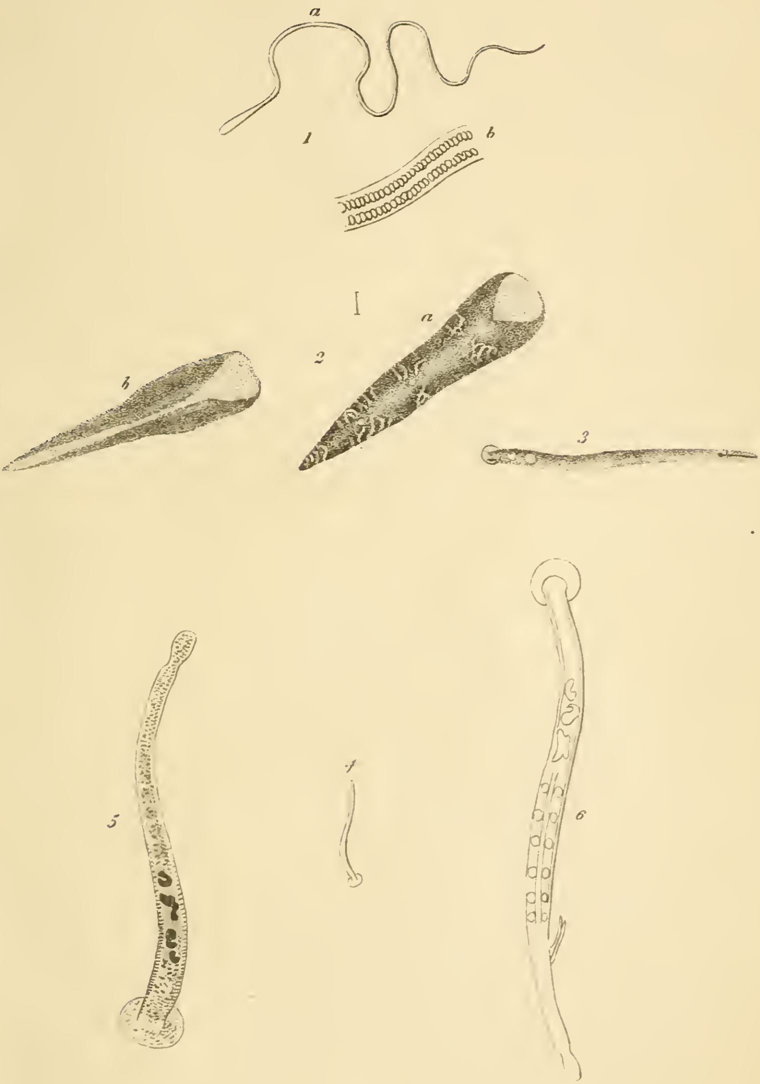

Dr Johnston del.

J. De C. Sowerby