152

(9)

I

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

SIR W. JARDINE, BART., F.L.S.—P. J. SELBY, ESQ., F.L.S.,
GEORGE JOHNSTON, M.D.,
CHARLES C. BABINGTON, ESQ., M.A., F.L.S., F.G.S.,
J. H. BALFOUR, M.D., Reg. Prof. Bot. Glasg.,
AND
RICHARD TAYLOR, F.L.S., F.G.S.

VOL. XV.

LONDON:

PRINTED AND PUBLISHED BY R. AND J. E. TAYLOR.

SOLD BY S. HIGHLEY; SIMPKIN AND MARSHALL; SHERWOOD AND CO.; W. WOOD, TAVISTOCK STREET; BAILLIERE, REGENT STREET, AND PARIS: LIZARS, AND MACLACHLAN AND STEWART, EDINBURGH: CURRY, DUBLIN: AND ASHER, BERLIN.

1845.

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

CONTENTS OF VOL. XV.

NUMBER XCV.

NUMBER XCVI.

NUMBER XCIX.

NUMBER C.

NUMBER CI. SUPPLEMENT.

PLATES IN VOL. XV.

The Binder is requested to substitute the half-sheet at the end of No. 100, in place of pp. 301—308.

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. 95. JANUARY 1845.

I.—*On the Anatomy of* Eolis, *a genus of Mollusks of the order* Nudibranchiata. By Albany Hancock and Dennis Embleton, M.D., F.R.C.S.E., Lecturer on Anatomy and Physiology in the Newcastle-upon-Tyne School of Medicine.

[With five Plates.]

The Nudibranchiate Mollusks are divided into two families, the *Doridæ* and the *Tritoniadæ*; the anatomy of the former was fully investigated by Cuvier, that of the latter, however, was only partially examined by that illustrious physiologist; and the *Eolidinæ**, a very extensive division of it, were left totally unexplored, but were nevertheless considered to agree in organization with *Tritonia Hombergii*, the typical form of the group.

Recently however the attention of zoologists has been drawn to the subject by M. Milne Edwards, who was the first to point out that the *Eolidinæ* deviate in a very striking manner from the rest of the family. He found in the genus *Calliopæa* a ramified digestive apparatus. This curious organ was supposed by that gentleman to perform the double function of digestion and circulation, and consequently to have analogy with the gastro-vascular system of the *Medusidæ* on the one hand, and on the other with the *Nymphon*, on account of the cæcal prolongations of the digestive organ that penetrate the exterior branchial papillæ.

Since this discovery there has appeared in the 'Annales des

* We use this name to designate the subfamily of which *Eolis* is the type.

Sciences Naturelles' a very elaborate article by M. A. de Quatrefages on what that gentleman considers a new generic form, to which he has given the name *Eolidina paradoxum*; this he states differs from the typical organization, not only in its digestive apparatus, but also in many other respects, and in some instances in the most extraordinary manner.

The subject of M. de Quatrefages' memoir however does not vary in any external characters from *Eolis*, to some of the British species of which it is closely allied. We should therefore expect the anatomy of *Eolidina paradoxum* to coincide pretty accurately with that of *Eolis*, at least not to deviate from it to any extent in the more important organs; yet very considerable deviations do exist, if the observations of M. de Quatrefages be correct. Several of these observations however we are disposed to question.

Previously to the publication of the memoir just named, we had investigated the anatomy of *Eolis* in company with Mr. Joshua Alder, and although many of our results were borne out by those of the French naturalist, yet in several important particulars we found that we entirely disagreed with him. We have therefore reinvestigated the matter with much care, and particularly with reference to the points in dispute, and have been able to corroborate our original views in the most satisfactory manner.

The subject is of considerable interest, as it is principally on his views of the anatomy of *Eolidina* and two other allied species that M. de Quatrefages has proposed his order *Phlebenterata*.

It is therefore desirable that the anatomy and physiology of the *Eolidinæ* should be fully ascertained.

With a view to this we now publish the results of our researches, hoping that they may have the effect of fixing the attention of others more able than ourselves to inquire into the matter.

We would premise that, in the following paper, where no authority is given after the name of any species mentioned, it must be understood that that species has been described by Messrs. Joshua Alder and Albany Hancock.

We have chiefly turned our attention to *Eolis papillosa*, Johnston, probably *E. Cuvierii* of French authors, Pl. I. fig. 1; not more on account of its general resemblance in form to *Eolidina paradoxum* than for the advantages presented by its great size, which has enabled us to ascertain by actual dissection almost every point of importance.

Of this species we have had numerous specimens, both alive and in spirits, and in all stages of growth, from two lines to two inches in length.

It is slightly depressed, tapering more abruptly than usual to a point behind; both the dorsal and oral tentacles are simple, short and conical; the branchial papillæ are slightly compressed and taper to a point; they are arranged down the sides of the back in about twenty transverse series of from twelve to eighteen papillæ each; the foot is broad, and slightly produced at the sides in front.

We have not however confined ourselves to this species, but have extended our inquiries to several others, for the purpose of showing how far the internal organization varies in the group.

E. olivacea, Pl. I. fig. 3, is thus frequently alluded to. It closely resembles the species described by M. de Quatrefages, and is in fact, according to the generic characters given by him, with the exception of a posterior dorsal anus, an *Eolidina*. It is generally about half an inch long, has four simple, slightly conical tentacles; the anterior part of the foot is rounded at the sides, or only slightly angulated; the branchial papillæ are cylindrical, and arranged down the sides in about seven transverse rows of four or five papillæ each.

E. coronata, Forbes, Pl. I. fig. 2, has also been examined with the same view. This species differs from the two former as much perhaps as any of the genus, and is therefore well calculated for our purpose. It is sometimes one inch and a half long, the body is almost cylindrical, and terminates in a fine point behind; the anterior lateral angles of the foot are somewhat produced; the oral tentacles are long and simple, the dorsal annularly laminated; the branchial papillæ are cylindrical, and arranged down the sides in six or seven clumps.

Besides these three, we have had upwards of twenty other species, to some of which we shall occasionally refer. A few of these have the anterior angles of the foot produced into tentacular points, as described by Cuvier; and others have the large vase-shaped branchial papillæ resembling those of the genus *Amphorina* of M. de Quatrefages.

During our investigations, we have used in the dissection of the organs the simple lens, and for the examination of the minuter parts of the organs, the tissues and fluids, one of Powell and Lealand's best compound microscopes. We have avoided using the compressor as much as possible, being aware that it is a great cause of error in studying the structure of animals so complicated and delicate as the *Eolidinæ*. These mollusks invariably contract themselves greatly when subjected to pressure, and the various organs are confusedly crushed together, so that it is quite impossible to distinguish any of them with precision. We have never succeeded in tracing in this manner the whole of any of the viscera, though we have several times made the attempt, and we can easily conceive that the compressor has led to many of the errors which we believe M. de Quatrefages has committed, though we give him full credit for the amount of information that he has really gathered from the very limited number and minute size of his specimens.

We propose to treat of the anatomy of *Eolis* by describing successively the various organs, beginning with those of digestion, which will form the subject of the present article. The physiology will be found incorporated with the anatomy.

In Pl. V. fig. 16, is given a general view of the viscera of *E. papillosa,* the dorsal skin having been removed.

Organs of Digestion.

These consist of

1st. An outer and an inner lip, leading to

2ndly. A buccal mass, composed of a pair of horny plates, provided with strong cutting-edges, and inclosing a spiny prehensile tongue, having strong muscles adapted to produce all necessary movements. From the posterior part of the dorsal aspect of this mass passes backward,

3rdly. A short constricted œsophagus, which ends in

4thly. A ramified digestive cavity; the ramifications continued into the branchial papillæ, and developed into a more or less complicated follicular apparatus for the biliary secretion, being at the same time continued into ovate vesicles which open externally at the apices of the papillæ.

5thly. A short intestinal tube coming off from the posterior part of the dorsal aspect of the bulb of the stomach, and ending in an anus placed on the right side of the body.

6thly. Minute salivary glands.

The mouth, in *Eolis papillosa* (an anterior view of which, from a specimen that had been in spirit, is shown in Pl. V. fig. 14), opens on the inferior surface of the head and in front of the anterior border of the foot. It is provided with an external pair of large soft lips, Pl. I. fig. 4 *a*, that divide vertically on the median line. A little within these there is a strong, firm, somewhat compressed, muscular layer—the inner lip, Pl. I. figs. 4, 6, and 8 *b*, surrounding an oval vertical space, through which two strong, brown, horny laminæ, the cutting-blades of the jaw, Pl. II. fig. 2 *a*, are visible. These blades are seen to be separated by a vertical fissure (Pl. V. fig. 14 *c*) opening into the cavity of the mouth. An inferior view of the mouth of *E. olivacea* in its natural state is seen in Pl. V. fig. 15.

The buccal mass itself, Pl. I. fig. 7, is composed of a pair of large corneous plates, a tongue, and the muscles necessary for the movements of these organs. It is a large and apparently compact body of a subtriangular form, with the sides a little compressed. The corneous plates, Pl. I. figs. 4 *a*, 9 *a a*, Pl. II. 5, 7, &c., are nearly co-extensive with the general mass, on the sides of which they are placed, partially imbedded in the muscles. They are of an irregularly elliptical form, slightly concave internally and convex externally, and are gradually thinned to a fine edge at their inferior and posterior margins. From the superior margin of each plate near its anterior part projects inwards a triangular process, Pl. I. fig. 9 *b* and Pl. II. fig. 7 *a*; these processes are united at their apices on the median line by a strong ligament, forming a hinge-like joint or pivot on which the horny plates move easily. Below and a little in advance of these processes project downwards the two large arched cutting-blades, Pl. I. fig. 9 *c*, Pl. II. 5, and 7 *b*; these blades form the anterior edges of the corneous plates, and end inferiorly in long pointed processes, which are kept together by muscular insertions.

The upper surface of the processes for the hinge is divided unequally by a slight ridge, Pl. I. fig. 9 *a* and Pl. II. 7 *c*, into two parts; these give attachment to transverse muscles which move the horny plates upon the pivot: the muscle in front of the ridge, Pl. I. figs. 6 *c'*, 7 *d*, 10 *c*, and Pl. II. 2 *b*, is also in front of the pivot, and has the office of closing the jaws; that behind the ridge, Pl. I. figs. 6 *d*, 7 *e* and 10 *b*, is the opponent of the former and opens the jaws. The latter is much larger than the former and consequently stronger, and extends backwards as far as the œsophagus. There is however another transverse muscle, Pl. I. figs. 6 *e*, 10 *d* and Pl. II. 2 *c*, the duty of which is to assist in closing the cutting-blades. This muscle is seen attached to the edge of the horny plates at their anterior inferior aspect below the cutting-blades. The closure of the jaws is further materially promoted by a sphincter muscle which forms part of the lips, and will be described further on.

On the upper aspect of the buccal mass, behind, and partly covered by the transverse muscle that opens the jaws, and running on each side of the œsophagus backwards and then downwards, is a well-defined muscular layer, Pl. I. figs. 5 *a*, 7 *f* and 9 *e*, having its origin from the inner border of the horny plates. The fibres which arise the furthest forward form the inner edge of each muscle, and unite on the median line immediately behind the œsophagus; those which come off behind these pass parallel to them, and are united also on the median line at points successively further behind and below the former, and the fibres which are last in origin are prolonged and become lost upon the under aspect of the buccal mass. All the fibres of this muscular layer, besides uniting with each other, are attached by their anterior surface to the muscles of the tongue upon which they lie. One office of these muscles appears to be to pull forwards the œsophagus so as to close its orifice; their principal function we will explain when we come to the tongue.

On removing these muscles there is brought into view a very thin stratum of glistening muscular fibres, Pl. I. fig. 9 *f*, attached to the opposed edges of the horny plates and converging towards the œsophagus, upon which they pass, forming at once a coating of longitudinal fibres for that tube, and the attachment of it to the skeleton of the mouth. This delicate layer lies upon the lining membrane of the mouth and œsophagus.

On cutting through the hinge and separating the horny plates, we obtain a view of the interior of the mouth, Pl. I. fig. 8; here we find in the median line the arched prominent ridge of the tongue *c*, extending from before backwards, formed of seventeen or eighteen transversely curved imbricated plates, Pl. II. fig. 1, their posterior free edges thickened, of a dark chestnut colour, and presenting about forty spines slightly bent, and having their points directed backwards. This ridge is supported upon the curved apex of a wedge-shaped muscular mass, Pl. I. figs. 6 *f* and 8 *d*, that rises from the posterior inferior wall of the mouth, and is much thicker behind than before. A lateral view of this mass shows two sets of muscular fibres: one, by far the stronger and larger, arising from the inner surface of the inferior posterior margin of the horny plate, and radiating to all parts of the curved ridge, where they are inserted into the ends of the transversely arched plates which sustain the spines; the other set, much less strongly marked, and crossing obliquely over the former, arise from the posterior extremity of the curved ridge of the tongue, and thence pass forward to be inserted successively into the ends of all the transverse plates of the ridge from back to front; the upper fibres are consequently the shortest, the lower the longest.

The former set of fibres, when acting as a whole, will carry downwards and backwards the entire ridge of the tongue. When the muscles of the two sides act alternately, the tongue will be moved from side to side; when the anterior and posterior borders of the muscles act alternately, as it may be supposed they can, the alternate advance and retreat of the spiny ridge will be assisted. The degree of curvature of the tongue and the situation of the curve will materially depend upon the former, as well as upon the latter set of fibres.

On removing the muscles just described from off one side of the tongue, a very beautiful piece of mechanism is brought into view; we find, corresponding to the base of the tongue and the under surface of the buccal mass, two strong semicircular bands of muscle; one, the inferior, Pl. I. fig. 5 *b*, arises from the inferior pointed extremity of the cutting-jaws *e*, directly above the inferior transverse muscle that assists to close the jaws; and thence passes in a curve backwards and upwards, and is inserted into the posterior extremity of the ridge of the tongue. It is to the under and posterior surface of this band that the muscle (*a*) we have mentioned, as coming down from the upper part of the buccal mass by the side of the œsophagus, is attached. The use of this inferior band is to pull the posterior end of the ridge of the tongue downwards, and thus assist in the rotatory motion of this organ backwards, by which food is carried to the opening of the œsophagus. The other, the superior band, Pl. I. fig. 5 *c*, lies within the curve of the former, and has its ends fixed to the ends of the spiny ridge of the tongue, which it will serve to approximate; but it will more particularly pull downwards and backwards the anterior end of the tongue, being the main agent in its rotatory motion forwards, on account of the muscles which come down from the upper part along the posterior surface of the buccal mass pulling upon the inferior semicircular band to which they are attached, and thus making the posterior end of the tongue a fixed point.

Of the three muscles here last mentioned, the posterior *a*, and the superior *c*, are associated together in action, and are opposed by the inferior *b*, which is also in part intermediate in situation between the others. Altogether they are the chief instruments in producing the rotatory backward and forward motions of the tongue, whilst the muscles that overlie them laterally assist in the rotation, and regulate the place and degree of curvature of the ridge, whilst they can depress the tongue in totality. Now, the nearly circular space that is left between the concave border of the upper semicircular muscle and the concavity of the ridge of the tongue is filled up by a mass of stout, short, transverse fibres *d*, which appear to give strength and stability to the lingual mass, binding strongly together the lateral muscles to which they are fastened, and forming at the same time a firm support to the spiny ridge, and a fulcrum as it were for the semicircular muscles that rotate it.

The inner concave aspect of the horny plates which form the lateral walls of the cavity of the mouth is uncovered for about one-third of its extent at the upper and anterior part, Pl. I. figs. 6 and 8 *a a*, Pl. III. fig. 6 *b*. The rest of the surface is lined by a thick, strong muscular mass, Pl. I. figs. 6 *g* and 8 *e*, and Pl. II. 4. Pl. III. fig. 6 *c*, the fibres of which are inserted into nearly the whole of the lower half of its internal aspect, just above the insertion of the external lateral muscles of the tongue, with which they are blended. From this attachment the fibres pass obliquely upwards, the inner ones being the longest and inclining forwards, and a thick body of muscle is formed, which is terminated above by a flat and broad border, Pl. I. fig. 8 *f* and Pl. II. 4 *b*, Pl. III. 6 *d*, that is free for some distance, lying nearly in contact with the horny plate: the muscles from the two sides meet together in front of the tongue, and are attached to the inferior pointed extremity of the cutting-jaws, Pl. I. fig. 8 *g*, Pl. II. 4 *c*, Pl. III. 6 *e*, blending there with the muscles that rotate the tongue backwards. On the outer surface of the free part of this cheek-mass, as it may be called, is a thin layer of fibres, Pl. III. fig. 6 *f*, passing at right angles to the bulk of the muscle, and extending from the lower extremity of the cutting-jaws to the side of the œsophagus. At the inferior border of this thin layer lie the salivary glands and duct (*a*).

The use of this mass of muscle appears to be that of accommodating itself to the action of the tongue and assisting it in carrying the food backwards into the œsophagus. May the free edges not be the organs of taste?

The whole of the muscular walls of the buccal cavity are lined, and the wedge of the tongue is covered by a strong membrane continuous with that which lines the œsophagus, and which forms one or two distinct folds, Pl. I. figs. 8 *h* and 6 *h*, over the posterior part of the tongue below the entrance to the œsophagus, but which does not appear to line the horny plates where they are uncovered by muscle, nor to coat the cutting-jaws, and which consequently is not continuous with the membrane which lines the channel of the mouth. It is most probably a mucous membrane.

Lips.—These consist of longitudinal and circular fibres: the longitudinal fibres of the inner lip, Pl. I. fig. 11 *b*, take their origin from a ridge, Pl. II. fig. 5 *a*, on the external surface of the anterior edge of the horny plates, where these become continuous with the cutting-jaws; the fibres arise all the way from the upper to the under margin of the horny plates, inclosing in an elliptical space the cutting-jaws. With these are blended the circular fibres.

The lip thus formed is coated on its inner and part of its outer surface by the lining membrane of the channel of the mouth, so that it projects by a free border, Pl. I. figs. 4 and 6 *b* and 11 *c*, which is wrinkled, into the channel leading to the buccal cavity. This inner lip acts as a sphincter to the orifice of the mouth, and will regulate and assist the approximation of the cutting-jaws; it will also take an active part in the prehension of aliment, which it will carry backwards to the cutting-blades.

The outer lips are prolonged into a tube, Pl. I. fig. 4 *e*, which is the channel of the mouth; they inclose the inner lip. Their longitudinal muscular fibres, Pl. I. fig. 6 *i*, arise from a ridge, Pl. II. fig. 5 *c*, on the sides of the horny plates, immediately behind the origin of the longitudinal fibres of the inner lip, and pass forward to be blended with the integuments at the external orifice of the mouth. The circular fibres are to be traced from end to end of this tube, but are most abundant at its posterior part, where they form a strong belt or sphincter, Pl. I. figs. 4 *f* and 6 *k*. The use of the outer lips appears to be chiefly confined to sensation, for they are abundantly supplied with nerves, and are retracted by means of their straight fibres when the animal takes its prey.

From the circular belt at the base of the outer lips pass backwards series of fibres, Pl. I. fig. 4 *g g*, the strongest and longest of which are below, corresponding to the foot. These fibres are inserted into the fleshy foot and into the common integument of the sides and top of the body, to which they attach the whole buccal mass, and their office is to retract that mass: this they will do most efficiently when the foot has firm hold of the ground.

From the same belt are seen passing backwards and lying against the external surface of the corneous plates, flat, shining, semitransparent bands of muscle, Pl. I. figs. 4 *h*, 7 *b*, and Pl. II. 3 *a*, which unite and divide irregularly as they are continued to their insertions along the upper and posterior borders of the horny plates. These bands appear to be antagonists to the last-mentioned, and may advance and rotate the buccal mass, during the prehension and cutting of the prey, and probably may assist in retracting the outer lip.

The general characters and the muscular arrangement of the buccal mass do not appear to vary materially throughout the genus *Eolis*. [See that of *E. coronata*, Pl. II. fig. 3.] The lips are nearly the same in all. There are corneous plates and spiny tongue in all. In *E. coronata* however, Pl. II. figs. 6 and 8, the jaws are slightly modified in form. The tongue also varies, and is composed of a single longitudinal row of large, strong, recurved spines or teeth which are minutely pectinated on each side.

In *E. nana* the same compound tooth is found, Pl. II. fig. 10 and Pl. III. fig. 3.

In *E. alba* the tongue is composed of a single longitudinal row of twenty large, simple, recurved spines, Pl. II. figs. 11 and 12, and in *E. olivacea* there are between fifty and sixty transverse rows, each containing about twelve stoutish, almost straight spines, Pl. II. figs. 13 and 14.

The spines of these tongues are very minute, and in *E. papillosa* are not more than one-sixth the thickness of the ordinary hair of the human head. They were often observed to be broken off abruptly, but never bent or partially fractured; hence we were led to suppose that they were not composed of horny tissue, and were induced to try the effect of some reagents upon them. Neither acetic nor nitric acids produced any change in them, but hydrofluoric acid in the nascent state corroded them extensively, leaving little doubt in our minds that the spines are composed of siliceous matter.

It is difficult to understand how M. de Quatrefages could have mistaken the buccal mass for the stomach, and yet there is no doubt that he has done so in *Eolidina*. From his diagram it appears clear that he has not understood the parts, and his description sets the matter at rest. At page 284 of his memoir, after describing as the œsophagus the channel that leads through the lips to the buccal mass, that gentleman goes on to say, "En arrière de l'œsophage, on aperçoit une masse oblongue, formée par des fibres musculaires entrecroisées. La cavité œsophagienne se continue dans son intérieur en s'y rétrécissant au moins dans l'état de vacuité où était cette portion de l'appareil digestif chez les individus que j'ai examinées. Peut-être est-ce là le lieu où se fait la digestion des substances avalées par l'animal. Du moins, dans un autre mollusque fort voisin de celui-ci, et que j'ai rencontré également à Saint Vast, je trouvai dans un organe entièrement semblable un petit poisson, dont toutes les parties molles avaient entièrement disparu, et dont la colonne vertébrale elle-même commençait à se dissoudre par l'action des forces digestives." And in the next paragraph adds, "Au-delà de ce *bulbe stomachale,* si l'on peut s'exprimer ainsi, commence le véritable intestin." It appears to us that this naturalist has here drawn a hasty conclusion from an imperfect observation. But afterwards, in a paper on his proposed order *Phlebenterata,* he recognises the tongue of *Actæon elegans,* which also at first sight he mistook for the back-bone of a small fish. Now the tongue of *Actæon* resembles closely that of several small species of *Eolis,* so that we trust that by this time M. de Quatrefages has come to a recognition of the true signification of the parts in *Eolidina paradoxum.*

The account however of the anatomy of this latter animal in the 'Annales des Sciences' for May and June 1843, shows at once that M. de Quatrefages has mistaken the outer lip for the mouth, the channel of the mouth for the œsophagus, the mouth itself for the stomach, and the stomach for the "véritable intestin."

In minute specimens of the *Eolidinæ* the microscope is necessary for the detection of these parts, and the compressor must be adjusted carefully with reference to them: great pressure is requisite to show the tongue. In large specimens the same parts can be dissected out either with or without a lens.

[To be continued.]

II.—*Memoirs on Geographic Botany.* By RICHARD BRINSLEY HINDS, Surgeon, R.N., Fell. Roy. Coll. Surg.

IN the ninth volume of the 'Annals of Natural History' I have dwelt with some detail on the agents which constitute climate, more particularly as they influence vegetation. It will there be seen that a great number of different climates are produced by the repeated changes in the relations which the constituents bear to each other, and every portion of the globe, of any extent, will produce a state of things influencing its climate, which perhaps it would not be possible to match exactly at any other place. Whether vegetation obeys minutely these movements in climate is yet to be determined, but it is not improbable that there is a very powerful connexion between the flora of any particular region and surrounding circumstances; as not only every continent has its own peculiar forms, but even different portions of a continent have an assemblage of forms which are repeated feebly elsewhere. Before, however, adverting to the varieties which vegetation presents, there are some other circumstances for our consideration.

The earliest mention of the vegetable kingdom is contained in the sacred writings; we are there informed that *the earth brought forth grass, and herb yielding seed after his kind, and the tree yielding fruit, whose seed was in itself, after his kind.* Further than this they do not acquaint us with any facts on the subject, excepting that we find that it occupied one of the earliest of the omnipotent labours, preceding in its existence all other organized beings. Our curiosity as to the early state of vegetation, its amount, or how the whole world has been covered with its members, remains still unsatisfied. These were left for the subsequent inquiries of man, and perhaps also for his happiness, since experience has taught us the pleasure to be derived from the exercise of our intellectual faculties and in the gradual accumulation of knowledge. Nor on the other hand can we perceive, though the information is scanty, that there is room for any of those restricted ideas which have been entertained by some as to the limited number of vegetable beings at first called into existence, or of the very confined region they were supposed to occupy. The world had been long peopled before we find any additional information, and this is contained in the writings of those philosophers whose names have descended to our times with many of their works.

At that period very limited ideas prevailed respecting the numerical amount of the flora of the world, which has since been discovered to be so vast. The imperfect knowledge of geography then prevailing, and the small amount of accumulated information, must account to us for not above a thousand different species being recorded. The ancients at the same time were not remiss in availing themselves of the properties of plants in the healing art, or for domestic purposes. To some extent the amount of known plants is an index of the advancement of the science, and on examination this will be found to have proceeded most irregularly; indeed none worthy of attention was made till the time of Linnæus. Subsequently a rapid advance took place, gradually increasing to the present time, when the progress outstrips all precedent.

Whilst the first naturalists were recording such plants as their exertions brought before their notice, none appear to have hazarded an opinion on the total amount of the vegetation of the world, till Ray ventured to fix it at 18,000. Though this amount may seem small, it most probably appeared at the time it was first promulgated of a more astonishing magnitude than the great amount to be presently mentioned, as in our opinion likely to be an approximation to the total flora of the earth, will to us in the present day. In the following details the first column expresses the amount known to or noticed by each authority, and the second column the total number of species which were, at the time specified, considered as existing on the globe:—

			Known.	Supposed Total.
A.C.	300	Theophrastus, History of Plants .	500	
A.D.	70	Pliny, History of the World .	1000	
	1580	Dodonæus, Stirpium Historia .	1330	
	1623	Bauhin, Pinax	6000	
	1690	Ray		18,000
		Tournefort	6000	
	1753	Linnæus, Species Plantarum, 1st ed.	7300	
	1762	,, ,, ,, 2nd ed.	8800	
	1796	Gmelin, Systema Vegetabilium .	16,635	
	1806	Persoon, Enchiridium	27,000	
		Humboldt		44,000
	1814	Brown, Flinders' Voyage . . .	37,000	
	1820	DeCandolle, Théorie Elémentaire	50,000	100,000
	1824	,, Prodromus . . .	50,000	
	1827	Sprengel	37,000	
	1830	Balbi, Géographie		80,000
	1835	Lindley, Introduction to Botany .		86,000

Perhaps no botanist ever conducted his researches on any class of plants without discovering that their amount exceeded all his expectations. This was particularly the case with ourselves when attempting to estimate the number of species spread over the world. As a foundation for these speculations, I took the number of species described in the first four volumes of DeCandolle's 'Prodromus Regni Vegetabilis,' a work unequalled for the correctness and copiousness of its details. Exactly one hundred families are described, and they comprehend 20,100 species*. The publication of this work commenced in 1824, and for the period intervening to the present time I have allowed 5000 more, including those which have been since described, or which are known to or in the possession of botanists, and have not hitherto been published. After looking back at the rapid progress of botany during this century, I feel perfectly justified in making the most liberal calculations, feelings by no means decreased on inspecting those portions of the globe as yet unexplored, and which do occasionally contain districts supposed to be as fertile as any known countries elsewhere. There remains to be included in this work from 150 to 200 natural families, for which I allow double the above number, or 50,200. The cryptogamic plants are not yet included; the estimate of these amounts to 13,870, which I consider as about the quantity either known from descriptions or existing in herbaria. The great total obtained from these is then the amount of plants at the present time in the hands of botanists, either from description or as dried specimens.

My conclusion as to the entire amount of vegetation rests on the hypothesis that two-thirds are at present known; and should any objections be raised to this, as leaving a far too liberal number undiscovered, it may be observed, that even in our own well-explored island additions are frequently made to the native flora, and the same is continually occurring throughout Europe. But setting Europe aside, it will not be easy to discover any other country, the vegetable productions of which have been thoroughly explored. India certainly has not; in Africa and Australia much has to be done, and no portion of either of the Americas has been examined with anything approaching precision, excepting the United States, and even in these many discoveries may yet be made. A great part of foreign countries are only examined at particular seasons, and often during those less favourable to the vegetation. In the tropics the wet season is the period for the prevalence of sickness and fatal fevers, and then vegetation assumes all its rank luxuriance; many are the herbaceous plants which are only then to be met with, and the traveller is usually deterred from visiting them—if not his own fears, the repeated warnings of the inhabitants compel him in the end to desist. Nature has been as bountiful to some parts of Africa as any other country, vegetation is wonderfully beautiful and luxuriant on the

* The numerical distribution of these families will be found given in detail for the six great divisions of the globe in the ninth vol. of the Ann. of Nat. Hist. pp. 415, 416.

western coast, and British travellers speak of it in raptures; but whilst the climate continues so highly prejudicial to Europeans, we can only hope to draw feebly from its stores. Of thirty-five travellers on this coast of Africa, twenty-two have fallen victims to the malignity of the climate, four have been murdered by the natives, and nine have returned. The Asiatic cholera, which so startled the world at its first appearance, carried off an insignificant proportion compared with this*.

Thus then I feel at liberty to conclude, that a third of the vegetable kingdom has yet to find its way into the collections of botanists; and recapitulating our deductions in a tabular form, they will stand as follows:—

Number of species described in the first four volumes of DeCandolle's Prodromus	20,100
Allow for species since described or known to other botanists	5,000
Allow for Vasculares yet to be described in the above work	50,200
	75,300
Cryptogamous plants	13,870
	89,170
Undiscovered species	44,585
Total . . .	133,755

It is highly important that the amount of the vegetable world should be ascertained, as it becomes the basis on which numerous

* In the 'Historical and Descriptive Account of British India,' published in the 'Edinburgh Cabinet Library,' vol. iii. p. 162, is the following paragraph from the pen of Dr. Greville :—"It is extremely difficult to form an estimate of the probable extent of the Indian flora, the vegetation of many parts of the country being entirely unknown, and almost everywhere very imperfectly explored. In fact, in the remote districts, little more has been done than to follow the courses of rivers. The herbarium in the Museum of the East India Company contains about 9000 species, including those known and described by Roxburgh in his manuscript catalogue, most of which were at that time new. To this amount remain to be added a considerable number of new species in the collection of Dr. Wight. * * * Dr. Wallich obtained, from his own personal exertion, in the valley of Nepaul, and within an area of about sixty miles in circumference, upwards of 2500 species. Twelve months was the space of time devoted to this labour, and it cannot be supposed that he succeeded in discovering all the vegetable productions of that district. From these and other data it has been calculated by Dr. Wallich that we are not acquainted, at the present moment, with more than the eighth part of the flora of India; an estimate by no means improbable, but which gives to India itself as many species of plants as we find described in botanical works."

calculations are to be raised. In fixing it at 134,000 species, we have attempted to do for botany what Swainson has done for zoology; but in a comparison between the two, the number of plants is found to be considerably less than that of animated beings. The great amount of the latter is however chiefly composed of insects, the above author limiting them at 550,000, whilst he computes the rest of the animal kingdom at 27,600; the whole clothing the surface of the globe with 711,600 different and distinct forms of organized matter.

The following will give some idea of the distribution of vegetable forms in round numbers, in the six natural divisions of the world, and their relative amount to the extent of surface:—

		Square miles.
Europe	11,200	2,793,000
Asia	36,000	12,118,000
Africa	25,200	8,500,000
North America	14,400	11,146,000
South America	40,000	
Australasia	7,200	3,100,000
	134,000	37,657,000

As might be expected, by every one the least acquainted with the physical conditions of these sections of the world, there is no connexion between the extent of surface and the proportion of vegetation it supports. From the gross result it appears that for every species there is a superficies of 281 square miles of dry land; a space amply sufficient for the repetition of species in the form of individuals, the very numerous multiplications of which clothe the land with vegetation, and is a character which must not be undervalued, as plants vary much in the number of individuals which are comprehended under different species, and whose abundance constitutes the value of the latter.

Linnæus was the first naturalist who ventured an opinion as to the manner in which the earth was originally covered with species; he imagined them to have spread from a common centre. There is no ground for supposing otherwise than that all the kingdoms of nature had a similar origin and distribution, and that the laws obeyed by one were common to all; the views of Linnæus extended to all of them equally. Several theories have been since proposed, but they all may be regarded as one great theory, gradually formed as information accumulated, and step by step enlarging to suit the new facts continually brought to light. The earth being furnished with vegetation at the period mentioned in the sacred writings, no event occurred likely to have a material influence on it, and the botanist, being once acquainted as to the manner of the first distribution, has every reason to remain satisfied with his knowledge. With the zoologist it is different; the catastrophe of the deluge necessarily swept all animated beings from the surface of the earth, excepting those preserved in the ark; an opinion strengthened by geologists, who regard the deluge as having been universal. At the subsiding of the waters the animals emerged from a focus, whence they were to spread to all regions. As it is allowed that plants and animals were distributed by the same laws, and the universality of the deluge being also allowed, there is wanting something in the history of animals and plants to place them under the same conditions. As we shall presently see, plants did not spread from one or several centres, but simultaneously covered everywhere the dry land. The inferences urging this conclusion are numerous and satisfactory, and this point once established to the conviction of botanists, the animal kingdom must be left to the inquiries of the zoologist.

It was imagined by Linnæus that all plants, birds and beasts diverged from one centre; indeed, that all organized beings were created in one spot, whence they spread far and wide to beautify and people the earth. This region enjoyed a mild and lovely climate, and to secure those varieties of temperature necessary for the existence of many, it was provided with a range of mountains and intervening valleys, where each could enjoy that climate most congenial to its habits. It would be useless to attempt to refute this, as its inaccuracies are evident on the slightest inspection; even the facts adduced for its support cannot be admitted at the present day. It is evidently the offspring of the imagination of the author, which always adorned his conceptions and writings, but in this, as in other instances, was destitute of the necessary solidity. Perhaps no similar class of men were ever so devoted to science as the pupils of Linnæus; many of them were travellers, and by their researches in distant countries the study of plants became greatly extended. As facts poured in, the hypothesis of Linnæus gradually lost ground, for it was discovered that the state of botany in different countries did not bear it out. Instead of one centre it was now maintained that there had been several, whence all organized beings were disseminated, more particularly plants. Willdenow was the most conspicuous promoter of this view, but it was merely a transition to the opinions received at present. It was however still maintained that those centres were mountain-chains, now regarded rather as barriers to a flora than fit surfaces for its diffusion.

The present state of our knowledge invites us to the conclusion, that wherever there existed a suitable combination of circumstances, there vegetation sprung up. Whatever might have been the state of the surface, whether valley, mountain or plain, it made no difference; if no unfriendly agents were at hand the soil was covered with plants. It seems highly probable that plants like animals are furnished with constitutions, having a nice perception of external circumstances, and though the inquiry assumes a microscopic tendency, we do not despair of discovering some very interesting facts, when a minute inquiry shall be instituted on the state of the different regions of alpine vegetation and the influences under which they flourish. On the other hand, if plants were diffused from one or more mountain-chains, the inquiry would end totally unproductive. Those circumstances which tend to establish the present view may be advantageously considered in detail.

1. The authority of the sacred writings.—The language of the Bible is brief, but there is no reason for limiting its meaning; the earth is stated, and why should not the whole earth be received? as bringing forth herbs and trees. That omnipotence which could call life into existence and cluster it around one centre was equally capable of spreading it over the whole earth.

2. The physical impediments presented by the distribution of land and water to the diffusion of species.—Since man has been an inhabitant of the globe, the changes in the relation of the seas and continents have been trifling, no event having occurred to disturb it; as they were at the creation they may be looked on as being now. That this disposition is such as powerfully to limit vegetation we shall presently see. Linnæus rested his hypothesis chiefly on the facilities, as he supposed, with which plants can be dispersed. He called to mind the great number of seeds and seed-vessels furnished with appendages presenting surfaces to the winds, and it must be acknowledged that the number of plants which nature has provided with organs for the diffusion of their seeds is very considerable. Nor can it be denied for an instant that *Erigeron canadense* was spread over Europe in every probability by the winds, assisted by the favourable structure of its seed-vessel; and next it may stand the fact, that *Canna indica*, though unprovided with any suitable organization, has been found a native alike of Asia, Africa and America. These however are but casualties, instances of departure from a general law, the exceptions which give birth to a rule; they are not the models representing the diffusion of species generally. There is every reason to suppose that the surface over which these plants are spread is confined, in spite of their highly favourable organization. It has often appeared to me, that birds, though furnished with such admirable organs for rapid locomotion, are very local in their habits. Every sportsman is acquainted with this circumstance, and is influenced by it in his search for game. If birds then with great locomotive powers are confined within restricted limits,

what may not be expected from plants, even though assisted by a favourable structure? Among these plants instances may be found which enjoy a very contracted habitat; *Carduus cyanoides* is one of these, and is found on two spots only in Germany. This plant has attached to its seed-vessel a brush of bristly hairs, like many other of its congeners, the use generally assigned to which is to assist diffusion, and which it often admirably accomplishes, though not in the present instance.

Numerous instances are related of seeds being carried by currents on the swell of the ocean across extensive seas from tropical coasts to the shores of northern countries. Fruits have often been picked up on the coasts of Scotland, Denmark and Sweden, which there is not the least doubt were shed within the tropics. Nor does the sea-water in all cases destroy the power of germination, as plants have occasionally been reared from them in our own country, and on the sandy beaches within the tropics the seeds of *Mucuna pruriens* are sometimes found in quantities in active germination, yet washed about by every rising tide. A more powerful agent has been man, who in his migrations has spread a number of plants in every place where he has fixed his residence; the proportion of these to the flora is however small, and they have seldom given a character to the vegetation*. It is therefore only in a few cases that it can be admitted plants have been thus diffused; the mass of vegetation has not moved over the world by this or similar methods.

A slight inspection of the tracery on a globe exhibits a certain relation in the distribution of water and dry land: towards the north a mass of land occupies the Arctic circle extending around the pole; traversing the globe on all sides towards the equator, divisions in the surface are gradually observed, increasing in size as they descend, and when arrived within the tropics, mostly enlarged into seas and oceans. The intervals between the masses of land beyond the equator more resembling processes shooting into the ocean, still increase, and towards the south are lost in a vast encircling sea. The tropical portions of each of the great divisions of the world are nearly isolated, whilst in the northern regions the consolidation is considerable, and the whole admits of a comparison, perhaps rather a rough one, of the manner in which the spread fingers are united at their base to the palm of the hand. In each of the divisions the vegetation of the tropics is rich and varied, but the identity in the productions of one with

* At Valparaiso in Chili, among a vegetation where they were in every respect strangers, I found the following plants:—*Linum catharticum*; *Sonchus oleraceus*; *Polygonum persicaria*; *Geranium molle*, *G. dissectum*; *Rumex pulcher*; *Mentha pulegium*; *Viola odorata*; *Equisetum palustre*. Similar instances are frequently mentioned in the writings of travellers.

the other is extremely slight; nor does this increase as we advance to the south. To the north, on the contrary, there is a gradual increase in the number of species occurring in the different divisions, and where the union of the land is great, many of the species have wide ranges of growth. It is stated that of the native flora of the United States, upwards of a seventh of the phanerogamic plants are common to Europe, and still further to the north the proportion is much greater. In the visits of Captain Beechey to Kotzebue's Sound in the Blossom ship of war, 233 species were collected; of these 117, or as nearly one-half as is possible, are met with in the north of Europe. Hence it appears that the large seas have been barriers to the diffusion of the present flora of the earth.

3. In confirmation of the views just expressed, we will mention some of the statements made by botanists respecting the frequency with which species are repeated, or in other words, the value of duplicates in those portions of the earth which have been subject to their investigations.

It is not unusual to meet with passages like the following in the narratives of even the most distinguished navigators. The author, the unfortunate La Perouse, is speaking of the vegetation around Port de Français, in 58° 37′ N.L.: "Among these potherbs we saw almost all that are common in the meadows and mountains of France;" and again in the same page, "No vegetable production of this country is unknown in Europe." The latter part of this is so far from being the case, that on this coast, and very near Port de Français, new species may still be discovered. It is most true that the general character of the vegetation is strikingly like that of France, England, or the North of Europe, and the traveller recognizes with much pleasure very similar plants to what he has been accustomed to see in his own country. But on a minute inspection, characters are discovered which distinguish many of them from their European representatives; whence we learn the importance of accurate and skilful observation in ascertaining what plants are to be considered as distinct from, or identical with, those of another country. In many instances this task is so difficult as to require all the judgement and experience of a practised botanist. It is only in the writings of the most sagacious travellers that we can hope to find that correctness in details worthy of implicit confidence.

The world may be divided into six sections, constituting so many distinct provinces of the vegetable kingdom, and having the watery barrier which separates them more or less complete. Europe is the first of these, and the isolation is less than in any of the others; Asia with its islands; Africa, including Madagascar and some islands; North America, extending as far south as the isthmus of Panamà; South America, with which are included the West India islands and the barren Falklands; Australasia, composed of New Holland, New Zealand, and the Polynesian islands. Each division possesses certain characters peculiar to itself which distinguish it from the others, and may be conveniently regarded as a source of comparison.

No travels of modern date are better known than those of Humboldt and Bonpland in Equinoctial America, and none have been attended with such copious and accurate observations; though they frequently encountered, especially on elevated stations in the Andes, species of genera common in Europe, yet throughout their whole travels they never saw one exogenous plant which was found equally in the old and new world. Twenty-four species alone were discovered which occurred in the latter, and all these were *Gramineæ* or *Cyperaceæ*. Among 4160 species met with in New Holland by Dr. Brown, 166 were to be found in Europe; 15 of these are *Exogenæ*; 121 belong to *Cryptogamia*, being nearly two-thirds of the number; and 30 to *Gramineæ* or *Cyperaceæ*. On a portion of the north-west coast examined by Mr. Cunningham he collected 1500 plants, and only 52 of these were repeated either in India or South America. Adanson in his 'Voyage to the Senegal' mentions, that he only saw two plants in the neighbourhood of that river which he had seen in Europe, tamarisk and purslain. At another river on the same coast, the Congo, of 600 species collected, Dr. Brown has stated that about a twelfth only were met with in South America and India. In high latitudes alone do we find that extensive diffusion which refuses to every restricted spot its own flora. A list of 409 species belonging to Greenland contains only nine peculiar to that country.

So far then we find little reason to conclude that vegetation originated in one or a few centres, since there is so little identity among plants of different countries.

4. Had the migration proceeded from a few localities, we should have expected to find, in all situations with similar climates, the identically same species of plants.—That such is not the case is evident from the preceding, but a few moments will be well occupied in showing what does happen here. It is a fundamental principle in geographic botany, that everywhere under similar circumstances similar, but not identical, species exist; this is a well-known fact, which the daily acquisitions to our knowledge continue to confirm. There is a marked resemblance in their productions, though the localities under comparison may be widely separated; the productions of the Asiatic tropic strongly resemble those of the American; the temperate extremity of Africa has many points of similarity with the tem-

perate portion of New Holland; and the southern extremity of America possesses many circumstances to remind the botanist of the North of Europe or America.

Occasionally these characters are conveyed by the presence of natural families, and their value increases inversely to the number of species they contain. A small family, composed but of a few species, has less means of being represented in different localities than a more bulky one. The closest connexions are furnished by genera, these being founded on a more minute view of their organization, and on characters shared by a smaller number of vegetable forms. A variety of remarkable instances are contained in botanical works* exhibiting lists of plants in one tropic or temperate region having kindred species in others, differing in a slight degree only, yet possessing those distinctive marks with a tenacity which makes it extremely difficult to arrive at any other conclusion than that they are separate species. Some of the natural families are very generally diffused; as the most remarkable may be mentioned—*Leguminosæ, Malvaceæ, Ranunculaceæ, Caryophylleæ, Cruciferæ, Umbelliferæ*, &c. The genera of some of these are also extremely ubiquitous; *Trollius* has been often cited as a remarkable instance, and as it is a genus of few species, the case is more striking. No genus of equal extent surpasses *Senebiera* in the wide diffusion of its species; it comprises eight species, two of which are European, whilst the Cape of Good Hope, St. Helena, Madagascar, Monte Video, Quito and Egypt, has each its peculiar kind.

5. Those islands which are so far removed from the nearest mainland, that their vegetation may be considered to be independent of it, have much that is peculiar in their flora.—Though there is not the least objection to consider many of them as the summits of submarine chains of mountains, it is not probable that they should have been so many centres of vegetation. If the latter were so numerous as to embrace even these, the theory must be regarded the same as that which maintains an universal creation. Some islands are but specks on the globe, and yet we find them with numerous peculiar species. The vegetation of St. Helena is almost altogether its own, having very few plants common with Africa or America. Among 239 plants collected at the Sandwich islands, exactly 100 have not hitherto been found elsewhere, not even in the other Polynesian islands. The Society islands have also a number of their own. Notwithstanding the immediate vicinity of the Canary islands to the coast of Africa, there were found to be thirty peculiar of sixty-four collected. It is only on islands situated as Malta, and originally extremely

* Willdenow, Introduction to Botany; Sprengel, Philosophy of Plants.

barren, that the flora is altogether that of the adjacent continents; or in some of the coral groups in the Pacific, such as the Radack chain, perhaps within no distant period first emerged from the ocean, which have received their plants from neighbouring islands.

6. The absence of any circumstances tending to support a change in the condition of the vegetable kingdom, such as the production of new species, or the disappearance of others.—Lyell has used considerable ingenuity in his attempt to prove, "that the species existing at any particular period must, in the course of ages, become extinct." A conclusion of this kind was highly desirable to establish his views, but we cannot help placing a different estimate on the speculations of Brocchi. It is quite gratuitous to suppose, that species like individuals might advance in age, from "certain peculiarities of constitution conferred on them at their birth." I may venture confidently to affirm, that as far as experience yet goes, we have no reason to conclude that plants have disappeared; nor can we allow that new species have appeared, hybrids seldom occurring in nature, and when produced by art only continuing through two or three generations.

These facts vary in the value to be attached to them severally, but collectively they form a powerful argument in support of the theory, that the earth was everywhere, at the same moment, furnished with a vegetation in accordance with the physical circumstances which prevailed. The exact state in which vegetation first existed, whether springing up from seeds, or in flowers and fruit, whether originally assuming the weakest phase in the circle of its existence, or appearing at once in the full vigour of its growth, this is needless for us to inquire. It is most probable, that as the wants of man were suddenly created, the means of gratifying them were co-existent; such is the conclusion to be drawn from the sacred writings; and if ever we were gratified by a knowledge of this minute particular, it would be of no service to us, being a solitary circumstance and without any connexion with the subsequent state of the original flora of the world.

Many of the natural families are so widely diffused, that they are represented in nearly every portion of the globe. More than a third of the whole have members in the six divisions already stated, a greater number still in five of these, and so on, till we find but a few left which occupy or are confined to a solitary division. Among the ten agamic families there is only one, *Marsileaceæ,* not found in them all. Those which are confined to one province are,—in Europe, *Globularineæ, Ceratophylleæ;* in Asia, *Dipterocarpeæ, Aquilarineæ, Camellieæ, Hydrocereæ, Moringeæ, Stilagineæ;* in Africa, *Bruniaceæ, Brexaceæ, Belvisiaceæ, Penæaceæ;* in North America, *Fourquieraceæ, Sarracenieæ;* in South

America, *Rhizoboleæ, Monomieæ, Simaroubiaceæ, Vochyaceæ, Calycereæ, Escallonieæ, Humiriaceæ, Lacistemeæ, Papayaceæ, Gilliesieæ, Gesnereæ*; in Australasia, *Tremandreæ, Baueraceæ, Epacrideæ, Goodenoviæ, Stackhouseæ, Bruniaceæ*; being thirty-one in number, or an eighth part of the whole.

In addition to the geographical divisions here followed, there is another which may be regarded as accessory to it. In the present instance the distribution of heat has been the leading consideration, which is well known, as a general rule, to diminish from the equator to the poles. The first region extends from the equator to the limits of the tropic in the northern hemisphere, or 23° 28′ N.L. The second is comprehended in the space between this and the parallel of 40° N.L., and is called the sub-tropic; the next extends from 40° to 60° N.L., being the temperate; and the last or arctic comprises all the surface north of 60°. As the regions are repeated in the southern hemisphere, the whole are necessarily eight in number; the north tropic, south tropic, north sub-tropic, south sub-tropic, north temperate, south temperate, arctic and antarctic. The last is scarcely more than a nominal region, though it still claims a few terrestrial plants and some Algæ, which make its existence necessary.

Inquiries have sometimes been made as to what are the most prominent sources of difference in the character of the vegetation, or of the composition of the respective floras, of the two hemispheres. To afford some illustration of this, those families are here enumerated which are more particularly distinguished for having the mass of their numbers in one or the other. Those families already mentioned as confined to one division have been omitted, as the repetition would only occupy useful space. The south tropic families are usually to be found in the Brazils, whilst the south sub-tropic, as *Oxalideæ, Diosmeæ, Proteaceæ, Polygaleæ*, are chiefly from the Cape of Good Hope, New Holland and South America. The list might be very easily enlarged, but our object is only to furnish the most striking.

In the northern hemisphere are predominant, *Acerineæ, Aurantiaceæ, Artocarpeæ, Amentaceæ, Berberideæ, Boragineæ, Caryophylleæ, Cistineæ, Cruciferæ, Coniferæ, Cupuliferæ, Campanulaceæ, Caprifoliaceæ, Dipsaceæ, Elæagneæ, Fumariaceæ, Grossulaceæ, Hypericineæ, Hippocastaneæ, Hamamelideæ, Magnoliaceæ, Onagrariæ, Orobancheæ, Papaveraceæ, Rosaceæ, Ranunculaceæ, Rutaceæ, Resedaceæ, Saxifrageæ, Umbelliferæ, Vaccineæ, Alismaceæ.*

In the southern hemisphere are predominant, *Atherospermeæ, Cacteæ, Crassulaceæ, Capparideæ, Diosmeæ, Dilleniaceæ, Ficoideæ, Geraniaceæ, Heliotropiaceæ, Myrtaceæ, Melastomaceæ, Myoporineæ, Malpighiaceæ, Oxalideæ, Pittosporeæ, Polygaleæ, Proteaceæ, Scæ-*

voleæ, Spigeliaceæ, Stylideæ, Tropæoleæ, Amaryllideæ, Hæmodoraceæ, Irideæ, Restiaceæ.

As has been stated, a considerable number of the natural families are represented in all the six divisions, and, *cæteris paribus,* those with the largest amount of species may be justly supposed to be in this respect the most prominent. With increased numbers not only are the means of repetition multiplied, but there is greater scope for variety of habit and predilection; the former displayed in the diversity of herbs, shrubs and trees, and the latter in peculiarity of constitution. Those most distinguished for a large amount* of species, as *Cruciferæ* with 990, *Myrtaceæ* 715, *Leguminosæ* 3875, *Umbelliferæ* 1009, *Cinchonaceæ* 1631, *Caryophylleæ* 759, have the most extensive range. It does not appear that the habitat is influenced by the number of genera, as might at first be supposed, since there are comparatively few in *Malvaceæ, Caryophylleæ, Leguminosæ* and *Geraniaceæ*; about the average number in *Cruciferæ,* but below it in *Cinchonaceæ.* Of the hundred natural groups previously referred to, thirty-three are distributed through all the divisions, whilst

Europe has representatives of . .	52
Asia	83
Africa	76
North America	81
South America	83
Australasia	53
Confined to a single division . .	9

The number of genera composing the families varies considerably; those of tropic or sub-tropic regions appear to have more than others of temperate regions in proportion to the species; but the tropic families do not abound generally either in genera or species. *Leguminosæ* with 272 genera, *Cinchonaceæ* 215, *Cruciferæ* 100, *Umbelliferæ* 160, are among the largest. Some consist only of one or two genera and scarcely more species; others with a large amount of species have but few genera, as *Geraniaceæ* with 490 species and only five genera; *Loranthaceæ* 330 species and four genera; *Oxalideæ* 159 species and also four genera. As instances to the contrary are *Aurantiaceæ* with forty-four species and twelve genera; *Olacineæ* seventeen species and eight genera; *Droseraceæ* forty-five species and eight genera; with *Bombaceæ, Meliaceæ, Magnoliaceæ, Flacourtianeæ.* Taken collectively, the whole amount of natural families possesses an average of upwards of eighteen genera each, or more correctly

* The numbers stated are obtained from DeCandolle's 'Prodromus Regni Vegetabilis.'

18·8. Proceeding in the same manner to estimate the number of species in each genus, they will be found to average upwards of ten to each, or 10·6. As the value of the group or assemblage depends on the amount of its component parts, so we must regard the value of a natural family or genus as governed by the number of its constituents; 18·8 is then the average value of a family, and 10·6 of a genus.

A discrepancy of opinion is not unlikely to arise respecting what should be considered as the division of the globe to which a natural family belongs. Each of the latter is formed by the aggregation of two classes of constituents, of different value and number, these being inversely to each other. The genera, as originating in characters of greater value, may on the one hand be considered to determine this, and on the other the great numerical proportion of species may be regarded as conclusive. Many of the families which possess the greatest proportion in one division are represented by a superior number of genera in some other, where the amount of species is smaller; to which then of the two does the group essentially belong? In reply we must confess that frequently it is extremely difficult to decide, and in some cases altogether impossible, since the characters approximate so closely in value. An analysis of *Byttneriaceæ* will more clearly explain this: if the number of species alone are regarded, the mass of the family is African, and afterwards South American; but if guided by the genera it is essentially Asiatic, whilst Australia follows with very few species.

Byttneriaceæ:—Genera 35, Species 221.

	Europe.	Asia.	Africa.	N. America.	S. America.	Australia.
Genera	...	22	7	7	8	9
Species	...	50	88	10	60	15

Magnoliaceæ is another instance; and in this case we can hardly venture to say which of the two, Asia or North America, claims it most forcibly.

Magnoliaceæ:—Genera 9, Species 40.

	Europe.	Asia.	Africa.	N. America.	S. America.	Australia.
Genera	...	3	...	4	4	2
Species	...	16	...	12	9	3

The native country of a family or genus is evidently an inappropriate expression; it assumes that some of its members have migrated from their original place of growth, a circumstance altogether at variance with an opinion already expressed. The world alone is their native country, and North America is as much the native country of *Byttneriaceæ* with only ten species, as is Africa with eighty-eight. There is another term frequently adopted, and within certain limits it is a correct one. Where the greatest number of the species of a genus or family abound, there is its metropolis; but it expresses no more, and we are still at a loss for a word to convey what is meant by the assemblage of generic and specific characters as just mentioned. In this case our ideas are best conveyed by using the adjective term of the division wished to be expressed; thus if any family has the preponderance of its constituents of genera or species, or both, in Europe, it would be requisite to call that family European, as to this province it essentially belongs.

Though the amount of individuals composing genera presents a much smaller aggregate than is met with in the natural families, still it is surprising how widely their species are diffused, and how comparatively rare it is to find them bounded by narrow geographic limits. The greater portion of those genera, composed of any tolerable number of species, obey the law with eagerness, to reappear wherever there may be a combination of circumstances propitious to their growth. To illustrate this, let us take that important natural group *Ranunculaceæ*, and examine how far its genera are circumscribed. Commencing with its type, *Ranunculus*, we shall find that it has members in all of the six divisions. The same will nearly apply to *Clematis* and *Anemone*. Very few genera are confined to a single province, perhaps *Knowltonia* may be cited as the only one, where the number of species is sufficient to admit of a deviation; this genus has five species, all inhabitants of the Cape of Good Hope. In *Cruciferæ*, *Capparideæ*, *Umbelliferæ*, *Malvaceæ* and *Caryophylleæ* the genera have a similar diffusion. *Cruciferæ* is remarkable for containing one extensive genus, *Heliophila*, of forty-seven species, all from Southern Africa.

As genera then collectively manifest so slight a disposition to range within narrow limits, it will be more satisfactory to examine those instances in which they exist under opposite circumstances, or are comparatively circumscribed. The genera of *Myrtaceæ* are remarkable for this, and omitting those which contain but one or two species, there are about twenty which are limited to one of the divisions. Australia, always peculiar in its natural productions, claims the greater share, comprising all important from the number of their species, and the beauty or singular structure of their flowers. The most prominent of these are *Eucalyptus*, *Calothamnus*, *Melaleuca*, *Metrosideros*, *Leptospermum*, *Calythrix* and *Callistemon*. A few solitary cases occur among these of species co-existing in other divisions, but are too rare to be of importance. In the same family, and confined to the South American province, are *Myrcia* with numerous species, *Calyptranthes, Lecythis,* and nearly the whole of the extensive genus *Eugenia.* Asia is less remarkable, having only a few genera scanty of species, as *Barringtonia, Stravadium, Sonneratia,* &c. *Portulaceæ,* by no means a large family, having only fourteen genera and ninety species, presents *Anacampseros* with ten species, *Ginginsia* seven, natives only of the Cape of Good Hope; *Calendrinea* fourteen, of South America; *Claytonia* twelve, of North America and Siberia; *Aylmeria* two, of New Holland. If Asia possess few of the restricted genera of *Myrtaceæ,* the deficiency is amply supplied by a large share of *Cinchonaceæ,* the amount of whose species, found in the hotter parts and in the Malaisian islands, is very great. Still it must yield to South America. The restricted genera are chiefly *Wendlandia* with sixteen species, *Mephitidea* eighteen, *Chasalia* nine, *Danais* four, to Asia; *Cinchona,* as limited to sixteen species, *Coccocypselum* sixteen, to South America; *Anthospermum* with nine species to the Cape of Good Hope; and *Opercularia* with thirteen species to New Holland, including two species belonging to New Zealand. *Leguminosæ* contains a great number of genera, but none of the larger have a limited habitat, excepting alone *Aspalathus,* which with eighty-four species is confined to the Cape, omitting a doubtful species. There are however a number of smaller genera, belonging chiefly to the suborders *Sophoreæ* and *Loteæ,* the greater portion of which are natives of the Cape of Good Hope and New Holland, and comparatively a few from India and South America.

Occasionally it happens that the sections into which many of the genera are divided possess but a limited range. This occurs with *Acacia,* which comprehends 258 species; one of its sections, consisting of sixty-four species, has that peculiar structure of the leaf which is called phyllodium; nearly the whole of these grow spontaneously in New Holland and the Polynesian islands, a few only being met with in Africa or Asia. The other sections with pinnate leaves are distributed through South America, Africa, Asia and Australia, especially the former. They have also a little variety in the colours of their flowers, being yellow, white, and sometimes pink; but the Australian species have all yellow flowers. *Vitis* has two sections dependent on the union or separation of the sexes in the same plant; the hermaphrodite species are natives of the warmer regions of Asia, whilst the diœcious occur in North America. In *Ceanothus* the manner of inflorescence, to some extent, co-exists with a limited geographic range of the sections.

When a group of plants is discoverable only in one of the great divisions or regions, it will be convenient to apply to it the term monomic, as expressive of its geographic properties; thus *Vochyaceæ,* being confined to South America, is a monomic family; and *Cliffortia,* whose shrubby species are all indigenous to South Africa, is a monomic genus. On the other hand, a natural family common to all the divisions, and these are about a third of the whole, are called polynomic; and a genus with a similar range, as *Viola* or *Ranunculus,* is a polynomic genus. If a group is restricted to two or more of the divisions, the appropriate Greek numeral must be substituted; thus *Acerineæ,* the members of which are natives of the temperate and sub-tropic regions of Europe, Asia and North America, is a trinomic family.

The value of the generic character is 10·6; an amount the result of an extensive estimate, though not of the whole vegetable kingdom, which unfortunately is not within our reach at present in a satisfactory form. This may however be considered as very closely approaching correctness, and giving us a tolerable accurate notion of the importance of the genus; compared with some of the statistical details which have become current of late years, it must be allowed to stand on a much firmer and broader foundation, and therefore not less worthy of faith. If all the species then were equally distributed among the genera, the share that would fall to each would be about ten and a half; but the genera are not so regularly composed, and when studying a very bulky or a small genus, the average shows us how far the group under consideration departs from the standard. The smaller genera greatly prevail, whilst some of the largest possess a great multitude of species. Those which contain but a single species bear a great proportion to the others, which I am disposed to think will diminish when the affinities of the genera to each other are better understood.

In Byttneriaceæ with	. . 35 genera,	11 have only one species.			
Caryophylleæ	„	. . 27	„	7	„ „
Cruciferæ	„	. . 100	„	34	„ „
Leguminosæ	„	. . 272	„	80	„ „
Myrtaceæ	„	. . 47	„	11	„ „
Sapindaceæ	„	. . 29	„	12	„ „
Terebinthaceæ, D.C.		. 55	„	24	„ „
Umbelliferæ		. . 160	„	64	„ „

At the same time that some of these trifling genera become merged into others, it is highly probable that the more extensive will undergo analysis, leaving the average proportions very slightly affected. A few of the largest genera at present are, *Pelargonium* with 369 species, *Mesembryanthemum* 316, *Acacia* 258, *Loranthus* 251, *Astragalus* 244, *Silene* 217, *Cassia* 211.

It is not possible to assign a value to species with that precision which can be adopted with families and genera; any attempt to bestow on them a numerical amount must utterly fail, making it requisite to adopt some other method. Some idea of their importance may be obtained by taking a comparative view of the relations they occupy towards each other, and to the whole mass of vegetation. It would appear that every species of plant has, on an average, somewhere about 281 square miles of surface to increase and multiply on; and making every allowance for those tracts of country which local causes render unfit to support a vegetation, we become highly sensible how infinitely multiplied the species must be to clothe the earth with that abundance we behold around us. The different species will vary in their power of multiplying individuals, either from their organization or surrounding causes; and there would also appear in some cases an idiosyncrasy which refuses to perfect their increase or diffusion. 1. The value of species is smallest in plants existing in only one or two solitary localities; such for instance as the cedars of Lebanon, which are indigenous alone in a circumscribed spot, and are so few in number that they can be counted. Many others are extremely local, especially of the *Orchidaceæ* of South Africa and New Holland, which are often only to be met with in the most solitary and secluded spots. The localities of some species of *Disa* and *Serapias* at the Cape have become well known from this very circumstance. Thunberg mentions that *Codon Royeni* and *Protea nana* are both rarities at the Cape; *Origanum Tournefortii* is alone found on the island of Amergos; *Forstera sedifolia* is a rare plant in New Zealand. These are instances where not only the geographic range is small, but also the amount of individuals. 2. The value is increased in those which have a wide geographic range. Here is included the mass of vegetation, and it comprehends all plants excepting those under the next head. Some have a greater distribution than others; it is a general rule, that the more simple the organization the greater is the diffusion; hence the frequency with which agamic species are repeated. Aquatic plants have also a wide range; *Lemna minor* is abundant throughout the northern hemisphere; *Typha latifolia* is equally diffused; also the species of *Nymphæa* generally, and *N. lotus* beautifies alike the waters of the Nile and the Ganges. *Arundo phragmites*, abundant throughout Europe, reappears in the marshes of the Macquarrie in New South Wales. 3. The value is at its maximum in those species, the individuals of which are exceedingly numerous, and are so crowded together, to the exclusion of all others, that they appear to require the society of each other, and from this latter circumstance have been called *social plants*. The *Gramineæ* are generally social, and in our meadows another eminently social plant, *Polygonum persicaria,* often struggles among them. *Erica vulgaris* covers large tracts in the temperate regions of Europe; *Ericaceæ* generally consists of social plants. *Filices, Musci, Leguminosæ, Compositæ,* and many other natural groups, contain numerous instances. Within the tropics some species of *Cactus, Aloe, Bromelia* and *Agave* become great nuisances from their social habits. Many display this character simply because there is no check to their mode of growth; this happens with the greater part of aquatic plants, as *Pontederia, Nymphæa, Nelumbium, Hydrocharis, Sagittaria.* Indeed plants are social from causes which are often so trifling, that it is a character of little value, excepting occasionally in Geographic Botany.

Yet after all, this presents but a feeble sketch of the vegetable clothing of the globe.

[To be continued.]

III.—*On the Occurrence of the Genus* Pollicipes *in the Oxford Clay.* By John Morris, Esq.

[With a Plate.]

The fossil species of the family Cirrhipeda, hitherto recorded as British, all belong either to the tertiary or cretaceous series; the pleistocene, marine and crag formations contain remains of species belonging to the genera *Acasta, Adna, Balanus, Clitia, Coronula* and *Scalpellum.* The upper marine, the London clay, and the different members of the cretaceous system contain only species of the genus *Pollicipes,* so that the addition of two new species of the latter genus from the Oxford clay is an interesting fact connected with its geological distribution.

Pollicipes concinnus. (Pl. VI. fig. 1.)

Testa subtrigona; valvulis lateralibus, anticis trigonis apice acuminato, posticis subtrapeziformibus; dorsali angustiori acuminata. Pedunculo squamulifero, squamulis adpressis subquadratis, transversim carinatis.

The compressed state of the specimen prevents the specific characters from being more accurately defined. The anterior valves are trigonal, the posterior somewhat trapeziform; the dorsal valve appears to have been narrow and acuminate. The peduncle is tolerably well preserved and consists of a series of small closely pressed scales, somewhat quadrate in form, each of them being regularly marked by a transverse carinated ridge, presenting a very neat and uniform appearance.

The figure (Pl. VI. f. 1.) represents an interesting group of this species, consisting of three principal individuals, surrounded at their bases by about twenty smaller ones, in different stages of growth, all of them being attached to the dorsal portion of an Ammonite, probably the *A. Elizabethæ*; to the opposite side of the Ammonite is attached a smaller but more imperfect series, which it has been thought unnecessary to figure.

This specimen forms a portion of the valuable collection of fossil remains belonging to Channing Pearce, Esq. of Bradford, by whom it was obtained from the Oxford clay, near Christian Malford, Wilts; and I cannot but bear testimony to the very elaborate drawing prepared by Miss C. Sowerby, from which the engraving was executed.

Pollicipes planulatus. (Pl. VI. fig. 2.)

Testa —— ?; valvulis lateralibus planulatis, anticis trapeziformibus, longitudinaliter linea impressa divisis, posticis subelongatis, trapeziformibus, ad basin suboblique truncatis, apicibus acutis, marginibus anticis subcrenulatis.

These three valves differ both in proportion and form from those of the preceding species, and are much flatter than is usual in this genus; the terminal or posterior valves are elongated and truncated at the base, their upper portion being marked with a slightly curved ridge running towards the lower edge or margin. From the Oxford clay, near Christian Malford, with the last species.

IV.—*Description of some new species of the genus* Ancyloceras. By John Morris, Esq.

[With a Plate.]

The genus *Ancyloceras* was established by D'Orbigny for certain species of Cephalopoda having the general form of *Scaphites*, but differing from them in their spiral volutions being distinctly separated from each other, as well as in some slight modifications in the arrangement of the foliations of the septa. The British species of *Ancyloceras* hitherto described have been arranged under *Hamites* and *Scaphites*, all of them belonging either to the lower portion of the cretaceous series or the Speeton clay* of Yorkshire. Mons. D'Orbigny, in the 'Terrains Crétacés,' p. 494, mentions one species of this genus as characteristic of the inferior oolite of Calvados, but has not yet detected it in any of the superior deposits, until the commencement of the lower portion of the cretaceous series, where, in the Neocomian strata, this genus appears to attain its maximum of specific development,

* The true position of this deposit is not yet satisfactorily determined, although considered as the equivalent of the Neocomian by some of the French palæontologists, and of the Hilsthon of Hanover by M. Römer. The *Hamites intermedius* and *Beanii* (Phillips) belong to the genus *Ancyloceras*.

eleven species having been described therefrom, four of which belong to the inferior and seven to the superior stage of this formation, all of them being specifically distinct from those of the British Isles. In England this genus also commences with the inferior oolite, from which two species have been obtained; it is again found in the Kelloway rock, but attains the full numerical development, as in France, in the lower part of the cretaceous series, and does not reappear in any of the superior deposits. In the 'Catalogue of British Fossils,' the genus *Crioceras* is mentioned as occurring in the Kelloway rock of Wilts; not having, however, at that period any specimens for examination, and having recently entertained some doubts on this point, in consequence of Mons. D'Orbigny stating that this genus is peculiar to the cretaceous system*, I have re-examined the whole subject, and by the inspection of a fine series of specimens kindly placed at my disposal by Mrs. Lowe, Mr. Channing Pearce and Mr. S. P. Pratt, it would appear, that the specimens generally found in collections from the Kelloway rock, under the name of *Crioceras*, are only the spiral volutions or chambered portion of *Ancyloceras*, the produced or hooked parts containing the last chamber being mostly wanting. There appears to be some difficulty in distinguishing the genera *Ancyloceras* and *Crioceras* when the chambered portion of the former is only preserved, both of them agreeing in having the spiral volutions distinctly separated from each other, and the lobes of the septa being formed of "parties impaires†," whilst in the genus *Scaphites*, to which *Ancyloceras* is closely allied, the lobes are formed of "parties paires‡."

Ancyloceras Calloviensis. (Pl. VI. fig. 3. *a*—*d*.)

A. testa oblonga, transversim æqualiter costata, costis acutis, lateraliter tuberculatis; dorsobi tuberculato; anfractibus compressiusculis; apertura ovali.

Spire composed of three rather compressed volutions, f. 3 *b*, each volution having about twenty-eight elevated ribs, slightly inflected posteriorly, and partially interrupted between the dorsal tubercles; in well-preserved specimens there are traces of intermediate smaller ribs. The ribs ornamented with two conical tubercles on the dorsal part (f. 3 *d*), and one nearly centrally placed on the internal portion of each side. The last volution produced into a straightish line (f. 3 *a*), which is recurved at the extremity when in a perfect state.

Mouth oval or somewhat hexagonal. The foliations of the

* "Les *Crioceras* ne paraissent avoir vécu qu'à la période crétacée—inférieure. Ils se sont seulement montrés, jusqu'à présent, dans le terrain néocomien et dans le gault."—Terr. Crétacés, p. 458.

† Terr. Crét., pp. 457, 492. ‡ Ibid p. 513.

septa appear to be more simple than in the cretaceous species, the superior lateral lobe is a little longer than the dorsal one, the inferior lateral lobe being nearly equal in length with the superior these however vary slightly, according to the period of growth.

To Mrs. Lowe of Chippenham we were indebted for our knowledge of this interesting species, by whom it was obtained from the Kelloway rock near that town, during the progress of the works for the Great Western Railway. The figures are executed from specimens in the collections of C. Pearce and S. P. Pratt, Esqrs.

Ancyloceras costatus. (Pl. VI. fig. 4. *a, b.*)

A. testa elongata, transversim oblique costata, costis approximatis obtusis, per dorsum interruptis; dorso rotundato; apertura ovali.

On the produced part of this shell the ribs are simple, obtuse, broader than the intervening sulcations, and increasing slightly in thickness from the ventral to the dorsal margin, where they are interrupted by a smooth space along the median line of the back. The spiral volutions have not yet been discovered, and the foliations of the septa are not shown in the specimen figured. This species bears some resemblance to the *A. furcatus* (d'Orb.) in the abrupt termination of the costæ on the dorsal margin, but the ribs are of greater relative thickness and not furcate as in that species.

From the inferior oolite near Bridport, in the collection of Channing Pearce, Esq.

Ancyloceras Waltoni. (Pl. VI. fig. 5. *a, b, c.*)

A. testa elliptica, transversim æqualiter costata, costis subacutis; anfractibus rotundatis; apertura ovali.

The surface of this shell is covered with a regular series of somewhat acute ribs, which are slightly arched on the ventral portion and are interrupted on the dorsal margin, where they terminate with a bluntish tubercle. The superior lateral lobe is as long as the dorsal one, the inferior lateral lobe is as wide and even longer than the superior one. From the inferior oolite near Bridport, in the collection of W. Walton, Esq. These specimens so closely resemble a species obtained by Mr. Bunbury from the inferior oolite of Calvados, that I feel some difficulty in assigning to it a specific name, in consequence of Mons. d'Orbigny stating that one species only, the *Ancyloceras annulatus*, is found in that deposit, of which I have not seen either a figure or description. Should it, however, prove to be a distinct species, I have proposed the name of *A. Waltoni*, as a tribute of respect to a gentleman who has assiduously cultivated the study of the oolitic fossils.

Distribution of the genus Ancyloceras.

IN ENGLAND.

Lower Greensand.

A. gigas.
A. grandis.
A. Hillsii.

Speeton Clay.

A. Beanii.
A. intermedius.
A.? Phillipsii.

Kelloway Rock.

A. Calloviensis.

Inferior Oolite.

A. costatus.
A. Waltoni.

IN FRANCE.

Neocomian superior.

A. brevis.
A. Duvalianus.
A. furcatus.
A. Matheronianus.
A. Renauxianus.
A. simplex.
A. varians.

Neocomian inferior.

A. cinctus.
A. dilatatus.
A. pulchellus.
A. Puzosianus.

Inferior Oolite.

A. annulatus.

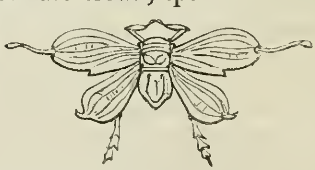
V.—*Descriptions of a new Genus and some new Species of Homopterous Insects from the East in the Collection of the British Museum.* By Adam White, Assistant Zool. Dep. Brit. Mus.

Ancyra, *White.*

A new genus seemingly allied to *Eurymela,* from which it may be at once distinguished by the shape of its head, which has not the dilated cheeks (see magnified fig. of face), so prominent a character in the New Holland genus. I can detect in *Ancyra* no stemmata. The antennæ are situated close under the eyes. Hemelytra finely veined, with a notch on the lower margin; at the end they are rounded and have a sort of knob, from which, in the male, proceeds a longish narrow appendage, widest at the end, and somewhat resembling the feathers on the head of *Pteroglossus ulocomus.* Wings somewhat falcated, especially at the ends, which are pointed and hooked. The legs are much dilated and compressed throughout; hind legs very long, with four spines on the outer edge of tibia. Body at the end covered with a somewhat waxy down-like secretion.

The species (*Ancyra appendiculata*) is of a rich deep brown colour; the hemelytra above are brown, spotted at the base with

Face magnified.



Ancyra appendiculata.

white, and have two widish powdery bands of white; the hemelytra beneath are of a mahogany-red colour; the wings are of a deep brown, almost black on the edge; between the wings there is a red-coloured space; body beneath yellow; legs black; in the female the wings are more powdery than in the male. Length 4½ lines; expanse of wings, exclusive of appendages, 1 inch.

Hab. Moulmein.

The sketch, kindly made for me by Mr. Humphries, will show the appearance of the insect better than any description. With reference to the genus *Eurymela*, I may mention that Mr. Harrington of Bath informed me that in New Holland the different species are named "manna-flies." They bore into the green bark of the gum-trees (*Eucalypti*), the sap exudes, dries and falls to the ground, sometimes in great quantities. This gum-tree "manna" is very sweet to the taste.

Cercopis Proserpina.—Head and thorax above of a yellowish orange colour; scutellum black, elytra black; inner margin, outer margin at the base, and veins in the middle of the same yellowish orange colour as is the thorax; under side of body and femora black; tibiæ and tarsi yellowish; end of hemelytra yellow. Length 11¾ lines.

Hab. Philippine Islands.

This and the five following species were collected by Mr. Cuming, and are measured from the apex of the head to the tip of the wings.

Cercopis Theora.—Black; head, thorax above, broad interrupted basal band of hemelytra, tip and small marginal spot behind the middle, tarsi, end of tibiæ and the tip of abdomen of an olivaceous yellow. Length 11 lines. Very near *C. Urvillei*, Serville, Guérin's Icon. pl. 59. f. 8.

Perhaps the male of a *Cercopis* near one described by Fabricius under the name of *C. nigripennis*, which has the tip and a narrow portion of the margin of the hemelytra yellow, the rest being black; in this the whole of the tibiæ are yellow.

Hab. Philippine Islands.

Cercopis Charon.—Of a deep black, the thorax in some specimens with a deep blue tinge. Legs and margins of abdominal segments of a reddish yellow. Length 10 lines.

Hab. Philippine Islands.

Cercopis perspicillaris.—Of a reddish yellow colour, a transverse black line between the eyes, two longitudinal black lines on the thorax near the margin. Hemelytra with two black spots at the base, a broad transverse black band sinuated behind, and two black spots near the apex; body beneath black, the edges of the segments narrowly margined with reddish. Length about 8 lines.

Hab. Philippine Islands.

Cercopis xanthomelæna.—Yellow; four black spots across the hemelytra, two on each, one near the scutellum, the other in the middle; a transverse black band, broadest externally, extends across the middle of the hemelytra, and has two yellow spots in it behind; sometimes there are three, in which case the central one is very small. Apex of hemelytra of a reddish brown. Length $7\frac{1}{2}$ lines.

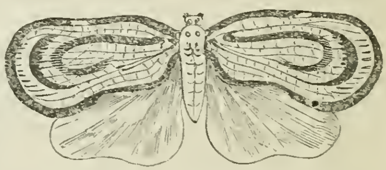
Hab. Philippine Islands.

A species near *C. spectabilis*, Burmeister ('Nov. Act. Phys. Med. Nat. Cur.' vol. xvi. supp. p.304. t.41. f. 8.), of which it may possibly be an extreme variety.

Cercopis mactans.—Cheeks and space between the eyes black; thorax with two broad longitudinal dorsal black bands not reaching to the anterior margin; sides of scutellum black, hemelytra black; outer margin yellow from the base to the middle, with a small blackish spot midway; inner margin at the base yellow, forming a line which extends as far as the end of the scutellum; behind the scutellum there is a transverse yellow spot common to both hemelytra; end of hemelytra with three largish yellow spots, one on each margin and another in the middle near the tip. Legs and body beneath yellow; body in the male spotted with black. Length from $8\frac{1}{2}$ to 9 lines.

Hab. Philippine Islands.

Pœciloptera Dianthus.—Pale, the wings of a milky white; hemelytra somewhat yellowish, especially at the base, rather broadly margined with brownish black, a hook-shaped broadish black line extending from the base of hemelytra to beyond the middle; between this and the outer margin there is a semicircular brownish black line attenuated at each end, a yellow point on the shoulder of each hemelytron, and the posterior margin of each at the base narrowly margined with yellow. Head between the eyes with three black lines, the middle one abbreviated. Thorax with at least twelve black spots above and on the sides, placed in three transverse rows. First and second pair of legs brownish except at the base, where they are pale. The hemelytra are somewhat longer in proportion than they are in *Pœciloptera phalænodes*, the head in front is somewhat dilated, and there is a strong keel on each side above the eye. Expanse of hemelytra 1 inch and 11 lines.



Hab. India; Java? There is a specimen in the collection of James Wilson, Esq. of Edinburgh.

For the sketch I am indebted to the obliging kindness of Mr. Humphries.

Pœciloptera papilionaria.—Hemelytra light purplish brown, spotted with white in the middle, at the base slightly yellowish mixed with brown; the fore margin to beyond the middle is pale, and from the end of the pale part there is an oblique broad bar abruptly broken off before reaching the middle of the hemelytron; between the end of the bar and the tip of hemelytra there is a narrow white lunule. The wings are of a smoky gray, and slightly iridescent.

Thorax yellow, spotted with black. Expanse of hemelytra 1 inch 1 line.

Hab. Java. James Wilson, Esq., F.R.S.E.; Stoll, Cigales, t. 7. f. 33?

Aphæna leucostictica.—Hemelytra at the base darkish green, with numerous blackish spots and dots, none on the anterior margin; end of hemelytra brownish yellow, with two or three minute white spots arranged in two outwardly bending lines. Wings at the base bluish verdigris-green, palest at the end, with a few black spots; end and margin blackish brown, with several milk-coloured dots. Head pale brown. Thorax with a greenish tinge. Body at the end above verdigris-green; under side and legs blackish. Expanse of hemelytra 1 inch 9 lines.

Hab. Philippine Islands; collected by Mr. Cuming.

Aphæna delicatula.—Hemelytra very pale greenish brown; basal part with many black spots (at least twenty), six of them on the anterior margin; the end darker brown, beautifully reticulated with pale greenish brown; wings at the base vermilion-red, with largish black spots, irregular on either side (at least seven); tip widely black; a large acutely-triangular sea-green mark on fore-edge between the red and black parts. Antennæ orange. Head and thorax above of a pale brownish colour with a kind of bloom over them. Body and legs blackish brown with a slight bloom. Expanse of hemelytra 1 inch 7½ lines.

Hab. China (Nankin); G. Tradescant Lay, Esq.

G. Tradescant Lay, Esq., in a note dated "British Consulate, Canton, 19th January, 1844," referring to this insect, says, "The gay *Fulgoridæ* were found in a grove not far from Nankin clinging to the trunk of a tree. They were however so much on the alert that it was very hard to capture them. I imagine they take their food and their pastime during the night and spend the day in sleep." Both the above species come near the *Aphæna variegata* of Guérin-Meneville in his 'Iconographie Règne Animal,' t. 5 8. f. 3.

VI.—*Descriptions of two apparently new Species of Lamellicorn Beetles.* By ADAM WHITE, Assistant Zool. Dep. Brit. Mus.

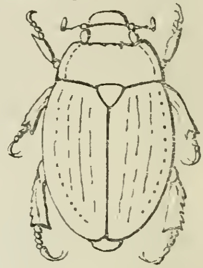
Anoplognathus (*Callöodes*) *Grayianus,* White.

Supra læte metallico-virescens, flavo circumdatus, subtus ferrugineus metallico-tinctus. Long. lin. 12—13½.

Hab. Australia (Sept.?). Mus. Brit.

Domino Joanni E. Gray, Musei Britannici Zoologiæ custodi indefesso, species hæc perpulchra dedicata est.

In another work, figures of the trophi and a more detailed description of this beautiful subgenus of *Anoplognathidæ* will be given; it is allied to the typical genus, differing in the greater breadth of the thorax, and in the elytra nearly covering the podex; the whole insect is flatter, more especially on the sides, and has a more Dytisciform appearance even than the genus *Repsimus,* MacLeay, to which at first I thought it belonged. The head is green and punctured, the shield yellowish, the sides rounded and somewhat straight in front, under side of head of a bronzy ferruginous. Thorax narrower than elytra, sides slightly rounded so as to be almost continuous with the side line of elytra, projecting behind in the middle and notched over the scutellum, lively glossy green, the sides broadly margined with yellow. Elytra much depressed, especially on the sides and behind, having a wide but shallow sinus on the side; surface punctured, the punctures generally running in striæ, some of the rows placed in slightly grooved lines; it is of a lively glossy green, the sides broadly margined with yellow. Legs and under side ferruginous; base of abdominal segments green, as are the tips of the femora and all the tarsi; front edge of tibiæ of fore-legs without teeth, hinder tibiæ moderate*.



* Through an oversight of the engraver, the tarsi in the above figure are most inaccurately represented.

In the British Museum collection are two specimens of the *Micronyx chlorophyllus,* Boisd., Faune de l'Océanie, ii. 188, Voy. Astrol. t. 6. f. 18. This insect appears to me to connect the *Areodidæ* and *Anoplognathidæ* in Burmeister's recently published volume of the 'Handbuch' (iv.). No notice is taken of this New Zealand form, which is perhaps regarded by the philosophic professor of Halle as belonging to a different family; the generic name stands in preference to Schönherr's. (See Gen. et Spec. Curc. vii. p. 313.)

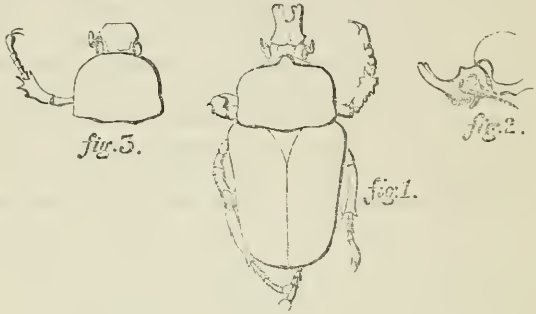
I may here mention that the male of the *Sisyphus Senegalensis,* Dej., of which a female only is in the British Museum collection, has the long process attached to the hind-legs, as in the *Sisyphus Bowringii* from China, described in the last Number of the 'Annals.' Mr. Waterhouse has a male in his collection. Mr. Charles Bowring of Queen Square, Westminster, informed me that his brother, John Charles Bowring, Esq., found the *Sisyphus* named after him to be a very common insect in Hong Kong.

Africa contains many curious *Cetoniadæ*, differing much from each other in the armature of the head of the male. Into none of the many divisions of this section given in the papers of MacLeay, Gory and Percheron, Dupont, Hope, Laporte, Schaum, Westwood, Burmeister, or Dr. T. W. Harris of Boston, U. S., does the following insect seem to me admissible, and I accordingly characterize it as a new subgenus. The greatest number of the species of Goliaths are indigenous to W. Africa from Senegal to the Congo. Far up in the interior of S. Africa Dr. Andrew Smith discovered the beautiful species named after him by MacLeay, and subsequently in the same region, Mr. Burke, the Earl of Derby's collector, found the *Cheirolasia Burkei* and *Ceratorhina Derbiana* of Melly, figured and described in that useful Magazine for these "notabilia" of entomology, the 'Arcana Entomologica' of Westwood; in this work also is described and figured the *Amaurodes Passerinii,* obtained by Mr. Melly from Mozambique, and now from a part of Africa, which may yet furnish other species, I have an opportunity of describing a species belonging to a small collection made by Dr. Roth, the indefatigable naturalist who accompanied Sir W. C. Harris on his embassy to the Court of Shoa. For permission to do this I am indebted to Dr. Horsfield of the East India House, and it is after him that I would name this apparently new form of *Cetonia.* It seems to me to come near *Dicronocephalus* and *Narycius,* between which and *Mecynorhina* it may be placed. To *Inca,* the male has a considerable resemblance at first sight, and the British Museum collection has from W. Africa a form closely resembling this Brazilian genus which was shown to the Secretary of the Entomological Society, who described and figured it in his 'Arcana.' Mr. MacLeay indeed regards *Inca* and *Dicronocephalus* as somewhat allied, unlike Burmeister, who places the former nearer *Trichius.* The species below is probably the insect referred to in the appendix of Harris's 'Highlands of Ethiopia,' vol. ii. p. 411, as "one notable *Inca,* the male of which is armed with a powerful head excrescence, and lives principally on the sap of wounded trees."

Goliathus (Compsocephalus, subg. White).

Head of *male* (figs. 1, 2) with the clypeus elongated and turned up; the clypeus is very deeply divided as far as the middle (somewhat as in *Narycius,* Dupont), the two divisions are slightly angulated, and each is distinctly notched at the end: over and in front of the eyes, the sides of the head are elevated, and the antennæ spring from a notch under this raised part. In *female* (fig. 3) the head is quadrangular, the edge of the clypeus in front abrupt, slightly sinuated in the middle, the sides somewhat dilated. *Tho-*

rax margined, that of the *male* slightly quadrate and considerably convex above, the surface irregular, and having two depressions in the middle, the sides slightly sinuated, anterior angle rounded; in front the thorax is lobed, (a very distant but yet decided approximation to the elongated frontal process on the thorax of *Gol. rhinophyllus,* Wied. (*Mycteristes,* Laporte) and *Phædimus Cumingii,* Waterhouse,) the margins on each side of the lobe considerably sinuated, and allowing as it were the side of the thorax to be seen; under side of thorax on the side behind much excavated for the reception of the femora of anterior legs: this character is very prominent in the *female* also, which has the thorax more depressed and very slightly lobed or sinuated in front. In the male the femora of hind-legs fit into the slightly excavated



sides of the metathorax. Legs of the *male,* especially the anterior pair, strong, with six irregular teeth on the tibiæ, three on external edge and three on internal; in the female the fore-legs are less strong, and the tibiæ have three strong teeth on the outside, the interior apical one only being present. Tarsi of fore-legs of male very large and compressed, the terminal joint beneath, at the end projecting, but apparently hardly spined.

Scutellum more pointed in male than in female. Elytra in both sexes ciliated; lateral margin slightly sinuated near the shoulder. Pygidium of male edged with hairs and bluntish, of female more elongated. Other characters might be added, but, with the figures*, I think the above may suffice to separate this Abyssinian *Cetonia* from any of the described subgenera.

G. (*Compsocephalus*) *Horsfieldianus,* White (figs. 1, 2, 3).

Viridis, thorace, scutelloque ferrugineo-fuscis, thorace viridi margi-

* For the sketches of this Goliath I am indebted to the obliging kindness of G. Ford, Esq. The extended legs are shown considerably fore-shortened, and the specimens are represented unset.

nato, elytris ochracescenti-viridibus, corpore subtus pedibusque metallico-viridibus, rubro-tinctis. Long. ♂ unc. 1, lin. 4; ♀ unc. 1, lin. 3.

Hab. Abyssinia.

♂ ♀ in Mus. "Hon. E. Ind. Co."; ♀ in Mus. Brit. T. Horsfield, M.D. Hoc insectum in honorem Thomæ Horsfield, M.D., Faunæ Floræque Javanicæ insularumque orientalium aliarum scrutatoris celeberrimi, nominavi.

Male.—Head above brown, on under side in some lights of a brilliant deep blue or bluish green; the clypeus excavated on under side at base of fork. Thorax and scutellum above of a rich deep rusty brown colour, the former narrowly margined with bright green, growing fainter where the thorax joins the scutellum; sides and under side metallic green. Elytra of a faded yellowish green, the surface dimpled; on the suture and near the scutellum lively green.

Female.—Head and thorax rich rusty brown, posterior half of the latter rather paler. Elytra plainer than in male and of a more lively green with the suture golden; lateral edge of elytra as in the male, with many light-coloured cilia which extend to the apex; the shoulders and a spot near the apex brown; under side and legs of a bright coppery red, segments slightly margined with green; tarsi of all the legs and tibiæ of fore-legs brownish.

VII.—*Description of a new species of* Melanogaster. By C. E. Broome, Esq.

To Richard Taylor, Esq.

Sir,

May I be permitted through the medium of your Journal to dedicate to my friend the Rev. M. J. Berkeley, to whose unwearied researches mycology is most deeply indebted, a pretty, new species of *Melanogaster* which I have lately met with in this neighbourhood? The characters are as follows:—

Melanogaster Berkeleianus, n. s. Parvus, globosus, longe radicatus; peridio sericeo albo, tactu gilvo fusco, intus pallide flavo; sporis minutis oblongo-ellipticis hyalinis albis, binucleatis.

The single specimen hitherto found was about the size of a pea, furnished with a long white root, which, as well as the silky white globose peridium, changed on the touch, or exposure to the air, to a pink-brown; the interior is of a delicate pale yellow, which is permanent; the texture of the walls of the cells is loosely cellular; spores elliptic-oblong, hyaline, containing two or sometimes three globose nuclei. In the form and colour of the spores this species very much resembles *Octaviana aphrodisiaca* of Montagne. Some of the spores appeared to be uniseptate, but this might arise from ocular deception. It grew in a loose soil in a wood composed of hazel, beech and firs, in October last.

I am, Sir, your obedient servant,

C. E. Broome.

Wraxall, near Bristol,
23rd December, 1844.

VIII.—*On the Laws which regulate the Geographical Distribution of Littoral Mollusca.* By M. Alcide d'Orbigny*.

The author in the first place urges the importance of investigations on the geographical distribution of the coast mollusca, as applied to general palæontology. It is, in fact, in the laws which at present regulate the geographical distribution of creatures that we must logically seek by comparison for light upon the successive animalization on the surface of the globe at all geological periods, in order to substitute well-ascertained facts for doubtful theories.

The author selected, as the theatre of his observations, South America, where he resided for eight years. Being at first of opinion, *à priori*, that the configuration of that continent, with relation to its latitude, the abrupt or very gradual slopes of its coasts, and the general currents which wash them, must have an immense influence upon this question, he points out particularly the characters which distinguish that part of the world, assisted, for these currents, by M. Duperrey's important map of the *movement of the waters*, without which he would have been unable to explain the anomaly of some facts. He presents in a table the name and *habitat* of 362 species of littoral mollusca, which, divided according as they belong to either of the two oceans, give 156 species peculiar to the Atlantic ocean, 205 species peculiar to the Pacific, and a single species common to both seas.

He examines separately the local faunas of the Atlantic and of the Pacific. In the first he finds that the Falkland islands have a peculiar fauna, that the fauna of the temperate regions is more numerous than that of the hot regions, and that each of these regions possesses from four to six times more peculiar than common species. The Pacific presented identical results relatively to the number of species peculiar and common to the hot and temperate regions; but the currents have there more influence on the partition of the species and on the separation of the local faunas where their action ceases.

His observations of the influence due to the orographic configuration of the coasts upon the zoological composition of the re-

* From the 'Comptes Rendus,' Nov. 18th, being an abstract by the author.

spective faunas which inhabit them, led him to the following results:—In ninety-five genera cited, fifty, or much more than half, are found only on one side, whilst forty-five only are common to the two seas. From this he concludes, that the configuration of the two coasts of South America, the one abrupt on the side of the Pacific, the other rising in a gentle acclivity from the Atlantic, have a greater influence upon the whole than the parallelism of the zones of latitude which the local faunas of the two oceans traverse equally.

In a fourth chapter, devoted to general deductions and conclusions, the author considers separately the action of the currents, the temperature, and the orographic configuration.

The general currents tend, by their incessant action, to diffuse upon all the points where they pass, the mollusca which can bear a great difference of temperature. In fact, in the Atlantic twelve species extend over nineteen degrees, and in the Pacific fifteen species are distributed over twenty-two degrees of latitude, traversing several different zones of heat, and cease to exist at the furthest northern limits of the currents, as is seen at Brazil and to the north of Callao (Peru). Thus we must, without any doubt, attribute to the general currents that influence of unequal value which carries the littoral mollusca of the cold regions in the Atlantic as far as the tropic only, and in the Pacific as far as eleven degrees more to the north.

The author finds the currents to have two opposite influences: by their continual action they tend evidently to diffuse the littoral mollusca beyond their natural limits of latitude; but when they are distant from the continent, as at the Falklands, when they double a cape advanced toward the pole, as at Cape Horn, or when they abruptly leave the coasts, under the hot regions, as at Payta, they then serve to isolate local faunas.

The effect of temperature is to confine species within more or less restricted limits; the proof of which lies in the number of mollusca peculiar to the different zones of heat traversed by the general currents, and above all in the sudden difference which is remarked between the composition of the local faunas of Payta and that of the parts situated to the north of Rio Janeiro. In fact, as soon as the action of the currents ceases to be felt, the temperature at once resumes all its influence, and a fauna peculiar to the hot regions begins to appear.

The orographic configuration of the coasts is marked by the different zoological forms which are observed between the two oceans: in fact, independent of the numerical amount of the genera which have been spoken of, it is easy to convince ourselves that the genera which predominate in the Pacific live principally on the rocks, whilst those of the Atlantic, which are wanting on the southern side, inhabit only the sandy bottoms. It is seen that the difference of orographic configuration of the coasts of the two oceans which wash South America exercises, by these conditions of existence more or less favourable which it offers to the littoral mollusca according to their genera, an immense influence upon the zoological composition of the faunas which inhabit them.

The author states it as a negative fact, that the greatest affluents, the Plata for example, which at its mouth is 128 kilomètres wide, have absolutely no influence upon the composition of the marine faunas of their environs.

M. d'Orbigny deduces from the facts observed by him the following conclusions, which apply immediately to the palæontologic faunas of the tertiary deposits:—

1. The faunas of two neighbouring seas, having an intercommunication, but separated only by a cape advanced toward the pole, may be distinct.

2. There may exist, at the same time, by the sole action of the temperature, in the same ocean and on the same continent, distinct faunas, according to the different zones of temperature.

3. Under the same zone of temperature, upon coasts in the neighbourhood of one and the same current, the currents may determine particular faunas.

4. A fauna distinct from the fauna of the nearest continent may exist upon an archipelago when the currents isolate it.

5. Distinct faunas, or at least differing much among themselves, may exist upon neighbouring coasts, by the sole action of orographic configuration.

6. When the same species are found over an immense extent of latitude, in the same basin, the currents will be the cause of it.

7. The identical species between two adjoining basins indicate direct communications between them.

8. The greatest affluents have absolutely no influence upon the composition of the neighbouring marine faunas; thus all the deductions which have been drawn from them, in the case of the tertiary basins, become illusory.

The author concludes by a final palæontological comparison. He has said that, with the exception of one species common to the two American oceans, all the others were, in the actual fauna, peculiar either to the Atlantic or to the Pacific, and the *ensemble* of the genera was very different in the two seas. The comparison of these results with the deductions drawn from the totality of the fossil shells of the lowest tertiary beds of South America, proves that these last, although differing specifically, are nevertheless in the same geographical conditions as the actual fauna.

Might we not conclude from this, that at the epoch when these tertiary beds were formed, the latitude, the currents, and the orographic configuration, had the same influences as at the present day? Thence it may be allowable to imagine that the Cordilleras had, at that geological epoch, sufficient height to form, upon a vast scale, a barrier between the two seas, and that, since that epoch, the south continent has not changed its form.

BIBLIOGRAPHICAL NOTICES.

Elements of Comparative Anatomy. By Rud. Wagner, M.D.; translated from the German by Alfred Tulk, M.R.C.S.E.

The greatest naturalist of modern times was also the highest authority in comparative anatomy; even as the first and greatest of naturalists in ancient times was also well-versed in the internal structure of the animals he classified. Cuvier and Aristotle had alike an intimate conviction of the necessity of comparative anatomy to the accomplishment of the zoologist. But comparative anatomy has still higher tendencies than those it possesses as guiding the zoologist in his arrangements: the form and structure of the living things that people and that have peopled this earth are intimately associated with its history, so that the geologist and palæontologist are scarcely less interested in a knowledge of comparative anatomy than the zoologist. More than this: function is identical throughout the animated realm of nature, and the physiologist, and, as a derivative from him, the physician and the surgeon, are all alike interested in possessing a comprehensive knowledge of the organs by which the specific functions, whose sum constitutes the life in each particular species of animals, are performed. Hence it comes that comparative anatomy has often been the preparative to the highest eminence ever achieved in the medical profession. We need only quote Mr. John Hunter in proof of the fact.

We had been for some time without a good elementary treatise on comparative anatomy in the English language. Strange as it may appear, it must still be allowed that there are certain subjects upon which we do not seem destined ever to possess perfectly satisfactory rudimentary works by native authors: comparative anatomy is one of these. The old standard was Blumenbach, which, translated by Mr. Lawrence, came to a second edition under the revision of Mr. Coulson. Then we had Carus, with the extent of whose success among us we are unacquainted. Now we have Wagner, a work which we cannot but regard as a great improvement upon all its predecessors. The grand features of the subject are in fact presented in the elements of comparative anatomy with the hand of a master, and the minor details are also there, just to the point that comes short of tediousness. The book is truly excellent, and we recommend all our readers to procure a copy, to interleave it, and have it at hand as the repository of any observations which they themselves may make.

The four parts already published, each complete in itself, comprise the anatomy of Mammalia, Birds, Reptiles and Fishes,—of the vertebrate animals therefore, and may be bound separately as a work perfect in itself. One word in reference to the translation : this we find faithful, and, like the original, terse and to the point; admirable for reference upon particular subjects, if less agreeable to read in the way we do a novel. Mr. Tulk is himself an excellent anatomist and naturalist, and deserves the thanks of all true friends of natural history for the pains he has taken in giving them a compendious guide to the very elements of all zoological science.

PROCEEDINGS OF LEARNED SOCIETIES.

April 23, 1844.—William Yarrell, Esq., Vice-President, in the Chair.

A continuation of Mr. Sylvanus Hanley's paper on new *Tellinæ* was read, containing the following descriptions :—

Tellina sincera. *Tel. testâ* T. carnariæ *simillimâ, sed majore, latiore, compressâ et albidâ; striis tenuioribus; ligamento valdè angusto; natibus paululùm ad latus anticum spectantibus; margine ventrali tantùm subarcuato; dentibus lateralibus conspicuis, subæquidistantibus.* Long. 1·20; lat. 1·40 poll.

Hab. ——? Mus. Cuming, Metcalfe.

Extremely like *T. carnaria*, but larger, broader, and more flattened. The oblique striæ are minute, and almost entirely disappear in aged specimens.

Tellina Senegalensis. *Tel. testâ* T. splendidæ *simillimâ, sed striis sulcisque exilioribus magisque confertis; extremitate etiam posticâ, striis arcuatis obliquis in utrâque valvulâ, ornatâ; superficie internâ purpureâ, albo posticè biradiatâ.* Long. 0·80; lat. 1 poll.

Hab. Senegal.

An extremely common shell, bearing some slight resemblance to *carnaria*, and has probably been hitherto neglected, from its close approximation to the *splendida* of Anton.

Tellina incarnata. *Tel. testâ obovatâ, subobliquâ, inæquilaterali, ventricosâ, solidâ, incarnatâ aut albido-roseâ, impolitâ; striis elevatis concentricis tenuissimis, strias radiantes elevatas confertissimè decussantibus; margine ventrali arcuato, posticè sursùm accliviore; dorsali anticè declivi et prope nates paululùm incurvato, posticè elevatiore subarcuato et subitò declinante; ligamento infosso; superficie internâ flavescente, margines versus subroseâ; dentibus lateralibus maximis.* Long. 0·70; lat. 0·95 poll.

Hab. San Nicholas, Zebu; sandy mud, low water.

This graceful species is allied in sculpture to the *decussata* of Lamarck, but the shape and colouring easily distinguish it. In almost every adult specimen the tips of the beaks are chalky white, the umbones yellow, and the ligamental edge rosy.

Tellina Lyra. *Tel. testâ ovali, tenui, compressâ, nitidiusculâ,* *albâ, striis concentricis elevatis ornatâ, interstitiis lævigatis; margine ventrali ad utramque extremitatem arcuato, medio convexiusculo; dorsali posticè altiore, convexo satisque declinante, anticè prope lunulam excavatam, aut horizontali aut leviter acclivi; latere antico paululùm longiore, rotundato; extremitate posticâ obtusâ; natibus acutis, prominentibus; flexurâ obsoletâ; dentibus lateralibus distinctis, antico approximato, postico parvo, remotiore.* Long. 1·80; lat. 2·60 poll.

Hab. Tumbez, Peru.

This most exquisite shell will probably prove inequivalve, but as I have never met with any but left valves, I can only judge so from analogy. Although very different in shape, its texture and the excavated dorsal areas remind us of *Burnetti*. The ventral fold is obsolete, and the situation of the umbonal ridge is indicated by a linear carina, which is only separated from the dorsal edge by a narrow concavity.

Tellina philippinarum. *Tel. testâ ovatâ aut subovatâ, tenui, subæquilaterali, intus extusque candidâ, nitidâ, concentricè et tenuissimè striatâ; margine ventrali arcuato, posticè sursùm acclivi; dorsali antico brevi, recto, subdeclivi; latere postico subcuneiformi; ligamento prominulo; extremitate anticâ obtusâ; cardine dente laterali (in junioribus subobsoleto) antico subapproximato.* Long. 0·70; lat. 1 poll.

Hab. St. Nicholas, isle of Zebu, and Jimmamailan, isle of Negros.

This shell, which appears to be common throughout the Philippine Islands, reminds us by its shape of the *T. solidula*. It is rather variable in its proportions, and but rarely attains the assigned dimensions. In aged specimens the vicinity of the umbones is usually of a flesh-colour or tawny orange.

Tellina Listeri. *Tel. testâ obovatâ, solidâ, ventricosâ aut subventricosâ, æquilaterali, glabrâ, extus intusque candidâ; margine ventrali medio subrecto; dorsali anticè arcuato paululùmque declivi, posticè recto, declivi; latere antico dilatato, obtusè rotundato; postico obtusissimè biangulato; ligamento magno, infosso; natibus obtusis; umbonibus plerumque subplanulatis; cardine dente laterali antico subapproximato.* Long. 2·3; lat. 3· poll.

Hab. Senegal. Mus. Cuming, Hanley.

This species appears to be represented in Lister's 'Historia Conchyliorum,' plate 288. fig. 235. Although in general shape it is approached by many of its section (*Tellinæ* with a single lateral tooth), its superior size and solidity render it remarkable.

Tellina pumila. *Tel. testâ* T. philippinarum *simillimâ, sed angustiore; margine ventrali medio subrecto; dorsali utrinque recto aut subconcavo, anticè paululùm declivi, latere postico cuneiformi; margine antico recto, verticali.* Long. 0·60; lat. 0·90 poll.

Hab. Valparaiso; sandy mud, from seven to thirty fathoms.

Easily to be confused with *T. philippinarum*, but is decidedly narrower and the margins less convex. The front dorsal edge, which is longer and less sloping than in that species, forms an angle with the straight and direct anterior margin.

Tellina Culter. *Tel. testâ parvâ, ovatâ, inæquilaterali, tenuiusculâ, convexâ, nitidâ, intus extusque aurantio-roseâ, lævigatâ; margine ventrali anticè arcuato, posticè sursùm acclivi; dorsali anticè magis minusve convexo satisque declivi, posticè recto et valdè declivi; latere antico producto, ad extremitatem obtusè rotundato; postico acuminato; natibus acutis; ligamento vix prominulo; flexurâ ventrali obsoletâ; cardine dente laterali antico parvo, approximato.* Long. 0·35; lat. 0·55 poll.

Hab. Cagayan, province of Misamis, Mindanao; twenty-five fathoms, sandy mud.

This species is closely allied to the *tenuis* of our own shores, but may be distinguished by its acuminated extremity. In young specimens there are indications of concentric striæ near the front of the ventral margin.

Tellina Corbuloides. *Tel. testâ subovali, inæquivalvi, solidâ, subventricosâ, sublævigatâ, roseo-incarnatâ (intus plerumque aurantio-rubrâ); margine ventrali sinistræ valvulæ, ultra marginem convexiusculum alterius, prominente; latere antico breviore, obtusè acuminato; extremitate posticâ rotundatâ; areâ dorsali posticâ in adultis subplanulatâ; natibus obtusis; flexurâ ventrali distinctâ; cardine dente laterali, parvo, approximato, antico.*

Var. *Testâ extus intusque candidâ.* Long. 0·80; lat. 1·20 poll.

Hab. Catbalonga, isle of Samar; ten fathoms, soft mud.

The general appearance of this shell gives us the idea of a *Corbula.* It is covered when fresh with a thin fugacious epidermis, which reflects the most brilliant prismatic colours.

Tellina Cycladiformis. *Tel. testâ parvâ, rotundato-subtrigonâ, tenui, ventricosâ, intus extusque incarnatâ aut pallidè roseâ, sublævigatâ; margine ventrali convexo; dorsali utrinque declivi, convexiusculo; latere antico rotundato et paullò breviore; extremitate posticâ obtusè subangulatâ; ligamento prominulo; flexurâ costâque umbonali obsoletis; cardine dente laterali parvo, approximato, antico.* Long. 0·20; lat. 0·25.

Hab. St. Nicholas, Zebu.

Not unlike *pisiformis,* but destitute of oblique striæ.

Tellina insculpta. *Tel. testâ oblongo-elongatâ, solidiusculâ, compressâ, æquilaterali, extus intusque candidâ; sulcis confertis concentricè exaratâ, striisque tenuissimis radiantibus (præsertim posticè) decussatâ; margine ventrali elongato, subrecto; dorsali utrinque subrecto, subdeclivi; extremitate posticâ subbiangulatâ; flexurâ ventrali distinctâ; cardine dente laterali quamplurimum approximato, antico.* Long. 1; lat. 2 poll.

Hab. Chiriqui, West Columbia; sandy mud, three fathoms.

This unique and elegant shell possesses the shape and general appearance of a *Psammobia.* The single anterior lateral tooth is so close to the primary ones, that the hinge appears to be composed of three cardinal teeth in the left valve. Beyond the almost obsolete umbonal ridge the concentric sulci become broken into small scales. The delicate radiating striæ are quite obsolete in front. The shell seems slightly inequivalve.

Tellina inæqualis. *Tel. testâ subovatâ, valdè inæquilaterali, solidâ, convexâ, candidâ, tenuiter striatâ; striis supernè obliquis, infernè concentricis, flexuosis; supra costam umbonalem inconspicuam, rugis erectis flexuosis, asperatâ; margine ventrali convexissimo; dorsali anticè subincurvato et valdè declivi, posticè brevi, recto, subdeclivi; latere antico producto, ad extremitatem attenuato, rotundato; extremitate posticâ obtusâ; natibus acutis; lunulâ distinctâ; superficie internâ candidâ, aut flavescente; cardine dente laterali magno, subremoto, antico.* Long. 0·90; lat. 1·20 poll.

Hab. Ceylon. Mus. Cuming.

An unique specimen of this curious shell is in the museum of Mr. Cuming, and reminds us in many particulars of the *Tellina Gargadia*; but that species is neither so narrow nor so greatly inequilateral, its oblique striæ do not extend over the posterior portion of the shell, and its hinge is clearly provided with two lateral teeth. The elevated flexuous wrinkles radiate down the umbonal slope in three distinct lines.

Tellina Felix. *Tel. testâ subovali, solidiusculâ, valdè inæquilaterali, convexiusculâ, nitidâ, lævigatâ, intus extusque roseâ; margine ventrali vix convexiusculo; dorsali anticè vix declivi, convexo, posticè valdè declivi; latere postico brevissimo, obtusè subtruncato, infernè subangulato; extremitate anticâ rotundatâ; costâ umbonali et flexurâ ventrali subobsoletis; cardine dente laterali magno, approximato, antico.* Long. 0·38; lat. 0·80 poll.

Hab. Panama; sandy mud, six to ten fathoms.

This elegant little shell approximates in form to the British *Donacina*, but differs as well in colouring as in sculpture and teeth.

Tellina columbiensis. *Tel. testâ ellipticâ aut oblongo-ellipticâ, compressiusculâ, subtenui, lævigatâ, intus extusque albidâ, epidermide tenuissimâ, fulvo-cinereâ indutâ; margine ventrali medio convexiusculo, utrinque arcuato; dorsali utrinque convexo, anticè paullò, posticè satis declivi; latere antico longiore, rotundato; extremitate posticâ acuminatâ; flexurâ subobsoletâ; dentibus primariis minimis, lateralibus nullis.* Long. 1·70; lat. 3 poll.

Hab. Monte Christi, West Columbia; sandy mud, twelve fathoms.

Its more compressed valves and minute teeth will distinguish it from the few species which are allied to it in outline. The hinge-margin is very short and rather broad. The general shape is that of *T. Soverbii*.

Tellina Souleyeti. *Tel. testâ oblongâ, tenuiusculâ, convexo-depressâ, intus extusque albidâ, lævigatâ; margine ventrali magis minusve convexo; dorsali anticè convexiusculo et subdeclivi, posticè subrecto aut subretuso et valdè declivi; flexurâ costâque umbonali distinctis; ligamento infosso; natibus acutis; latere antico* *longiore, rotundato; extremitate posticâ subrostratâ; dentibus lateralibus nullis.* Long. 0·75; lat. 1·25 poll.

Hab. St. Nicholas, Zebu; sandy mud at low water.

I have named this species in honour of my friend M. Souleyet, whose investigation of the *Pteropoda* promises to be of high interest to natural science.

Tellina undulata. *Tel. testâ oblongâ, tenuissimâ, compressâ, impolitâ, intus extusque albidâ, subobliquè et concentricè undulatâ; margine ventrali convexo; dorsali anticè subrecto et vix declivi, posticè incurvato, satisque declivi; latere postico brevi, attenuato, rostrato; flexurâ costâque umbonali distinctis; natibus acutis; dentibus lateralibus nullis.* Long. 0·40; lat. 0·80 poll.

Hab. St. Elena, West Columbia; sandy mud, six fathoms.

The oblique waves are chiefly conspicuous in front of the shell, and become concentric posteriorly. This character is so distinct that the species cannot possibly be confounded with any of this genus. The general shape is that of *crucigera*; the fold is very distinct and the ligament sunken.

Tellina micans. *Tel. testâ subovali, tenui, nitidissimâ, compressâ, niveâ, lævigatâ; margine ventrali convexo; dorsali anticè convexiusculo, subhorizontali; latere antico longiore, ad extremitatem rotundato aut obtuso; postico cuneiformi; flexurâ costâque umbonali obsoletis; natibus obtusis; dentibus lateralibus nullis.* Long. 0·50; lat. 1 poll.

Hab. Catbalonga, isle of Samar, and Bias, isle of Negros.

Bears a close resemblance to the *margaritacea* of Lamarck, but that species is not devoid of lateral teeth. It is a glassy-looking shell and highly polished; the surface too is sometimes slightly opalescent.

Tellina cuspis. *Tel. testâ ovatâ, solidiusculâ, convexâ, nitidiusculâ, roseâ, anticè et infernè substriatâ; margine ventrali arcuato; dorsali utrinque subdeclivi, anticè convexo, posticè recto aut subretuso; flexurâ costâque umbonali distinctis; latere antico paululùm longiore, rotundato; postico subacuminato, subrostrato; dentibus lateralibus nullis.* Long. 1·20; lat. 1·85 poll.

Hab. —— ? Mus. Cuming, Walton, Metcalfe.

A beautiful shell, whose general appearance is that of an abbreviated specimen of the *T. depressa* of Lamarck, which latter must resume its prior appellation of *incarnata*, being decidedly the species so designated by Linnæus.

"Descriptions of *Marginellæ* collected during the voyage of H.M.S. Sulphur, and from the collection of Mr. Cuming," by Mr. Hinds.

Marginella, Lamarck.

Section I. *Phænospira.*

Marginella piperata. *Mar. testâ obovatâ, maculis parvis nigris et albidis, interdum longitudinaliter coalitis, confertim ornatâ; spirâ retuso-conicâ, obtusâ; anfractu ultimo rotundatè angulato;*

spirâ lineâ unicâ comitatâ; labro incrassato, extùs nigro maculato, intùs lævi; columellâ quadriplicatâ. Axis 9 lin.

Hab. ——?

Cab. Cuming.

Marginella scripta. *Mar. testâ parvâ, retusè ovatâ, cincreâ, lineis nigris longitudinalibus valdè angulatis (zic-zac) sparsim maculatis; spirâ retusissimâ; labro intùs denticulato; columellâ quinqueplicatâ, duabus superioribus transversis.* Axis $3\frac{1}{2}$ lin.

Hab. Straits of Macassar; in eleven to fifteen fathoms, coarse sand.

Cab. Belcher.

Marginella livida. *Mar. testâ ovatâ, pallidè cærulescente, obsoletè trifusciatâ; spirâ retusâ; labro albido, valdè incrassato, intùs lævi; columellâ latè callosâ, supra spiram ascendente, quadriplicatâ.* Axis $6\frac{1}{2}$ lin.

Hab. Cuba.

Cab. Grüner.

Shell ovate, dull pale blue, indistinctly banded by a darker colour; the face covered by a white callosity spreading over the columella, ascending along the spire, and running into the labrum, which is thus thickened even beyond what is usual; the back shouldered and slightly angular.

It is to the liberality of M. Grüner that I am indebted for the opportunity of including this shell in these descriptions.

Marginella nodata. *Mar. testâ elongatè ovatâ vel subfusiformi, luteo-olivaceâ, lineis nigris subflexuosis longitrorsum ornatâ, punctis concoloribus conspersis; spirâ elongatâ, inconspicuè plicocostatâ; labro incrassato, intùs denticulato; columellâ quadriplicatâ.* Axis 10 lin.

Hab. Cape Blanco, west coast of Africa; in from twelve to fifteen fathoms, among sand.

Cab. Belcher.

With the general aspect and character of *M. Cleryii*, but somewhat larger, more broadly shouldered, the longitudinal lines studded at intervals with dark spots, and which are somewhat regularly disposed in the transverse direction; and lastly, the spire is less elongated and furnished with rather indistinct pliciform ribs.

Marginella musica. *Mar. testâ ovatâ, cinereo-olivaceâ, lineis nigris transversim ornatâ; spirâ retuso-conicâ; labro paululùm incrassato, intùs lævi; columellâ quadriplicatâ.* Axis 8 lin.

Hab. Cape Blanco, west coast of Africa; in thirty-five fathoms, sand.

Cab. Belcher.

Readily distinguished from any species hitherto recorded by the transverse, somewhat distant, and regularly disposed dark lines.

Marginella Belcheri. *Mar. testâ concinnè ovatâ, albâ, lineis eleganter punctatis raris, frequentioribus, vel confertis transversim dispositis, interdum albo fasciatâ; spirâ mediocri, conicâ; labro incrassato, albo, prope medium subdilatato, intùs lævi; columellâ quadriplicatâ.* Axis 9 lin.

Hab. Cape Blanco, west coast of Africa; in from twelve to fifteen fathoms.

Cab. Belcher.

This very beautiful species displays considerable variation in the character of its markings. In some individuals the exterior is nearly white, with a few scattered transverse lines, composed of elegant minute dottings, and these are perhaps the older shells; from this they gradually become more and more covered with them, till in some the whole surface is quite darkened. In this latter case irregular lines become conspicuous in the longitudinal direction. In many specimens the transverse lines are separated by intervals, which permit the ground-colour of the shell to show through like milk-white bands. The outer lip seems in all cases to retain its uniform white colour, and at its upper part is slightly emarginate, but becomes thickened at and a little beneath the centre.

Marginella sapotilla. *Mar. testâ elongatè ovatâ, ferè subcylindraceo-ovatâ; cinereâ vel glaucescente, concolore; spirâ retuso-conicâ; aperturâ intùs fuscâ; labro incrassato, recto, albo, posticè fulvo, intùs lævi; columellâ quadriplicatâ.* Axis 11 lin.

Hab. Panama; in from five to thirteen fathoms, sandy mud.

Cab. Belcher et Cuming.

The American analogue of *M. cærulescens*, or more correctly *M. prunum*, than which it is of smaller size, more cylindrical in shape, whence result its straight outer lip, less fullness and roundness of the shoulders, but without any disposition to that obscure banding which is visible in some specimens of *M. prunum*. Both species present a rich brown colour within the aperture, and in general appearance they are remarkably alike.

Marginella constricta. *Mar. testâ albidâ, obscurè trifasciatâ; spirâ retusè conicâ; anfractu ultimo prope medium coarctato; labro incrassato, medio incurvato, intùs lævi, supernè ad spiram adscendente; columellâ quadriplicatâ.* Axis 8 lin.

Hab. —— ?

Cab. Cuming.

Marginella nivosa. *Mar. testâ ovatâ, cinereo-fuscâ; maculis lacteis laceratis super lineas longitudinales dispositis; spirâ retusâ; labro subrecto, incrassato, albo, ad spiram adscendente, intùs infra medium læviter denticulato; columellâ quadriplicatâ.* Axis 9 lin.

Hab. —— ?

Cab. Cuming.

A full-shaped oval shell of a fawn colour, with longitudinal lines, as if marking the periods of growth, on which are aggregated small irregular milk-white spots; these are generally clustered on the lines, but a few occupy the intervals between them. The outer lip is of an uniform white, and beneath its middle are a few rather indistinct denticulations; above it ascends to the spire, which it renders callous on that side. Within it is of a pale fawn-colour.

Marginella pruinosa. *Mar. testâ ovatâ, coarctatâ, albidâ, obsoletè trifasciatâ, maculis parvis lacteis conspersâ; spirâ conico-*

retusâ, subcallosâ; labro incrassato, paululùm incurvato, intùs læviter denticulato; aperturâ angustâ; columellâ quadriplicatâ. Axis. 6 lin.

Hab. West Indies.

Cab. Cuming.

In some respects similar to the foregoing, but, in the place of its full rounded form, this is contracted towards the middle of the body-whorl. The fasciation is constant on all the specimens, but always very faint and indistinct, and the small milk-white spots are scattered with little regularity over the surface.

Marginella australis. *Mar. testâ retusè ovatâ, albidâ vel pallidè corneâ; spirâ conico-retusâ; labro incrassato, ponè albido, intùs lævi; columellâ quadriplicatâ, versus basin albo fasciatâ.* Axis $3\frac{1}{3}$ lin.

Hab. North-west coast of Australia; in coral sand at low water. Mr. Dring, R.N.

Cab. Cuming.

The characters of this little shell are quite unobtrusive, if we except the white base of the columella; and this may serve to distinguish it from any species hitherto on record.

Marginella vitrea. *Mar. testâ coniformi, hyalinâ, nitidâ; spirâ valdè retusâ; labro paululùm incrassato et reflexo, intùs lævi; columellâ plicis quatuor gracilibus.* Axis 3 lin.

Hab. West coast of Africa.

Cab. Belcher.

Marginella fusiformis. *Mar. testâ fusiformi, albidâ vel pallidè corneâ; spirâ elatâ, obtusâ; anfractu ultimo gradatim attenuato; labro paululùm incrassato, intùs lævi; aperturâ lineari; columellâ quadriplicatâ.* Axis 3 lin.

Hab. Straits of Malacca; in seventeen fathoms, mud.

Cab. Belcher.

This species departs so far from the usual outline of the genus as to become decidedly fusiform. The recent shell is most probably of a delicate horn-colour, though the prevailing number of our specimens are white, shining and glossy, and, there seems little doubt, have lost their original colour.

The following species belongs to a section of this genus, which might with much propriety be separated as a subgeneric group, under the name of *Volvarina*. They are all delicate and rather thin shells, with an apparent spire, the labrum never varixed, and usually not even thickened, with a sharp edge, always bent in on the aperture. The columellar folds are nearly constantly four in number, slender, and more or less oblique. *M. avena*, Valenciennes, is a typical species.

Marginella nitida (Volvarina). *Mar. testâ elongatè ovatâ, fuscâ, politâ, nitidâ, concolore; spirâ conicâ, obtusâ; labro tenui, acuto, inflexo, pallido; columellâ quadriplicatâ.* Axis 4 lin.

Hab. ——?

Cab. Cuming.

Section II. *Cryptospira.*

Marginella tricincta. *Mar. testâ obeso-ovatâ, cinereo-cærulescente, fusco trifasciatâ, labro incrassato, luteo, intùs lævi; columellâ sexplicatâ, ad basin albâ; plicis tribus superioribus transversis, supremâ paululùm obsoletâ.* Axis 11 lin.

Hab. Straits of Macassar; in eleven fathoms, coarse sand.

Cab. Belcher.

Marginella blanda. *Mar. testâ ovatâ, tenui, sardonychiâ, obsoletè fasciatâ; spirâ vix occultâ, pallidâ; labro subincrassato et subreflexo, intùs lævi; columellâ albidâ, sexplicatâ, plicis superioribus evanidis.* Axis 9 lin.

Hab. Cape Blanco, west coast of Africa; in twelve to fifteen fathoms.

Marginella imbricata. *Mar. testâ ovatâ, albidâ, maculis rufis quadratis propè medium unifasciatâ, aliter punctis transversis ordinatè vestitâ; apice puncticulato; labro reflexo medio et cum basi columellæ ustulato; columellâ subcallosâ, quadriplicatâ.* Axis 5 lin.

Hab. Acapulco. Col. Moffat.

Cab. Cuming.

In one specimen the tessellated band which encircles the body-whorl is broken up into a number of small spots and punctations, so that though these markings present usually a nearly square shape, they are most probably disposed to vary. The shell in some respects approaches *M. interrupta.*

Marginella muralis. *Mar. testâ elongatè ovatâ, ferè subcylindraceâ, lacteâ, nitidâ; maculis pallidè rufis quadratis transversis ornatâ, interdum albo marginatis, majoribus per series tres dispositis; labro vix incrassato, subinflexo, intùs sulcato; columellâ plicis tribus inferioribus distinctis, obliquis, alteris superioribus obsoletis transversis.* Axis $5\frac{1}{2}$ lin.

Hab. ——?

Cab. Cuming.

This is a remarkably pretty glittering species, and the specific name seems justified by the appearance of the pale red regularly-disposed square markings, which resemble the extremities of the bricks in a wall. The labrum is not merely toothed within, but distinctly sulcate. It approaches M. Kiener's *M. maculosa,* but the ornation is quite of a different character, and it has no angular elevation on the body-whorl.

Marginella sagittata. *Mar. testâ retuso-ovatâ, pallidâ, lineis rufis sagittatis transversis, alteris longitudinalibus confluentibus, ornatâ; apice puncticulato; labro subinflexo, intùs lævi; columellâ vix quadriplicatâ.* Axis 5 lin.

Hab. Brazils: Humphreys.

Cab. Cuming.

Shell shortened, ovate, the ornation consisting of reddish brown, transverse, arrow-headed markings, disposed in regular series and connected by waved longitudinal lines. The labrum is not the least thickened, and slightly inflexed, and the superior fold of the columella is scarcely distinguishable.

May 14.—Rev. John Kirby in the Chair.

The conclusion of the paper by Dr. Falconer and Capain Cautley on the Gigantic Fossil Tortoise of India was read :—

"On a former meeting we went through the anatomical characters presented by the remains of the *Colossochelys Atlas*. Commencing with the plastron, we traced the modifications of form through the costal elements of the carapace and the dorsal vertebræ, all of which bear the closest resemblance to the ordinary type of the Chersite Chelonians, or true land tortoises. A like result followed the examination of the extremities, which, as exhibited in the remains of the humerus, femur and ungueal phalanges, were seen to be constructed exactly on the plan of *Testudo*, with columnar legs and truncated club-shaped feet, as in the proboscidean Pachydermata. The same direction of affinity was observed throughout the conformation of the head. The only portions of the skeleton from which more or less direct evidence was not derived, were the neck and tail vertebræ, of which there were no specimens in the collection. The general result of the examination showed that the *Colossochelys Atlas* was strictly a land tortoise in every part of its bony frame; and the impressions of the horny scutes proved the like in regard to the arrangement of its dermal integument.

"The principal distinctive characters were found in the sternum, which is enormously thickened at its anterior extremity, along the united portion of the episternal bones, and contracted into a narrow neck, so that the width of the combined episternals does not much exceed their thickness: this thickened portion bears on its under side a deep massive cuneiform keel, which terminates upon the commencement of the entosternal piece. There is more or less thickening of this part in all the species of *Testudo*, and the amount of it is very variable in different individuals of the same species; but there is nothing approaching the same degree of contraction in reference to the thickness, nor aught like a developed keel, in any of the existing land tortoises which we have either had an opportunity of examining, or seen described in systematic works on the tribe. The keel in the fossil is feebly shown in the young animal, but strongly marked in the adult. Conceiving that generic distinctions are only legitimate in the case of well-defined modifications affecting some of the leading characters in the organization of an animal, we do not consider ourselves warranted in attaching a higher systematic importance to the *Colossochelys* than as a subgenus of *Testudo*, which may technically be defined thus (the distinction resting mainly on the form of the sternum) :—

Subgen. Colossochelys.

Testa solida, immobilis, sterno anticè in collum valdè incrassatum, subtùs cariná crassâ cuneiformi instructum, angustato. Testudo terrestris, staturâ et mole ingenti (inde nomen κολοσσὸs et χέλυs) sui tribus prodigium! Olim in Indiæ orientalis provinciis septentrionalibus degebat.

"*Colossochelys Atlas.*—The first fossil remains of this colossal tortoise were discovered by us in 1835 in the tertiary strata of the Sewalik Hills, or Sub-Himalayahs skirting the southern foot of the great Himalayah chain. They were found associated with the remains of four extinct species of Mastodon and Elephant, species of Rhinoceros, Hippopotamus, Horse, Anoplotherium, Camel, Giraffe, Sivatherium, and a vast number of other Mammalia, including four or five species of Quadrumana. The Sewalik fauna included also a great number of reptilian forms, such as crocodiles and land and freshwater tortoises. Some of the crocodiles belong to extinct species, but others appear to be absolutely identical with species now living in the rivers of India: we allude in particular to the *Crocodilus longirostris*, from the existing forms of which we have been unable to detect any difference in heads dug out of the Sewalik Hills. The same result applies to the existing *Emys tectum*, now a common species found in all parts of India. A very perfect fossil specimen, presenting the greater part of the evidence of the dermal scutes, is undistinguishable from the living forms, not varying more from these than they do among each other. Prof. Thomas Bell, the highest living authority on the family, after a rigid examination, confirms the result at which we had arrived, that there are no characters shown by the fossil to justify its separation from the living *Emys tectum*. There are other cases which appear to yield similar results, but the evidence has not yet been sufficiently examined to justify a confident affirmation of the identity at present.

"The remains of the *Colossochelys* were collected during a period of eight or nine years along a range of eighty miles of hilly country: they belong in consequence to a great number of different animals, varying in size and age. From the circumstances under which they are met with, in crushed fragments, contained in elevated strata which have undergone great disturbance, there is little room for hope that a perfect shell, or anything approaching a complete skeleton, will ever be found in the Sewalik Hills. It is to be mentioned, however, that remains of many of the animals associated with the *Colossochelys* in the Sewalik Hills have been discovered along the banks of the Irrawaddi in Ava, and in Perim Island in the Gulf of Cambay, showing that the same extinct fauna was formerly spread over the whole continent of India.

"This is not the place to enter upon the geological question of the age of the Sewalik strata; suffice it to say, that the general bearing of the evidence is that they belong to the newer tertiary period. But another question arises: 'Are there any indications as to when this gigantic tortoise became extinct? or are there grounds for entertaining the opinion that it may have descended to the human period?' Any *à-priori* improbability, that an animal so hugely disproportionate to existing species should have lived down to be a contemporary with man, is destroyed by the fact that other species of Chelonians which were coeval with the *Colossochelys* in the same fauna, have reached to the present time; and what is true in this respect of one species in a tribe, may be equally true of every other placed under the same circumstances. We have as yet no direct evidence to the point, from remains dug out of recent alluvial deposits; nor is there any historical testimony confirming it; but there are traditions connected with the cosmogonic speculations of almost all Eastern nations having reference to a tortoise of such gigantic size, as to be associated in their fabulous accounts with the elephant. Was this tortoise a mere creature of the imagination, or was the idea of it drawn from a reality, like the *Colossochelys*?

"Without attempting to follow the tortoise tradition through all its ramifications, we may allude to the interesting fact of its existence even among the natives of America. The Iroquois Indians believed that there were originally, before the creation of the globe, six male beings in the air, but subject to mortality. There was no female among them to perpetuate their race; but learning that there was a being of this sort in heaven, one of them undertook the dangerous task of carrying her away. A bird (like the Garŭda of Vishnoo or the Eagle of Jupiter) became the vehicle. He seduced the female by flattery and presents: she was turned out of heaven by the supreme deity, but was fortunately received upon the back of a tortoise, when the otter (an important agent in all the traditions of the American Indians) and the fishes disturbed the mud at the bottom of the ocean, and drawing it up round the tortoise formed a small island, which increasing gradually became the earth. We may trace this tradition to an Eastern source, from the circumstance that the female is said to have had two sons, one of whom slew the other; after which she had several children, from whom sprung the human race.

"In this fable we have no comparative data as to the size of the tortoise, but in the Pythagorean cosmogony the infant world is represented as having been placed on the back of *an elephant, which was sustained on a huge tortoise*. It is in the Hindoo accounts, however, that we find the fable most circumstantially told, and especially in what relates to the second Avatar of Vishnoo, when the ocean was churned by means of the mountain Mundar placed on the back of the king of the tortoises, and the serpent Asokee used for the churning-rope. Vishnoo was made to assume the form of the tortoise and sustain the created world on his back to make it stable. So completely has this fable been impressed on the faith of the country, that the Hindoos to this day even believe that the world rests on the back of a tortoise. Sir William Jones gives the following as a translation from the great lyric poet Jyadeva: 'The earth stands firm on thy immensely broad back, which grows larger from the callus occasioned by bearing that vast burden. O Cesava! assuming the body of a tortoise, be victorious! Oh! Hurry, Lord of the Universe!'

"The next occasion in Indian mythology where the tortoise figures prominently is in the narratives of the feats of the bird-demigod 'Garŭda,' the carrier of Vishnoo. After stating the circumstances of his birth, and the disputes between his mother Vinŭta and 'Kudroo,' the mother of the serpent, it is mentioned that he was sent on an expedition to bring 'Chundra' the moon, from whom the serpents were to derive the water of immortality. While pursuing his journey, amidst strange adventures, Garŭda met his father Kŭshgŭfa, who directed him to 'appease his hunger at a certain lake, where *an elephant and tortoise were fighting*. The body of the tortoise was eighty miles long—the elephant's 160. Garŭda with one claw seized the elephant—with the other the tortoise, and perched with them on a tree 800 miles high.' He is then, after sundry adventures, stated to have fled to a mountain on an uninhabited country, and finished his repast on the tortoise and elephant.

"In these three instances, taken from Pythagoras and the Hindoo mythology, we have reference to a gigantic form of tortoise, comparable in size with the elephant. Hence the question arises, are we to consider the idea as a mere fiction of the imagination, like the Minotaur and the chimæra, the griffin, the dragon, and the cartazonon, &c., or as founded on some justifying reality? The Greek and Persian monsters are composed of fanciful and wild combinations of different portions of known animals into impossible forms, and, as Cuvier fitly remarks, they are merely the progeny of uncurbed imagination; but in the Indian cosmogonic forms we may trace an image of congruity through the cloud of exaggeration with which they are invested. We have the elephant, then as at present, the largest of land animals, a fit supporter of the infant world; in the serpent Asokee, used at the churning of the ocean, we may trace a representative of the gigantic Indian python; and in the bird-god Garŭda, with all his attributes, we may detect the gigantic crane of India (*Ciconia gigantea*) as supplying the origin. In like manner, the *Colossochelys* would supply a consistent representative of the tortoise that sustained the elephant and the world together. But if we are to suppose that the mythological notion of the tortoise was derived, as a symbol of strength, from some one of those small species which are now known to exist in India, this congruity of ideas, this harmony of representation would be at once violated; it would be as legitimate to talk of a rat or a mouse contending with an elephant, as of any known Indian tortoise to do the same in the case of the fable of Garŭda. The fancy would scout the image as incongruous, and the weight even of mythology would not be strong enough to enforce it on the faith of the most superstitious epoch of the human race.

"But the indications of mythological tradition are in every case vague and uncertain, and in the present instance we would not lay undue weight on the tendencies of such as concern the tortoise. We have entered so much at length on them on this occasion, from the important bearing which the point has on a very remarkable matter of early belief entertained by a large portion of the human race. The result at which we have arrived is, that there are fair grounds for entertaining the belief as probable that the *Colossochelys Atlas* may have lived down to an early period of the human epoch and become extinct since:—1st, from the fact that other Chelonian species and crocodiles, contemporaries of the *Colossochelys* in the Sewalik fauna, have survived; 2nd, from the indications of mythology in regard to a gigantic species of tortoise in India.

"Some of the bones were analysed with great care by Mr. Middleton, and yielded a large proportion of fluorine, the constituents being,—

Phosphate of lime	64·95
Carbonate of lime	22·36
Fluoride of calcium	11·68
Oxide of iron	1·00
A trace of chloride of soda.	——
	99·99

"Other Sewalik fossil bones were at the same time subjected to analysis, such as the *Mastodon elephantoides*, *Camelus sivalensis*, Horse, Ruminants, &c., and the whole of them yielded similar results, with a proportion of fluoride of calcium varying from 9 to 11 per cent. This is much above the usual quantity found in fossil bones; the utmost that has been met with having been in bones of the Anoplotherium from the Paris basin, 14 per cent."

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

The following extracts were read from a letter from Robert Templeton, Esq., M.D., Corr. Mem., Royal Artillery, Colombo, Ceylon:—

"You will be glad to learn that I yesterday heard of a new monkey, which I imagine, from the description, must belong to the same genus as the Wanderoo. Every day brings some novelty to my notice, but I regret to say that although I have many promises from officers at out-stations, I do not receive specimens as fast as I could wish.

"You may announce to the Society that I had an accouchement in my house of a *Loris*, the affair occupying about half an hour, at the end of which a little naked object was fully in the world, about two inches long, like a young mouse, perfectly without covering, a large head, attenuate body, and excessively slender legs; the face and eyes were proportionally much smaller than in the older animal. It clung to the mother so tenaciously, that I believe it would have almost parted with its legs rather than let go its hold. The mother died on the following night and the young one immediately after, so that I had little time for observing them. You will perceive from the half-finished sketch I enclose that it is not at all entitled to the usual appellation of *dog-like*, which has been derived I presume from the drawings having hitherto been made from stuffed specimens.

"The loss of the 'Memnon' has been a matter of serious concern to me, as she carried a paper which cost much trouble, and of which I foolishly destroyed the copy; unfortunately, since that time I have had neither leisure nor specimens from which to work out another. In the meantime I wish you to inform the Society that there is found in the alpine regions of Ceylon during the rainy season enormous worms, reaching from twenty to forty inches in length, and about an inch or 1½ inch in thickness. From the size and colour I have adopted the name of Megascolex cæruleus.

"The body is composed of 270 rings, the sexual organs occupying the 16th, 17th and 18th; between this part and the head it is somewhat ventricose, but at the 17th ring there is a decided narrowing. Each ring is dilated in the middle of its length into a ridge, which carries on it, except in the mesial line of the back, minute conical mammillæ, 100 in number, each surmounted with a minute bristle, arched backwards; the dermoid covering is striated in opposite directions diagonally, to admit of the contractions of the muscles beneath; dorsally the depressed parts of the rings are deep bright blue, which becomes gradually narrowed as it descends the sides, and terminates abruptly, leaving the inferior parts orange-yellow, but the absolute ventral part is pure yellow.

"The intestinal canal is very large, extending to within an eighth of an inch of the surface, and supported on all sides by a series of membranous partitions, attached externally to the edge of each ring. The walls of the intestine are composed of strong but fine membrane, which is separable into layers, but is without any distinct appearance of fibres; exterior to this are the muscular bundles, which serve for the progressive movements of the animal; they are compound, whitish, shining fibres, collected into longitudinal fasciculi, separated by tolerably strong cellular membrane, and are deficient, as far as I am aware, only in one position.

"In all works which I have examined it is stated (I think originally by Sir Everard Home) that the respiration of this tribe is carried on through a system of pores on the sides of the animal, as in the leech. This is a complete mistake; the facts are as follows:—Along the middle line of the back, as I have before noticed, the mammillary projections are deficient for a space about one-tenth of an inch broad, and in the interval between each ring in this situation is a small transverse narrow ridge, in the centre of which, and occupying its whole breadth, is the orifice of the respiratory apparatus, a narrow oval; they are first visible in the interval between the 14th and 15th ring, and terminate between the 17th and 18th from the tail, being most developed at half the length of the animal, or rather a little nearer the tail. The artery runs along the whole back of the worm, sending off lateral branches at the position of the septa, and at the place where the respiratory orifices open externally it forms the inferior boundary of a little quadrangular space, shut up on all sides by cellular membrane, so as to present the appearance of a little sac like a reticule, with a rectangular bottom; the sides of this space are formed as follows: the muscle becomes deficient there, taking a new attachment, and having a new origin beyond the orifice, the profile being arched rather abruptly, and thus we have an anterior and posterior wall; the lateral are formed by the muscular bundles of either side, and the shape must necessarily be more or less quadrangular, in fact nearly square: the membrane forming the immediate walls of the sac is so fine and so loose that I failed in all attempts to trace its form inside, but I satisfied myself of there being a distinct cavity, by introducing from the outside a small blunted wire, with which I gently pressed the sides; it seemed however not so extensive anteriorly, posteriorly, and at the angles, as I should have supposed from the form of the more solid supports outside.

"The rest of the anatomy of this animal I must leave until I can procure more specimens and have more leisure.

"When I first got the *Megascolex* I was sure I had obtained an animal which would break down the old division of *Abranches setigères* and *A. sans soies*, for the bristles are so minute that I did not in the first instance perceive them. As to its being a true *Lumbricus* there could be no doubt. I was much gratified when I discovered that the separation of the tribes, founded on a character which indicates their respective terrestrial and aquatic habits, was correct, and gave due credit to its proposer."

"Monograph of the genus *Myadora*, a small group of Acephalous Mollusks of the family *Myaria*," by Lovell Reeve, Esq.

Genus Myadora, Gray.

Testa trigono-ovata, inæquivalvis, valvâ sinistrâ plus minusve concavâ, dextrâ planâ, rarò concaviusculâ; inæquilateralis, latere postico rotundato, antico leviter flexuoso, coarctato, infernè plerumque truncato, depressione plano-concavâ sub umbones. Cardo: dentibus in valvâ dextrâ duobus lateralibus, elongatis, rudibus, ab umbone divergentibus, quorum posticus planus, subobsoletus; in valvâ sinistrâ projecturis sulcatis duabus lateralibus, dentes recipientibus. Ligamentum internum in foveâ trigonâ centrali inter dentes insertum, appendice testaceâ concavâ sæpè internè protectum. Valvæ intus margaritaceæ, pallii impressione musculari anticè sinuatâ.

The genus *Myadora*, introduced by Mr. Gray in his account of the 'Shells of Molluscous Animals,' in the 'Synopsis of the Contents of the British Museum,' is one that cannot fail to be appreciated; nothing indeed can more fully demonstrate the necessity for a new generic allotment of certain species, than the circumstance of their having been transported at different times from one genus to another by the same author*.

The *Myadoræ* partake of the characters of *Anatina* and *Pandora*, and as they have been referred at times to both of those genera, it is important to describe with some minuteness the differences which entitle them to generic distinction. In *Anatina* the hinge is com-

* "In an Appendix to a Catalogue of Shells collected in the Australian and Polynesian group, by Mr. S. Stutchbury," says Sowerby, in his account of the genus *Pandora*, 'Species Conchyliorum,' Part 1, "I have described, under the name of *Pandora brevis*, a shell (*Myadora brevis*, nobis) which I am now convinced is rather an *Anatina*, inasmuch as its flat valve is destitute of the blunt tooth which characterizes the *Pandoræ*; it differs also from them in having a sinus in the muscular impression of the mantle, and in being possessed of a small testaceous appendage attached to the ligament." This shell it will be seen however has not the spoon-shaped processes of *Anatina*.

posed of two hollow spoon-shaped processes, containing the ligament, protected in some species by a moveable testaceous clavicle, which crosses the dorsal axis of the shell on the posterior side, as in the *Anatina truncata*, for example, a species now commonly obtained with the accessory hinge-piece complete.

In *Pandora*, which is too flat and compressed a shell to admit any structure like the spoon-shaped processes of *Anatina*, the ligament is lodged in a cicatrix, protected on the posterior side by a single central oblong tooth in the right valve only; the clavicle is dispensed with, but the loss is in a degree supplied by a thickening and folding over of the dorsal margin.

In *Myadora*, which being a thicker shell requires a hinge of more solid structure, the peculiarities above noted in *Anatina* and *Pandora*, the clavicle of the former, the folded margin of the latter, are united in the following modified condition. The dorsal margin of the right valve of *Myadora* becomes consolidated into a tooth-like ledge or projection, diverging from, on each side, the umbo, fitting into grooved projections of similar construction in the left valve; and by the diverging of these tooth-like projections a compact triangular cavity is obtained for the insertion of the ligament, which in some species is walled in, as it were, internally, not laterally as in *Anatina*, by a moveable testaceous clavicle forming an angle with the diverging ledges.

The clavicles of *Anatina* and *Myadora*, it may be observed, are very differently situated with respect to the ligament, the one being a side appendage, extending across the dorsal axis of the shell; the other an internal appendage, parallel as it were to the dorsal axis.

Of the following ten species, which I propose to refer to this genus, the grand type, *Myadora striata*, is an inhabitant of Port Nicholson, New Zealand, and the remainder are for the most part collected by Mr. Cuming in the Philippine Islands.

1. MYADORA CRASSA. *Anatina crassa*, Stutchbury, Zool. Journ. vol. v. p. 100; Tab. Supp. xliii. f. 5 and 6.

Conch. Iconica, *Myadora*, pl. 1. f. 1.

Hab. —— ?

This short rounded species is the only one at present known in which the right valve is concave.

2. MYADORA TRIGONA. *Myad. testâ trigonâ, valdè plano-depressâ, usque marginem concentricè striatâ, striis prominentibus, quasi carinulatis, prope marginem anticam undatis; umbonibus acutissimè mucronato-elevatis.*

Conch. Iconica, *Myadora*, pl. 1. f. 2.

Hab. Catanauan, province of Tayabas, island of Luzon.

Four odd valves only of this interesting little species were collected by Mr. Cuming at the above-mentioned locality.

3. MYADORA PLANA. *Myad. testâ trigono-oblongâ, anticè subtruncatâ, planissimâ, concentricè striatâ, striis subdistantibus, valvæ sinistræ prominentioribus.*

Conch. Iconica, *Myadora*, pl. 1. f. 3. *a* and *b*.

Hab. Baclayon, island of Bohol, Philippines (found in sandy mud at the depth of seventeen fathoms); Cuming.

This species is chiefly distinguished from its congeners, the *Myadoræ tincta* and *trigona*, by its more oblong shape.

4. Myadora ovata. *Myad. testâ ovatâ, subtriangulari, valvâ sinistrâ ventricoso-concavâ, dextrâ leviter convexâ, concentricè striatâ, striis elevatis, prope marginem anticam subobsoletis, valvæ dextræ numerosis, confertis, sinistræ prominentibus, subdistantibus, umbonibus depresso-incurvis.*

Conch. Iconica, *Myadora*, pl. 1. f. 4.

Hab. San Nicolas, island of Zebu, Philippines (found in sandy mud at the depth of six fathoms); Cuming.

This species exhibits a greater disparity in the sculpture of the valves than any other, the striæ of the right valve being very fine and close-set, whilst those of the left are almost keel-like and comparatively distant.

5. Myadora tincta. *Myad. testâ trigonâ, anticè subtruncatâ, usque marginem concentricè striatâ, striis elevatis, prominentibus; fuscescente tinctâ.*

Conch. Iconica, *Myadora*, pl. 1. f. 5.

Hab. Island of Ticao, Philippines (found in coral sand at the depth of six fathoms); Cuming.

The *Myadora tincta* scarcely differs from the *Myadora plana*, except in being of a less oblong and more triangular form.

6. Myadora striata, Gray, MSS. British Museum; *Pandora striata*, Deshayes.

Conch. Iconica, *Myadora*, pl. 1. f. 6. *a*, *b*, and *c*.

Hab. Port Nicholson, New Zealand; Swainson.

This is the grand type of the genus, and of much larger size than any other species.

7. Myadora brevis. *Anatina brevis*, Stutchbury, Zool. Journ. vol. v. p. 99; Tab. Supp. xliii. f. 1 and 2.

Conch. Iconica, *Myadora*, pl. 1. f. 7.

This is a very interesting form, and the striæ of the left valve are peculiarly wrinkled.

8. Myadora oblonga. *Myad. testâ trigono-oblongâ, anticè latissimè truncatâ, concentricè striatâ, striis elevatis, regularibus, prope marginem anticam angulatis.*

Conch. Iconica, *Myadora*, pl. 1. f. 8.

Hab. Island of Mindoro, Philippines; Cuming.

The anterior side of this species is the most broadly truncated of any.

9. Myadora curvata. *Myad. testâ curvato-oblongâ, valvâ dextrâ convexiusculâ, anticè subindistinctè flexuoso-costatâ, concentricè striatâ, striis elevatis, angustis, regularibus.*

Conch. Iconica, *Myadora*, pl. 1. f. 9.

Hab. Island of Corrigidor, Philippines; Cuming.

This species differs also in form rather than in variety of sculpture.

10. Myadora Pandoræformis. *Anatina Pandoræformis*, Stutchbury, Zool. Journ. vol. v. p. 99; Tab. Supp. xliii. f. 3 and 4. Conch. Iconica, *Myadora*, pl. 1. f. 10.

The *Myadoræ striata, brevis*, and *Pandoræformis* are the only species of the genus at present known to have the clavicle.

The Secretary called the attention of the Meeting to a specimen of the Two-toed Sloth, *Bradypus didactylus*, which was now in the Gardens, and requested Mr. Ball, Secretary to the Royal Zoological Society of Ireland, to communicate such particulars connected with the habits and manners of this curious animal as had fallen under his observation.

Mr. Ball regretted that it was out of his power to state the exact locality from which the animal had been obtained; however, he had reason to believe that it was brought from Demerara.

Its general food was sea-biscuit and water; of fruit it partook sparingly, but he had observed it pick the young buds of the hawthorn flowers and eat them with great avidity.

While in the Zoological Gardens at Dublin its favourite position was where it was supported partly by the branch to which it clung, and partly by an adjoining branch on which its back could rest.

In lapping water, the great length to which its tongue was protruded was very remarkable, thereby showing its affinity to the other *Edentata* of South America.

BOTANICAL SOCIETY OF EDINBURGH.

This Society held its first meeting for the session on Thursday the 12th of December 1844, Dr. Seller in the Chair.

Numerous donations to the library and museum were announced, particularly from Dr. Fraser, Algoa Bay, eleven volumes of botanical works and specimens of Cape woods and plants. From the Rev. J. E. Leefe, the second Fasciculus of his 'Salictum Britannicum Exsiccatum.' From Dr. Dewar, Dunfermline, plants from the river Congo, &c. From Mr. Charles Lawson, jun., plants from the Rocky Mountains, &c. The thanks of the Society were voted to the respective donors.

The following communications were read:—

1. "Notice of the discovery of *Alsine stricta* in Teesdale," by Messrs. J. S. Gibson and J. Tatham, jun.

2. "On the genus *Spirulina*," by Mr. Ralfs. One species only, the *S. tenuissima* (Kutz.) was described. [This paper will shortly appear in the 'Annals,' and in the forthcoming series of the Society's Transactions.]

3. "Notice of the discovery of *Cirsium setosum*, Bieb., near Culross," by Dr. Dewar. [Notices of the discovery of this and of *Alsine stricta* have already appeared in the 'Annals of Natural History.']

4. "Journal of a Tour through part of the United States and the Canadas" (continued), by Mr. James M'Nab.

In the last part of this paper, read before the Society, Mr. M'Nab gave an account of the botanical features of the country in the neighbourhood of Stillwater, and concluded with an examination of the woodland grounds in the vicinity of Whitehall; the present portion embraces the journey from the latter place to Montreal.

"The southern extremity of Lake Champlain is winding and narrow, having considerable tracts of level ground extended on each side. The woods for the first sixteen miles are very various, the principal trees being the wild cherry (*Prunus virginiana*), elms, walnuts, sugar-maple, and the aspen poplar (*Populus tremuloides*). The rocky grounds overhanging the lake were densely clothed with the Arbor vitæ. After having fairly entered upon the expanse of the lake, the appearance of the lofty white or Weymouth pines (*Pinus Strobus*), towering above the deciduous trees, along the rising grounds at the base of the hills, was remarkable; most of them being destitute of branches, which gave them more the appearance of palms than pines. About Essex, half-way along the lake, it widens, and all at once the wooded rocky land by the water's edge is changed for a rich champaign. The fields of the different farms being laid off in squares, and each farmstead having a large orchard attached to it, render this tract very interesting. The soil seemed a light-coloured clay, and the wood on the lower grounds was not very plentiful; but the rising grounds behind were closely studded with scraggy pines.

"Near the northern extremity the lake contracts: by this time we had entered upon Lower Canada. The country here presented a totally different appearance, owing to the dense dark masses of pines, elms and spruces, which covered a vast extent of the country, and having every here and there, along the edge of the lake, rustic but picturesque log-houses, inhabited by French Canadians, employed in felling the timber, dressing and carrying it to the lake for the purpose of being floated down to the harbour at Lapraire, on the St. Lawrence river, for exportation. On reaching St. John's, the northern extremity of Lake Champlain, the forests presented the same appearance as they did when we first entered the lake, with the addition of the balm of Gilead fir, *Abies balsamifera*: numbers of this tree were seen covering the drier grounds; the largest observed did not exceed thirty feet in height and four feet in circumference. On the dry surface of these woods, the spice-root, *Dalibarda repens*, formed exceedingly beautiful tufts, resembling in its ground-clothing propensity the *Epigæa repens*, as seen in the New Jersey forests. The sugar-maple, *Acer saccharinum*, is here in greater quantities, and attains a larger size than hitherto noticed, and notwithstanding the great mutilation to which they are yearly subjected in spring, for their sap, which is here extensively used in the manufacture of sugar, appears in the most perfect state of health.

"At St. John's we picked in the swampy grounds and in the shallow water by the edge of the lake, luxuriant flowering specimens of the sweet flag, *Acorus Calamus*, *Iris versicolor* and *Utricularia vulgaris*. In drier soil, the *Eupatorium verticillatum* was the chief plant in flower, and covered a great extent of ground.

"Passing onwards to Lapraire, the only tree of any interest and deserving of notice was the canoe birch, *Betula papyracea*. Several compact masses of these trees, evidently of the second growth, occupied the lower grounds; but from their closeness none had attained a great size. Large trees must exist in the neighbourhood, although we did not fall in with them, as many of the canoes in this district were made from the bark of this tree; although the greater number were scooped out of the trunks of the fir tribe.

"On crossing the St. Lawrence to Montreal, we were much surprised to see the great difference which the Canadian winter produces upon the species of ornamental trees: as examples may be mentioned the *Ailantus glandulosa*, the trees here being quite small and stunted; the osage orange, *Maclura aurantiaca*, seemed barely alive; mulberries were small and unhealthy; weeping willows are almost always killed in winter, although in the neighbourhood of New York the stem of this tree is seen averaging from eight to fifteen, and sometimes twenty feet in circumference. None of the Catalpa trees and Magnolias, which prove so ornamental in the pleasure-grounds both of New York and Philadelphia, can be made to thrive here, with the exception of *Magnolia glauca*; and even these are in a very unhealthy condition. The deciduous cypress, *Cupressus disticha*, is also much dwarfed. Evergreens, with the exception of the fir tribe, were rarely to be seen. On visiting the gardens and nurseries in the neighbourhood, we were much gratified at finding them so well managed. On the garden walls we observed healthy trees of peaches, apricots and nectarines, having well-ripened wood, and every appearance of affording plentiful crops. Gooseberries and currants were in great abundance, with high-flavoured fruit, which is seldom to be met with in the gardens of the United States; apples were plentiful, but pears rather scarce. Vines trained on espaliers had a promising appearance.

"In the nursery-grounds the fruit and flower departments seem to receive the most attention. Few of the indigenous plants are cultivated, although considerable quantities of the genera *Cypripedium, Trillium, Orchis, Habenaria, Goodyera, Calypso, Pagonia* and *Sarracenia*, procured from their native habitats when in flower, lay stored in boxes for sale and barter with the British merchants.

"We next proceeded to the Montreal Mountain, situated to the north-west of the town. A number of fine specimens of the sugar-maple were seen, with a great mixture of shrubby plants. The lime-trees, *Tilia americana*, had a singular and beautiful effect, from the large size of their foliage; some of the leaves measured thirteen inches long and eleven broad. Very few herbaceous plants were obtained, owing to the penetrating rays of the sun having scorched everything. In very shady places, particularly on the north and east side of the mountain, we procured a few good specimens, in flower, of *Orchis macrophylla, Corallorhiza multiflora, Aralia hispida* and *ramosa, Aster acuminata, Aspidium bulbiferum*, which, with the *Cyperus retro-fractus* from the most exposed places, formed the most interesting part of our collections. After some difficulty we reached the summit, and the view as seen around was truly grand. We beheld the St. Lawrence winding its way through a vast extent of level country, while in various parts extensive wooded islands were seen obstructing its course. On descending the south side of the mountain, which is closely wooded, the thermometer indicated 89° of Fahrenheit. The exertion caused by ascending and descending was severe; and owing to the parched state of the ground, and the flaccid vegetables with which it was covered, walking was rendered nearly as difficult as over sea-weeds on a rocky shore."

At this meeting the election of office-bearers for the ensuing year took place, when Dr. Douglas Maclagan was chosen President; and Professor Graham, Drs. Lowe, Greville and Seller, Vice-Presidents.

GEOLOGICAL SOCIETY.

Nov. 20, 1844.—A paper was read "On the Geology of Gibraltar." By J. Smith, Esq., of Jordan Hill.

The great rocky masses terminating Europe on the S.W. and Africa on the N.W., and cut through by the Straits of Gibraltar, consist of siliceous sandstones, associated with limestone, chert, shale and coal, all apparently of the oolitic formation. The Gibraltar limestone contains casts of *Terebratula fimbria* and *T. concinna*, species found in Britain in the lower oolite. The covering of the older rocks consists of soil, river alluvium, post-tertiary marine sands, and local patches of diluvium. Wherever the covering is removed, the surface of the rock beneath is seen to be water-worn. The rock of Gibraltar is 1470 feet high. The southern extremity is marked by a triple series of terraces and inland cliffs, formed by the sea at former levels. Its northern terminates in a perpendicular cliff. The elevated part is divided into three distinct eminences, the effects of different local upheavals. The northern of these (the rock gun) does not appear to have undergone any derangement in its stratification since its first upheaval, although it must have been subjected to many elevations and depressions of level. Its older beds (those of the limestone) dip west at an angle of 20°, and those formed since the elevation are horizontal, remaining in their natural position. In this state the whole of the rock must have remained for a lengthened period, until a second upheaval broke it across, leaving the northern portion in its original position, but lifting the whole of the southern 20° more, so that its beds, which formerly dipped 20° west, now dip 40°; and the fresh deposits, formerly horizontal, 20°. On these deposits, others, formed after the upheaval, rest unconformably. A third upheaval in the same direction, but still further to the south, lifted the rock there about 20° more, leaving the northern and middle hills in their former position, but inclining the southern 60°. Thus we have four distinct epochs; of the deposits formed during each we have remains, and at Martin's Cave the whole may be seen in juxtaposition. Immediately under O'Hara's tower, the highest peak, the inclination of the beds to the west is nearly 80°, and a short way to the south of it, they are vertical. Under this point there is, at the height of about

50 feet, sloping inwards 11°, beds of sandstone in a sea-worn cave, proving at least one other disturbance in addition. Subsequent to these great disturbing changes, there occurred a series of elevations and depressions, indicated by mixed beaches and sea-bottoms at different levels and by the surface of the rock perforated by Lithodomi and sea-worn to the very summit, indicating that the amount of change of level in these comparatively modern times—for the fossils in these deposits are in every case identical with species now living in the neighbouring seas—exceeded the height of the mountain, or 1470 feet. There are evidences, also, of a series of movements of depression. All these changes must have preceded the historical period, as previous to the last change, Gibraltar must have been an island, of which there is no record; the most ancient accounts describing it as it is now. The upheaving forces must have been deep-seated, as there are no erupted igneous rocks near.

MISCELLANEOUS.

SUBMARINE EXPLORATIONS BY M. MILNE EDWARDS.

M. MILNE EDWARDS in a communication to the French Academy states, that having for some time been occupied in studying the lower marine animals, particularly Zoophytes, Mollusca, Vermes and Crustacea, in their living state, on the northern and eastern coasts of France, and being desirous of also entering upon a comparative study of species peculiar to warmer regions, he had visited with this view the shores of the Mediterranean, where their habitats not being rendered accessible as on the coasts of the Channel and the Atlantic by the alternations of the tide, he had availed himself of the apparatus invented by Colonel Paulin for a course of submarine exploration. He then describes the apparatus, which is a sort of helmet with glass eye-holes, and a flexible tube for a supply of air; and states, that by its aid, in Provence, Italy, Sicily and Algeria, he often explored the habitations of a multitude of these animals, remaining under water more than half an hour, and at a depth of more than seven mètres.

"Exploring by these means," he adds, "the rocks and the bottom of the port of Milazzo, I procured an immense number of the eggs of mollusks and annelides whose development I wished to study. Besides, I was enabled to catch in the irregularities of the bottom the minutest animals that remain fixed, and cannot be obtained in any other manner. I saw perfectly all that surrounded me, and it was muscular fatigue alone that hindered me from walking at the bottom of the sea just as I could do on the shore.

"The questions to which I had especially directed my attention relate to the embryology of the Annelida and of the Mollusca, to the circulation of the blood in the latter animals, as also in the Crustacea, and to the organization of the *Stephanomiæ*, and of the Ciliograde Acalephæ in general; but whilst following out these investigations I had occasion to make various observations on subjects of secondary interest: thus I have succeeded in tracing the mechanism of the singular motions discovered by M. Sieboldt in the interior of the auditory capsule of the Mollusca; I have convinced myself in the most positive manner of the existence of hermaphrodism in the *Anatifæ*, a fact which had been rendered doubtful by the observations of Mr. Goodsir on the alleged males of the *Balani*. I have observed that in the *Haliotides* the sexes are separated as in the *Patellæ*, and that consequently it is at present less possible than ever in my opinion to admit as the basis of classification of the Gasteropod Mollusca, the distinction of these animals into monœcious, hermaphrodite, and diœcious. I have discovered a new fact which shows how little physiological importance should be attached to the colour of the blood, so constant in the Vertebrata, in the inferior animals, a conclusion which already resulted from my observations on the Vermes. I have found in fact, in the neighbourhood of Palermo, an *Ascidia* with red blood. I shall in conclusion notice another zoological fact which of itself is of no importance, but will furnish a further proof of the errors which might be committed by placing too much confidence in the invariability of the relations which appear to exist between the organization of the lower animals and their external characters. M. Savigny, in showing how much the internal structure of the compound *Ascidiæ* differs from those of the Halcyons and other polypes with which they had up to that time been confounded, pointed out the existence of six tentacula in the one and of eight in the others, as being the external character the most fit to distinguish them without the aid of the scalpel; and in truth never more than six tentacula had hitherto been found round the mouth of the compound *Ascidiæ*, while the Halcyons and other zoophytes constructed after the same type, always present eight; but this empirical character now loses its entire value, for I have found in the Mediterranean a compound *Ascidia* having eight of these appendages."

The author promises to give an account in a future communication of his observations on the development of the Annelida.

From the *Comptes Rendus* for Nov. 25, 1844.

OBSERVATIONS ON SOME POLYPES.

Dr. Reid has detailed several new observations he has made upon certain polypes when carefully examined by the microscope: he mentions some appendages to the polypidom in the *Cellularia scruposa* and *Cellularia reptans* which had not been previously described. At the anterior part of the outer side of each cell in the *Cellularia scruposa*, and immediately in front of the tooth-like process there attached, are two pretty long spines and a rounded process, which tapers slightly from its fixed to its free extremity. This rounded process is open at the top, and is hollow in dead specimens: but when alive it is full of a contractile substance. In this contractile substance the end of a hair-like curved filament, about the length of the cell, is immersed. This hair-like filament is moved about by the contractile substance attached to it, generally in jerks after intervals of repose, and in its movements sweeps the anterior and posterior surfaces of the cell to which it is fixed. These movements continue for a considerable time after the animal inhabiting the cell has been dead. A hollow rounded process, with a hair-like curved and moveable filament projecting from it, is also fixed upon the corresponding part of each cell of the *Cellularia reptans*. These moveable hair-like filaments are analogous to the moveable bird-head process attached to each of the cells of *Flustra avicularis*.—*Proceedings of the St. Andrews' Lit. and Phil. Soc.*, Nov. 1844.

FOOD OF THE AUSTRALIAN NATIVES.

Mr. Hodgkinson, in his 'Australia, from Port Macquarie to Moreton Bay, with Description of the Natives, their Manners and Customs,' &c., gives a somewhat elaborate account of Australian field-sports, and of the Aborigines. On the immediate banks of the MacLeay river, he says, there are no fewer than six distinct tribes; besides several others near the sources of the river among the mountains. All these tribes are able to get an abundance of food with very little trouble, and add the reptile kingdom to the ordinary sources :—

"All the larger varieties of snakes are eaten by them, but they will never touch one that has been killed by a white man. Guanas, and a short thick kind of lizard called the dew-lizard, are also much relished by them. However repugnant the idea of eating reptiles seems to us, it is from a real liking for their flesh that the Australian savages eat them, and not from the great scarcity of better food; for I have on two or three occasions known them, when employed by me in assisting at the cattle-musters, pulling maize, &c., and well-fed on bread and beef, carefully preserve any snake they chanced to kill, and cook and eat it at the next fire. Induced by curiosity, I have on several occasions tasted the flesh of every one of the reptiles just mentioned, and although nothing but the most extreme hunger could make me conquer my aversion so as to dine on them, I must nevertheless own, that not one of them possessed any disagreeable taste. The flesh of the black snake in particular was rich and juicy, somewhat resembling in flavour the flesh of a sucking-pig, whilst that of the guana was whiter and drier, and more approximated to fowl. Besides, these savages are not the only race of men who eat reptiles, for the common water-snake of England (*Natrix torquata*) is eaten in several parts of the continent of Europe; and every one knows that the guana of the West Indies (a much more hideous animal, by-the-by, than the guana of Australia) is considered very good eating by the planters in some of the islands."

MR. SCHOMBURGK'S COLLECTIONS IN GUIANA.

It appears from the report of the Chev. Schomburgk, read at a recent meeting of the Geographical Society, that notwithstanding the great difficulty of conveying collections of natural history over such a country as that traversed by him, and the frequent loss of objects collected with great pains, he has deposited in the British

Museum 2500 specimens of dried plants, 100 specimens of woods, dried fruits, a flower and young leaf of the *Victoria regalis*, and several other botanical specimens preserved in spirits, a collection of bird-skins, upwards of 100 specimens of fishes in spirits, a geological collection, and an ethnological collection. The Royal College of Surgeons has been presented with some skulls, a perfect skeleton, and a number of plaster casts. The model-room of the Admiralty has received a collection of woods; the Royal Garden at Kew several living plants; and presents of curiosities from Guiana have been made to different scientific societies and institutions.

METEOROLOGICAL OBSERVATIONS FOR NOV. 1844.

Chiswick.—Nov. 1. Overcast: boisterous. 2. Constant heavy rain: boisterous at night. 3. Cloudy and fine. 4, 5. Cloudy. 6. Overcast. 7. Rain: cloudy. 8. Overcast: heavy rain at night. 9. Hazy clouds: fine: clear. 10. Clear and fine: rain. 11. Densely clouded: fine. 12. Rain: drizzly: boisterous, with rain at night. 13. Heavy rain. 14. Rain. 15. Cloudy. 16. Hazy: clear. 17. Foggy. 18, 19. Overcast. 20. Hazy: clear and fine. 21. Foggy throughout. 22. Hazy. 23. Foggy. 24. Hazy: cloudy. 25. Cloudy and fine. 26. Clear and frosty. 27. Sharp frost: foggy: clear and frosty at night. 28. Foggy: cloudy. 29. Easterly haze: foggy. 30. Overcast.—Mean temperature of the month $0^{\circ}\cdot85$ above the average.

Boston.—Nov. 1. Cloudy. 2. Stormy: rain P.M. 3. Rain: rain early A.M.: rain P.M. 4. Rain: rain early A.M.: showery afterwards. 5. Cloudy: rain early A.M.: showery afterwards. 6. Rain: rain early A.M.: rain A.M. and P.M. 7. Fine. 8. Cloudy: rain P.M. 9. Cloudy. 10. Fine: rain P.M. 11. Fine: rain early A.M. 12. Cloudy: rain P.M. 13. Cloudy: rain A.M. and P.M. 14. Fine. 15. Cloudy: rain early A.M. 16. Fine. 17—20. Cloudy. 21. Fine. 22. Cloudy: first ice this morning. 23. Cloudy. 24. Cloudy: total eclipse of the moon visible 11 P.M. 25. Cloudy. 26, 27. Fine. 28—30. Cloudy.

Sandwick Manse, Orkney.—Nov. 1. Cloudy. 2. Damp. 3. Bright: clear. 4—7. Fine. 8. Showers. 9—11. Rain. 12. Cloudy. 13. Frost: fine: cloudy. 14. Frost: fine: cloudy: frost. 15. Rain. 16. Rain: drizzle. 17, 18. Cloudy. 19. Bright: hazy. 20. Showers. 21. Bright: cloudy. 22. Bright: clear: aurora. 23. Bright: clear. 24. Clear. 25. Cloudy. 26. Bright: rain. 27. Cloudy: damp. 28. Cloudy: clear. 29. Rain: clear. 30. Bright: clear.

Applegarth Manse, Dumfries-shire.—Nov. 1. Fair: wind high. 2. Very slight shower. 3. Very slight shower: clear. 4, 5. Fair, but threatening. 6. Cloudy and damp. 7. Fair and fine. 8. Dull A.M.: rain. 9. Fair, but dull. 10, 11. Cloudy A.M.: rain P.M. 12. Rain. 13. Fair and mild. 14. Heavy rain: flood. 15. Fair and fine. 16. Fair and fine, though cloudy. 17. Damp: slight shower. 18. Rain P.M. 19. Fair and fine. 20. Fair and fine: frost A.M.: fog. 21. Fair and fine: frost. 22. Slight rain. 23. Fair, but dull. 24. Fair: frost. 25. Fair: slight frost A.M. 26. Fair, but cloudy. 27. Cloudy A.M.: rain P.M. 28. Fair, but dull. 29. Shower. 30. Fine: frost A.M.

Mean temperature of the month	$43^{\circ}\cdot6$
Mean temperature of Nov. 1843	41 ·7
Mean temperature of Nov. for twenty years	39 ·9
Mean temperature of spring-water	47 ·0
Mean temperature of ditto Nov. 1843 ...	44 ·2

... 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.			
1844. Nov.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumfries-shire. 9 a.m.	Dumfries-shire. 9 p.m.	Orkney, Sandwick. 9¼ a.m.	Orkney, Sandwick. 8½ p.m.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumfries-shire. Max.	Dumfries-shire. Min.	Orkney, Sandwick. 9¼ a.m.	Orkney, Sandwick. 8½ p.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1.	29·513	29·248	29·28	29·55	29·42	29·89	29·90	50	40	47·5	49½	44	48	45	e.	se.	e.	ese.	·38	......	......	......
2.	29·245	29·119	28·91	29·40	29·50	29·93	29·99	47	37	44	47½	41	43½	43½	e.	e.	e.	ese.	·49	......	......	·20
☾ 3.	29·384	29·318	29·08	29·55	29·62	30·01	29·97	45	37	43	48½	42	44½	38	ne.	se.	ne.	ese.	......	·51	......	......
4.	29·371	29·215	28·96	29·50	29·30	29·79	29·66	48	27	44	45½	38	40½	40	nw.	ne.	n.	ne.	......	·69	......	......
5.	29·215	29·175	28·82	29·33	29·40	29·69	29·74	49	34	45	45½	40	38½	36	n.	calm	nne.	......	·03	·10	......	......
6.	29·276	29·252	28·85	29·37	29·23	29·75	29·73	48	30	43	46	41	39½	41	sw.	calm	ne.	......	......	·41	......	......
7.	29·377	29·364	29·05	29·34	29·34	29·69	29·65	51	44	38	48	38	39	40½	se.	calm	ne.	......	·06	·75	0·10	......
8.	29·096	28·937	28·83	29·21	28·94	29·56	29·45	57	42	48	50½	35	44	45	se.	calm	ne.	e.	·58	......	......	·10
9.	29·077	28·947	28·60	28·87	28·90	29·32	29·23	56	35	48·5	51	42½	43	42½	w.	calm	n.	e.	......	·11	......	·50
● 10.	29·194	28·919	28·75	28·96	28·96	29·23	29·23	54	35	43	47	38	42	41½	s.	calm	nw.	ene.	·34	......	......	·29
11.	29·495	29·177	28·72	29·00	29·16	29·23	29·23	50	37	42·5	46	36	41	40	w.	calm	nw.	ene.	·16	·49	......	·45
12.	29·503	29·417	29·03	29·23	29·18	29·35	29·33	58	48	43	44½	34	40	39½	sw.	calm	se.	ene.	·50	......	......	·14
13.	29·828	29·506	29·09	29·30	29·53	29·48	29·63	57	37	50	51	39	37	37½	sw.	calm	sw.	e.	·38	·06	......	......
14.	30·109	30·012	29·55	29·90	29·97	29·97	30·08	55	49	43	48½	39½	36	35	sw.	calm	ne.	nw.	·12	·24	0·85	......
15.	30·078	30·025	29·50	29·55	29·75	29·33	29·47	59	45	55	53½	40½	47	50	sw.	w.	sw.	wsw.	......	·04	......	·67
16.	30·237	30·191	29·68	29·97	30·04	29·90	29·89	60	43	47	53	47½	43	50	sw.	calm	ssw.	se.	......	......	......	·31
☽ 17.	30·296	30·280	29·75	30·10	30·10	29·90	29·85	56	44	53	54½	48½	50	50	sw.	calm	ssw.	wsw.	......	......	......	·12
18.	30·258	30·178	29·75	30·00	29·90	29·85	29·76	55	51	48	51½	42	50	50	sw.	calm	ssw.	......	......	......	......	......
19.	30·177	30·143	29·68	29·94	29·88	29·86	29·95	55	47	49	54	48	49	44½	s.	calm	ssw.	sw.	......	......	......	......
20.	30·204	30·111	29·60	29·86	30·10	29·73	29·97	59	30	49	52	48	47	47	sw.	w.	ssw.	w.	......	......	......	·08
21.	30·304	30·291	29·88	30·20	30·20	30·18	30·20	49	30	39·5	48	35	47½	47	sw.	calm	sse.	w.	·02	......	......	......
22.	30·246	30·185	29·87	30·14	30·02	30·18	30·02	45	39	34	42	30	43½	43	w.	calm	sse.	sse.	......	......	0·48	......
23.	30·146	30·124	29·75	29·94	30·00	29·80	29·96	45	28	43	45½	34	43	41	e.	calm	s.	se.	......	......	......	......
○ 24.	30·031	29·947	29·68	29·94	29·89	29·93	29·88	44	31	42	44½	37	43	40	ne.	calm	sse.	sse.	......	......	......	......
25.	30·102	29·983	29·61	29·90	29·98	29·93	29·98	45	29	37	41	32½	43	45	n.	calm	n.	se.	......	......	......	......
26.	30·296	30·221	29·85	30·02	30·00	29·96	29·82	45	22	32	46½	34	43	46	sw.	calm	ne. se.	se.	......	......	......	......
27.	30·326	30·237	29·95	29·99	29·90	29·72	29·72	46	23	32	50	44	49	51	sw.	calm	sse.	ssw.	......	......	......	·28
28.	30·110	29·986	29·73	29·80	29·80	29·57	29·89	44	38	36	49½	45	49	46½	se.	calm	sse.	sse.	......	......	......	......
29.	30·038	29·958	29·69	29·90	30·00	30·02	30·07	44	37	42	48	43	45	45	e.	calm	se.	se.	......	......	0·15	·11
30.	30·099	30·073	29·79	30·09	30·10	30·09	30·18	40	30	40	44	32½	43	41	ne.	calm	se.	sse.	......	......	......	......
Mean.	29·821	29·717	29·37	29·961	29·661	29·761	29·781	50·53	36·63	43·3	48·2	39·6	43·71	43·40					3·06	3·40	1·58	3·25

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 96. FEBRUARY 1845.

IX.—*Description of some Animals found amongst the Gulf-weed.* By Harry D. S. Goodsir, M.W.S.

[With a Plate.]

The animals described in the following communication are chiefly Mollusca and Crustacea, and were all found attached to the Gulf-weed, *Fucus natans*.

I am indebted to my friend Professor Edward Forbes of King's College, London, and Mr. A. G. Melville, Assistant Demonstrator of Anatomy in the University of Edinburgh, for the opportunity thus afforded me of examining the creatures found in such a habitat. The contents of the bottle received from Prof. E. Forbes were taken between the parallels of 25° and 36° north, and in about 40° west long.; and the specimens received from Mr. Melville were all taken about 40° north lat. during the course of one day's sailing. It will be observed that the animals from both of the above districts are generically and in most instances specifically similar.

Nautilograpsus minutus, Edwards. Pl. VII. fig. 1.

Inter-orbital space slightly hollowed in the mesial line, serrated very minutely, the teeth being only seen with a magnifier. Internal orbital angles rounded, external projecting forward in the form of spines and very acute; lateral edge of the carapace armed with a single blunt tooth shortly behind the external orbital angle.

Description.—The whole body of a straw-yellow, with shades of a reddish blue colour on the carapace; tips of the eyes black.

Carapace almost square, the anterior or inter-orbital space projecting, the posterior part of the lateral edges contracting slightly, the latero-posterior edges of considerable length, and the posterior hardly so extended as the anterior. Dorsal surface of the carapace shining, slightly convex, and with the sculpturing hardly perceptible, but very delicately grooved transversely with punctured lines running almost parallel to one another. Ambulatory legs of considerable length; the anterior pair large, the arm extending beyond the lateral edge of the carapace, and having its internal edge very much depressed and thinned, at the anterior angle of which are several strong spines; the remaining legs are all depressed, with the edges of the last three joints armed with long, thick-set hairs, and especially the superior edges. The internal antennæ consist of four segments, the last being multiarticulate, and a strong articulated spine arises from the internal edge of the third articulation near its distal extremity. The external pair of antennæ arise from the internal angles of the orbit, are multiarticulate and very minute. The external foot-jaws are large, but have their internal edges so formed as to leave a lozenge-shaped space between them. The abdomen in the male of this species is narrow and of a triangular shape; that of the female large, rounded, and covering almost all the lower surface of the body. It appears to have been found in great numbers both by Mr. Williams and Mr. Melville.

2. *Hippolyte ensiferus.* Pl. VII. fig. 2.

H. with one short tooth projecting forwards from the base of the rostrum; rostrum slightly curved upward with four or five spines at the tip, the third of which from the dorsum is longest. Peduncular scale of external antennæ not so long as the rostrum almost by one-third. External foot-jaws not so long as the peduncle of the external antennæ; with the terminal joint flattened, serrated at the apex and on its internal edge.

Description.—The whole animal about 1 inch in length, of an ochrey yellow colour except the tips of the eyes, which are black. The internal antennæ with the peduncle 3-jointed; the scale of the external pair very thin and narrowed at the tip, which is also bifurcated. The external foot-jaws have the external edge of the last joint smooth and rather thickened. The first pair of thoracic legs are short, thick, smooth and didactyle; those of the second pair are long, filiform, spined, and also didactyle; the third articulation is very slender. The last three pairs of legs are much longer than any of the preceding, filiform and spined. The middle plate of the tail not so long as the second, armed with two pairs of spines at the tip.

Found in considerable abundance between the parallels of 25° and 30° north, and 4° west long., by Mr. Williams. Almost every specimen infested with *Bopyrus squillarum.*

3. *Palæmon natator.* Pl. VII. fig. 3.

P. with the rostrum lanceform, having eleven or twelve large distinct spines on its superior edge, and two small rather indistinct ones on its inferior edge near the tip. Two spines on each side of the carapace near or on the anterior edge. Middle plate of the tail with three obsolete spines on each side and two long spines from the extremity.

Description.—The whole animal of a yellow colour; rather more than an inch in length and very robust. Rostrum about the same length as the peduncular scales of external antennæ, lanceolate, being rounded and narrowed at the base and dilated near the extremity before ending in a point. The peduncular portion of the superior antennæ 4-jointed, the basal joint being large and hollowed out superiorly for the reception of the eyes; each of the segments of the peduncle end externally and anteriorly in a spine which projects forwards and outwards. The outermost of the three terminal filaments is the thickest. The peduncular scale of the external antennæ does not terminate in a point, but is obliquely truncated; the terminal filament is longer than those of the superior antennæ. First pair of legs very slender, reaching a little beyond the peduncle of external antennæ, didactyle. Second pair much stronger, and although the first four joints are delicate, the hand is large and ovate, didactyle; claws slender and almost straight. The last pair of legs slender.

4. *Amphitöe pelagica.* Pl. VII. fig. 4.

A. with peduncle of superior antennæ about half the length of the inferior antennæ, being almost the same length as the first three joints of the peduncle of the lower antennæ. First pair of legs small, second pair with the wrist very much enlarged, and the claw sickle-shaped and moveable, inferior edge having a small tooth with a slight notch on either side of it near the distal extremity; claw as long as the wrist and tapering very gradually to a point.

5. *Bopyrus squillarum.* Pl. VII. figs. 5, 6, 7, 8, 9, 10, 11.

B. with posterior edge of last abdominal segment perfect.

Description.—Male minute, about 1 line in length or hardly so long, linear. Head small, and about half as long as its greatest breadth. First thoracic joint larger than any of the succeeding. Ambulatory legs very short and chelate. Female broad, flattened and pyriform, very much contracted posteriorly and dilated anteriorly. Young almost globular. From beneath carapace of *Hippolyte ensiferus.*

6. *Anatifa sulcata.* Pl. VII. fig. 13.

The peduncle of this *Anatifa* is so short as not to be seen without separating the animal from its attachment. The shape is triangular, and the peduncular extremity of the animal is slightly concave, with the posterior edges of the latero-peduncular divisions serrated; the posterior and abdominal angle of this part of the shell is incurvated and pointed, and its external surface is deeply sulcated, the sulci all radiating from the posterior abdominal angle to the dorsal edge of the division, where they form small but very distinct serrations. Dorsal division of the shell smooth, extending almost the whole length of the dorsum, and reflected upon the posterior dorsal angles of the latero-peduncular division. A small obsolete tooth may be observed upon the dorsal edge near its anterior extremity. The antero-lateral are much smaller than the peduncular divisions of the shell, and are also sulcated, the sulci radiating from the anterior point towards the abdominal edge: the ridges formed by these sulci are armed in both divisions with minute teeth, the points of which in the peduncular portion all project towards the dorsum, those in the anterior towards the abdomen. Attached to a portion of *Fucus natans.*

The species now described differs in some points from the figure given by Quoy and Gaimard in the 'Voyage de l'Astrolabe,' which beautiful work I have been able to see through the kindness of Mr. Grut; I thought it unnecessary however to give another specific name.

Several specimens of *Scyllæa pelagica* were in the bottle, and the spawn (Pl. VII. fig. 14) of this animal was attached in several places to the Fucus in rather irregular coils; the central extremity adhered to a stem of the Fucus, the succeeding parts surrounding it in coils, the external extremity being attached in the same manner as the central one.

EXPLANATION OF PLATE VII.

Fig. 1. *Nautilograpsus minutus*, nat. size.
Fig. 2. *Hippolyte ensiferus*, mag. three times.
Fig. 3. *Palæmon natator*, mag. twice.
Fig. 4. *Amphitöe pelagica*, enlarged.
Fig. 5. *Bopyrus squillarum*, female, magnified.
Fig. 6. ——— ————, young.
Fig. 7. ——— ————, male.
Fig. 8. The abdominal surface of the head of male *Bopyrus.*
Fig. 9. One of the ambulatory legs of male *Bopyrus.*
Fig. 10. One of the ambulatory legs of female.
Fig. 11. Last abdominal segment of female *Bopyrus*, showing the entire segment.
Fig. 12. Drawing of an ovum, a cluster of which were attached to the Fucus.
Fig. 13. *Anatifa sulcata*, magnified, attached to a portion of the Gulf-weed.
Fig. 14. Spawn of *Scyllæa pelagica.*

X.—*On the Anatomy of* Eolis, *a genus of Mollusks of the order* Nudibranchiata. By Albany Hancock and Dennis Embleton, M.D., F.R.C.S.E., Lecturer on Anatomy and Physiology in the Newcastle-upon-Tyne School of Medicine.

[Concluded from p. 10.]

The œsophagus, Pl. I. figs. 4 *c,* 6 and 8 *b,* Pl. II. fig. 9, and Pl. III. figs. 1, 2 and 4 *c,* passes from the posterior dorsal aspect of the buccal mass, and is a much-constricted canal. It is short, longitudinally plicated, and usually bent into the form of an S, so that the apparatus of the mouth can be advanced with facility. It is generally colourless, but in *E. coronata* and two or three other species it is of a deep rosy hue, appearing as a stain of that colour, immediately behind the dorsal tentacles. It consists of longitudinal and circular fibres, the former of which have been noticed in the description of the muscles of the buccal mass. The plicæ seem to be formed by the lining membrane, which we take to be a mucous one, and by the muscular coat.

The stomach, Pl. II. fig. 9, and Pl. III. figs. 1, 2 and 4 *d,* throughout the entire group is a large pyriform pouch which lies diagonally in the body, the lower end approaching the left side; it is continued in the form of a wide, tapering canal, Pl. II. fig. 9, and Pl. III. figs. 1, 2 and 4 *g,* along the median line immediately below the dorsal skin, and terminates near the posterior extremity of the body in a blind sac. From the pouch and its continuation branches are given off in pairs, not however in perfect symmetrical order, but always more or less alternating. These branches give off smaller tubes which are continued into the branchial papillæ. From the upper surface of the posterior extremity of the stomach, just where it is continued into the great central canal, is given off a short intestine, Pl. II. fig. 9, and Pl. III. figs. 1, 2 and 4 *e,* which passes backwards, outwards and to the right side, then running for a short distance along the side, turns outwards and upwards and ends abruptly in a nipple-like anus *f,* generally concealed among the branchial papillæ.

In *E. papillosa,* Pl. II. fig. 9, the anus is situate immediately behind the ninth row of papillæ, and the intestine is considerably dilated a little before its termination : this dilatation is not so conspicuous in other species. In *E. coronata,* Pl. III. fig. 1, the anus is placed amidst the papillæ in the second clump and close behind the fourth row, and in *E. olivacea,* Pl. III. fig. 2, the nipple is seen about midway between the third and fourth rows. In *E. despecta,* Johnst., Pl. III. fig 4, it is between the first and second branches.

This portion of the digestive apparatus, *i. e.* the intestine and the anus, appears to have been entirely overlooked by M. de Quatrefages in his *Eolidina paradoxum,* in which he says there is a very small anus at the termination of the central channel. In all the species we have examined we have not been able to detect such an orifice, but have found the true anus and intestine as above described in at least fifteen examples of the *Eolidinæ.*

The stomach, Pl. III. fig. 7, is composed of three coats, a mucous, a muscular, and an external one, which we suppose to be serous. The inner surface of the bulb, of the great central channel, and of the primary and secondary branches, is beset with fine numerous longitudinal rugæ or plicæ, that appear to be formed by projections of the muscular coat covered over by the mucous membrane. In specimens that have been some time in spirits, the mucous coat presents merely a minutely granular appearance; but we have every reason to think that in the living state it is lined with a layer of ciliated epithelium. The muscular coat consists of minute flattened fibres, passing in nearly all directions, the longitudinal and transverse fibres being most distinct. The serous coat appears to be of more homogeneous texture than the others, and much thinner.

In *E. papillosa,* Pl. II. fig. 9, the branches forming the anterior pair arise from about the middle of the dorsal surface of the gastric pouch, and are the only ones which come off anterior to the intestine; they soon bifurcate, the anterior portion is subdivided into four branches, the posterior is continued on without further division; the second pair have their origin in the upper posterior surface of the stomach, and bifurcate like the first pair; the anterior portion remains undivided, the posterior bifurcates: the two anterior pairs of branches however are not always symmetrical, as will be observed by referring to the diagram; indeed we have scarcely seen them alike in any two individuals. The remaining four pairs of branches arise from the central canal, and simply bifurcate. These branches at their origin are all pointed more or less backward; after their bifurcation they incline obliquely forward along the side of the body, lying nearly parallel to each other. From the whole of these branches constricted ducts lead into the interior of the branchial papillæ. In this species there are from twelve to twenty of these ducts given off from each row or branch.

In *E. coronata,* Pl. III. fig. 1, the ramifications of this curious digestive apparatus are somewhat modified. The anterior pair arise from the superior aspect of the lower extremity of the stomachal bulb, close in front of the origin of the intestine, and each trunk passing forward gives off seven branches, the posterior of which is the largest and supplies about seven papillæ. There are five or six other pairs, all of which originate in the great central trunk, and divide in the same way as the anterior pair, but the branches diminish in number and in size towards the posterior extremity of the body. It may be remarked, that the first and second pairs of branches in this and in most other species are more widely separated than the rest, and in the interval the heart is usually placed.

Another modification is seen in *E. olivacea*, Pl. III. fig. 2; in this species there are six pairs of branches, all of which are simple except the first or anterior pair; these arise as usual from the stomach, and are each divided into three branches. In *E. despecta*, Pl. III. fig. 4, the arrangement is still more simplified: after the branches of the first pair come off in the ordinary way from the stomach and pass on undivided, each to a single papilla, the central trunk passes to its termination in a zigzag direction, giving off a branch at each angle to a large clavate papilla. There are in all four of these papillæ on each side; they are not in pairs however, but alternate.

Other slight variations might be cited, but the above are the chief modifications, and are perhaps sufficient to show to what extent the digestive system varies in the genus *Eolis*.

We have searched in vain for the lateral vessel described by M. de Quatrefages, and have little hesitation in pronouncing its non-existence in the genus. We have seen several species with the ramifications coloured, and in none of them have we observed the slightest indications of such a vessel. In dissecting *E. papillosa* we made every endeavour to detect it, but without success; and in a small specimen of that species we have since seen the very terminations of the branches, and are quite satisfied that they are isolated: the branches mostly ended in free blind sacs of variable length; others had their ends prolonged, bent outwards and received into small papillæ, which seemed to be in process of development; hence we inferred, that the glandular apparatus in the interior of the papillæ was formed originally from the free ends of the branches from the stomach. We are also of opinion that when the animal is mature, the ends of all the branches will be found to enter papillæ. We have observed the termination of branches in papillæ in a species which had their minute ramifications coloured: this species belongs to that portion of the genus of which *E. coronata* is the type. It is therefore probable that M. de Quatrefages has been deceived by the doubling of the skin at the sides of the body, caused by the pressure necessarily used during the mode of investigation adopted by that gentleman: we have seen under such circumstances what might be readily mistaken for a vessel.

The prolongations of the branches from the gastric cavity that are continued into the papillæ are considerably modified in form in the various species, and from the variety and brilliancy of their colouring form the chief attraction of these very elegant animals. These prolongations appear on a superficial examination to be cæca, but when investigated under favourable circumstances and with a lens, they are found to be tubes with more or less complicated follicular walls, Pl. IV. fig. 9 *a* : the upper extremity of the tube, where the follicular structure ceases, becomes suddenly delicate, transparent and minute, fig. 9 *b*, and is continued on to communicate with a minute ovate vesicle, fig. 9 *c*, which lies within the extreme apex of the papilla, and opens externally by a minute circular foramen, fig. 9 *d*: the inner surface of the follicular or glandular part, which we take to be the liver, is lined with a granular matter.

The simplest form of this peculiar organ is met with in *E. concinna*, Pl. IV. fig. 1. In this species it is a mere dilated tube with its wall slightly waved, and having the inner surface sprinkled with darkish granules. In *E. Farrani*, fig. 2, it still maintains a considerable simplicity of structure, but becomes decidedly sacculated, and with some degree of regularity. The complexity of this organ is however much increased in *E. olivacea*, fig. 3, in which it is deeply and regularly produced into follicles or sacculi, which are much and variously puckered; but in *E. papillosa*, fig. 4, it appears to attain its highest development. The central channel is somewhat tortuous, and gives off on all sides variously sized, irregularly shaped blind sacs, which are crowded with little compound follicles. The whole of the inner surface of this complicated biliary organ is lined with a thickish layer of what appears to be a granular substance through an ordinary magnifier, but which on examination with the microscope is found to be composed of large irregular vesicles or globules, Pl. V. fig. 7, disposed without any manifest arrangement, and filled with numerous granules. These last when submitted to a still higher magnifying power are seen to be transparent, rounded, and of various sizes, and nucleated, fig. 8. The larger bodies or globules have a diameter of $\frac{1}{1500}$th of an inch. The largest of the granules measure about $\frac{1}{5000}$th of an inch in diameter.

The compound follicular nature of this gland is best observed in the living papilla fresh plucked from the animal, and submitted to a slight action of the compressor. In papillæ that have been some time in spirits the gland is somewhat contracted, its divisions approximated, and thus a more uniform surface of follicles is presented.

In describing this gland or liver M. de Quatrefages has the following passage: "Mais les cæcums qui partent des branches de l'intestin pour pénétrer dans les cirrhes s'entourent, en entrant dans leur cavité d'une espèce de fourreau irrégulier formé d'une substance granuleuse bien moins transparente que le reste des tissus. Il m'a semblé reconnaître en outre l'existence de très petits orifices s'ouvrant dans l'intérieur du cæcum." Now in the numerous species we have examined, we have seen nothing to warrant the idea here laid down. From our statement above it will be seen, first, that we believe these prolongations of the branches of the digestive cavity not to be cæca, and secondly, that they are not simple tubes having a granular substance *coating* them, but we find that the walls of the tubes are more or less bulged or thrust outwards into the form of simple or compound follicles, and that the walls are *lined* throughout by the granular matter we have already described; in fact, that each papilla contains a perfect gland of distinctly follicular type. Pl. IV. fig. 5. shows a longitudinal, and Pl. IV. fig. 7. a cross section of a papilla of *E. papillosa*; *a* in each represents the great central channel from which on all sides branch off large canals that end in small imperforate diverticula.

The whole internal surface of this compound gland is furnished with minute vibratile cilia, as likewise the small canal that leads to the oval vesicle; the cilia do not appear to be continued into the vesicle. We have however seen, on examining these parts under pressure, small granules which had accidentally passed into the tube, driven by the ciliary motion into the vesicle.

Having described the glandular apparatus, we now pass on to the vesicle at the extremity of the papilla. This vesicle is of an ovoid form; its long diameter in the largest specimens measures about $\frac{3}{200}$ths of an inch, its narrow end lying within the very apex of the papilla; both ends are perforated; the narrow end opens externally through a round aperture in the skin covering the apex of the papilla, the opposite extremity communicates with the gland by means of the slender tube, of variable length, which has already been noticed.

The walls of the vesicle, which are seen of an opake white in those species which have transparent skin, is fused with the integument of the papilla round the external orifice; and below this stout muscular bands, Pl. IV. fig. 9 *e*, attach the vesicle to the skin, so that during the contractions of the papilla the vesicle is held secure in its position. In *E. papillosa* the wall of the vesicle, Pl. V. fig. 12, consists throughout of a strong thick layer of finely interwoven circular muscular fibres. The contents appear to be arranged in longitudinal masses, as represented in the longitudinal section, Pl. V. fig. 1, which in a cross section, Pl. IV. fig. 8, have a triangular outline, the apices not quite reaching the axis of the vesicle. There is therefore a free space corresponding to the long axis. If we take out a portion of the contents of the vesicle and place it under the $\frac{1}{8}$th-inch object-glass of the microscope, we find it to consist of numerous transparent, long, narrow, slightly bent, elliptical bodies, Pl. V. fig. 11, having a double longitudinal faint marking extending from one end nearly to the other; and globules of various sizes, Pl. IV. fig. 6, containing either one nucleus or several small granules in their interior. These are imbedded and adhere to a tenacious, obscurely granular mucus-like matter. The largest elliptical bodies measure in length $\frac{3}{1000}$ths of an inch, the smallest $\frac{1}{2000}$th of an inch. The largest globules have a diameter of $\frac{1}{4500}$th of an inch.

On placing a papilla recently severed from the living *E. papillosa* in a compressor, and establishing a slight degree of pressure, there were observed to be ejected at intervals from the terminal orifice, little transparent ellipsoidal membranous bags, Pl. V. fig. 9, containing half a dozen or more of the elongated bodies already spoken of. Immediately after expulsion most of these bags burst, and the contained bodies becoming scattered, each shot forth from the end that first appeared a slender hair-like filament, fig. 10 *a a*, with astonishing velocity to a length far exceeding the diameter of the field of the microscope. Other bags did not become ruptured till a second or two after their expulsion; from these the filaments proceeded very slowly and in a perfectly regular serpentine line, so that their advance could be followed by moving the stage of the microscope, and was observed to resemble closely the progression of many small Annelida. These filaments becoming stationary retained a serpentine form, fig. 10 *b b*; other filaments were minutely spirally twisted at their junction with the elliptical body, fig. 10 *c c*. The faint double line seen in the interior of the elliptical body we suppose to be the part that contains the filament.

The elliptical bodies pressed out from papillæ which had been in spirits were never observed to emit filaments; we presume therefore that this phænomenon is a vital manifestation.

These bodies we find to differ in form in different species: thus in *E. coronata*, Pl. V. figs. 2 and 3, they are slightly bent, but shorter and thicker than in *E. papillosa*, and enlarged at their posterior extremity; they are provided with a similar filament at one end.

The bags, fig. 6, contain a considerable number of these, and also numerous other bodies of much larger size, of elliptical form, flattened and transparent, but having in their interior a peculiar marking which is represented in fig. 5. In *E. olivacea* the bodies with filaments, fig. 4, are rather stouter, but strongly resemble those of *E. coronata*.

On several occasions we have witnessed the expulsion of these bodies from the living animal, which at the time was suffering slight pressure, so slight indeed that the animal was able to move its papillæ, and in one instance an *E. Drummondi* crawled from one side of the compressor to the other. The expulsion was effected by the walls of the vesicle, and recurred at intervals; small masses of the bodies were ejected with considerable force, and to some distance. We do not feel ourselves at present in a position to decide upon the true nature of these bodies, but we may say that they resemble Spermatozoa more than anything else; we may add, that we have obtained bodies to all appearance Spermatozoa from the genital organs of *E. papillosa*, which differed only from those obtained from the papillæ in being more rounded as to their bodies, and altogether inferior in size. They are shown in Pl. V. fig. 13, as seen under deficient magnifying power.

We shall now revert to the follicular gland of the papilla. We think there can be no doubt of its being a secreting organ pouring its secretion into the digestive cavity, and we agree with M. de Quatrefages in the opinion that the entire series of these glands represents the liver, which in the Mollusca is characteristically large, but in the *Eolidinæ* has disappeared from the abdominal cavity. The central canal of the gland opens inferiorly by a short duct, Pl. IV. figs. 2, 3, 4 *a*, into one of the ramifications of the digestive cavity, and superiorly by the delicate canal before described into the ovate vesicle. We have no doubt that by the lower opening the secretion of the gland finds its way into the gastric ramifications; but as to the nature of the communication or connexion between the gland and the ovate vesicle, we confess our entire ignorance.

To give a general idea of the digestive apparatus, we should say that the compound follicles of the papillæ represent the liver; the small tubes leading from them are their ducts, by which their secretion is carried into the gastric organ consisting of the pyriform pouch, the great central canal, and their main branches.

In some species however the structure and functions of the several parts seem somewhat modified. In *E. despecta* the central canal, all the ramifications and the glands of the papillæ are coloured and granulated alike; it is therefore probable that the whole of these parts perform the same function. The stomach and intestine are the only parts that are transparent in this remarkable species. In *E. gracilis, E. rufibranchialis, E. Northumbrica* and others, either the extremity of the great central canal or the ends of the lateral ramifications are slightly coloured like the glands of the papillæ.

This view of the matter is somewhat corroborated by what is observed to take place during digestion. The food enters the stomachal bulb in large masses, and is there broken up and mixed with the fluids of the digestive cavity. In this state it is driven throughout the alimentary system by the alternate contractions of the pyriform pouch and the great trunks leading from it. These contractions are only of a nature to produce an oscillatory motion which serves to promote that intimate mixture of the alimentary matters with the hepatic and other secretions necessary to the process of digestion.

We have watched this action with great care in *E. coronata*, and have observed on several occasions in individuals that were free and moving about at pleasure, and in which the action of the parts was natural, currents passing rapidly backwards and forwards through the stomach, and larger ramifications obeying the various contractions of the parts, and holding in suspension large, crude, irregular particles varying in size and shape. We had the satisfaction also to see more than one individual take its food, which we have found to be always of an animal nature, and could perceive the lumps as they were lopped off by the jaws pass along the œsophagus and enter the stomach. We have likewise frequently seen the track of the *true* intestine marked out by the dark colour of the fæces it contained, and have witnessed also the expulsion of the same from the anus.

M. de Quatrefages supposes that the refined products of digestion pass into the branchial cæca as he terms them, and also into the ovoid vesicle, though in the latter he has seen no floating corpuscles. Through the walls of the cæca, and especially through those of the vesicle, he believes that the chyle for the support of the body transudes. Again, he makes the branchial cæca surrounded by a granular mass performing the office of liver, thus cumulating in the same organ function upon function. We have already stated that we agree with M. de Quatrefages in taking the glands of the papillæ, as we term them, to represent the liver, and we now subjoin, that we see no reason to believe them to be also the organs by means of which the chyle is conveyed from the digestive to the circulatory system. We have ourselves seen crude particles of the alimentary matters mixed with regular corpuscles pass into the glands of the papillæ, and on one occasion even a large angular fragment was forced through the narrow duct at the base of a gland, entering its cavity and afterwards passing out again. But in all these cases, our specimens, as well as those of M. de Quatrefages, were suffering considerably from the action of the compressor, and consequently the fluids of the stomach and other parts may have been forced into unnatural channels. We do not put much faith in examinations conducted in this way, and indeed the only satisfactory method of investigating this subject is to watch the progress of digestion when the animal is moving freely about; and until this be done, all theorizing appears to us idle, and likely to lead to error and confusion.

Salivary glands.—These in *Eolis* are very small and difficult to detect; they lie concealed between the corneous plates and the muscular mass of the cheek, as previously noticed. On removing either of the corneous plates in *E. papillosa,* the gland will be found lying exposed in a depression on the upper third of the external surface of the cheek-mass, corresponding to about the centre of the corneous plate, Pl. III. fig. 6 *a.* The gland is composed of a small cluster of roundish, yellow, irregular follicles, fig. 5, and frequently a little way in advance of this there is a smaller one made up of two or three follicles. The two parts are connected by a long slender duct, which passing backwards opens into the mouth at the commencement of the œsophagus. We have likewise detected this gland in *E. coronata.*

This gland differs conspicuously in size, position and character from the same organ in *Eolidina,* figured and described by M. de Quatrefages. All we can say is, that in our researches we have observed nothing like the representation given by him of the salivary glands of that species. It is certainly not likely that in animals so closely allied these organs should be so widely different. We would suggest therefore the possibility of that naturalist having mistaken some portion of the generative organs for them. We are inclined to do this the more since he has entirely misunderstood the sexual apparatus, and figured and described only a small portion of it, and since we have sometimes observed, when examining these animals in the compressor, portions of that apparatus not altogether unlike M. de Quatrefages' figure of the salivary glands of *Eolidina paradoxum.*

Since writing the above, we have had much satisfaction in gathering from the Observations of M. Souleyet on the Gasteropod Mollusca, forming the proposed order *Phlebenterata* of M. de Quatrefages, translated in the November Number of the 'Annals,' that our views have been almost altogether verified.

With respect however to the anatomy of the gland of the papillæ, M. Souleyet appears to adopt the opinion of M. de Quatrefages, who states that the prolongation of the digestive cavity into the papilla is *coated* with a granular layer—the liver. We have shown above that this view is inaccurate, and in confirmation of this we may as well state, that on the papillæ being subjected to pressure, the granular structure of the gland invariably becomes ruptured internally; but if the view taken by these gentlemen be correct, we should apprehend that the rupture would take place externally into the vascular canal surrounding the gland.

EXPLANATION OF THE PLATES.

Plate I.

All the anatomical figures in this plate are from *E. papillosa*.

Fig. 1. *Eolis papillosa*, Johnst., a little above natural size.

Fig. 2. *E. coronata*, Forbes, nearly double natural size.

Fig. 3. *E. olivacea*, Alder and Hancock, four times natural size.

Fig. 4. Section of the lips with buccal mass attached: *a*, outer lip; *b*, inner lip; *c*, œsophagus; *d*, corneous plates of buccal mass; *e*, channel of mouth; *f*, circular belt of muscle at the attachment of outer lip; *g g*, muscles passing from the circular belt to foot and skin of head; *h*, muscular bands passing from circular belt to posterior margin of horny plates; *i*, foot.

Fig. 5. Vertical section of buccal mass, showing the muscles of the tongue, the external layer being removed: *a*, muscle which assists in rotating tongue forwards, arising from upper margin of horny plate, and passing downwards to inferior surface of *b*, muscle which rotates the tongue backwards, being inserted by its ends into the posterior end of tongue and into the inferior extremity of cutting blades *e*; *c*, muscle attached to both ends of tongue, which it will approximate; it will also assist *a* in rotating the tongue forwards; *d*, strong layer of short transverse muscles which bind together the external layers of muscle, and form a fulcrum for the semicircular rotators; *f*, œsophagus; *g*, corneous plates; *h*, ridge of the tongue; *i*, cutting-jaws; *k*, the hinge or fulcrum of horny plates; *l*, anterior extremity of muscular cheek-mass.

Fig. 6. Nearly vertical section of buccal mass: *a*, horny plate; *a'*, cutting-edge; *b*, inner lip; *c*, hinge or fulcrum; *c'*, transverse muscles that close the jaws; *d*, transverse muscles that open the jaws; *e*, inferior transverse muscles that assist in closing the jaws; *f*, wedge-shaped mass of tongue, supporting spiny ridge and showing the two external layers of muscles; *g*, muscular cheek-mass; *h*, fold of lining membrane of mouth; *i i*, outer lip; *k k*, circular muscular belt at base of outer lip; *l*, œsophagus.

Fig. 7. Upper aspect of buccal mass: *a a*, corneous plates; *b*, muscular bands on the external surface; *c*, œsophagus; *d*, transverse muscles before fulcrum; *e*, transverse muscles behind fulcrum; the dark line between the two sets of muscles indicates fulcrum; *f f*, muscles arising from upper part of horny plates, and passing down behind mass of tongue marked *a* in fig. 5.

Fig. 8. View of cavity of buccal mass from above, the fulcrum being divided, and the horny plates *a a* drawn apart; *a' a'*, cutting-edges of jaws; *b*, inner lip; *c*, spiny ridge of tongue; *d*, wedge-shaped muscular mass of ditto; *e*, muscular cheek-mass; *f*, flat upper border of ditto; *g*, anterior attachment of ditto to cutting-jaws; *h*, folds of lining membrane of mouth; *i*, fulcrum of horny plates; *k*, anterior and posterior transverse muscles; *l*, œsophagus.

Fig. 9. Upper aspect of buccal mass with superficial muscles removed: *a a*, corneous plates; *b*, triangular process forming fulcrum; *c*, cutting-edges of horny plates; *d*, ridge dividing surface of fulcrum into anterior and posterior parts; *e*, muscle of left side which passes down to be attached below to tongue-mass, fig. 7 *f f*; *f*, thin layer of muscular fibres which pass from edge of horny plate, converging to form longitudinal fibres for œsophagus, *g*.

Fig. 10. Lateral aspect of buccal mass obliquely viewed, with part of the muscles removed: *a*, exposed surface of corneous plates; *b*, posterior transverse muscles to open jaws; *c*, anterior ditto to close jaws; *d*, inferior ditto to close jaws.

Fig. 11. Same view as fig. 10: *a*, corneous plates; *b*, muscles of inner lip; *c*, inner lip.

PLATE II.

All the anatomical figures in this plate are from *E. papillosa* unless otherwise stated.

Fig. 1. Two views of transversely arched plates from ridge of tongue, magnified, to show the spines.

Fig. 2. Anterior aspect of buccal mass, with lips and lateral muscles removed: *a*, cutting-edges of jaws; *b*, superior anterior transverse muscles; *c*, inferior ditto; *d*, tongue appearing between cutting-blades.

Fig. 3. Lateral view of buccal mass of *E. coronata*.

Fig. 4. Muscular cheek-masses inclosing *a*, the tongue; the horny plates have been removed; *b*, flat upper free border of masses; *c*, anterior pointed extremity of muscular masses attached to lower end of cutting-blades; *d*, œsophagus.

Fig. 5. External lateral view of horny plate, all muscles removed: *a*, ridge giving origin to muscles of inner lip; *c*, portion of same giving origin to muscles of outer lip; *b*, cutting-blade.

Fig. 6. Same view of horny plate of *E. coronata*.

Fig. 7. Interior view of horny plate of *E. papillosa*: *a*, fulcrum or hinge; *b*, cutting-blade; *c*, line dividing the origin of the anterior and posterior superior transverse muscles.

Fig. 8. Front view of horny plates of *E. coronata*.

Fig. 9. Digestive apparatus of *E. papillosa*, the glands of the papillæ removed: *a*, buccal mass; *b b*, corneous plates of same; *c*, œsophagus; *d*, bulb of stomach; *e*, true intestine; *f*, anus; *g*, great central canal leading from stomach and ending posteriorly in a blind sac; *h*, a primary branch from digestive cavity; *i*, secondary branches; *k*, ducts from glands of papillæ.

Fig. 10. Teeth of *E. nana*.

Fig. 11. Spiny ridge of tongue of *E. alba*.

Fig. 12. Upper aspect of three plates of same.

Fig. 13. Portion of spiny ridge of *E. olivacea*.

Fig. 14. Upper aspect of two plates of same.

PLATE III.

Fig. 1. Digestive apparatus of *E. coronata*; the letters correspond to those of fig. 9, Pl. II.

Fig. 2. Digestive apparatus of *E. olivacea*; letters as above.

Fig. 3. Upper aspect of two plates of spiny ridge of tongue of *E. nana*.

Fig. 4. Digestive apparatus of *E. despecta*; letters as in fig. 9, Pl. II.

Fig. 5. Salivary gland and duct of *E. papillosa*, highly magnified.

Fig. 6. Lateral view of buccal cavity and cheek-mass of *E. papillosa*, one horny plate removed: *a*, salivary gland; *b*, horny plate; *c*, part of cheek-mass attached to horny plate; *d*, flattened upper border of cheek-mass; *e*, anterior extremity of cheek-mass passing to its attachment to inferior points of cutting-blades; *f*, free part of external surface of cheek-mass.

Fig. 7. Stomach of *E. papillosa* laid open, showing rugæ of internal surface of bulb, central canal, primary and secondary branches.

PLATE IV.

Fig. 1. Papilla with gland of *E. concinna*.

Fig. 2. Papilla with gland of *E. Farrani.*
Fig. 3. Ditto ditto of *E. olivacea.*
Fig. 4. Ditto ditto of *E. papillosa.*
Fig. 5. Longitudinal section of papilla of *E. papillosa,* showing interior of gland, &c.: *a,* great central channel; *b,* diverticula therefrom.
Fig. 6. Globules from ovate vesicle, highly magnified.
Fig. 7. Transverse section of gland of papilla of *E. papillosa*: *a,* great central vessel; *b,* diverticula from it.
Fig. 8. Transverse section of ovate vesicle.
Fig. 9. Highly magnified representation of a papilla of *E. papillosa*: *a,* the gland; *b,* fine vessel leading from gland to ovate vesicle *c*; *d,* orifice at apex of papilla; *e,* muscles attaching vesicle to wall of papilla; *f f,* external wall of space in which the blood circulates in contact with the external surface of the gland; *g g,* muscular bands inclosing cellular spaces between *f f* and the skin of the papilla; *h,* skin of papilla; *i,* vibratile cilia on external surface of ditto; *k k k,* circular and longitudinal muscular fibres of skin.

Plate V.

Fig. 1. Longitudinal section of ovate vesicle.
Figs. 2 and 3. Spermatozoid bodies from ovate vesicle of *E. coronata.*
Fig. 4. Spermatozoid bodies from ovate vesicle of *E. olivacea.*
Fig. 5. Elliptical bodies inclosed in bags or utriculi with the spermatozoid bodies of *E. coronata.*
Fig. 6. Utriculus or bag from ovate vesicle of *E. coronata,* containing the two kinds of bodies mentioned under fig. 5.
Fig. 7. Vesicles or globules containing granules from the gland of papilla of *E. papillosa.*
Fig. 8. The granules more highly magnified.
Fig. 9. Utriculi from ovate vesicle of *E. papillosa,* containing the spermatozoid bodies.
Figs. 10 and 11. Spermatozoid bodies from same: *a a a a, b b, c c,* different appearances presented by the filaments or tails of the spermatozoid bodies of *E. papillosa.*
Fig. 12. Part of a transverse section of the wall of ovate vesicle of *E. papillosa,* showing the interlacing muscular fibres.
Fig. 13. Spermatozoa from generative organs of *E. papillosa.*
Fig. 14. Anterior view of *Eolis papillosa* from spirits: *c,* cutting-jaws; *b,* inner lip; *d,* folds of lining membrane, &c. of channel of mouth; *e,* oŭter lips; *f,* fold of integument external to outer lips; *g,* labial tentacles; *h,* dorsal tentacles; *i,* anterior margin of foot.
Fig. 15. Inferior view of head of *Eolis olivacea* in its natural state. The letters in this fig. as far as they go are as in fig. 14.
Fig. 16. General view of viscera, &c. of *Eolis papillosa* from above, the dorsal skin alone having been removed: *a,* buccal mass; *b,* cerebral ganglia with the nerves passing off from them; *c,* ganglia at the base of dorsal tentacles, supposed to be olfactory; *d,* œsophagus; *e,* stomachal bulb; *f,* great central canal; *g g g,* primary and secondary branches from ditto; *h,* true intestine; *i,* anus; *k,* portions of male generative organs; *l,* ovarium; *m,* ventricle of heart, with aorta passing forwards from it; *n,* auricle of heart.

XI.—*Memoirs on Geographic Botany.* By Richard Brinsley Hinds, Surgeon, R.N., F.R. Coll. Surg.

[Continued from p. 30.]

If it has been ever the reader's fortune to traverse an extensive ocean, he must have felt at the end of the voyage that all his previous ideas respecting space had undergone a considerable modification. During the voyage he has often gone on deck to view the vessel hastening through the water, and to gaze on the unchanging horizon; day after day he beholds the vessel hurrying on, but the scene around remains the same. As his observations extend, he compares the velocity of his ship and the unchangeable nature of the scene, till he becomes insensibly impressed with the extent and vastness of the surface over which he has travelled. He has had a practical proof of a circumstance, which it is very true his reason might have partially displayed to him, but it has made a much firmer impression on his mind than any effort of intelligence could have produced, and the importance is proportionately increased. In fact, he concludes his voyage with his ideas of space greatly enlarged, and the world he inhabits seems to him larger than he ever thought it was before.

A very similar feeling possesses the traveller as he penetrates an extensive forest. Every morning he commences his journey, patiently pursuing the winding pathways through interminable multitudes of trees and shrubs, till, when evening arrives, he is hardly less fatigued with the monotony of the scene than with the exertions of the day. His feelings are the same as those at sea,—he is surprised at the interminable character of the scene, and his ideas of space are measured by a greater standard. He wonders at the vast multitudes of vegetable beings; whence they could possibly have drawn nourishment to rear such solid structures; he speculates on their age, and lastly on their use. In both cases the ideas of space are the same, but they have received an impulse from the novelty of the scene; perhaps assisted also by the perfect stillness which reigns so completely in deep forests, and during the heat of the day the silence is more painful than on the wide ocean. The chief difference between the two is, that one is a sea of waters, the other a sea of trees.

The reader who has confined his travels to his own country, I would recommend to open a map of the two Americas. Let him trace them throughout from north to south, and he will scarcely find a spot which does not support a vegetation of some kind or other; the deserts and ungenial spots being few and limited. A great part is covered with forest-trees of unequalled growth, and where a smaller vegetation prevails, the number of individuals is greater than ever. It is not merely the tropic regions which are prolific; the temperate regions have also their dense and gloomy forests; in fact it is beyond all human possibility to form any numerical estimate of the amount of the vegetable kingdom; it would be like counting the sands of the Great Sahara. Let the imagination picture all it can of multitude, space, and prolific increase, and some conception may be conveyed to the mind.

Every botanical region of the globe possesses a flora having features which proclaim relations with other regions; these vary according to the nature of the relationship and the circumstances under which the respective floras exist. The value of the points of connexion fluctuates as the comparisons are drawn from groups of plants united by general characters, or from others less common and more intimately connected with their existence. The modes of relation are three in number, corresponding in a general manner with the three assemblages of vegetable forms known as families, genera, and species. By the families are established the most distant and general resemblances, constituting *analogy*; by the genera a closer approximation, or *affinity*; and by the species the most perfect accordance of characters, or *identity*.

Generally these modes of resemblance coincide with the parallel groups; but there are instances of analogy and affinity, which must be admitted as such, and yet are not so closely limited. As an instance of this kind, as regards analogy, may be mentioned the existence of *Ficoideæ* chiefly in South Africa, and of *Cacteæ* almost entirely in the two Americas. The analogical resemblance arises from the great succulence met with in these two families, together with a certain correspondence in their organic structure. A further illustration occurs in the alpine flora of the Canaries and Mount Etna; in the former *Sempervivum* has numerous species, and not one is indigenous to the latter, where *Sedum* is nearly equally abundant. Whilst then it is admitted that there is some difficulty in fixing the precise limitation of these terms, they may be considered, as a rule, to display the coincidence expressed above.

Whenever an analogy exists, it by no means follows that there should be a further connexion by affinity or identity, for the nature of the analogical resemblance does not require this. On the other hand, when there is an affinity between two regions, it presupposes also an analogy; and when the relation is so intimate as to establish an identity, there is necessarily both an analogy and an affinity.

The sources of *analogy* being derived from natural families, and the latter as we have seen usually widely diffused, they are abundant in all vegetable regions, founded on latitude, which approach each other. In the tropical regions throughout, there is a great similarity in the families, those existing in one or more being often common to the others. In the subtropic and other regions it is the same, from the general similarity of controlling circumstances. Sometimes an analogy will be established between two regions not parallel, when external circumstances are peculiar: the temperate (Iroquois) region of North America presents some analogous features to the subtropic portion of Europe; the tropics also establish an analogy with temperate and subtropic Europe and America, by the latter possessing indigenous species of *Palmæ* and *Cinchonaceæ*, these families being chiefly tropical. Between corresponding regions in the north and south hemispheres the analogy is also great, since under similar circumstances we everywhere find a similar assemblage of plants.

When tracing *affinity*, a closer view of vegetable organization is required, since its existence is drawn from genera. Generally it is found to follow analogy in similar regions; thus we find it strongly developed in parallel regions in the same hemisphere, and in analogous regions in different hemispheres. The latter offer some highly interesting comparisons, as also do the resemblances of affinity between regions which are not parallel. *Punica granatum*, originally indigenous on the northern shore of Africa, though since spread over the warmer portions of the globe, acknowledges a congener from Guiana, *P. nana*; the former being an inhabitant of the European subtropic region, the latter of the American north tropic. In this instance the value of the relation is increased, since none are found elsewhere and the means of affinity are few, *Punica* having but two species. Nowhere is affinity so admirably maintained as between different mountain ranges, the resemblances in their different alpine floras being so extensive and so similar in widely-spread ranges. The genera existing on one of these is frequently repeated by kindred species on others, whilst the whole contents of a zone will bear a close comparison with those of a similar zone elsewhere. Alpine vegetation, always fascinating, is again linked by interesting affinities with various regions: if on elevations within the tropics, the zones passed through in ascent will respectively resemble the subtropic, temperate, and arctic regions. *Draba* has several species in the mountains of Mexico, connecting the flora with the temperate regions of Europe and Asia where the species are abundant.

In the relation of *identity* we possess the closest resemblance in the productions: as the word implies, it consists in the coexistence of some of exactly the same forms in different regions, some of the species of one being indigenous to another. Between parallel regions the identity is of course greatest, but the different parallel regions vary in the intensity of this character. From observations on a great number of species, the average of duplicates in the six great divisions or provinces is 1 in 325, and the amount fluctuates in different countries on both sides of this estimate, according to physical circumstances. Within parallel tropical regions the amount is smallest, and increases as we advance towards the north, through the subtropic and temperate regions, till the maximum is attained in the arctic. This progressive increase in the northern hemisphere is no doubt due to the configuration of the land, the large continental masses here closely approximating, and forming almost a continuous surface about the arctic circle, assisted also by the great similarity of climate. In the southern hemisphere there is precisely an opposite distribution of land and water, the continents gradually growing narrower towards the south, and yielding to the ocean of waters, which at the antarctic circle is scarcely broken by land. Of 233 species collected in Kotzebue's Sound one half are found in Europe, whilst a similar proportion crosses Behring's Straits, and are repeated in Siberia. Though the affinity between similar regions in the two hemispheres, or between distant mountain chains, is strongly characterized, the relations of identity are extremely slight; in the latter particularly so, where it is rare to meet with species identically the same as those of the plains.

It is by these three methods of relation that the flora of one region or country is to be compared with another, and an analysis established, conclusive and satisfactory, whence its importance as an isolated flora, or compared with others, is ascertained. Alpine vegetation judged by these characters loses some of its importance, its relation being chiefly that of affinity, the species belonging to genera whose maximum exists near the level of the sea; hence peculiar groups, as genera and families, are very rarely limited to them. The features of the vegetation of the lowlands are repeated in accordance with controlling circumstances, marked and peculiar characters being seldom met with. To illustrate more fully these different relations, we will sketch an outline of the flora of the Sandwich islands, which, from their solitary situation in a wide ocean, are well adapted for this purpose.

These islands, eleven in number, including two which are scarcely more than rocks, stretch obliquely across a point intersected by 21° N.L. and 157° W.L. They are distant 2900 miles from America, 3500 from Asia, and nearly the same from the most projecting part of New Holland. Numerous islands intervene between the two latter of these continents, but those towards the Sandwich islands are mostly small and unimportant. The climate is extremely equable and not disagreeably warm; in 1838 the mean temperature was 77°, and the range of the thermometer from 85° to 66°, being nineteen degrees. Much rain falls in some of the deeper valleys, but varies greatly in quantity in different situations and different islands. On the plain on which the capital is built, twenty-one inches fell in the above year; but this is considerably less than what falls more towards the interior of the island, and on the elevated parts. The surface is very irregular, has but little level land, and consists chiefly of mountain ranges of moderate height, intersected by numerous deep and fertile valleys; the superficies of the whole is about 7000 square miles. The soil, resulting from the decomposition of several varieties of lava, is very fruitful, but requires much water; supplied with plenty of the latter, its productiveness is unlimited.

Their geographical position bestows on them a tropical flora, whilst the irregularities of surface ensure variety. For the present, however, we are confined to the plains. *Cinchonaceæ, Guttiferæ, Sapindaceæ,* arborescent *Euphorbiaceæ,* tree-ferns, and a solitary representative of *Palmæ,* omitting the cocoa-nut, with other families equally tropical, but not quite so abundant, stamp its general features. The relations of the flora to the American and Asiatic tropic are so nicely balanced, that it is difficult to decide of which it most partakes; the sources of analogy are perhaps most numerous with the Asiatic. With more distant regions it has also relations through some members of *Cruciferæ, Saxifrageæ* and *Umbelliferæ,* families abounding in temperate regions, and presenting an analogy the tropics do not often display. Each of these families is but feebly represented: *Cruciferæ* has two species of genera belonging to the European temperate region, hence an affinity with that portion of the globe: this is further supported by an umbelliferous plant, *Hydrocotyle interrupta,* which is regarded in the islands as originally a native plant, and is also widely diffused elsewhere: the genus supplies another affinity to temperate regions, whilst the species acknowledges an identity with several others. The saxifrageous plant, *Broussaisia arguta,* supplies an analogy alone; the genus and species are found only in the Sandwich islands. Like other islands they have a multitude of ferns. An analogy, stronger than usually prevails in tropical countries, is established with subtropical regions through shrubby *Compositæ, Labiatæ,* and some others.

The affinities are numerous, and very equally distributed between New Holland, Asia and America. In common with Asia are the genera *Cyrtandra, Santalum,* and *Elæocarpus;* with America, *Clusia, Brunellia,* and *Heliotropium;* and with New Holland, *Metrosideros, Cyathodes, Pittosporum,* and *Exocarpus.* Few of their species are the same, the relations ceasing chiefly with the genus.

The repetition of species indigenous elsewhere is also considerable: taking one hundred and sixty-five of the phænogamous, fourteen were found to be American, twelve Asiatic, thirteen common with New Holland, twenty with the other Polynesian islands, and thirteen with Europe. Some of the ferns are American, a few Asiatic. Of the whole flora, about a moiety of the species are found beyond the islands. Much of the vegetation is thus identical with other countries, but is distributed among them with surprising impartiality.

The grounds on which its peculiarities rest, and on which its individuality as an independent flora depends, may be briefly hinted. The islands are without any plants which are likely to confer on them an exclusive natural family. *Cyrtandraceæ* and *Scævoleæ* they possess in comparatively greater intensity than others. Their only considerable genus is *Kadua*; it has eight or nine species. There are besides a few other genera limited to the islands, but they have chiefly a solitary species each, rarely as many as two or three. About one half the species as yet known are confined to their own shores, but as a further acquaintance is gained with the flora, this number will be most probably increased. Those extensive compact forests of bulky and lofty trees, which it is customary to find in tropical countries, have no existence in the Sandwich islands. Their trees are not usually of large growth, and they crowd up the sheltered and moist valleys. The plains are comparatively bare or only thinly wooded, the trees preferring the precipitous sides of the mountains. Nor has the vegetation that variety of shades of green to be expected; the leaves are of a dull lurid colour, generally they are small in size, and more or less entire. The flowers are equally inconspicuous for size, and do not possess much richness of colours: the xanthic varieties greatly prevail, often rendered dull by a greenish hue. *Leguminosæ* are said to be proportionately rare in the Polynesian islands; in this group they are far from abundant. As far as is yet known, no *Orchidaceæ* are indigenous, a circumstance the more remarkable, since they are not uncommon in the Society islands.

We look in vain to these islands for evidence of the migration of their flora. Though their own proper vegetation is below the average, and is mixed largely with species common to other lands, the number still remains sufficiently great to place any ideas of its individuality beyond a doubt. They must be regarded as possessing an original vegetation, which, whilst it has received species from other countries, has sent occasionally some of its members abroad to colonize the coral islands as they gradually emerge from the ocean. In all probability, the solitary species of *Kadua* found on Romanzoff island has wandered from its native soil; and Chamisso collected fifty-two species on the Radack chain, a third of which are found on the Sandwich islands.

The part which vegetation performs in the economy of nature is in every way capable of exciting our admiration at the harmony and mutual dependence existing among the several kingdoms. In the connexion of the latter with each other, it is not easy to discover a point where it can be said these cease or begin. We learn that a portion of the earth became dry land, and was thus prepared for the clothing of vegetation with which it was immediately invested. The heavenly bodies were rolled into their stations, and that variety of light and temperature required by plants was bestowed on them. The vegetable kingdom left in this condition would have flourished in boundless luxuriance, but without any very apparent use, and another host of organized beings was soon added, to keep its vigour in check, and to derive nutriment from it. Among the countless myriads of animals now called into existence, it is impossible to say how far they depress the exuberance; the multitudes of insects constantly feeding on the foliage, the flocks of birds always on the search for seeds, and the herbaceous animals tearing the branches from the trees and the roots from the soil, must cause vast quantities to disappear. Even with all these, however, a very slight impression can ever be made, and a limit to its excess is derived from the property of all plants to run through a certain course and then die.

Plants, like all organized beings, have a determinate period to their existence. This varies greatly; some scarcely survive beyond a few hours, others a few months, and some extend through many years, even through ages, each in its existence performing an assigned set of functions. Every species is endued with a certain period of vitality which it receives from its organization. Among trees, the ash and the elder do not attain the longevity of the oak. Individuals, besides the specific attributes conferred on them, are liable to casualties which may extend or contract their duration. Among the natural causes are, the varying influence of climate within the range of their growth, situation, whether in the interior or margins of forests, and certain injuries to which they are exposed from animals. The removal of plants from one climate to another is capable of converting annuals into biennials and the reverse, and cultivation will sensibly protract the life of others. The larger vegetation when assembled in masses will be observed to carry with it certain appearances indicative of age, and in this state of things climate seems the chief agent. Two spots on the same latitude, and with coeval forests, may in one have every appearance of great age and longevity, and in the other all the signs of youth and vigour.

Dissolution at length overtakes all organized beings, the principle of life is withdrawn, and they are resolved into their constituents. With the removal of life organization ceases, chemical affinities assume activity, and the inorganic kingdom claims the rest: this is now the magazine whence future plants are to draw their food, and derive vigour to pursue their functions.

With regard to the chemical effects it is capable of producing, these are perhaps but slight. Vegetation has a salutary influence over the atmosphere by the removal of carbon; this agency is confined to the green organs, those parts coloured giving it out, but not in the same proportion. A positive prejudicial action is sometimes exerted over the health of man: the rank luxuriance of the vegetation of warm climates, where there is abundant moisture, creates a malarious atmosphere which fully balances its otherwise good effects. It cannot be concealed that some countries are so extremely fatal to human life, as to make them almost uninhabitable. When the vegetation of an unhealthy spot is removed, and the soil exposed for a time to the sun's heat, it becomes comparatively healthy, as has been the case at Sierra Leone.

Man has without doubt been powerfully affected by the nature of the vegetation. It is so often combined with climate that it is not easy to estimate the power of each separately, and yet there is a wide difference between the herbivorous man of the South who scarcely ever touches animal food, and the carnivorous being of the North, whose frame requires the stimulus of a large proportion of meat. The Indian of the Pampas lives on horse-flesh, and sometimes beef; his disposition is as untameable as his food is gross. The Hindoo is usually content with vegetable food, and presents in every respect a strong contrast of character. The pastoral habits of the tribes of Asia Minor, the adjacent countries, and of some portions of North America, are forced on them by the nature of the vegetation. To prevent the chances of starvation for themselves and their flocks and herds, they traverse the plains in pursuit of vegetation. But how much does this imply! every circumstance around them must be adapted to their migratory habits—limited personal property, hardihood, patient endurance, skilfulness in resources, and a recklessness which eminently fits them for the vicissitudes of their checkered life.

We shall now conclude by referring briefly to some of those external characters of vegetation which contribute towards its *physiognomy*.

The surface of the globe presents a great diversity in its features, attributable to the extremely irregular physical distribution of its parts, and its unequal exposure to the heavenly bodies, especially the sun. Throughout the kingdoms of nature this variety is distinctly marked, and the general impression conveyed is so universally acknowledged, that any person, totally unacquainted with the principles of natural history, feels no hesitation in pointing out the native country of any quadruped, bird, or insect, with distinctive general characters. With plants it is the same; only a little closer observation is required, since they do not fix themselves so firmly in the mind as the animal kingdom. Still a well-informed person will form a correct judgement of the part of the globe whence many of the plants in a collection of exotics may have been obtained; he will easily separate the plants of the tropics from those of colder regions, and not unlikely will discriminate between the plants of different continents in the same parallels. The varieties which are thus so generally evident become multiplied in the eyes of a botanist after a little examination, and he can trace certain points of distinction and resemblance, which render them highly interesting and often important to our subject.

In the vegetable kingdom, the peculiar organization which gives rise to this diversity of appearance in different regions does not originate in those characters which are taken for the purposes of classification, but is due to others of a more general kind, and which we shall attempt to explain. It depends also on a more extensive view of the flora, influenced by the method of grouping, the general outlines of individuals, and their shades of colour. The impressions conveyed by these constitute what has been termed the *physiognomy* of vegetation; expressive of its powers of giving a bias to a scene or landscape. It must be confessed, that though the eye catches any peculiarities, and can convey to the mind a correct impression of the same, it is often extremely difficult to express them in language, and in fact they are so deficient of positive characters, that any words we have cannot express them. Who is there that would pretend to describe in language the exact grouping of a mass of clouds, or give a shape to the waves of the ocean, or to the foam they dash from their crests? The painter however can do this; he can closely represent the clouds and waves, whilst he also can express on canvas the physiognomy of a landscape. If we turn to the rural scenes of our best artists, what delight do they convey from their correctness, and from portraying to us so exactly what we may every day see in nature! How faithful are the landscapes of Titian and Claude Lorraine, and how happily have they caught and expressed the outlines and groupings of vegetation! Not merely have artists succeeded in representing a particular landscape, but certain species of trees and shrubs with such correctness, that they are evident on the slightest inspection. But it must be acknowledged, that while the artist does seize many of these features with his brush, which the naturalist is unable to describe with his pen, the former is enabled to select his subjects from the whole vegetable world, whilst every plant claims equally the attention of the latter.

It may be interesting to mention a difficulty of this kind which I experienced; and I shall give it in the same words I used at the time, when a luxuriant tropic vegetation was before me, and the impressions were fresh on the mind. After some experience among tropical vegetation, the duties of my profession removed me to high northern latitudes, and I thought a return to the tropics a particularly favourable opportunity of seizing the more prominent features, without the mind being induced to picture too freely from the novelty of the subject. A portion of my remarks was as follows:—"After looking on the vegetation of high latitudes for some months past, I felt more alive on our return to the tropics to the characteristic features of their vegetation. It is very plain that this has peculiarities easily distinguishable by the eye, but which it has puzzled me to find adequate language to express. The most prominent circumstance is its superior denseness, added to which there is, when looking on distant masses, a roundness and fullness of outline not shared with floras of other regions. Of course I now speak only of its pictorial characters as seen from a distance, and the general features it is capable of giving to a landscape. What are generally called tropical views contain some near representation of particular objects, as palms, tree-ferns, &c., and form no part of what I wish to express. I expected to find a greater richness of colouring, but I do not discover that the tropical forests surpass in the least the rich deep-green fir-forests of North-west America illumined by a mid-day sun. The only ground of surpassing excellence is the occasional variety of tints, and the green generally presents that shade which artists obtain by a greater admixture of yellow."

Perhaps it is owing to the variety in the shades of green, in plants of different latitudes and places, that artists have succeeded so well in representing them. Every region will offer some difference in this, to some extent confined to itself. The deep-green forests of the North are peculiar to them; those of the tropics have a yellower or more autumnal tint; in the subtropic regions the shade of colour of the leaves is of an olive-green; maritime vegetation also has its glaucous hue. Physiologists have attempted to account for these different tints: Mustel, Chevreul, and Senebier represent that, though carbon is apparently black, on examination it will really be found to be blue. The latter also maintains that the vegetable tissue is not exactly white, but of a pale yellow; hence, as in similar cases, it is easy to comprehend how the mixture of the blue and the yellow produces the green. To support this opinion, he cites the green which is obtained by mixing together China ink and gamboge, and that by varying the proportions, all the shades of green are produced which are found in the foliaceous organs of plants. DeCandolle adds, that though this explanation is somewhat mechanical, it is very likely to be correct.

The Chinese, with that practical application of facts to purposes of utility which so pre-eminently distinguishes them as a nation, have availed themselves of some of these features in their landscape gardening. To convey the appearance of distance, trees of the loftiest and largest growth with foliage of the deepest green are selected for the foreground. Others of smaller stature and more subdued shades are placed in the distance; whilst to vary the surface and increase the apparent extent, groups of suitable trees, selected also with a due regard to the influence of the seasons, are judiciously scattered about. To aid the effects produced by vegetation, representations of old ruins, receding walls, and time-worn rock-work, are all made available.

All the species which enter into the flora of a country do not equally assist to give a certain physiognomy; and they will vary considerably among themselves as to their power of doing so. Trees and shrubs from their size will surpass herbaceous plants, whilst these also will excel each other according to any peculiarities of organization they may possess. The prevalence of certain families in particular regions will often be highly characteristic: none would feel at a loss when surrounded by *Cruciferæ* and *Umbelliferæ*; or when traversing a plain covered with *Ericaceæ*, a grove of *Chamærops palmetto*, or a thicket of *Melastoma.* When plants become gregarious, especially those of larger growth, they deeply impress features on the scenery around them. An impression of this kind is also liable to occur from an opposite cause. Supposing in a forest where the trees possess a similar aspect and manner of growth, there occur one or two, or more individuals of a totally different character; these latter will obtain a prominence which is not due to them from their numbers, but from their peculiarities. A circumstance of this kind strongly impressed me in the Brazilian forest, when encountering a few individuals of *Araucaria braziliensis* in the midst of trees not distinguished for their physiognomy.

To obtain some numerical value for those plants which appeared to give a character, I assembled a number of different species in Devonshire, and after carefully examining them, and making the freest allowances, I came to the conclusion that in 100 species, forty-eight might be considered as contributing to the physiognomy of the flora, and fifty-two were too insignificant to assist in this. It occurred to me to repeat the observation within the tropics, where I found the numbers very similar, though the proportions were reversed: in 100 species they were respectively fifty-three and forty-seven.

The general contour of the stems of trees, with the mode of division of their ramifications, often present peculiarities. In temperate regions there are many trees thus distinguished, as the species of *Quercus*, *Populus* and *Salix*, to which may be added *Pinus* and *Cupressus*, which are so eminently expressive in a landscape. Omitting the more tropical forms, as palms, huge herbaceous *Endogenæ*, and others which are equally unique, this region contains trees of singular habits of growth. It would be difficult to fix on the most marked. Some might select many of the species of *Ficus*, and point out the complex appearance of their main stems, the immense horizontal extension of their branches, with the great proportionate lowness of the whole tree; and what seems more curious than all, the immense number of smaller stems in every stage of development, some just protruding from the horizontal branches, others pendent midway between the canopy and the soil, displaying on each thick rounded extremity an enormous spongiole; many too have reached the soil, and having attained strength and size, act as columns to support the whole structure. The tropical forest abounds with these in every variety of growth and apparent distortion. Again, there is the gigantic *Bombax ceiba*: the trunk of this tree resembles a cone greatly elongated, and stretching above the summits of all the other trees, whilst from its base spread huge processes diverging on all sides, and taking a powerful hold of the earth; where these are lost in the trunk it is of great girth, and continues upwards gradually diminishing in size, and sometimes enlarging for a space, till high in the air it sends forth its branches, chiefly in a horizontal direction. The greater part of the year these are destitute of leaves, and support a number of pendent pods, filled with the silky threads surrounding the seeds. Humboldt speaks of a forest of *Cactus*, not mere herbaceous plants, but tall trees with stems yielding wood suitable for domestic purposes. Equally characteristic and far more beautiful is a forest consisting of bamboos. There is one kind of palm which must present a strange appearance to the botanist, accustomed to regard the straight naked stems of this tribe: this is the doum palm (*Cucifera thebaica*) of Egypt and Abyssinia, whose trunk is branched in a dichotomous manner. I should perhaps hardly appreciate the novel feature this must present to the traveller, had I not seen in Mexico a tall full-grown palmetto, forked at about the middle of its length, and remember the momentary surprise I felt at the circumstance. Subsequently, in New Ireland, I twice noticed this circumstance in a *Cycas*.

Leaves are characteristic from several circumstances :—

1. They vary greatly in their size or dimensions.—The largest leaves are found among *Endogenæ*, where they are frequently distinguished for their extent of surface. Aquatic plants have often large leaves. Among terrestrial plants, some of the species of *Magnoliaceæ*, *Melastomaceæ* and *Solaneæ* are remarkable. *Lappa glabra*, *Heracleum spondylium*, and *Panax horridum* have large leaves for high latitudes. Within the tropics a great number of the leaves of shrubs and trees are compound, and very frequently composed of a multitude of small leaflets, which give a most pleasing appearance; the numerous species of *Mimosa* and *Acacia* usually possess them. In others these organs hardly deserve the name of leaves: in *Erica* they are much contracted, and in *Pinus* and *Abies* more resemble petioles destitute of laminæ, being in fact needle-shaped. In *Tamariscineæ*, *Casuarina* and *Ephedra*, the leaves are reduced to scales or mere points.

2. The outline, or method in which they are separated into lobes or divisions.—Very striking is the appearance of that useful tree the *Artocarpus incisa*, with its large leaves divided into deep and numerous laciniæ. Clustered as this tree is in groves around the habitations of the natives, it conveys an aspect to the scenery strictly Polynesian. As further instances may be mentioned the species of *Platanus*, some *Sterculiæ*, and the characteristic *Carica papaya*.

3. As to consistence.—The leaves of herbaceous plants, especially those of the wet season of warm climates, are frequently very soft and flaccid, and filled with a quantity of aqueous juice. Evergreen trees have their leaves chiefly of a tough and leathery consistence; many of the trees and shrubs bearing this kind of leaves are natives of subtropical regions, as the evergreen oaks, many *Phillyreæ*, and *Olea europæa*. In some the mesophyll is more than usually developed, as in *Hoya carnosa*; and in the members of *Crassulaceæ* and *Ficoideæ* it is carried to excess in their shapeless and succulent leaves.

4. It would be difficult to describe the numerous shades of green, though, when masses of vegetation are contrasted, they are thrown out and become prominent. During the vigour of vegetation other shades are occasionally developed. In some species of *Fuchsia*, *Begonia* and *Amaranthus*, the leaves possess a very decided pink. Some have a silvery hue on their under surface, though this appearance may be sometimes dependent on the presence of hairs. It is chiefly in the autumn that leaves take on their different colours, and which are often excessively varied; but as vitality is then ceasing, these appearances are rather attendant on disorganization.

5. As to the direction of their surfaces.—It is usual with ex-

ogenous plants to have their leaves horizontal, thus forming a right angle with the stem, or with their points inclining towards the horizon. Some depart from this, as the *Salix babylonica,* and the weeping variety of *Fraxinus excelsior.* In endogenous plants, on the contrary, the leaves generally tend towards a vertical position, which perhaps their weight prevents them from attaining; so that it is customary to find them forming an angle of 45° with the horizon. The mixture of the large herbaceous *Endogenæ* with a vegetation chiefly exogenous, conveys a remarkable character to the physiognomy.

Besides the peculiar features offered by leaves, there are others which will be occasionally prominent. They may be found in the unusual development, or some idiosyncrasy, of the various organs, and are perhaps only discoverable in particular instances. Sometimes the inflorescence is the source; at others the flowers, fruit, or floral appendages. Very different is the appearance of the trees of some species of *Cassia* laden with their long slender black pods and light pale foliage, from a grove of *Hibiscus* and *Psidium* in the Pacific, or of *Melastoma* in the Brazils.

A general impression is conveyed by the prevalence of certain colours in flowers; in some situations nothing but yellow flowers are seen, in others only white or blue, till the repetition is almost tiring. The varieties of colours, being dependent on the presence of heat and light, alter with the latitude; hence a relation between the two can be established. For the same reason there will exist a similar relation with the seasons of the year. Colours have been arranged by Schubler and Funk under two series which they have called oxidized and deoxidized; but DeCandolle proposed to call them respectively xanthic and cyanic, from the general prevalence of the colours in each. This arrangement * appears to have been chosen with considerable happiness, since most flowers range themselves under one or the other, and it affords a basis by which colours can be compared and their relative importance ascertained. There is one variety of coloration which they take no notice of further than to give their reasons for not assigning it a place in their series, and this is white. The reasons seem good and philosophical in theory, but in practice it will sometimes be impossible to assign every white flower to some particular colour, as is recommended; I shall therefore venture to use it as a colour for the present, according to general opinion.

White or pale-coloured flowers prevail over all others; they are

* These series are developed in their 'Untersuchungen über die Farben der Bluthen,' 1825. Some details may be met with in DeCandolle's 'Physiologie Végétale,' tom. ii. pp. 901–924, and in the Library of Useful Knowledge, *Botany*, pt. 4. pp. 120–124, by Dr. Lindley.

abundant in all latitudes particularly high; among the plants of the spring they are more numerous than those of the autumn. Though common in the tropics they are rarer than in northern latitudes, and are more frequent in alpine situations than in the plains. The xanthic series of colours are most numerous in situations exposed to the heat and brilliancy of the sun's rays; hence their comparative abundance within the tropics in the autumn, and in the plains over the mountains. This latter circumstance seems to have been noticed by the inhabitants of Peru, for we are told that in referring to the colours of the flowers, it is common for them to say, *Oro en la costa, plata en la sierra* (gold on the coast, silver in the mountains); in the truth of which they are borne out by nature. Yellow is frequent in some natural families, as *Compositæ*, where it very generally prevails. Though flowers of the cyanic series are plentifully mixed with the xanthic, their preponderance is in other latitudes or different seasons. Some of the intense blues and violets delight in the clear skies of subtropic regions, whence might be inferred a partiality to a clear transparent atmosphere over one, though warmer, yet often teeming with aqueous vapour. *Myrtaceæ*, essentially a tropical family, has not a single blue flower. Fruits, coloured branches or stems, the internal woody structure, can all be ranged under these two heads; thus the number of xanthic woods within the tropics is considerable.

I could not neglect the opportunities which have occurred to me to obtain some statistical details respecting the colours of flowers, and a portion of my observations are subjoined in the Table.

	Colours.	Central America, L. 10° N.	Sandwich Islands, L. 21° N.	Alashka. L. 57° N.	California, L. 25° N.	New Guinea, L. 3° S.	Hong Kong, China, L. 22° N.
		January.	June.	July.	Nov.	August.	February.
	Green	....	....	1	....	1	
Cyanic.	Greenish-blue ...						
Cyanic.	Blue	1	2	8	5	1	2
Cyanic.	Violet-blue	....	2	4	5	2	2
Cyanic.	Violet	1	1	1	3	1	1
Cyanic.	Violet-red	10	7	12	12	7	8
	Red	2	1	....	1	....	3
Xanthic.	Orange-red	1	1				
Xanthic.	Orange............	4	4	....	4	3	4
Xanthic.	Orange-yellow...	5	3	4	3	6	5
Xanthic.	Yellow	14	12	6	11	7	11
Xanthic.	Yellow-green ...	4	10	3	....	7	4
	White	8	7	11	6	15	10
		50	50	50	50	50	50

Or—

	Cyanic.	Xanthic.	White.
Central America	12	30	8
Sandwich Islands	12	31	7
Alashka	26	13	11
California	25	19	6
New Guinea	12	23	15
Hong Kong	13	27	10

In a practical view these colours may be regarded under the three heads of cyanic, xanthic, and white or blanched. The last will be found to bear an unusual proportion in New Guinea, even among its autumn flora, and at a season when the xanthic series is predominant; and this is also important at Hong Kong, but there the month of the year must be taken into consideration. In the high latitude of Alashka, as might be expected, the blanched flowers are numerous, and the cyanic series prevails, though in the midst of summer. In California the superiority of the cyanic series over the xanthic is worthy of remark, considering the time of the year, the brilliancy of the atmosphere, its general dryness, and the exposed character of the vegetation; and still more, as some limited observations made two degrees to the south give an excess to the xanthic series. In Central America January is a month of the dry season and the xanthic colours prevail; and the same occurs at the Sandwich islands, notwithstanding the general tameness of the flowers of their flora.

XII.—*On the Preservation of Objects of Natural History for the Microscope.* By the Rev. M. J. Berkeley.

To Richard Taylor, Esq.

My dear Sir, King's Cliffe, Dec. 28, 1844.

I had an opportunity a few days since of inspecting Mr. Thwaites' collection of Algæ at Bristol, and as his mode of preparing the specimens is not perhaps generally known, and as regards utility, is far superior to any other I have seen, I think it may not be disagreeable to some of your readers to have a short notice of it in your Journal. The distinguishing peculiarity of the collection is, that the specimens are ready mounted for the microscope, and preserved in a liquid which retains all their characters perfectly, so that at a moment's notice any species is ready for inspection in as great perfection as when it was first gathered; and if any unusual structure occur, the portion of the plant may be set up and re-examined at pleasure, a point which was impossible in many cases before. The value of this method will at once be appreciated by all practical algologists, who know that scarcely any tribe of plants suffers so much by drying as Algæ, especially the freshwater Algæ. The complicated endochrome, for instance, of *Zygnema* and allied genera is entirely destroyed by drying; whereas by Mr. Thwaites' method every peculiarity of structure is admirably preserved, even to the cytoblasts which occur in some species.

The method is simple and requires only a little delicacy of manipulation, which indeed may be said of all microscopical preparations. Slips of plate glass of a size convenient for the microscope are the best recipient for the specimens. On the centre of these a little square area is insulated with gold size, which must be laid on of greater or less thickness, so as to build up a little wall according to the thickness of the specimen to be mounted. A number of these should be prepared ready for use. A solution is then to be made consisting of

1 part alcohol,
14 parts water,

and to be accurately saturated with creasote. This should then be filtered through prepared chalk, and the solution allowed to stand for a month in case any precipitate should form; it must then be decanted for use and kept in a stoppered bottle, and the small portion wanted from time to time should be passed through a piece of linen to prevent any impurity from spoiling the clearness of the preparation.

When then it is requisite to mount a specimen, a drop or two of the fluid is placed in the insulated area, the edge having been first lightly retouched with gold size and the specimen floated in the fluid, care being taken to remove all air-globules; a slip of talc, or, what is better, microscopic glass, a little exceeding the size of the area, is then dropped upon it and pressed gently upon the size, by which means the specimen is hermetically sealed; a coat or two of gold size is then put round the edges for greater security, and when the whole is perfectly dry, a coat of sealing-wax varnish. Care of course must be taken that the glass, especially that which covers the specimen, is perfectly clean. The slips are all made precisely of the same size, and are placed vertically in little drawers, on the sides of which grooves are made for their reception. A box of the size of a common writing-desk will hold about 250 specimens.

Mr. Thwaites finds this solution answer best for freshwater Algæ; for marine Algæ he uses generally Goadby's solution, the formula for which is given in the 'Microscopical Journal' for 1842, p. 183. It consists of

4 ounces of bay salt,
2 ounces of alum,
4 grains of corrosive sublimate,
2 quarts of boiling water.

This does not answer however for freshwater Algæ. Some of the specimens of marine Algæ, mounted in Goadby's solution, such as *Codium tomentosum, Helminthocladia vermicularis,* &c., are admirable.

This method of preparing Algæ certainly requires some little expenditure of care and patience, but it will be found so satisfactory in its results as amply to compensate any additional pains; and when once the requisite arrangements have been made, the trouble in the case of individual specimens from time to time will not be found so great as might be expected.

It may be remarked that the method is equally applicable to other microscopical objects, and especially to those of vegetable physiology.

I am, my dear Sir, faithfully yours,
M. J. Berkeley.

XIII.—*A Century of new Genera and Species of* Orchidaceous *Plants.* Characterized by Professor Lindley.

[Continued from vol. xii. p. 398.]

Decade 3.

21. Pleurothallis *Hartwegii*; caule medio laxe et longe vaginato, folio oblongo sessili amplexicauli, spatha obtusa carinata coriacea, spicis plurimis erectis rigidis secundifloris folio subæqualibus, sepalis disjunctis falcatis intus pubescentibus, labello cordato ovato obtuso basi auriculato (v. trilobo lobis lateralibus brevibus rotundatis) juxta sinus bilamellato.

Popayan (Hartweg).

Very like *P. macrophylla.* Stem a foot and more high. Leaf a span long. Spikes eighteen to twenty.

22. Pleurothallis *lævigata*; caule angulato medio laxe et longe vaginato, folio oblongo sessili amplexicauli vernice quasi inducto, spatha acuta carinata coriacea lævigata, spicis plurimis erectis rigidis secundifloris folio brevioribus, floribus omnino *P. Hartwegii* sed duplo majoribus.

Popayan (Hartweg).

Very like *P. Hartwegii,* but the leaves are more polished, the spikes often shorter, and especially the flowers are twice as large. Perhaps it is a mere variety.

23. Stelis *maxima*; folio oblongo obtuso, spica recta basi spathacea triplo longiore, bracteis amplexicaulibus cuspidatis internodiis brevioribus, floribus ventricosis disepalis, sepalis multistriatis concavis, ...

At the foot of Mount *Tunguragua,* at the height of 11,000 feet (Hartweg).

A beautiful species, with flowers almost half an inch long, and apparently purple. It would be a *Pleurothallis* if its petals were not truncated and dwarf.

24. Stelis *brevilabris*; caulescens, folio lineari-lanceolato mucronato, spicis quadruplo longioribus solitariis erectis secundis strictis, bracteis cuspidatis internodiis brevioribus, sepalis lateralibus acutis supremo oblongo brevioribus.

Popayan (Hartweg).

Related to *St. ascendens* and *lamellata*, but easily distinguished by the drooping, ringent, almost 2-lipped flowers. Can it be *St. elongata*, H. B. K.? but the description does not agree.

25. Pleurothallis *convoluta*; folio coriaceo convoluto, spicis pluribus folio brevioribus erectis, floribus lævibus, sepalis marginatis lateralibus ultra medium connatis, petalis duplo brevioribus obtusis diaphanis, labello longiore complicato apice spathulato acuto infra medium utrinque dilatato rotundato.

Popayan (Hartweg).

26. Pleurothallis *galeata*; caule medio longe et laxe vaginato, folio petiolato cordato-oblongo obtuso, spatha subcoriacea obtusa, spicis filiformibus plurimis nutantibus folio brevioribus, sepalis lateralibus semiconnatis angustis erectis dorsali antico galeato membranaceo, petalis linearibus sepalis paulo brevioribus, labello cucullato rhombeo angulis rotundatis utrinque bilamellato apice crasso calloso.

Popayan (Hartweg).

Near *Pl. macrophylla*.

27. Pachyphyllum *squarrosum*; foliis recurvis squarrosis, labello obsolete trilobo callo a marginibus longe distante.

Popayan (Hartweg).

Much like *P. distichum*, except in the leaves and the form and callosity of the labellum.

28. Dialissa, gen. nov. *Steli* proximum. Calyx tubulosus, bilabiatus, antice ventricosus; labio altero bifido revoluto. Petala nana. Labellum indivisum, rectum. Columna nana, recta, biauris. Pollinia 2.

Dialissa *pulchella*. Spithamæa et ultra, cæspitosa. Caules teretes, monophylli, vaginis tubulosis membranaceis glabris vestiti. Folium petiolatum, lanceolatum, striatum, acutissimum, tridentatum; racemo striato, basi distanter vaginato triplo brevius. Bracteæ $\frac{1}{2}$ pollicares, falcatæ, acutissimæ, perfoliatæ, canaliculatæ, glabræ, distichæ, floribus glabris æquales. Sepalum supremum subcordatum, erectum. Petala rhombea. Labellum spathulatum, rotundatum, linea transversa elevata.

Popayan (Hartweg).

29. Gastropodium *violaceum*. Ramosum, distiche foliosum, foliis carnosis linearibus obtusis mucronulatis, vaginis striatis transverse

rugosis. Racemi breves, sessiles, terminales, cernui. Flores parvi, membranacei, violacei. Bracteæ subulatæ, membranaceæ. Sepala conniventia, ovata, libera. Petala lanceolata duplo minora. Labellum c. columna connatum, ventricosum, ovatum, callo tripartito ad basin. Columna brevis pyramidalis, partis liberæ marginibus latis crassis truncatis. Clinandrium nudum. Anthera plana, membranacea, 4-locularis. Pollinia 4, oblonga, collateralia, omnino sejuncta, filis totidem rectis, nec replicatis, lævibus, apice connatis colligata. Ovarium cuniculatum, antice ventricosum.

Popayan (Hartweg).

This genus is near the true species of *Diothonea*, and like it in habits. It differs in its naked anther-bed and in the structure of the pollen masses.

30. Restrepia *cucullata*; foliis oblongo-linearibus coriaceis acutis pedunculis filiformibus erectis brevioribus, sepalis lateralibus in unum lineari-lanceolatum connatis supremo angustissimo, petalis duplo brevioribus linearibus acuminatis, labello carnoso oblongo lævi tricarinato, columna cucullata.

Popayan (Hartweg).

XIV.—*Description of an apparently new species of Longicorn Beetle from Mexico in the collection of the British Museum.* By Adam White, Assistant Zool. Dep. Brit. Mus.

[With a Plate.]

In M. Delessert's 'Souvenirs d'un Voyage à l'Inde,' a very interesting account has been given by M. Perrotet, his companion, of the habits of the *Dorysthenes montanus* of Guérin, with which I shall commence this paper, more especially as the insect about to be described would be arranged close to it by many authors (such as Laporte de Castelnau), although at present we have no means of ascertaining whether the *Prionacalus* of this memoir, and *Psalidognathus* of Mr. G. R. Gray, like the East Indian genus alluded to, and unlike the majority of the group to which they belong, live on the ground in elevated places destitute of large trees. The *D. montanus* begins to appear above the surface of the ground about the end of April, and comes up in immense numbers till the beginning of the rainy season, which lasts from the end of May or during June. They appear in such swarms that the highways and by-paths are covered with them in some places, and it is said that the bears of the country, at the season when they abound, get up to the mountains to feed on them. They have been observed by MM. Delessert and Perrotet coming out of their holes in the ground, especially in the neighbourhood of Coonoor, Kotirgherris and other places amongst the Neelgheries, where they may be seen white, yellow and brown, accordingly as they have been for a short or long time out of the pupa state; they always keep to the ground and walk slowly. Amongst the *Prionidæ* this group, containing *Dorysthenes, Cyrtognathus, Cacoscelis,* and perhaps *Acanthinoderus, Psalidognathus* and *Prionacalus,* resembles in habit *Dorcadion* and allied genera among *Lamiadæ,* as Guérin-Meneville very justly remarks (*l. c.* Mag. de Zool., and Rev. Zool. Cuv. 1840, p. 39 *Cyrtognathus*). I may here add, that the curiously curved jaws and very strong legs with their slender elongated tarsi seem to fit them particularly for getting into the ground, escaping from it and walking on its surface*.

In a small collection of insects from Mexico, purchased last year by Mr. Gray for the British Museum from M. Hartweg, there are three specimens of a subgenus of *Prionidæ,* at first sight with very considerable resemblance to the *Psalidognathus modestus,* Fries, Vetensk. Akad. Handl. 1833, p. 327. t. 9. f. 3, agreeing with that species in many particulars, but to me appearing distinct.

From the genus *Psalidognathus* of Mr. George Gray (Griff. A. K., Insects, ii. p. 115. t. 6. f. 14), as characterized both by Mr. Gray and M. Fries, it differs in many particulars, sufficient, if the established subgenera of *Prionidæ* be valid, to constitute a new subgenus closely allied to *Psalidognathus*: in my description any comparisons refer to this latter genus.

Prionus, subg. *Prionacalus,* White.

♂. Head behind the eyes without a prominent spine; the lateral margin behind produced into a slight process directed backwards.

♀. Head midway between the eyes and the posterior edge, with a strong broad spine on each side.

♂ ♀. Cheeks where jaws are inserted, without strong tooth on the outside. (See Pl. VIII. fig. 1 *b*.) Labium very short (in *Psalidognathus* the labium is elongated).

Jaws very strong (in female widest), with the upper surface rounded, the ends bent downwards, the edges strongly toothed and notched, the terminal tooth fitting into a groove in the other, and the ends probably lapping over each other.

Palpi very prominent (Pl. VIII. fig. 1 *a c* and 2 *a b*). Maxillary with terminal joint largest, securiform and much dilated, penultimate joint much shorter than the third. Labial palpi with the terminal joint much dilated. Antennæ 11-jointed, with first joint

* The *Euchroa dimidiata* of Guérin-Meneville, Delessert, Voyage, p. 57. t. 14. f. 1, and Mag. de Zool., is the *Niræus tricolor* of Newman, Mag. Nat. Hist. iv. 194; the original specimens, from Mr. Children's collection, are in the British Museum.

scabrous and much thickened at the end, second joint punctiform, third joint as long as the fourth and fifth together.

Elytra covering the abdomen, margined; sides at the base with a curved, somewhat hooked angle near the base; the lateral margins bulge; *elytra very short in the male compared with those of the male of* Psalidognathus, *apparently* soldered along the suture, and both sexes seem to be apterous.

Legs of the male with the tibia and femur nearly equal in length and very similar in general thickness; inside of the tibiæ flat and hairy. In the female, the legs, *especially the femora, are very large, strong, and compressed;* the tibiæ at the end 2-spined; tibiæ of fore-legs rounded above, inside flat and hairy, angular beneath, and deeply notched or sinuated at the end; tarsi of hind-legs most elongated. The species I have named

Prionus (*Prionacalus* *) *Cacicus,* White.

Niger, antennis pedibusque rufis.

Hab. Mexico. ♂ ♀ (Pl. VIII. fig. 1, 2.) in Mus. Brit. (Theod. Hartweg).

In the male the antennæ, palpi and legs are rufous; the first-mentioned are blackish at the base. Jaws, excepting at the end and on the edges (where they are smooth), roughly punctured. Head, thorax and elytra at the base somewhat roughly punctured, the elytra becoming more delicately punctated towards the end.

In the female the antennæ at the ends, the palpi, tibiæ at apex and the tarsi are ferruginous; head with the two keels above the eyes shorter. Head, thorax and elytra very roughly vermiculated and dotted, and with a slight shining metallic lustre.

M. Fries, in his memoir on *Psalidognathus* in the 'Vetensk. Akad. Handl. 1833,' p. 327, has described under the name of *P. modestus* what appears to be decidedly a second species of the subgenus above described †. He characterizes it as follows, and on

* The latter part of the name is the generic name applied by the late lamented Dalman to the form previously described by Mr. G. R. Gray as *Psalidognathus*: his species, *Psal. superbus,* seems to be distinct from the *P. Friendii* of Mr. Gray. M. Nisser in 1827 sent four specimens from Sant Remedios to the Stockholm Academy, and Dalman named the species *Acalus superbus,* but was prevented by death from describing it; the name *Acalus* has been preoccupied, otherwise I would assign it to the subgenus. *P. superbus* seems to me to be the *P. Friendii,* var. *viridis,* of French authors, which has a comparatively shallow groove between the antennæ, and has the tibiæ in the male much more dilated, as well as other characters, which we have not space to give here. Specimens of both are in the British Museum; Mr. G. Gray's type specimen of *P. Friendii* from Mr. Children's collection, and specimens of *P. superbus* from the collection of M. Buquet.

† I am indebted to the obliging kindness of Mr. Jones, an assistant in the library of the British Museum, for translating me the memoir from the Swedish.

the first examination I found myself rather doubtful whether the *P. Cacicus* was not the same species. The following is the description of M. Fries: *Psalidognathus* (*Prionacalus*) *modestus*; labium short, bifid.

M. Fries had only seen two specimens, a male and female; the former, from being very small, he imagines must be a very diminutive example of the sex, while he judges that the female must be amongst the largest individuals of the species. In the *male* the head is smaller than the thorax, with a little pointed spine on both sides, and *a sort of hook where the mandibles are attached.*

Mandibles are as long as the head, resembling those of the female of *Psalidognathus superbus*; in the middle of the thorax there is an excavation; the elytra have hardly any trace of the reticulated and elevated lines; the humeral hook is very small; the wings together are as long as the body.

In the *female* the ridge of the head is less marked and ends in a raised point; the appendages on side of head are very short and fine; the mandibles as in the male; labrum at tip bent in the same as the preceding (?); elytra more thick and firm, without raised lines, deeply pitted and granular; there are no wings.

M. Nisser found this very distinct species at Antiochia in Columbia, and deposited the male and female in the Academy Museum.

Jan. 16, 1845.

On the same plate are figured two Coleoptera from Xanthus in Asia Minor, found by Charles Fellows, Esq., and now in the Museum collection. In a subsequent number of the 'Annals' descriptions of these will be given. The smooth *Carabus* with thick legs and dilated thorax was found close to the "Horse Tomb" as it has been called, but now more properly denominated the "Winged Chariot Tomb;" it was the monument of Paiafa, one of the satraps of Lycia: I have named it *Carabus* (*Procrusticus*) *Paiafa.* There are characters that would separate it from both *Carabus* and *Procrustes.* The longicorn may be an extreme variety of *Cerambyx Kœhleri,* L. Syst. Nat. 393. 31, between which and *C. Desfontainii,* Fabr. S. E. 274. 37. (Oliv. t. 23. f. 183), it seems to come. As a small compliment to the distinguished traveller and archæologist who found it close to the "Harpy Tomb," as well as to mark his fondness for entomology in his youth, I have named it *Purpuricenus Fellowsii*: it is very common on the trees about Xanthus.—A. W.

XV.—*Note on a British Shell of the genus* Circe. By William King, Curator of the Museum of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne.

The Linnæan genus *Venus* has of late been very much subdivided by some conchologists, so that in addition to Lamarck's *Cytherea* and Poli's *Artemis*, we have now the genera *Circe, Chione, Meroe*, and several others.

Chione, as its name implies, is represented by such shells as *Cytherea Chione* and *C. Erycina*. *Circe*, according to some shell-labels in the British Museum, is represented by *Cytherea scripta* and *C. divaricata*. *Circe* somewhat resembles *Chione* in its teeth, but it differs from the latter in the pallial impression being slightly inflected, and in the cartilage fulcra being deeply sunk.

There appear to be three or more sections of the genus *Circe*. In one the species have transverse ribs (*C.* (*Cytherea*) *arabica*); in another they are furnished with diverging longitudinal ribs (*C.* (*Cytherea*) *divaricata*); and in the third they are very much compressed, especially at the umbones (*C.* (*Cytherea*) *scripta*).

I have entered upon this note with the view of showing that a British shell which has hitherto been called *Cyprina triangularis** belongs to the genus *Circe*. I was first led into this opinion from examining some specimens belonging to Mr. J. Alder, who dredged them in Oban Bay during the last summer.

The so-called *Cyprina triangularis* is decidedly a *Circe*, inasmuch as it possesses what appear to be the distinguishing characters of the genus, namely deeply-sunk cartilage fulcra, and a slight sinus in the pallial line. I may even go so far as to say, that it belongs to the section represented by the transversely ribbed species. As regards the dental character of the Oban shell, it is precisely that of the genus in general,—consisting of three diverging cardinal teeth in each valve, and an anterior tooth in the left one. It also possesses a well-defined lunette as in the Venuses, with which it further agrees in the absence of an epidermis.

In the deeply sunk cartilage fulcra, and the dental character just given,—in the possession of a well-defined lunette†, and in the want of an epidermis, the Oban shell is essentially different from all the true Cyprinas, either recent or fossil‡. Leaving out

* Turton's Shells of the British Islands, p. 136. tab. 11. figs. 19 and 20.

† According to a figure in D'Orbigny's 'Terrains Crétacés,' pl. 271, a species of *Cyprina* has a well-defined lunette.

‡ The genus *Cyprina* may be safely considered as represented by *C. islandica* (recent), *C. rustica* (Suffolk crag), and *C. angulata* (greensand). Many of the so-called Cyprinas do not appear to belong to this genus: *Cyprina consobrina* (D'Orbig.), notwithstanding its want of a pallial sinus, I consider a Venus; and *Cyprina Morrisii* (J. de C. Sow.) has teeth after the type of *Cytherea Lamarckii*.

of consideration the anterior tooth which it possesses in common with some other genera, *Cyprina* has only two cardinal teeth in each valve: another difference consists in the left valve of this genus being provided with a posterior callous tooth which fits into a broad depression in the opposite valve. The Oban shell may be said to have a posterior tooth, as there is a small groove for one of the kind in the right valve, but it does not differ from that of many of the Venuses*.

The only character which the Oban shell possesses to induce one to consider it a Cyprina is its slight pallial sinus; but, as before observed, this is general to the Circes, and it even belongs to some of the Venuses.

I am not aware who proposed the genus *Circe*; it is adopted by Mr. J. E. Gray in the Catalogue of the British Museum, and appears to be a good one.

XVI.—*Note on the Boring Apparatus of the Carnivorous Gasteropods, and of the Stone- and Wood-burrowing Bivalves.* By Albany Hancock, Esq.

During the investigation of the anatomy of the *Eolidæ* by Dr. Embleton and myself, we ascertained, as appears in the last Number of the 'Annals,' that the teeth of these animals are composed of silex. Directed by this interesting fact, I was induced to examine the nature of the instrument by which the carnivorous Gasteropods pierce the testaceous covering of bivalve and other shells. I found this apparatus in *Buccinum undatum* to be composed of rows of stout, much-curved spines or teeth, of great brilliancy, and as glossy and transparent as glass, and certainly to have no appearance whatever of horny tissue. They are so similar to those of *Eolis*, that there could be little doubt that they are formed of the same material; and accordingly, after subjecting them to the action of acid, such was found to be the case. Their capacity to drill holes in calcareous matter is therefore easily understood, without the necessity of supposing the aid of a solvent requisite, as surmised by Cuvier.

This result was to be expected after the discovery of the siliceous nature of the teeth of *Eolis*; but that the wood- and stone-burrowing Bivalves should work out their excavations by an instrument provided with the same material may, perhaps, appear somewhat startling. Such however I believe is the fact; a fact which if established will at once explain all the phænomena attending this much-controverted problem. It is not my intention

* I am acquainted with a greensand *Venus* which has a posterior tooth and depression as large as in *Cyprina*.

at present to enter into details; all that I now wish to communicate is the result at which I have arrived; and in a short time I hope to have the pleasure of publishing, at length, my observations in connexion with this interesting subject.

The excavating instrument of *Pholas* and *Teredo* is formed of the anterior portion of the animal, in the surface of which are imbedded siliceous particles. The particles penetrating the skin give to it much the character of rasping-paper. The whole forms a rubbing surface, which being applied closely to the bottom of the cavity by the adhesion of the foot, enables the animal to rub down, and so penetrate, shale, chalk, wood, or even the hardest limestones and marble.

Saxicava rugosa is also furnished with a rasping surface covered with siliceous particles. This surface, however, in this species is formed entirely of the anterior portion of the mantle, the margins of which being united are much thickened, forming a sort of cushion capable of considerable protrusion at the will of the animal. The foot is small, and passing through a much-constricted orifice, gives origin to a byssus, which anchors the shell close to the base of the excavation, and thus holds the rubbing apparatus in immediate contact with the part to be excavated.

XVII.—*On a new species of* Platycercus. By John Gould, F.R.S. &c.

Dear Sir, 20 Broad Street, Golden Square, Jan. 11, 1845.

My collector, Mr. Gilbert, has lately sent me the description of a new *Platycercus* discovered on the Darling Downs at the back of Moreton Bay, on the east coast of Australia, and which he states far surpasses in beauty every other species of the genus yet discovered. I have therefore thought it of sufficient importance to the ornithologist to send you a copy for insertion in the 'Annals of Natural History.'

Band across the forehead half an inch in breadth, scarlet, fading around the eyes, lores and cheeks into pale lemon-yellow, which again gradually blends with the green of the under surface; crown of the head and nape blackish brown; sides of the neck to the shoulders verdigris-green with yellowish reflexions; back grayish brown; rump and upper tail-coverts verditer-blue, the longer coverts with a band of black at their extreme tip; primaries and secondaries black edged with bluish green; shoulders with a spot of rich vermilion; under wing-coverts and edges of the pinions verditer-blue; two middle tail-feathers olive-brown at the base, gradually passing into greenish blue at the tip with olive reflexions; the three outer feathers on each side with a narrow zigzag band of black at about half their length from the base, then greenish blue to the tip, the inner webs fading into white near the extremity; throat and chest yellowish emerald-green, each feather tipped with verditer-blue; middle of the breast and the sides verditer-blue; abdomen and under tail-coverts scarlet; irides dark brown; bill horn-colour, becoming blackish gray at the base; legs and feet yellowish brown.

Length about 12 inches; bill $\frac{1}{2}$; wing $5\frac{1}{4}$; tail $7\frac{1}{2}$; tarsi $\frac{5}{8}$.

Nearly allied to *Platycercus hæmatogaster*. In habits it is a truly grass-feeding parrakeet.

For this beautiful species I propose the name of *Platycercus pulcherrimus*,

And remain, dear Sir, yours truly,

To R. Taylor, Esq. JOHN GOULD.

XVIII.—*On the Means by which various Animals walk on the Vertical Surfaces of highly polished Bodies.* By JOHN BLACKWALL, F.L.S.

PERCEIVING among eminent naturalists and physiologists in this country not only a disinclination to adopt the explanation of the means by which animals of various species ascend the vertical surfaces of highly polished bodies, published in the 'Transactions of the Linnæan Society,' vol. xvi. pp. 487, 767, but also a disposition to adhere to the old and exploded view of the subject, which has been recently introduced into important works on zoology and physico-theology, in the course of last autumn I made several experiments bearing directly upon the remarkable phænomenon under consideration, the particulars of which I shall proceed to state.

Having captured vigorous specimens of the following insects and spiders, *Coccinella vigintiduo-punctata*; the common earwig, *Forficula auricularia*; the hive-bee, *Apis mellifica*; the common wasp, *Vespa vulgaris*; the house-fly, *Musca domestica*; the large flesh-fly, *Musca vomitoria*, *Philodromus dispar*, and *Drassus sericeus*; and having ascertained that they could walk with facility upon the perpendicular sides of a well-cleaned glass-jar, I put into a perfectly dry and clean phial a sufficient quantity of nitrate of silver in a very finely pulverized state to cover the bottom of it to the depth of about one-twelfth of an inch; then holding the phial at various degrees of inclination to the plane of the horizon and turning it round, I distributed in this manner many of the finer particles of the caustic over the whole of its inner surface. Into the phial thus prepared I introduced, in succession, the insects and spiders named above, taking care to renew the nitrate of silver whenever its efficacy appeared to be diminished, and after they had remained in it a sufficient time for the caustic to act upon the pulvilli of the former and the tarsal brushes of the latter, they were removed into the glass-jar, the vertical sides of which they had previously ascended without difficulty. The result was precisely such as my former researches had led me to anticipate; the insects and spiders were rendered quite incapable of walking on the sides of the jar, and the cauterized papillæ connected with the inferior surface of the climbing apparatus never again resumed their function; yet by the help of their claws the animals were enabled to ascend with ease the perpendicular sides of objects having a slight degree of roughness.

Satisfied that the cauterized state of the papillæ connected with the climbing apparatus was attributable to the agency of the nitrate of silver operating through the medium of a fluid emitted from their extremities, an experiment occurred to me, which, if carefully conducted, promised to render the fluid apparent to the eye when aided by a powerful magnifier. By subjecting the femur, tibia and tarsus of the large flesh-fly and the common house-fly to a moderate degree of pressure, a change was invariably perceived to take place in the appearance of the extremities of the hair-like papillæ on the inferior surface of their pulvilli, which assumed a silvery lustre, evidently occasioned by an increased reflection of light. On passing a finger gently over the papillæ several times in succession, and again examining them under the magnifier, the cause of the augmented brilliancy became obvious, numerous granules of gelatinous matter being discovered upon them, plainly consisting of the coagulated fluid emitted in minute quantities from their extremities, and accumulated together into particles of increased magnitude by the action of the finger, the silvery lustre, at the same time, having disappeared.

Thus it is clearly demonstrable that the papillæ on the climbing apparatus of two very common insects, remarkable for the agility of their movements on polished perpendicular surfaces, emit from their extremities in exceedingly small quantities a fluid coagulable on exposure to the atmosphere; and this deduction from direct experiment may be extended analogically to all those insects and spiders which are capable of walking on the clean, dry, vertical sides of polished bodies.

To these recently ascertained facts I add a succinct review of those previously recorded, which have exercised the most decided influence in removing the difficulties which surrounded the subject of this inquiry, in the hope that such an accumulation of valid evidence, when fairly tested by others, will be considered as establishing the conclusion, that various animals, capable of walking on the clean, dry surfaces of highly polished bodies in opposition to gravitation, are enabled to adhere to such surfaces, not by the pressure of the atmosphere on their climbing apparatus, as is commonly supposed, but by a viscous secretion emitted from the papillæ with which it is provided.

A large, clean, open phial of transparent glass, containing the larvæ of several species of insects, capable of moving upon polished perpendicular surfaces without the help of lines produced by a spinning organ, was placed in the receiver of an air-pump, from which the air was then exhausted by the usual process; nevertheless, the larvæ continued to traverse the inner surface of the phial in every direction. This experiment was made in the summer of 1827; in conducting it I was assisted by that distinguished philosopher and excellent man the late Dr. Dalton of Manchester, who kindly allowed me to use his air-pump, and remarked, on witnessing the result, that it was physically impossible that the larvæ could be supported on the sides of the phial by atmospheric pressure.

In the next place, I put specimens of the common house-fly into the receiver of an air-pump, and, after having exhausted the air, observed that they walked readily upon its inner surface as long as their vital powers were unimpaired, and that some individuals ultimately died adhering to its sides, from which it required a slight degree of force to detach them. Here, as in the case of the larvæ, it is evident that the insects could not be held to the glass by the pressure of the atmosphere, so that this striking fact supplies an *experimentum crucis* by which the insufficiency of the popular hypothesis to account for the phænomenon it is intended to explain is rendered manifest.

Having cleared the way for a more exact investigation of the subject by the detection of this prevailing error, it occurred to me, that as the adhesion of insects to the upright sides of an exhausted receiver cannot be occasioned by atmospheric pressure, or by any exertion of muscular force, some individuals remaining fixed even after life is extinct, it must be caused by the emission of a viscous fluid from the papillæ on the inferior surface of their climbing apparatus. In order to ascertain whether this is the case or not, I placed in clean phials of transparent glass, spiders and various insects in the larva and imago states capable of walking on their upright sides; then breathing into the phials till the aqueous vapour expelled from the lungs was copiously condensed on their inner surface, I found that the moisture totally prevented the animals from obtaining any effectual hold on the glass; and a similar consequence ensued when the flour of wheat or finely pulverized chalk was thinly distributed over their interior surface, the minute particles of those substances adhering to the tarsal brushes of the spiders, the pulvilli of the perfect insects, and the under side of the feet of the larvæ, which had their efficiency speedily restored, however, on the removal of the impediment by the customary process of cleaning the parts employed by each species.

As a further confirmation of the accuracy of my opinion, I may remark, that on careful and repeated examinations made with lenses of moderately high magnifying powers, in a strong light and at a favourable angle, I never failed to discover visible tracks left by spiders and insects in the larva and imago states when moving in a vertical direction on clean glass. On submitting the matter constituting the tracks to the direct rays of the sun in the month of July, and to the action of brisk currents of air whose drying power was great, I ascertained that it did not suffer any perceptible diminution by evaporation under those circumstances; and it has been shown, in the recent experiments made by employing pulverized nitrate of silver instead of flour, or chalk reduced to powder, and by inspecting under a powerful magnifier the feet of flies when the superior joints of their legs were subjected to moderate pressure, that a fluid, coagulable on exposure to the atmosphere, is emitted in minute quantities from the papillæ on the climbing apparatus of certain animals having the power of walking on the vertical surfaces of highly polished bodies.

In my 'Researches in Zoology,' p. 228, I have stated my conviction, founded on a minute inspection of specimens preserved in spirit of wine, that tree-frogs, *Hylæ*, and the lizards denominated *Geckos*, are enabled to move on the perpendicular sides of polished objects by the agency of adhesive matter emitted from papillæ situated on the inferior surface of their toes; those of the former resemble the papillæ on the pulvilli of the house-fly in their distribution; those of the latter being disposed in transverse fasciæ, somewhat in the manner of the papillæ on the palate of the cow, but with less simplicity; and whoever compares the two, will be led, by analogy of structure and arrangement, to infer, upon physiological principles, that they perform a similar function, though from the different situations of the parts it cannot be applicable to the same purpose.

Such is the brief survey which I proposed to give of the more prominent facts elicited by my investigation of this interesting subject.

It is not at all surprising that a considerable degree of unwillingness should be felt to reject a generally-received opinion which has long been regarded as established, or that a novel one substituted for it should be viewed with distrust or assailed with objections; but it certainly is extraordinary that the evidence by which the one is corroborated and the other subverted should be suffered to remain without examination. To the simple, satisfactory, and easily-conducted experiments which supply that evidence, I again respectfully solicit the attention of naturalists.

XIX.—*Remarks on the Synonyms of a Homopterous Insect described in the last Number of the 'Annals.'* By Adam White, Assistant Zool. Dep. Brit. Mus.

In the last Number of the 'Annals' there are descriptions of some Homopterous insects from the collection of the British Museum. Since the memoir was published, I have seen, for the first time, the text to Guérin's admirable 'Iconographie du Règne Animal' (a work which on the title-page bears the date of 1829–1838, although I see on the *wrapper* it was not finished till 1844, through some mistake of the printer [?]). I find an exceedingly great number of new genera and species of insects not figured in his plates, and on looking over it among the Homoptera saw a description of the *Pœciloptera circulata*, Guérin-Meneville, from the Malay coast, which is certainly the insect I have long subsequently published as the *Pœciloptera Dianthus*, so that this pretty species will now stand as

Pœciloptera circulata, Guérin, texte Iconogr. du Règne An. p. 361.
P. Dianthus, White, Proc. Ent. Soc. 1843 (ined.), Annals and Mag. of Nat. Hist. Jan. 1845, p. 36 (cum fig.).
Hab. Malay coast (Guérin), Java (Wilson).

To my description of *Cercopis Charon* (*l. c.* p. 35), I should have added "very near to, if not a variety of, *Cercopis viridans*, Guérin in Belanger, Voy. t. 3. f. 7."

In the text of M. Guérin's work, under the head of the genus *Aphæna*, he complains of the system of changing generic names, such as the one established by him, because not exactly properly compounded. The distinguished professor of zoology at Halle, on this ground, has given the genus alluded to the name *Aphæna*, and in his 'Handbuch der Entomologie,' ii. (we confine ourselves to the portion of his great work dedicated to *Rhynchota*), he has very frequently for similar reasons changed the names.

As a student of Hemiptera and Homoptera I for one raise my pen against this innovation, the more especially as it seems to have been a principle adopted by one of the best French entomologists, the able and amiable Serville, in his work on the Hemiptera in the 'Suites à Buffon'; an admirable book, so far as it goes, the joint production of MM. Serville and Amyot. If names are to be altered because improperly compounded, then let the dictum pass into a law, and many of the genera of Linnæus, Fabricius and Latreille, the fathers of entomology, *must* be changed. A fit of radicalism seems to have fallen upon most of the scientific describers of the present day: "If a name has been twice employed," say some, "in botany or zoology, the name last published must be changed;" others say, "No; if a name be already employed both in botany and zoology, retain them both, but take care not to be guilty, if you can possibly help it, of falling into such a mistake again." If the former of these canons pass as unquestionable *law*, I believe at least one-sixtieth part of the names used in entomology, and even some of those employed for Crustacea and Aptera, must be changed; and he who is bold enough to publish his catalogue first, will find *nobis* a well-marked feature on the page. We are inclined to think, that even if there be (for instance) two generic names (*Urania*) employed, one in botany and the other in zoology, no confusion can result from letting them retain their places, far less indeed to our view than must result from changing them; and it is really a sad thing to see, as is not unfrequently done, the changer have to change *his* name, because he has found that even *it* has been already used, so that we have sometimes *three* generic names, where at all events, on the most latitudinarian view of the subject, *two* would have been amply sufficient, and on the most narrow calculation, *one* would have caused no confusion. Thanks to the very useful 'Nomenclator Zoologicus' of Agassiz and his coadjutors, such mistakes are not nearly so likely to take place as they formerly were. In the work of Hahn on the Hemiptera, the name of *Bellocoris* has been applied to a genus; and this is one instance out of many that might be adduced of names compounded, and improperly compounded, of Latin and Greek words; but if I go, and not knowing whether M. Hahn means to say "*Pretty* Bug" or "*War*-Bug," and change his name, if the former of these popular paradoxes be the hemipterologist's meaning, to "*Polemocoris*," I conceive I make a most ridiculous blunder; and changers of names, and even those who too curiously pry into the designed or unintentional etymology of scientific appellations, frequently fall into equally false positions. Instances of this from the work above-quoted might be copiously given; and we are not sure, that if many of the exceedingly uncouth, but often good-enough, Chinese, Arabic and Sanscrit names imposed on Hemiptera and Homoptera by the truly scientific and amiable Serville and his coadjutor, were strictly analysed by such scholars as were Sir Wm. Jones, the Rev. Henry Martyn, Dr. Morrison, or Professor Kidd, many of them would be found equally ill-formed with Greek compounded names of other authors, which the distinguished French entomologists seem to me to have most recklessly changed. We wish to see an analysis of every zoological and botanical work and memoir published annually, and really believe that were any society here to join with the scientific societies on the continent, and in America or Asia, a yearly volume of this nature would tend to cement together naturalists, as it would assuredly help to simplify a nomenclature which scientific synonyms, most innocently bestowed, really make appalling to every student of zoology and botany.

London, Jan. 9, 1845.

PROCEEDINGS OF LEARNED SOCIETIES.

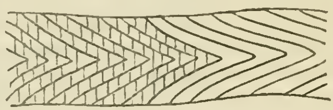
ROYAL SOCIETY OF EDINBURGH.

This Society held its first ordinary meeting for the season on Monday the 2nd of December, 1844.

Read—1. "Account of the late Earthquakes at Demerara." By N. H. Campbell, Esq. Communicated by M. Pouton, Esq.

2. "On the Existence of an Electrical Apparatus in the Flapper-Skate and other Rays." By Dr. Stark.

In this communication the author described a very peculiar organ, which from its situation and structure he believed to be an electrical organ. It ran along each side of the tail of the animal, forming a large pad on each side of the lateral muscles. This organ was much more developed in *Raia Batis* than in any of the other forms of Ray, and less so in *R. clavata*. The minute structure of the organ was described as consisting of numerous septa running in the longitudinal direction of the organ and forming cones, in the following manner, with intermediate septa running in an opposite direction.



The spaces within the smaller septa were filled with a gelatinous matter, which the author described as similar to the gelatinous matter in the electrical organs of the torpedo and other electrical fishes. The nerves for the supply of these organs were derived from the eighth pair or great lateral nerve, and the terminal filaments formed large regular loops which were suspended in the gelatinous matter.

Dec. 16.—1. "On a possible Explanation of the Adaptation of the Eye to Distinct Vision at different distances." By Professor Forbes.

The author stated that the crystalline lens is loosely suspended amidst the fluids of the eye, which are capable of conveying a uniform pressure to all parts of its surface. This pressure is the result of the action of the recti muscles upon the exterior of the sclerotic coat of the eye-ball, and is communicated to every part of its contents. The lens consists of a condensed nucleus surrounded externally by a softer and more gelatinous portion, so that the pressure acting upon the softer and external parts diminishes the vertical diameter of the lens, while that in the axis of vision may be increased, thus increasing the curvature of the refracting surfaces and shortening the focus.

2. "Notice of an Ancient Beach near Stirling." By Charles Maclaren, Esq.

This beach consists of a terrace of stratified sand and gravel about two miles in length, extending from the foot of Abbey Crag westward to Lecropt Church. It is nearly level on the top, which is elevated about 85 feet above the low alluvial plain called the Carse of Stirling. Adding 20 or 25 feet for the height of this plain above the Forth at Stirling, the elevation of the terrace above the level of high tide will be about 110 feet. The breadth of the terrace is about 200 feet at Lecropt Church, about 900 feet at Airthrey Mineral Well, and nearly half a mile at Airthrey Castle. Several openings have been cut in it by streams or other agents. The preservation of this portion of the ancient sea-bottom may be attributed to the high trap hill of Abbey Crag at its east end, which had protected it from the action of the tide when the sea covered the Carse. A remnant of another terrace at a corresponding level is found at the opposite side of the Carse, two miles southward, near Whitehouse Farm, and small portions of a terrace fifty feet lower are found at Stirling Castle and near Causeyhead.

January 6, 1845.—1. "Further Remarks on the Electrical Organs of the Rays." By Dr. Stark.

2. "Observations on the same subject." By John Goodsir, Esq.

Mr. Goodsir stated that he had examined the part described by Dr. Stark. It was, as he had suspected, the posterior part of the middle mass of the caudal muscles. The texture of this part differs remarkably from the muscular; it consists of numerous compartments formed by the aponeurotic septa of the muscle. Each compartment contains next its walls a rich festooned arrangement of nervous loops, these loops being generally united three by three; the sling of each loop is enlarged and contains one or more nucleated corpuscules, the limbs passing back into nervous tubes of the usual size. With these nervous loops, blood-vessel loops similarly enlarged are intermixed. The centre of each compartment contains a gelatinous mass applied externally to the nervous loops, and in its interior containing a vacant space. The gelatinous mass consists of areolæ formed by bars passing in all directions: these bars are thickest where they meet one another: they consist of a series of nucleated cells, which are plump and gelatinous in appearance, and much larger at the points of junction of the bars. These larger cells Mr. Goodsir considers as the germinal spots of the texture. The bars, and consequently the whole arrangement of the gelatinous mass, appear to be covered by a membrane presenting a most remarkable appearance,—a series of grooves or lines, the general direction of which is parallel to the bars, but generally slightly inclined. These grooves resemble the grooves or lines of mother-of-pearl, or the groovings on the dermal plates of some of the older fossil fishes.

Mr. Goodsir concluded by stating that this organ had the general appearance of an electrical organ, but that the evidence educed of its electrical properties appeared to him to be insufficient.

ZOOLOGICAL SOCIETY.

June 11, 1844.—George Gulliver, Esq., in the Chair.

"On the Blood-corpuscles of the Two-toed Sloth, *Bradypus didactylus*, Linn.," by George Gulliver, F.R.S.

From an observation which I have lately made, it results that the Two-toed Sloth is one of the very few animals that has blood-discs considerably larger than those of Man; its average size in vulgar fractions of an English inch is 1-2865.

M. Mandl* discovered that the blood-corpuscles of the Elephant are the largest at present known belonging to the Mammalia, and I subsequently found that those of the Capybara were, as far as we then knew, next in size, as noticed in my Appendix to Gerber's Anatomy, pages 5, 8, and 50.

But it now appears that the blood-corpuscles of the Sloth are larger than those of the Capybara, and, among mammiferous animals, second only in magnitude to the corpuscles of the Elephant.

For the sake of comparison, some of my measurements of the average size of the largest blood-discs of Mammalia are here set down in the order of the magnitude of the discs, and in vulgar fractions of an English inch.

Elephas Indicus, Cuv.	1-2745
Bradypus didactylus, Linn.	1-2865
Balæna Boops, Auct.	1-3099
Hydrochærus Capybara, Erxl.	1-3216
Phoca vitulina, Linn.	1-3281
Dasypus villosus, Desm.	1-3315
Myopotamus Coypus, Desm.......	1-3355
Pithecus Satyrus, Geoff.	1-3383
Dasypus sex-cinctus, Auct.	1-3457

Numerous other measurements are appended to the English version of Gerber's Anatomy.

It has been said that the blood-corpuscles are larger in omnivorous than in herbivorous and carnivorous animals. To the facts which I have elsewhere† shown to be at variance with this opinion, it may be added that the oviparous Vertebrata, whatever may be the nature of their food, have larger blood-corpuscles than Mammalia, and that the size of the blood-corpuscles of many carnivorous birds exceeds that of the corpuscles of several of the omnivorous species.

Finally, the Two-toed Sloth, which is a purely vegetable feeder, has, excepting the Elephant, the largest blood-corpuscles hitherto observed in any mammiferous animal.

"Mr. Hinds' resumed description of new Shells, from the cabinets of Sir E. Belcher and H. Cuming, Esq."

RINGICULA, Deshayes.

RINGICULA GRANDINOSA. *Rin. testâ ovatâ, retusâ, lævigatâ, politâ; anfractibus rotundatis, ultimo magno, subquadrato, rotundato; columellâ supernè valdè callosâ, denticulatâ.* Axis $1\frac{2}{3}$ lin.

Hab. Bais, island of Negros; in six fathoms, coarse sand: Cagayan, island of Mindanao; in twenty-five fathoms, sandy mud: Cat-

* Anatomie Microscopique, Paris 1838, Prem. Liv. p. 17. M. Mandl's observation refers to the blood-corpuscles of the African elephant; it was those of the Asiatic species that I examined.

† Appendix to Gerber's Anatomy. p. 4–5.

balonga, island of Samar; in ten to thirty fathoms, mud: Sorsogon, island of Luzon:—all in the Philippines.

Cab. Cuming.

These little shells resemble each other very closely, and it is only by close attention to minute characters and the proportion and form of the last whorl that they can be satisfactorily discriminated. The present species is perfectly smooth, and the last whorl is large, of a squarish form, and full and rounded. The upper portion of the aperture is strongly denticulated.

Ringicula propinquans. *Rin. testâ ovatâ, retusâ, striatâ, nitidâ; anfractibus rotundatis, ultimo magno valdè rotundato, concinnè striato.* Axis $1\frac{1}{2}$ lin.

Hab. Sual, Philippines; in five to seven fathoms, sandy mud.

Cab. Cuming.

Here the last whorl is not so square in shape, but very full and rounded, and is neatly striated in a very regular manner, and the spire is short. Till the light is thrown properly on them, these striæ are not very evident, but once discovered they will be found constant.

Ringicula caron. *Rin. testâ ovatâ, acuminatâ, striatâ, nitidâ; anfractibus rotundatis, ultimo subtransverso, rotundato, distanter striato; spirâ exsertâ; aperturâ subabbreviatâ; labro corrugato.* Axis $1\frac{2}{3}$ lin.

Hab. Straits of Malacca; in seventeen fathoms, mud.

Cab. Belcher.

The greatest breadth of the last whorl is probably in the transverse direction, and it is grooved with striæ placed at regular distances from each other. The spire also is proportionately lengthened.

Ringicula exserta. *Rin. testâ ovatâ, acuminatâ, lævigatâ, politâ; anfractibus rotundatis, lævigatis; spirâ elongatâ; labro ponè valdè incrassato.* Axis $1\frac{2}{3}$ lin.

Hab. Camiguing; in forty fathoms, sandy mud: Sorsogon, island of Luzon; in six fathoms, coarse sand;—both in the Philippines.

Cab. Cuming.

Compared with *R. grandinosa*, the last whorl is small, but agrees in being quite smooth and round; the spire is elongated, as in *R. caron*, and the labrum is even rather more reflected than is usual.

Ringicula australis. *Rin. testâ ovatâ, acuminatâ, lævigatâ, politâ; anfractibus rotundatis, penultimo sensim minore; spirâ elongatâ, infrà suturam fasciâ subalbidâ cinctâ.* Axis $1\frac{1}{2}$ lin.

Hab. Port Lincoln, Australia.

Cab. Metcalfe.

The only specimen before me has not attained its full adult age. In its characters it is rather intermediate; the spire is not so prominently produced, and the penultimate whorl is more than usually developed, so as to be more intermediate in size between the others. All these species are of one uniform glassy semiopake colour, in some individuals being more glassy, in others more opake.

NEÆRA, Gray.

NEÆRA LYRATA. *N. testâ suborbiculari, tenui, fragili, diaphanâ, liris transversis sulcatâ, anticè rotundatâ; rostro retusissimo; margine ventrali convexâ.* Long. $4\frac{1}{2}$; lat. 2; alt. $3\frac{1}{3}$ lin.

Hab. Basay, island of Samar, Philippines; in from five to seven fathoms, sandy mud.

Cab. Cuming.

This species is to *Neæra* exactly what *Mactra elegans* is among that group, the sculpture and outline of the shells being so very similar. This is of course comparatively a very miniature shell.

NEÆRA TENUIS. *N. testâ ovali, fragili, diaphanâ, striis concentricis incrementis rugosâ, anticè rotundatâ, posticè retusè rostratâ; margine ventrali anticè subemarginatâ.* Long. $4\frac{1}{2}$; lat. 2; alt. $3\frac{1}{3}$ lin.

Hab. Bais, island of Negros, Philippines; in seven fathoms, coral sand.

Cab. Cuming.

Less ventricose than is usual with the species of this group, posteriorly gradually attenuated into a short blunt beak, and on the ventral margin slightly emarginate.

NEÆRA COCHLEARIS. *N. testâ majusculâ, oblongâ, albidâ, striatâ, prope umbones elevatiusculâ, anticè rotundatâ, posticè attenuatè nasutâ, liris angustis, versus umbones respectantibus; margine ventrali valdè rotundato, posticè emarginato.* Long. $11\frac{1}{2}$; alt. 8 lin.

Hab. Bais, island of Negros, Philippines; in seven fathoms, coral sand.

Cab. Cuming.

The description is drawn up from a single valve, but this is so large, and the characters so marked, as to render its future identity comparatively easy.

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

"Description of some new species of Birds brought by Mr. L. Fraser from Western Africa," by H. E. Strickland, Esq., M.A.

Mr. Fraser has placed in my hands for examination and description a portion of the ornithological collection made by him during the Niger expedition, and I now present the names and characters of the new species. Mr. Fraser's researches in Western Africa have made us acquainted with several new and interesting species of birds, and as he was only able to bring home very few, and in some cases only one specimen of each species, it would be very desirable that full descriptions, illustrated by figures, of these ornithological rarities should be made public, especially as it may be long before the pestilential shores of Western Africa are again explored by naturalists.

HIRUNDINIDÆ, CYPSELINÆ.

Cypselus parvus, Licht., Verz. Doubl. p. 58.

A specimen of this bird was brought by Mr. Fraser from Acra; it is probably the smallest species of the genus, the total length being only 6 inches, wing $4\frac{3}{4}$ inches, medial rectrices $1\frac{3}{4}$ inch, external $3\frac{1}{4}$ inches. Plumage uniform mouse-colour, chin whitish.

Acanthylis bicolor (Gray); *Chætura bicolor*, Gray, Zool. Misc. p. 7.

A specimen of this elegant little species was obtained in May 1842 at Fernando Po, where it was very common.

Turdidæ, Malurinæ.

Prinia olivacea, Strickl. *P. suprà viridi-olivacea, remigibus fuscis, olivaceo limbatis, caudâ cuneatâ, rectricibus duobus intermediis fuscis, lateralibus albis, extùs fusco marginatis, extimo toto albo; mento corporeque toto inferno albido, pallidè flavo lavato. Rostrum pedesque fuscescentes.*

The aspect of this bird is that of a *Phylloscopus*, but the beak is longer, more depressed at the base, the culmen carinated, the wings short and rounded, the first quill subspurious, the fourth longest; tail much graduated, rectrices narrow; tarsi moderately long, acrotarsia scutate, toes slender, the outer longer than the inner. These characters induce me to class the bird provisionally in the genus *Prinia*.

Total length $4\frac{1}{2}$ inches; beak to gape 6 lines, to front $5\frac{1}{2}$ lines, breadth 2 lines, height $1\frac{1}{2}$ line; wing $1\frac{3}{4}$ inch; medial rectrices 1 inch 10 lines, external 1 inch 1 line; tarsus $7\frac{1}{2}$ lines, middle toe $5\frac{1}{2}$ lines, hind ditto 5 lines.

Hab. Fernando Po; June 1842.

Prinia icterica, Strickl. *P. suprà flavo-olivacea, loris, superciliis, genis, margine alarum, tibiis, caudæque tectricibus infernis lætè flavis, mento, gulâ, pectore et abdomine albidis, pallidè isabellino lavatis, hypochondriis flavo-olivaceis, rostro nigro, pedibus rubris.*

This bird appears to belong to the same group as the last, but the beak is rather more depressed, the tail shorter and less cuneate, and the tarsi rather longer. In all other respects their structures correspond. They both have short rictal bristles and the nostrils are large, oblong, and situated in a large membranous depression of the beak. Possibly they may hereafter form a distinct genus of *Malurinæ*, distinguished chiefly by the depressed form of the beak.

Total length $3\frac{3}{4}$ inches; beak to gape $7\frac{1}{2}$ lines, to front 6 lines, breadth $2\frac{1}{4}$ lines, height $1\frac{1}{2}$ line; wing 1 inch 11 lines; medial rectrices $1\frac{1}{4}$ inch, external 1 inch; tarsus $9\frac{1}{2}$ lines, middle toe $6\frac{1}{2}$ lines, hind ditto $5\frac{1}{2}$ lines.

Hab. Fernando Po; June.

Mr. Fraser adds: "Irides light hazel; note *tweet, tweet, tweet,* hopping about the topmost branches of a small tree like a wren." In a sketch of this bird by Mr. Fraser the tail is erect, as in *Troglodytes.*

Turdinæ.

Cossypha poensis, Strickl. *C. corpore suprà fuliginoso-fusco, remigibus fuscis, omnibus* (1â *et* 2â *exceptis*) *basin versùs rufo-ferrugineis, sed scapis fuscis; rectricibus fuscis, tribus externis utrinque albo terminatis (qui color in rectricis extimæ pogonio* *externo obliquè versus basin producitur), corpore toto inferno ferrugineo, gulâ obscuriore. Rostrum atrum, pedes flavescentes.*

Seems to be a typical *Cossypha*, allied to *C. reclamator* (Vieill.), with which it agrees in all essential characters. The specimen above described is a male, and was procured at Clarence, Fernando Po.

Total length $7\frac{3}{4}$ inches; beak to gape 10 lines, to front 7 lines, breadth 4 lines, height $2\frac{1}{2}$ lines; wing 4 inches 2 lines; medial rectrices $3\frac{1}{2}$ inches, external 3 inches 4 lines; tarsus 1 inch, middle toe and claw 1 inch, hind ditto 8 lines, lateral toes equal.

Mr. Fraser adds that this bird "feeds on the ground; when sitting quiet in a naked bush it is with difficulty to be discovered. Irides hazel."

PYCNONOTINÆ.

ANDROPADUS LATIROSTRIS, Strickl. *A. corpore suprà olivaceo, remigibus fuscis, extùs viridi-olivascente, intùs albido, marginatis, rectricibus fusco-brunneis, olivaceo limbatis; corpore subtùs olivascente, lateribus menti, alæ tectricibus infernis, et abdomine medio stramineis. Rostrum corneum, marginibus pallidis, pedes unguesque pallescentes. Rostrum depressum, tomiorum dentibus obliquis 6 vel 7 utrinque; illis maxillæ distinctis, mandibulæ subobsoletis.*

In this species the beak is considerably depressed and formed like that of a *Muscicapa*; the teeth of the upper mandible are distinct and regular, but disappear about the middle of the beak. The lower mandible is also furnished with five or six serrations, but very low and indistinct. The wing is much rounded, the fifth quill being longest and the rest graduated. The colour and texture of plumage are much like that of the East Indian *Pycnonotus flavirictus*, Strickl. (Ann. Nat. Hist., June 1844.)

Total length $6\frac{3}{4}$ inches; beak to gape 11 lines, to front 7 lines; breadth 4 lines, height $2\frac{1}{2}$ lines; wing $3\frac{1}{4}$ inches; medial rectrices 3 inches; external $2\frac{3}{4}$ inches; tarsus $\frac{3}{4}$ inch, middle toe and claw 8 lines, hind ditto 6 lines.

The above description is taken from a specimen marked "female." In two other specimens in which the sex is not indicated the dimensions and plumage are the same, but the yellow streak on each side of the chin is wanting, and the lower mandible wants the serrations, and exhibits only a small subterminal notch. These are probably younger individuals.

Hab. Fernando Po; June.

ANDROPADUS GRACILIROSTRIS, Strickl. *A. corpore toto suprà olivaceo, remigibus primariis fuscis, extùs olivascente, intùs pallidè ochraceo limbatis, corpore subtùs pallidè olivaceo-cinerascente, mento gulâque albidis, abdomine medio crissoque pallidè flavescentibus, alarum tectricibus infernis pallidè ochraceis. Rostrum pedesque corneo-fusci; rostrum longiusculum, turdinum, dentibus maxillæ duobus, mandibulæ nullis.*

This species differs from the former one in several points of structure; the beak is considerably narrower at the base and more slender, the upper mandible has only two dentations, with a faint trace of a third, and the lower mandible exhibits only a slight subterminal emargination. The wings also differ, being more pointed; the first quill is subspurious, and the second, third and fourth nearly equal, the third longest. These two species, however, agree in the structure of the tail and feet, and in the texture and almost the colour of the plumage, the rump-feathers being dense, long and downy, as in the true *Pycnonoti*. The specimen before me is a male; it exhibits two or three slender nuchal bristles, like those of *Pycnonotus* and *Criniger*, which are not traceable in *A. latirostris*.

Total length 7 inches; beak to gape 10 lines, to front 7 lines, breadth 3 lines, height $2\frac{1}{2}$ lines; wing $3\frac{1}{4}$ inches; medial rectrices 3 inches 1 line, external 2 inches 11 lines; tarsus $9\frac{1}{2}$ lines, middle toe and claw 9 lines, hind ditto 6 lines.

Hab. Fernando Po; June. "Irides white; a pretty songster."

MUSCICAPIDÆ, MUSCICAPINÆ.

MUSCICAPA FRASERI, Strickl. *M. capite, dorso alisque fuscis, ferrugineo tinctis, remigibus fuscis, primariis extùs basin versus obscurè ferrugineis, omnibus, 1â et 2â exceptis, pogoniis internis ad basin pallidè rufis, uropygio, caudæ tectricibus, corporeque toto inferno rufo-ferrugineis, gulâ pallidiore, rectricibus fuscis, 6 intermediis strictissimè, lateralibus largè, rufo terminatis, externo ferè omninò rufo. Rostrum latum, nigrum, pedes pallidè brunnei.*

The rufous colouring of the plumage reminds us of *Tchitrea*, Less. (*Muscipeta*, Auct.), but the beak is much shorter and more triangular than in that genus. In its general structure and proportions this bird appears to approach the restricted genus *Muscicapa* more closely than any other group. The form of the beak is almost exactly that of the *Muscicapa latirostris*, Sw., of India, and the legs are much shorter than is usual in terrestrial birds. Notwithstanding these characters, Mr. Fraser's notes state that this bird "feeds on the ground; has the motions and plump appearance of a robin." He adds that the irides are hazel, and that it is a beautiful songster.

The beak is strong, depressed, very broad, the sides straight when viewed from above, and the base furnished with bristles of moderate length. The first quill is subspurious, 1 inch long; the second is half an inch shorter than the third; the fourth is the longest. Tarsi short, acrotarsia and paratarsia entire; outer toe slightly longer than the inner one, its first phalanx attached to the middle toe; claws curved, compressed, sharp; tail rounded. The male and female are alike, except that in the specimen before me of the female the narrow rufous tip of the medial rectrices is wanting, and the dimensions are rather less than in the male.

Total length $7\frac{1}{4}$ inches; beak to gape 9 lines, to front 6 lines, height $2\frac{1}{4}$ lines, breadth at gape 6 lines; wing 3 inches 10 lines; medial rectrices $3\frac{1}{4}$ inches, external 3 inches 1 line; tarsus 10 lines, middle toe and claw 9 lines, hind ditto 7 lines.

Hab. Fernando Po.

I dedicate this species to Mr. Louis Fraser, naturalist to the Niger expedition, who succeeded in bringing home many interesting additions to zoological science, notwithstanding the difficulties and dangers by which he was surrounded.

LANIIDÆ, LANIINÆ.

TEPHRODORNIS OCREATUS, Strickl. *T. capite suprà genisque fusco-atris, dorso toto alisque obscurè fusco-plumbeis, remigibus rectricibusque fusco-atris, extùs plumbeo limbatis, corpore toto inferno albo, gutturis pectorisque plumis cinereo strictè marginatis, alarum tectricibus infernis cinereis albo marginatis. Rostrum pedesque atri, acrotarsiis integris.*

This bird approaches sufficiently near to the Indian genus *Tephrodornis* to be classed with it, the only important structural differences being that the acrotarsia are entire and that the tail is slightly rounded. The beak resembles that of *T. Indica* (Gray), but is a trifle shorter; the nostrils are concealed by incumbent bristly feathers; the fourth, fifth and sixth quills are nearly equal, the first three graduated, and the outer toe longer than the inner.

Total length $6\frac{3}{4}$ inches; beak to gape 11 lines, to front 7 lines, breadth 3 lines, height $2\frac{1}{2}$ lines; wing 3 inches 7 lines; medial rectrices 3 inches, external 2 inches 8 lines; tarsus 10 lines, middle toe 9 lines, hind ditto 7 lines.

Hab. Fernando Po; June. "Irides hazel, legs blue."

Mr. Gould laid upon the table a number of Skins of Animals and Birds, being part of a large collection which Mr. Gilbert had lately forwarded to him from Australia. Mr. Gould characterized the following species:—

MAMMALIA.

MACROPUS GRACILIS. *M. infrà incanescens et saturatè fuscus; colli lateribus rufescenti-fusco lavatis; genis, mento et gulâ fulvescente-albis, vellere molli, ad basin cinereo, exinde fusco, dein albo, apice nigro; pilis longis nigris crebrè interspersis.*

	feet	in.
Length from tip of nose to the tip of the tail . .	2	6
——— of tail	1	1
——— of tarsi and toes, including nails	0	5
——— of arm and hand, including nails	0	$3\frac{1}{4}$
——— of face from tip of nose to base of ear. .	0	$3\frac{1}{2}$
——— of ear	0	$2\frac{1}{4}$

Face and all the upper surface of the body grizzled grey and dark brown, the grizzled appearance produced by each hair being greyish white near its tip; sides of the neck and the outer side of the limbs washed with reddish brown; margin of the anterior edge and the base of the posterior edge of the ear buffy white; line from the angle of the mouth dark brown; line along the side of the face, chin and throat buffy white; under surface buffy grey; tail clothed with short grizzled hairs, similar to the upper surface of the body, and with a line of black on the upper side at the apex for about one-third of its length; the fur, which is somewhat soft to the touch, is grey at the base, then brown, to which succeeds white, the points of the hairs being black; there are also numerous long black hairs dispersed over the surface of the body; feet grizzled grey and rufous.

This is a very elegantly formed little animal, and is intermediate in size between *Macropus lunatus* and *Macropus frænatus.*

Hypsiprymnus platyops. *H. facie magnopere latâ; hâc, corporisque lateribus, fuscescente-cinereis; dorso rufescenti-fusco; facie, partibusque superioribus pilis longis, et flavido-albis inter vellus crebrè adspersis; corpore inferiore fulvescente-cinereo.*

	feet	in.
Length from tip of the nose to the extremity of the tail ..	1	7
——— of tail	0	7
——— of tarsi and toes, including nails	0	$2\frac{5}{8}$
——— of arm and hand, including the nails	0	$2\frac{1}{2}$
——— of face from tip of nose to base of ear	0	3
——— of ear	0	$0\frac{7}{8}$

Face extremely broad, and, with the sides of the body, brownish grey; back reddish brown; the whole of the face and upper surface beset with numerous long yellowish white hairs, offering a strong contrast to the darker colouring of the fur; all the under surface and limbs buffy grey; tail brown above, paler beneath.

'Mor-da,' aborigines of Western Australia.

The above is the description of a female received from Swan River.

Perameles arenaria. *P. vellere rigido et cinerascente-fusco, pilis longis nigris intermixto, his fasciam lateralem vix distinctam, notamque instar ephippii ad dorsum medium efficientibus; auribus ferrugineis ad basin, in medio saturatè fuscis, ad apicem cinerascente-fuscis; corpore inferiore fulvescente-albo.*

	inches.
Length from tip of nose to extremity of tail	$14\frac{1}{2}$
——— of tail	$4\frac{1}{4}$
——— from tip of nose to base of ear	$3\frac{1}{4}$
——— of hind-leg, tarsi and toes	$2\frac{1}{4}$
——— of fore-leg	$2\frac{1}{4}$
——— of ear	$1\frac{5}{8}$

The fur is harsh to the touch and of a greyish brown hue, interspersed with numerous long black hairs, which form a broad indistinct band down the flanks, immediately before the hind-legs, and a kind of saddle-like mark on the centre of the back; ears rather lengthened and of three colours—rusty red near the base, then dark brown, and the apex of a light greyish brown; sides of the muzzle and all the under surface buffy white; line along the upper surface of the tail dark brown, the remainder buffy white; outside of the fore-legs dark brownish grey; feet and claws buffy white.

Hapalotis longicaudata. *H. supernè pallidè arenacea, pilis longis, nigris, ad caput et dorsum cum vellere intermixtis; rostri lateribus, et abdomine albis; caudâ pilis brevibus nigris ad basin indutâ, apicem versùs nigris et elongatis; apice extremo albo vellere molli, adpresso et juxta cutem plumbeo.*

	inches.
Length from tip of nose to extremity of tail	16
——— of tail	9
——— from tip of nose to base of ear	$1\frac{3}{4}$
——— of hind-leg, tarsi and toes	2
——— of fore-leg	$1\frac{3}{8}$
——— of ear	$0\frac{7}{8}$

All the upper surface and the outside of the limbs pale sandy, interspersed on the head and over the back with numerous fine black hairs, which, becoming longer on the lower part of the back and rump, give that part a dark or brown hue; ears naked and of a dark brown; sides of the muzzle, all the under surface and the inner surface of the limbs white; tail clothed with short dark brown hairs at the base, with lengthened black hairs tipped with white on the apical half of its length, the extreme tip being white; tarsi white; whiskers very long, fine, and black; the fur is close, very soft, and of a dark slaty grey at the base, both on the upper and under surface.

This species is considerably smaller than *Hapalotis albipes*, but has a much longer tail and longer hind-legs in proportion to the size of the body.

'Kor-tung' and 'Goota-was,' aborigines of Moore's River, Western Australia.

Phascogale calurus. *Phasc. cinerea; subtùs pedibusque albis, indistinctissimè flavo-tinctis; caudá corpore longiore, dimidio basali pilis brevibus, rufis, apicali pilis longis nigris obsitá; auribus magnis ad basin pilis flavescentibus obsitis.*

	inch.	lin.
Length from tip of nose to extremity of tail ..	10	6
——— of tail	5	6
——— from tip of nose to base of ear......	1	3
——— of tarsi and toes	0	11
——— of ear..........................	0	$7\frac{1}{2}$

This beautiful species was procured in the interior of Western Australia.

It is nearly allied to *P. penicillata*, but is of smaller size and has the tail less bushy; the portion covered with short hair is extended from the base nearly to the middle of the tail, and is remarkable for its brilliant rusty-red colour; on the apical half of the tail the hairs are long, being on an average about half an inch in length; all the under side is black, very nearly to the root. The fur is soft and moderately long, and its general colour is ashy grey externally, but grey next the skin; the under parts of the body are white, tinted with cream-colour, and this last-mentioned tint is very distinct on the sides of the body; the eye is encircled by a narrow black line, and there is a blackish patch in front of the eye. The ears are large and very sparingly clothed for the most part with very minute dusky hairs, but at the base, both externally and internally, are some longish yellow hairs.

Phascogale crassicaudata. *Phasc. suprà cinerea flavo-tincta;*

corpore subtùs, pedibusque albis; auribus mediocribus, externè maculâ nigrâ ornatis; caudâ brevi crassâ.

	inch.	lin.
Length from tip of nose to extremity of tail ..	5	7
——— of tail	2	1
——— of ear	0	$5\frac{1}{2}$
——— tarsi and toes	0	7

Hab. Western Australia.

This species is about the size of the common mouse, and is not unlike the *Mus sylvaticus* in its colouring; above grey with a wash of yellow, and on the sides of the body distinctly tinted with yellow; under parts and feet pure white; tail much swollen, especially in the middle, and clothed throughout with very minute pale hairs; ears clothed with pale hairs, but with a largish black spot externally; eyes encircled with black hairs; fur moderately long and soft.

AVES.

Ieracidea occidentalis. *Ier. vertice et corpore superiore ferrugineo-fuscis; singulis plumis strigâ centrali nigrâ angustè notatis; caudâ fusco multi-fasciatâ; corpore subtùs albo plumis lineâ fuscâ angustâ notatis.*

Crown of the head, back and scapularies rusty brown, with a narrow stripe of black down the centre; rump deep rusty brown, crossed by broad bands of dark brown, the tip of each feather buffy white; wings very dark brown; the inner webs of the primaries with a series of large spots, assuming the form of bars, of a deep rusty brown near the shaft and fading into buffy white on the margin; wing-coverts tipped with rusty red; spurious wing with a row of rusty red spots on either side of the shaft; tail dark brown, crossed by numerous broad irregular bars of rusty red, and tipped with pale buff; ear-coverts and a stripe running down from the angle of the lower mandible dark brown; chin, all the under surface, and a broad band which nearly encircles the neck, white, with a fine line of dark brown down the centre; thighs deep rust-red, each feather with a line of black down the centre and tipped with buffy white; cere very light greenish flesh-colour; irides wood-brown; space round the eye pale yellow, becoming brighter near the eye; base of the upper mandible, the under mandible and gape, very light horn-colour; tip of the upper mandible black.

Total length, 16 inches; bill, $1\frac{1}{4}$; wing, $12\frac{1}{2}$; tail, $7\frac{3}{4}$; tarsi, $2\frac{1}{2}$.

Hab. Western Australia.

Ægotheles leucogaster. *Æ. quoad colorem Æ.* Nov. Hollandiæ *consimilis, at grandior, rostro longiore, et abdomine albo.*

Head black; crown, lunar-shaped mark at the back of the head, and a collar surrounding the neck, black, freckled with grey in the centre of each feather; back freckled black and white; wings brown, crossed by numerous bands of lighter brown, freckled with dark brown; primaries margined externally with buff, interrupted with blotchings of dark brown; tail dark brown, crossed by numerous broad irregular bands of reddish buff, freckled with dark brown; ear-coverts strawwhite; chin, abdomen and under tail-coverts white; breast, sides of the neck, and a narrow collar surrounding the back of the neck, white, crossed by numerous narrow freckled bars of black; irides dark brown; upper mandible dark olive-brown, lower white, with a black tip; legs pale yellow, claws black.

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

Hab. Port Essington.

Malurus pulcherrimus. *Mal.* Mas: *vertice, et fasciâ dorsali splendidè violaceo-cæruleis; orbitis et plumis auricularibus ex ærugine cæruleis; gulâ indico-cæruleâ, nigro subtùs indistinctè marginatâ; plumis scapularibus castaneis; loris, nuchâ, et dorso imo holoserico-nigris.* Fœm.: *fusca, subtùs pallidior, orbitis rubidè fuscis.*

Crown of the head and a broad band across the centre of the back rich glossy violet-blue; space surrounding the eye and the ear-coverts verditer-blue; throat intense indigo-blue, bounded below by an indistinct band of black; lores, collar surrounding the back of the neck, and the lower part of the back, deep velvety black; scapularies chestnut; wings brown; tail dull greenish blue, indistinctly barred with a darker tint and slightly tipped with white; abdomen and under tail-coverts white; bill and feet black; irides dark brown.

Female dull brown, paler beneath; tail-feathers like those of the male, but less bright; bill and space round the eye reddish brown.

Remarks.—Very similar in its markings and general contour to *M. Lamberti*; it may however be always distinguished from that species by its larger size and by the deep indigo-blue colour of the throat and chest, which parts are black in *M. Lamberti.*

Total length, $5\frac{1}{4}$ inches; bill, $\frac{9}{16}$; wing, 2; tail, $3\frac{1}{4}$; tarsi, $\frac{15}{16}$.

Hab. Western Australia.

Pachycephala Gilbertii. *Pach.* Mas: *colore saturatè olivaceo-fusco; capite plumbeo; loris nigris; gulâ ferrugineâ; humeris subtùs, abdomine medio, crissoque arenaceis.* Fœm. *differt, loris non nigris, neque gulâ ferrugineâ.*

The plumage dark greyish olive-brown; the head dark slate-grey, and the breast of a lighter grey; the lores black; throat rust-red; under surface of the shoulder, centre of the abdomen and under tail-coverts sandy buff; irides light brown; bill and feet black. The female is similar in colour, but is destitute of the black on the lores and the red on the throat.

Total length, $6\frac{3}{4}$ inches; bill, $\frac{11}{16}$; wing, $3\frac{7}{8}$; tail, $3\frac{3}{8}$; tarsi, 1.

Hab. Western Australia.

July 9th.—William Horton Lloyd, Esq., in the Chair.

"Descriptions of a number of new species of Shells belonging to the genus *Cytherea*," by Sylvanus Hanley, Esq.

Cytherea varians. *C. testâ ovato-cordatâ, inæquilaterali, subventricosâ, tenuiusculâ, albâ, maculis et lineis angulatim flexuosis castaneis variegatâ, concentricè (et anticè præsertim) sulcato-striatâ; lunulâ magnâ, cordatâ, lineâ impressâ circumscriptâ, albâ, maculâ* *castaneâ aut livido-purpurascente basi ornatâ; pube castaneo venulatâ; superficie internâ omninò albidâ; margine integro; cardine ut in* C. læta. Long. 1; lat. 1·45 poll.

Index Test. Sup. t. 15. f. 33.

Hab. Brazil.

Easily distinguished from *læta* and *obliquata* by its lunule, and from *pellucida* (to which in colouring and general contour it approximates) by its close and irregular groove-like striæ.

Cytherea obliquata. *C. testâ ovato-cordatâ (interdum oblongo-cordatâ), tumidâ aut ventricosâ, solidiusculâ, sublævigatâ, albidâ, lineis angularibus minutissimis brunneis aspersâ; margine ligamentali convexiusculo, subdeclivi; ventrali subarcuato; lunulâ magnâ, indistinctâ, colorum experte; natibus valdè obliquis, candidis; ligamento angusto; extremitate posticâ obtusâ; superficie internâ albâ aut albido-roseâ; margine integro.* Long. 1·75; lat. 2·50 poll.

Index Test. Sup. t. 15. f. 24.

Hab. ——? Mus. Cuming, Hanley, &c.

A species which for a long time has been confounded with *læta*, whose dentition, lunule and general shape it possesses. It is however a broader shell, with the beaks still more oblique, and its surface invariably speckled with minute scattered linear zigzags, which are more closely congregated near the swollen umbones.

Cytherea plebeia. *C. testâ suborbiculari, subquadratâ, valdè inæquilaterali, solidâ, compressiusculâ, squalidè albidâ, fulvo variegatâ (intus lividâ), concentricè et confertissimè sulcatâ; margine ligamentali convexo et subdeclivi; postico dorsali paululùm subretuso et valdè declivi; ventrali arcuato; umbonibus haud complanatis et minimè striis divaricatis instructis; lunulâ lanceolatâ, albâ; margine interno subcrenulato.* Long. 1; lat. 1·20 poll.

Index Test. Sup. t. 15. f. 37.

Hab. Catbalonga, Philippines. Mus. Cuming, Hanley.

This species is allied to the type of its subgenus, the *Circe scripta*, but the compressed umbones of that shell at once distinguish it. Minute tawny zigzags adorn the whitish ground of the anterior surface, whilst the fulvous hue predominates posteriorly.

Cytherea philippinarum. *C. testâ cordatâ, inæquilaterali, ventricosâ, crassiusculâ, pallidè lividâ, radiis et lineis angulatim flexuosis saturatioribus variegatâ, concentricè costellatâ; costellis convexis, confertis; interstitiis lævigatis; lunulâ brevi, cordiformi, albâ; rimâ livido purpurascente; margine ventrali integro, arcuato; superficie internâ albidâ, maculâ lividâ sub umbonibus notatâ.* Long. 0·80; lat. 1 poll.

Index Test. Sup. t. 15. f. 36.

Hab. Philippines. Mus. Cuming, Hanley.

Very distinctly characterized by its crowded narrow ribs. The dentition is that of its subgenus *Chione*, and the short white lunule, equally with the narrow ligament, is bordered with livid purple.

Cytherea diemenensis. *C. testâ oblongo-cordatâ, convexâ, nitidiusculâ, concentricè et obsoletè sulcatâ, carneo-fulvâ; radiis angustis* *lunulâque lanceolatâ, colore tinctis saturatiore; pube albâ, strigis flexuosis litteratâ; superficie internâ albidâ, radio fusco-purpureo obliquo, sub umbonibus ornatâ; margine integro.* Long. 0·80; lat. 1·20 poll.

Hab. Van Diemen's Land. Mus. Metcalfe.

Easily to be distinguished from those allied to it in form by its internal ray. The hinge is that of the section *Chione*.

Cytherea cor. *C. testâ cordato-trigonâ, intus extusque albâ, convexiusculâ, undique concentricè striatâ; striis exilibus, regularibus, confertissimis; latere postico majore, subcuneiformi; margine ligamentali valdè declivi, convexiusculo; ventrali subarcuato; natibus acutis; lunulâ oblongâ, impressâ; margine interno integro.* Long. 0·80; lat. 1 poll.

Index Test. Sup. t. 15. f. 7.

Hab. Africa. Mus. Metcalfe.

Not unlike the *Venus variabilis* of Sowerby in shape and general appearance. The epidermis is of that white velvety texture which we meet with in *argentea*.

Cytherea Hindsii. *C. testâ trigonâ, ventricosâ, solidiusculâ, lævigatâ, nitidâ, subæquilaterali, albidâ, brunneo nebulosâ, utrinque obtusâ; latere antico paululùm majore; natibus incurvatis, pallidis; lunulâ magnâ, subinconspicuâ, omninò pallidâ; pube fusco strigatâ; superficie internâ albidâ; margine integro.* Long. 1; lat. 1 poll.

Index Test. Sup. t. 15. f. 35.

Hab. Guayaquil. Mus. Cuming, Hanley.

This and the succeeding species belong to the subgenus *Trigona*, and are easily distinguished from the *Mactroides* of Born and Chemnitz by the absence of a purple stain upon the umbones.

Sept. 10.—William Horton Lloyd, Esq., in the Chair.

"Descriptions of six new species of *Voluta*," by G. B. Sowerby, Esq.:—

Voluta mammilla, Gray. *Vol. testâ ovato-oblongâ, tenui, lutescente, apice mammillari, obtusissimo, subspirali; anfractibus duobus, ultimo magno, ovali, maculis lineisque castaneis picto; aperturâ magnâ; columellâ plicis tribus.*

Shell ovate-oblong, thin, brownish-yellow, with a mammillary, subspiral, very obtuse apex; volutions two, the last of which is large, oval, marked with chestnut-coloured spots and zigzag lines; aperture large; columella with three folds.

From New Holland; a single specimen, which appears to be only a very young shell, is in the British Museum. This is a very remarkable species, forming the link that unites *Cymba* with *Melo*, the apex of this species being subspiral, while in *Cymba* the apex is amorphous.

Voluta piperita. *Vol. testâ obovatâ, ventricosiusculâ, crassiusculâ, pallescente, quinquefasciatâ, fasciis posticâ medianâ et anticâ brunneo-puncticulatis, strigisque fuscis irregularibus ornatis;*

fasciis duabus intermediis pallidioribus, strigis nonnullis lividis, cum strigis fuscis, fasciarum alternarum continuis; anfractibus quinque, tribus primis papillam efformantibus, papillâ lævi, posticè subgranosâ; ultimo maximo, ovali; aperturâ elongatâ, latiori, intus aurantiacâ; columellâ plicis 4, *validis, labioque columellari aurantiacis.*

Shell obovate, rather ventricose and thickish; of a pale colour, with five bands, the posterior, middle and anterior of which are dotted with brown, and ornamented with irregular fuscous streaks; the two intermediate bands are paler, with livid streaks, which are continuous with the brown streaks of the alternating bands; volutions five, of which the first three form the papillary apex, which is smooth, and slightly granose posteriorly; the last volution very large, oval; aperture elongated, rather wide, orange-coloured within; columella with four distinct folds, orange-coloured as well as the columellar lip.

A single specimen only is known, which is in Mr. Norris's collection.

Voluta Norrisii. *Vol. testâ ovatâ, suboblongâ, ventricosâ, coronatâ, lævi, cinereo-fulvâ, maculis parvis niveis aliisque fuscis adspersâ, fasciis duabus transversis fuscis, interruptis, hîc illîc lineis interruptis, longitudinalibus notatis; spirâ brevi, apice papillari, granoso; anfractibus sex, ultimis duobus spinis brevibus acutis coronatis; aperturâ magnâ, oblongâ, intus fuscâ; columellâ quadriplicatâ, plicis duabus anticis validioribus.*

Shell ovate, rather oblong, ventricose, coronated, greyish brown, sprinkled with small snow-white and brown specks, with two transverse brown interrupted bands, here and there marked with interrupted longitudinal lines; spire short, with a papillary granose apex; volutions six, the last two crowned with short sharp spines; aperture large, oblong, brown within; columella with four folds, of which the two anterior are prominent.

Found on the reefs at low water, on Dupuch's Island, by J. C. Dring, Esq., R.N. In Mr. Cuming's collection. Wagner has figured this species for *V. nivosa.*

Voluta megaspira. *Vol. testâ fusiformi, turritâ, tenuiusculâ, lævi, rufescente-carneolatâ, strigis maculisque castaneis notatâ; spiræ anfractibus sex, subelongatis, medio ventricosiusculis, primis duobus apicem papillarem efformantibus,* 3*tio*, 4*to*, 5*to* et 6*to* *obtusè longitudinaliter costatis, ultimo magno, oblongo, anticè attenuato; aperturâ oblongâ, labio externo subreflexo; columellâ quinqueplicatâ, plicis posticis obtusis, parvis.*

Shell fusiform, turrited, rather thin, smooth, of a reddish flesh-colour, marked with chestnut streaks and blotches; volutions of the spire six, rather elongated and ventricose in the middle, the first two forming the papillary apex, the 3rd, 4th, 5th and 6th with obtuse longitudinal ribs, the last large, oblong, attenuated anteriorly; aperture oblong, outer lip slightly reflected; columella with five folds, the posterior of which are small and obtuse.

I have only seen a single specimen, which is in Mr. Cuming's extraordinary collection; it is probably the same as Kiener's *V. lyriformis*, but it is not the same as Broderip's, which is identical with Swainson's *Mitra lyriformis*. Its papillary apex closely resembles that of *V. fulminata*.

Voluta Guildingii. *Vol. testâ oblongâ, crassâ, fulvescente, lineolis saturatioribus aliisque albis pictâ; spirâ acuminatâ, apice obtuso: anfractibus 5 ad 6, subventricosis, longitudinaliter costatis, interstitiis costarum transversim striatis, ultimo magno, lævigatiusculo; aperturâ mediocri, labio externo extus incrassato, albicante, intus dente parvo instructo; columellâ plicis quinque ad sex parvis, anticis duabus validioribus.*

Shell oblong, thick, fulvous, marked with little white lines and others of a darker colour; spire acuminated, with an obtuse apex; volutions five to six, rather ventricose, longitudinally ribbed, interstices of the ribs with transverse striæ, the last volution large, rather smooth; aperture middle-sized, outer lip externally thickened, whitish, furnished with a small tooth internally; columella with five or six small folds, of which the two anterior are more prominent.

This is the smallest known species of Volute; it was discovered at St. Vincent's by the late Rev. Lansdown Guilding. In Mr. Cuming's and Mr. Metcalfe's collections.

Voluta Cylleniformis. *Vol. testâ parvâ, ovatâ, crassâ, læviusculâ, albicante, maculis parvis flavicantibus sparsim ornatâ; spirâ subconicâ, anfractibus sex, posticè coarctatis, ad suturam granosis, anticè longitudinaliter costatis, ultimo magno, anticè transversim striato; canali parvo, reflexo; aperturâ oblongâ, labio externo extus incrassato, margine interno intus dente parvo instructo; labio columellari anticè ruguloso, dentibus tribus parvulis munito.*

Shell small, ovate, thick, rather smooth, whitish, sprinkled with small yellowish specks; spire somewhat conical, with six volutions, which are contracted posteriorly, granose at the sutures and longitudinally ribbed anteriorly; the last volution is large and anteriorly transversely striated; canal small, slightly reflected; aperture oblong, outer lip externally thickened, its internal edge furnished with a small tooth; columellar lip rugulose anteriorly, furnished with three small teeth.

The only specimen I have seen of this curious little shell is in the collection of W. Metcalfe, Esq. In general appearance it nearly resembles a *Cyllene*.

GEOLOGICAL SOCIETY.

Dec. 4, 1844.—A paper was read, entitled, "Remarks on the Geology of British Guiana." By the Chevalier Robert H. Schomburgk.

The geology of the district of British Guiana is chiefly confined to primitive rocks. At the mouth of the Orinoco is an extensive delta consisting of blue clay, which, when pierced, gives a supply of water, and Artesian wells have been sunk here in many places with success. Below the clay appear the remains of an ancient forest. The alluvial flat is terminated by sand-hills, beyond which occurs granite intersected by numerous greenstone dykes, and then commence the savannahs, which are traversed by large beds of conglomerate often containing iron ore, and pierced with lofty porphyritic hills. The savannahs are supposed to be the bed of an ancient lake. A region in which much jasper occurs next succeeds, and then a remarkable range of granitic mountains; and the author directed especial attention to the insulated rocks of grotesque form abounding in the district. He also remarked on the probability of gold being found in the river-courses, and on the appearance of the well-known diamond-matrix of Brazil.

A letter was next read from Mr. Trevelyan, remarking on the occurrence of polished and scratched surfaces in the neighbourhood of Conway, on the ascent of Moel Siabod, from Capel Carig, on Snowdon, and in other localities in North Wales.

Dec. 18.—A paper was read "On the Pipes or Sandgalls in the Chalk and Chalk-rubble of Norfolk." By Joshua Trimmer, Esq.

The observations recorded in the present paper were made in chalk pits near Norwich, and the surface of the chalk was observed to be furrowed by irregular cavities, or deep cylindrical conical pipes, entering the chalk from the channeled surface. The contents of the furrows appeared to be fine sand mixed with a light-coloured amber or yellow ochre, the former often filling up the cavities both here and elsewhere. The author considers, that although chemical agency may have assisted in the formation of these cavities and pipes, yet that it is necessary to admit also mechanical action, and he refers to several instances of the known effects of rain-water on cliffs, and excavations of basins in river-beds, in proof of the probability of his opinion being correct.

Jan. 8, 1845.—The following communications were made:—

A paper by Mr. A. G. Bain "On the Geology of the South-Eastern extremity of Africa."

The principal object of this paper was to describe the district in which certain remarkable fossils had been obtained by the author and forwarded to England. The lowest stratified rock in this district is a red sandstone containing fragments of plants, which seem to resemble a common carboniferous species (*Lepidodendron Sternbergi*). Over this rock, and conformable to it, is a conglomerate of claystone porphyry containing pebbles, and to it succeeds clayslate. The next is the fossiliferous rock, and it consists of a disintegrated sandstone containing argillaceous matter in septarian nodules, the fossils being found in the nodules.

A notice, by Prof. Owen, of one of the genera of animals (*Dicynodon*) whose remains were forwarded by Mr. Bain. The most important character in this genus is the possession of two large tusks like those of the walrus, but the general structure of the bones indicates distinctly the reptilian character of the animal. The first of the species described by Prof. Owen was named *D. lacerticeps*, from its analogies with the lizards. In this species there is an exhibition of unusual strength in the bones of the face, but there is no mark of any other teeth than the two which give the peculiar character to the animal. Prof. Owen considers that the whole of the anterior part of the jaws was sheathed with horn in the same manner as the Chelonians, and this is the more interesting from the other analogies presented with the Chelonians. It appears indeed throughout, that this singular animal united the character of the Lacertians, Chelonians and Crocodilians. The second species described was named *D. testudiniformis*, and differed from the former in its greater resemblance to the Chelonians. A third species, *D. strigiceps*, is chiefly remarkable for the singular position of the tusks, placed far back behind the orbit of the eye. The nearest analogue of this singular genus is the *Rhynchosaurus* of the new red sandstone of England. An unexpected point of structure exhibited in these animals is the existence of tusks like those of mammalia, exhibiting no mark whatever of the presence of a succession of teeth, which in all other reptiles known invariably exist. The tusks of the Dicynodon were probably used as weapons of offence and defence, and the habits of the animal seem to have been marine.

BOTANICAL SOCIETY OF LONDON.

Jan. 3, 1845.—J. E. Gray, Esq., F.R.S. &c., President, in the Chair.

Mr. S. Gibson presented a specimen of *Scirpus acicularis* (Linn.) with much longer stems than ordinary; the culms formed a dense tuft about 14 inches high.

Mr. Fitt presented specimens of an *Œnanthe* commonly considered *Œ. pimpinelloides* by the botanists of Norfolk. It is the *Œ. Lachenalii* (Gmel.) of Babington's 'Manual,' and the species confused with or mistaken for the true *pimpinelloides* by most other English botanists since the time of Hudson.

Four of the specimens were selected for the Society's herbarium, as showing variations from the normal character of the root. Some of the tubers were branched; some approximated to those of Smith's "*peucedanifolia*" in being thicker and shorter than ordinary. On one specimen the external fruits in the umbellules are very slightly contracted at their base; the ridges being confluent and forming a ring, much like the callous base of the fruit in the true *pimpinelloides*. The specimens were located from salt-ditches near Yarmouth.

The Secretary called the attention of members to a series of specimens of *Dryas octopetala* (Linn.), which had been sent to the Society some years ago by Mr. Tatham from Arncliff Clonder, Yorkshire. The sepals or lobes of the calyx varied considerably in length and breadth; on one specimen the length was scarcely twice the breadth, while in another the length was four times the breadth. The convexity of the base of the calyx also varied much. He reminded the meeting that Mr. Babington had described a second species of *Dryas* (*D. depressa*, Bab.) found in Ireland, and distinguished from the well-known *D. octopetala* by exactly the same characters which these specimens proved to be within the range of variation of the true *D. octopetala*. He had not seen any example of the *D. de-*

pressa, described in Babington's 'Manual,' and could not speak with certainty about its claims to be held a distinct species; but the published characters by which it was attempted to be distinguished from the better known species were scarcely sufficient with these examples before the Society. When a series of specimens of *D. octopetala* are examined, it will be seen that the sepals are usually broader in those which are more advanced in the fruiting stage, as compared with others just opening into flower. Of the specimens before the Society, the one having the broadest sepals was advanced in fruit. But it was proper also to observe, that on this specimen a single sepal was longer than the rest, and had apparently been white and petal-like at its extremity; it might therefore be considered an aberration rather than a healthy variation from the normal form.

MISCELLANEOUS.

NOTES IN NATURAL HISTORY*.

"I HAVE been able to make scarcely any remark worthy of notice on subjects connected with natural history since I left England. One is of the growth of the "Chicorée†," as the shells I send you are called, at Séchelles: they are found in the grassy weed which grows on a somewhat muddy bottom, in which they bury themselves almost entirely during the period in which the shell is tender. I send you four, with the shells in progressive stages of development, which I collected and packed with great care, and hope you will receive them safe.

"In coming from Séchelles hither we touched at Juan de Nova, where I had an opportunity of seeing for the first time an island of purely coral formation. It is of a horse-shoe shape, about twenty-one miles long, and from half to three-quarters of a mile broad, with extensive reefs around it abounding with turtle. Dogs of different kinds have been left there from time to time, and finding abundance of food in the turtle-eggs, young turtle, and sea-fowl, have multiplied prodigiously, so that there are now some thousands of them. I can testify from personal observation that they drink salt water, and they have *entirely lost the faculty of barking*. Some of them which have been in captivity several months had not yet lost their wild looks and habits, nor had they any inclination for the company of other dogs, nor did they acquire their voice. You may perhaps have heard of this before; if so, my notice will confirm your knowledge; if not, I hope the facts, as being of my own ocular demonstration, will prove interesting. On the island the dogs congregate in vast packs, and catch sea-birds with as much address as foxes could display. They dig up the turtle-eggs and frequently quarrel over their booty. The greater part of them droop their tails like

* Extract from a letter dated Port Louis, Mauritius, Oct. 2nd, 1844, from G. Clarke, Esq. to Thomas Bell, Esq.

† *Murex saxatilis.*

wolves, but many carry them curled over their backs. They appear to consist of spaniel, terrier, Newfoundland and hound, in various degrees of mixture, and are of all colours except pure white or brindled.

"A most tremendous epizootic has visited us, as you have perhaps seen by the papers. From 10,000 to 12,000 head of bullocks have fallen victims to it, and not three per cent. of those attacked have escaped, nor have any preventive or curative measures whatever been found. It seems to be a kind of catarrhal fever, and is generally fatal in three or four days. Its ravages were fearfully rapid, herds of 200 or 300 being entirely finished in a single week. This calamity is the more sorely felt from its occurring just at the beginning of crop, which is remarkably heavy this year."

EHRENBERG'S RESEARCHES ON INFUSORIA.

M. von Humboldt, in a letter to M. Valenciennes (Potsdam, December 16), gives an account of M. Ehrenberg's observations on the Infusoria contained in the sea-water brought by Captain Ross from various latitudes, and in the atmospheric dust sent to him by Mr. Darwin (Annals, vol. xiv. p. 169). He adds, "M. Ehrenberg has also found that the calcareous Bryozoa, of which $\frac{8}{9}$ths of the chalk is composed, descend below the Jura formation, in the United States as far as the mountain limestone; but the species which occur in these formations are different from those of the chalk. You also know that notwithstanding the age of the chalk, half of the calcareous Bryozoa of this formation still live in the Baltic or in the ocean.

"The pumice-stone contained in the *trass* of the Rhine (of volcanic origin) is filled with siliceous Infusoria. It is to be supposed that the little animals inhabited the pumice-stone fallen into some fresh-water lake, and that these fragments were afterwards enveloped in a muddy ejection. As pumice-stone is formed from obsidian, and as volcanoes are a reaction of that which is in the innermost part of our planet against its outer crust, we cannot admit the pre-existence of the siliceous Polygastrica in craters. We must begin by collecting facts, hypotheses will come afterwards."—*Comptes Rendus*, Dec. 23, 1844.

Occurrence of the Anoplotherium *in the lowest layers of the tertiary period of the Paris Basin.* By M. E. Robert.

Amongst the numerous bones of the Lophiodon, crocodile, tortoise, &c. associated with the stems of *Yuccaceæ*, which I have collected at different intervals in the central and upper layers of the *calcaire grossier* of Nanterre and of Passy, I have hitherto only been able to separate a jaw-bone of *Anoplotherium leporinum*; the rarity of such a fossil might lead us to suppose that the Lophiodons are almost the only ones which are to be met with much lower than their congeners, the Anoplotheriums and Palæotheriums, in the tertiary layers; however, beneath the calcaire grossier and in the midst of the plastic clay, the workmen have laid bare at Montalets (commune of Meudon) a left thigh-bone, which, from its characters, appears to me to belong to the most common of the species of *Anoplotherium* described by Cuvier; it differs but a very little from it by being a little longer in the bone, and will range under the varieties mentioned by that illustrious palæontologist. The proportions compared to those of the commonest species are:—

	Commonest species (Cuvier).	Meudon species.
Length between the head and the inner condylus...	0,36	0,40
Breadth between the head and the great trochanter	0,12	0,118
Breadth from one condylus to the other	0,10	0,085
Great diameter of the head............................	0,047	0,053
Diameter of the bone at its mean part	0,053	0,053

This bone, the largest and best-preserved perhaps which has been found in the inferior layers of our tertiary system, is of a dark brown externally as well as throughout its compact substance; but the spongy tissue is incrusted with iron pyrites ornamented with the richest colours; the tissue is moreover penetrated with very small crystals of sulphate of lime, which mineral incrusted all the bone with lenticular crystals, even disputing the place with some impressions of carbonized plants. It will perhaps also be interesting to learn, that in the neighbourhood of its site and a little above it, in the midst of a grayish clay abounding in seeds of *Chara* transformed into hydrate of iron, a large number of nodules of amber were gathered, as pure and transparent, but more fragile than that found on the coasts of the Baltic.—*Comptes Rendus*, Dec. 23, 1844.

Description of a new species of Australian Bird. By J. Gould.

Podiceps Australis. *P. quoad colorem,* P. cristato *consimilis, at cristâ collari in medio latiùs et saturatiùs castaneâ, et ad apicem latiùs nigrâ.*

Crown of the head and occipital tufts black; frill black at the outer edge and chestnut in the centre, gradually passing into buffy white on the face; upper surface and wings dark brown; scapularies and secondaries pure white; all the under surface silvery white, stained with brown and chestnut on the flanks; irides red; bill dark horn-colour; upper surface of the tarsi and toes dark olive-green; under surface pale yellow.

Total length, 24 inches; bill, $2\frac{3}{4}$; wing, $7\frac{1}{2}$; tarsi, $2\frac{1}{4}$.

Hab. Australia and Van Diemen's Land.

Remark.—Nearly allied to *P. cristatus,* but differs in being somewhat larger in size, and in having the frill fuller and of a blacker hue than in that species.—*Proc. Zool. Soc.* August 13, 1844.

Bibliographical Notice.

We are informed that Mr. King is preparing for publication a portion of his Lectures on Geology. The subjects treated of may be gathered from the following headings:—

A popular view of the production of coal from vegetable matter.

On the origin of the North of England coal-field.

On the cause of the crystalline structure of the magnesian limestone of Sunderland.

On the various systems which have been adopted in classifying the Animal Kingdom. The principles of the *Chronogenic classification* as applied by the lecturer to the Tetrabranchiate Cephalopods*, Reptiles and Mammals in 1841.

An outline of the Comparative Histology of Plants. On the vegetation of the various geological periods.

An outline of the science of Conchology. On the Testaceous Mollusks of the various geological periods. The Tetrabranchiate Cephalopodous type traced throughout its principal generic modifications.

An attempt to graduate the principal reptilian and mammalian groups of the various geological periods into existing forms according to the principles of the chronogenic classification.

The work will be illustrated with numerous diagrams and figures; and it is intended to publish it by subscription.

METEOROLOGICAL OBSERVATIONS FOR DEC. 1844.

Chiswick.—December 1—3. Overcast. 4. Cloudy and cold: sharp frost. 5. Frosty: severe frost at night. 6. Frosty and foggy: severe frost. 7. Hazy: slight frost. 8. Dry and frosty: sleet. 9. Overcast. 10. Cold and dry. 11. Dusky haze: clear and frosty. 12. Foggy: overcast. 13. Thick haze: overcast. 14. Hazy: densely overcast. 15. Slight thaw: foggy. 16. Foggy. 17. Dense fog. 18. Foggy: fine at night. 19. Drizzly: boisterous. 20. Overcast: clear and cold: boisterous. 21, 22. Cold and dry: overcast. 23. Overcast. 24. Hazy and cold. 25. Overcast. 26, 27. Dense fog. 28. Fine: overcast. 29. Drizzly: rain. 30. Foggy. 31. Hazy.—Mean temperature of the month 6°·8 below the average.

Boston.—Dec. 1. Cloudy. 2. Cloudy: very dark day. 3. Cloudy: rain early A.M. 4. Cloudy. 5, 6. Fine. 7. Cloudy. 8. Fine: snow P.M. 9—16. Cloudy. 17. Foggy: rain early A.M. 18. Rain: rain P.M. 19. Cloudy. 20—22. Fine. 23—25. Cloudy. 26—30. Foggy. 31. Foggy: rain early A.M.

Sandwick Manse, Orkney.—Dec. 1. Bright: cloudy. 2. Cloudy: drops. 3. Cloudy. 4. Bright: clear. 5. Bright: cloudy. 6. Bright: frost: cloudy: frost. 7, 8. Bright: frost: hazy. 9. Showers. 10, 11. Showers: sleet. 12. Cloudy: showers. 13—15. Snow-showers. 16, 17. Showers. 18. Showers: clear: frost. 19. Clear: frost: clear: showers. 20. Bright: clear: frost. 21. Clear: frost. 22. Frost: clear: thaw. 23. Cloudy: thaw. 24. Cloudy. 25. Cloudy: showers. 26. Cloudy: frost: cloudy. 27. Cloudy: frost: clear. 28. Cloudy: damp. 29. Fog: damp. 30. Bright: cloudy. 31. Showers: cloudy.

Applegarth Manse, Dumfries-shire.—Dec. 1. Fair, but cloudy. 2, 3. Fair and mild. 4—11. Frost. 12. Frost: slight fall of snow. 13. Frost. 14, 15. Frost: cloudy. 16. Frost: very slight. 17. No frost. 18. No frost: rain. 19—21. Frost. 22. Frost: very mild. 23—26. Frost. 27. Frost: mild and fine. 28. Frost A.M.: rain P.M. 29. Thick fog. 30. Frost: shower P.M. 31. Frost: fog.

Mean temperature of the month	33°·8
Mean temperature of Dec. 1843	46 ·4
Highest temperature 27th day	43 ·5
Lowest temperature 20th day	20 ·0
Mean temperature of spring-water	43 ·6
Mean temperature of ditto Dec. 1843 ...	46 ·1

---

* Vide Annals of Nat. Hist. Oct. 1844.

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.
1844. Dec.	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.	30·123	30·083	29·83	30·14	30·10	30·28	30·21	42	33	39	43	38	41	42½	ne.	calm	ne.	s.	......	......	......	......
2.	30·053	29·998	29·68	29·98	29·91	30·09	30·04	40	27	39	42	37	43	43	ne.	calm	ese.	se.	......	......	......	......
☾ 3.	30·073	30·043	29·75	30·12	30·20	30·16	30·21	39	33	38	41	36½	43	40	ne.	calm	se.	s.	......	·02	......	......
4.	30·223	30·169	29·97	30·22	30·15	30·21	30·10	40	22	37·5	39½	28	40	38	ne.	calm	e.	sse.	......	......	......	......
5.	30·111	30·069	29·85	30·08	30·08	30·05	30·11	35	14	31	33	24½	37	36½	ne.	calm	ne.	sw.	......	......	......	......
6.	30·216	30·203	29·92	30·09	30·19	30·10	30·06	30	14	25·5	32	20	34	36	e.	calm	ne.	sse.	......	......	......	......
7.	30·294	30·298	30·03	30·18	30·18	30·10	30·14	34	20	33	31½	23	38	37½	e.	calm	s.	sse.	......	......	0·00	......
8.	30·172	30·058	29·98	30·19	30·12	30·18	30·21	32	26	33·5	34½	24½	37	38	ne.	e.	e.	sse.	·01	......	......	......
● 9.	30·119	30·104	29·87	30·05	30·17	30·24	30·31	32	28	29	36	28½	37	38	ne.	e.	ese.	sse.	......	......	......	·15
10.	30·104	30·044	29·88	30·16	30·05	30·32	30·21	32	28	35·5	37	35	37	37	ne.	e.	ene.	se.	......	......	......	·22
11.	29·962	29·952	29·70	29·89	29·82	29·98	29·88	30	22	31	36	32	38	38	ne.	calm	e.	se.	......	......	......	·09
12.	29·924	29·750	29·71	29·85	29·74	29·96	29·96	31	24	32	33	29	38	38	e.	calm	e.	sse.	......	......	......	·05
13.	29·545	29·443	29·40	29·51	29·46	29·91	29·80	32	25	27	33	26½	35	36	e.	e.	e.	e.	......	......	......	·10
14.	29·523	29·430	29·40	29·44	29·50	29·86	29·92	32	28	30	38½	30	37	36	e.	e.	e.	e.	......	......	0·00	·07
15.	29·556	29·436	29·33	29·51	29·47	29·88	29·78	40	34	33	39	31	34½	38	e.	calm	ese.	e.	·03	......	......	·08
☽ 16.	29·336	29·316	29·17	29·39	29·33	29·73	29·70	43	35	37	40½	32	37	38	e.	e.	e.	e.	......	......	......	·09
17.	29·434	29·365	29·05	29·30	29·32	29·69	29·67	44	35	38·5	41½	36	39½	39	e.	calm	ene.	e.	......	·10	......	·12
18.	29·806	29·581	29·30	29·52	29·82	29·85	30·11	44	40	38	41	36	37½	32½	ne.	calm	ne.	ne.	·05	......	......	·27
19.	30·214	30·025	29·79	30·12	30·21	29·24	30·33	42	29	40	42	36½	36	35	e.	calm	ne.	ssw.	·01	·08	......	......
20.	30·288	30·260	30·00	30·34	30·35	30·39	30·45	38	28	33·5	36	25	37	34½	ne.	calm	e.	s.	......	......	......	·15
21.	30·462	30·295	30·05	30·35	30·34	30·49	30·49	37	30	33	38	25½	33	37	ne.	calm	e.	......	......	......	......	......
22.	30·239	30·176	30·05	30·32	30·20	30·45	30·36	35	27	33·5	37	29	36	39	ne.	calm	e.	sse.	......	......	0·05	......
23.	30·238	30·095	29·93	30·14	30·18	30·31	30·29	34	28	32	36	31	38	38½	ne.	calm	e.	se.	......	......	......	......
○ 24.	30·270	30·245	30·00	30·19	30·17	30·30	30·30	34	31	32	34½	32	40	39½	e.	calm	ese.	se.	......	......	......	......
25.	30·260	30·194	29·95	30·12	30·09	30·30	30·18	35	31	33·5	36½	30	40	37½	e.	calm	e.	se.	......	......	......	......
26.	30·116	30·072	29·88	29·99	29·90	30·10	30·02	39	30	36	41	30	34	33½	se.	calm	se.	se.	......	......	......	......
27.	30·038	29·998	29·80	29·87	29·87	30·04	30·01	38	30	33	43½	32½	33½	35½	ne.	calm	se.	se.	......	......	......	......
28.	29·944	29·906	29·80	29·75	29·68	29·91	29·86	48	42	33	42	29½	41	43½	se.	calm	sse.	se.	·15	......	......	......
29.	29·932	29·910	29·57	29·75	29·80	29·82	29·88	49	38	40	39½	35½	43	45	se.	calm	sse.	......	·15	......	0·10	......
30.	30·008	29·951	29·66	29·88	29·93	30·01	30·03	42	32	33	38	27½	41	42½	ne.	calm	ne.	n.	......	......	......	·34
31.	30·105	30·067	29·78	29·98	30·05	30·00	30·11	44	32	38	38	32	45½	43	ne.	calm	ne.	w.	......	·20	......	·04
Mean.	30·019	29·984	29·74	29·949	29·944	30·030	30·088	37·32	28·90	34·1	37·9	30·4	38·11	38·25					·40	·40	0·15	·77

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 97. MARCH 1845.

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

[With a Plate.]

British Nereides.

Syllis, *Savigny.*

Char. *Body* linear-elongate, slender: *head* small, lobed more or less in front: *eyes* four: *antennæ* three, cranial, filiform, submoniliform, similar to the *tentacular cirri,* of which there are two pairs: *proboscis* divided into two distinct portions, the aperture plain, edentulous: *segments* numerous: *feet* undivided, armed with jointed bristles; the *superior cirrus* elongate, submoniliform, the *inferior* short, unjointed: *tail* with two moniliform styles: *branchiæ* none.

1. *S. armillaris;* pale yellowish-brown, unspotted; head deeply lobed in front, the lobes papillary; superior cirri four times longer than the breadth of the body, submoniliform. (Plate IX. figs. 1, 2, 2 *h.*)

Nereis armillaris, *Müll. Wurm.* 150. *tab.* 9. *fig.* 1—5, copied in *Encyclop. Méthod. pl.* 55. *fig.* 13—17. *Bosc, Vers,* i. 168. *Turt. Gmel.* iv. 86.

Hab. Among shells and stones in deep water. Berwick Bay.

Desc. Animal of a pale yellowish-brown colour, dusked in some places from the earthy contents of the intestine, very slender, linear-elongate, tapered at the tail, somewhat compressed. *Head* distinct, small, deeply lobed in front; the lobes porrect, papillary, coalescent behind, but separated by a line from the antenniferous portion, which is rounded and slightly convex: *antennæ* slightly tapered, submoniliform, the medial originating from the vertex and rather longer than the lateral: *eyes* placed in a semicircle, the posterior pair more approximated than the anterior: *proboscis* long, the outer portion shorter than the basal, smooth: *post-occipital segment* not larger than the following, with two *tentacular* *cirri* on each side, the superior longer than the inferior, submoniliform: *segments* very numerous, short, or about as broad as long; the *foot* obtuse, undivided, furnished with a single fascicle of colourless bristles, which are jointed and curved near the pointed apex; the spine conical, straight: *superior cirrus* at least three times the breadth of the body in length, becoming gradually shorter near the tail, slightly tapered, submoniliform: *inferior cirrus* not projecting much beyond the foot, conical, undivided: *styles* of the tail elongate.

Length 2 inches; breadth about a line.

This worm is not uncommon. The specimen figured was found among some shells and stones which had been brought up from deep water by the lines of the fishermen. It may be compared, so far as external appearance goes, with the subterranean Geophilus: its motion is moderately quick and effected in the usual way.

To the *Scyllis monilaris* of Savigny this species is evidently nearly allied, and indeed I find no characters to distinguish it excepting the deeply-lobed front, and the greater comparative elongation of the superior cirri, which, in the figure of *S. monilaris* given by Audouin and Edwards (Hist. Nat. du Litt. de la France, ii. pl. 4 B. fig. 1—5), scarcely exceed the breadth of the body. By the same characters *S. armillaris* is separated from the *S. fulgurans*. I have no opportunity of comparing ours with figures of any of the other species of the genus indicated by Audouin and Edwards. Müller's figures of this species are very good.

Any one acquainted with Annelides will at once be led, from their great development and form, to conjecture that the frontal lobes of this worm are analogous to the exterior antennæ of the Nereis; and it may be considered as giving support to the opinion of Blainville, who had come to this conclusion from the examination of species in which their development is much less remarkable, and where there was little coincidence in their figure.

Plate IX. fig. 1. *Syllis armillaris*, natural size. Fig. 2. The same magnified. Fig. 2 *h*. The head more highly magnified.

2. *S. prolifera*; yellowish-brown, unspotted; head semicircular in front, entire; superior cirri scarcely twice the breadth of the body, very obscurely jointed, not moniliform. (Plate IX. figs. 3, 4.)

Nereis prolifera, *Müll. Zool. Dan. tab.* 52. *fig.* 5—9, copied in *Encyclop. Méth. Vers, pl.* 56. *fig.* 12—15. *Turt. Gmel.* iv. 90. *Bosc, Vers,* i. 174. *Audouin et Edw. in Ann. des Sc. Nat.* xxix. 231. *note* 3; and *Hist. du Litt. de la France,* ii. *p.* 209. *note* 3.
Hab. Amongst corallines in deep water. Berwick Bay.

Desc. *Body* rather more than half an inch in length, scolopendriform, roundish, of a yellowish-brown colour: *head* small, distinct, rounded and entire in front, with four *eyes* placed in a square, the anterior pair more widely set than the posterior: *antennæ* three, elongate, filiform, clothed with minute cilia, unjointed: *proboscis* apparently without teeth or other armature: *segments* numerous, narrow, incised at their junctions; the *post-occipital* with a pair of *tentacular cirri* on each side, one-half the length of the antennæ; the *cirrus* of the following segment elongate, antenniform: *feet* uniramous, short, entire, armed with a single fascicle of retractile simple unjointed bristles; the *superior cirrus* longer than the breadth of the segments, obscurely marked with a few transverse lines or wrinkles, but not in any degree moniliform; the *inferior cirrus* small, and not projecting much beyond the foot: tail tapered, tipped with a pair of *styles.*

This little worm always kept its antennæ twisted up in a spiral manner, so that it was not easy to get a distinct view of their number and location: they differ remarkably from those of the preceding species in their greater development; and it was easy to see, with a magnifier of no high powers, that they were clothed throughout with fine cilia.

Plate IX. fig. 3. *Syllis prolifera* of the natural size. Fig. 4. The same magnified; 4 *h*, the head and anterior segments; 4 *s*, the middle segments; 4 *t*, the posterior extremity and styles.

Glycera, *Savigny.*

Char. *Body* lumbriciform, attenuated at both ends, the rings numerous, narrow: *head* conical, bulged at the base, prolonged into a sort of annulated horn with four minute equal *antennæ* on the apex: *tentacular cirri* none: *mouth* inferior; the *proboscis* very large, clavate, two-jointed; the terminal joint smooth, the basal joint elongate, villose with minute papillæ: *feet* uniform, obsoletely biramous, setigerous, with a short superior and inferior *cirrus,* and sometimes branchial papillary processes: tail with a pair of short *styles.*

In all the *Nereides* which we have hitherto described, the head is to be readily distinguished by its enlarged form and its dissimilarity from the first segment; but in the *Glycera* there is no marked line of separation between these parts. The head has the appearance of a small pointed horn, and is indeed so like the anterior end of the earth-worm, that we cannot but perceive, in this sameness of character, a certain approximation to a junction between the families to which the *Glycera* and earth-worm respectively belong. Yet though this is unquestionable, still the *Glycera* is not the nearest connecting link, for there are other *Annelides errantes* which partake more of the habits and character of the *Terricolæ.*

1. *G. alba*; body most attenuated anteriorly; jaws four; supe-

rior ramus of the foot pointed on the dorsal aspect, rather longer than the cirrus; branchiæ none. (Plate IX. fig. 1—9.)

Nereis alba, *Müll. Zool. Dan. Prod.* 217. *Zool. Dan. tab.* 62. *figs.* 6, 7. *Aud. et Edw. Litt.* ii. 243. *Turt. Gmel.* iv. 89. *Bosc, Vers,* i. 172.

Hab. In sandy places between tide-marks under stones. Berwick Bay, not uncommon.

Desc. *Body* vermiform, round, or rather somewhat flattened on the ventral surface, tapered anteriorly to a sharp point, less tapered at the tail, $2\frac{1}{2}$ inches long, smooth, indistinctly annular, of a yellowish-white colour, stained with the contents of the intestine, and marked with a red vessel down the back. *Head* cornuted, the apex surmounted with four minute *antennæ* only visible with a magnifier. *Proboscis* very large, faintly striate in a longitudinal direction; the teeth brownish-black, corneous, falcate, divided into three processes at the base, inserted into a sort of tubercle forming a square round the plain oral aperture. *Segments* very narrow, equal and numerous. *Feet* papillary, obscurely biramous, obtuse, pointed above at the outer angle; the *cirri* short, the inferior almost obsolete: *bristles* colourless, jointed near the apex; the spines straight, setaceous, pellucid. *Anal segment* rounded, apodal, terminated with two minute *styles*, which are frequently cast off in the animal's struggles.

Glycera alba lives under stones, sometimes buried in the gravel or sand, but the worm never penetrates far below the surface. Its motions in the water and in the sand are slow, but when irritated the contortions of the body are violent, and it very often twists itself so as to form a short spiral column, as we have attempted to show in the first of our illustrative figures.

Savigny considers his *G. unicornis* to be identical with the *Nereis alba* of Müller. It is more probable, however, that the British species is the same as the Norwegian; the more especially as there is nothing in the description to create any doubts of their identity. The *G. unicornis* is remarkable for its want of jaws, affording a striking proof that organs of vast importance in the higher classes are here only of secondary consequence, and do not even afford a good generical character.

Plate IX. fig. 1. *Glycera alba*, natural size, and in a favourite position. Fig 2. The same, with the proboscis protruded. Fig. 3. The head magnified. Fig. 4. A view of the proboscis fully extruded. Fig. 5. The apex of the proboscis viewed in front to show the jaws. Fig. 6. Three views of a jaw detached and magnified. Fig. 7. A side-view of a foot from near the middle of the body slightly compressed. Fig. 8. A view of two feet from above. Fig. 9. A bristle highly magnified. Fig. 10. The tail magnified.

[To be continued.]

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

[With a Plate.]

Staurastrum, *Meyen*.

Fronds simple, constricted in the middle; end view angular, or circular with the margin lobato-radiate, or in a few instances compressed with a process or mucro at each extremity.

Fronds minute, simple, more or less constricted in the middle, so as to form two segments, which are often somewhat twisted, generally broader than long, and in most of the species elongated laterally into a process, so that the constriction on each side is a roundish or angular sinus; in other respects the front view shows the segments quite entire.

The end view varies in form; in most of the species it is triangular or quadrangular, and the angles are either rounded or elongated into rays; in a few it is circular, with five or more processes forming marginal rays; and in three species it is compressed, and the extremities terminate in either a process or a mucro.

Ehrenberg in his great work has distributed the plants which I shall describe here among different genera, according to the number of angles or processes seen in an end view. Thus he refers those with three angles to *Desmidium*, and those with four to *Staurastrum*. He formed his genus *Pentasterias* for the reception of a plant with five rays, and placed one with two processes in his new genus *Arthrodesmus*. But this arrangement appears unnatural, not only because it separates nearly allied forms, but also because the number of rays are not constant even in the same species, as Meneghini remarks; whilst Professor Bailey says, when describing an American species, "The number of arms is *usually* three, but I have met with specimens in which one corpuscle had *three* and the other *four* arms, others in which *both* had *four*, and others again in which *both* had *five* arms;" I have myself seen a frond of *Staurastrum paradoxum*, one segment of which had four and the other only three rays. I have generally found the *Pentasterias margaritifera* of Ehrenberg having six rays, but not unfrequently five, and occasionally indeed even seven rays to each segment.

In the following description of this genus I have taken as my guide Meneghini's 'Synopsis Desmidiearum,' the best work on this family which I have seen. Besides the species placed in this genus by Ehrenberg, I have included in it his *Pentasterias*, and those plants which he has improperly united with *Desmidium*, and

* Read before the Botanical Society of Edinburgh, May 9, 1844.

also a plant which he refers to *Arthrodesmus.* This last plant I was at first inclined to keep distinct, but am unable to do so, as one undoubted species (*S. tetracerum*) has also compressed fronds; whilst another compressed form added by Meneghini (*S. Incus*) in its front view so much resembles *Staurastrum mucronatum,* that I am not sure it may not be a variety of it.

A little care will distinguish *Staurastrum* from the other genera in this family, although some of its species appear at first sight to approach forms which belong to them. It differs from *Desmidium* in never forming a filament; the species with compressed fronds differ from *Cosmarium* in the front view by having a process or mucro at each side of the segment. Some species have a considerable resemblance to species of *Xanthidium,* but in *Xanthidium* the spines are always situated on the convex surface of the segments, whilst in this genus the rays are elongations of their angles.

I have divided *Staurastrum* into four sections.

In the first, the front view is truncate at the ends, and the angles of each segment, prolonged in straight processes, diverge from each other.

In the second, the front view shows the processes, if any, of the one segment, either parallel to or converging with those of the other; the end view is triangular or quadrangular.

In the third, the front view also shows the processes, if any, parallel or converging; but the end view is circular, with five or more marginal rays or lobes. This section also has the central circular portion more distinct from the rays and slightly produced beyond them.

In the fourth, the processes, if present, are in the front view converging; but the end view is compressed, and terminated at each extremity by a process or mucro.

* *In the front view the elongated processes of one segment diverge from those of the other.*

1. *S. tetracerum.* Fronds rough; front view with four slender diverging processes which are entire at the apex; end view compressed, with a process at each extremity. *Staurastrum paradoxum,* Ehr. Infus. p. 143. tab. 10. fig. 14; Pritch. Infus. p. 185. figs. 102, 103. *Micrasterias tricera* and *tetracera,* Ktz. Synop. Diatom. in Linnæa 1833, p. 602. figs. 83, 84 and 85.

In pools, Dolgelley and Penzance.

Fronds very minute; front view nearly square; the angles elongated into straight, slender processes, which diverge from each other; frequently, however, a segment may be so twisted that one of its processes is situated behind its companion, and is not seen until carefully looked for; in this case the frond appears to have only three processes in a front view, which seems to have misled Kützing, who has made another species of it. The end view is much compressed, and terminated both ways by an elongated process. The frond is rough with minute granules, which form transverse lines on the processes, and give them a jointed appearance. The colouring matter is very pale.

Ehrenberg and Meneghini unite the "*Micrasterias tetracera*" of Kützing to the "*Staurastrum paradoxum*," Meyen; but the latter plant has four processes at each end, whilst the present has only two, which, if I am correct in my view of the following species, differ also in their entire extremities.

Plate X. fig. 1. *Staurastrum tetracerum*: *a*, front view; *b*, end view; *c*, side view.

2. *S. paradoxum*, Meyen. Fronds rough; front view with elongated diverging processes which are minutely trifid at the apex; end view quadrangular or sometimes triangular. Meyen, Nov. Act. Leop. Holm. vol. xiv. p. 43. figs. 37, 38; Menegh. Synop. Desmid. p. 227. *Micrasterias Staurastrum*, Ktz. *l. c.* p. 599.

In pools and slow streams, Dolgelley and Penzance.

Fronds very minute, green, generally much constricted in the middle, the ends truncate; each segment has generally four elongated processes diverging from the processes of the other segment. The end view is sometimes trilateral, but generally quadrilateral, and shows the angles elongated into rays; I have also seen a specimen in which one segment had four and the other only three rays. In the front view the frond generally rests on one of its sides, when each segment appears to have only two processes, as the other two are covered by them; sometimes only one process is thus hidden, and occasionally all four may be seen at the same time. The processes are elongated, colourless, and being rough with minute granules arranged in transverse lines acquire a jointed appearance; each terminates in three minute points.

When only two processes are seen at each end in the front view, this species bears much resemblance to the preceding; but its frond is more constricted, larger, of a deeper green, and its processes are thicker and not entire at the apex.

In the newly-formed segment the processes are merely conical projections.

Plate X. fig. 2. *S. paradoxum*: *a*, front view; *b*, newly-formed segment; *c*, end view; *d*, end view of new segment; *e*, front and end views of three-rayed variety.

3. *S. bifidum*. Frond smooth; front view with thick diverging processes which are deeply trifid at the apex; end view triradiate. *Desmidium bifidum*, Ehr. Infus. p. 141. tab. 10. fig. 11.

In boggy pools: rare. Dolgelley and Penzance.

Fronds minute, smooth, scarcely constricted in the middle, truncate at the ends; each segment has three elongated, straight processes, which diverge from those of the other segment; frequently in the front view only four processes are visible, as one of those at each end is concealed behind another. The end view is triradiate, the rays hyaline, stout at their base and gradually tapering. In this view, as the frond is generally twisted, the rays of the lower segment may be faintly seen between those of the nearer one. The processes are really deeply trifid at the extremity, though in certain positions they appear bifid, in which case the diverging points are forked like the tail of a swallow.

This species, even in the front view, may always be known from the two preceding ones by its smooth and divided processes.

Plate X. fig. 3. *S. bifidum*: *a*, front view; *b*, frond dividing; *c*, end view; *d*, newly-formed segment.

** *Front view without diverging processes; end view triangular or quadrangular.*

4. *S. orbiculare*, Mgh. Fronds smooth; front view suborbicular; end view bluntly triangular. Mgh. *l. c.* p. 225. *Desmidium orbiculare*, Ehr. Infus. p. 141. tab. 10. fig. 9; Pritch. Infus. p. 183.

In pools and slow streams. Weston Bogs near Southampton; Rackham Common, Sussex, and Jack's Wood Spring near Tunbridge Wells, *Mr. Jenner*; Dolgelley and Penzance.

Fronds rather large, smooth, deeply constricted in the middle; the segments, broader than long, are generally in close approximation for their entire breadth, and hence by their union form a suborbicular frond; their sides are rounded and have no processes. The end view is triangular, with sides straight or slightly concave and angles rounded.

Staurastrum orbiculare may be recognised by its smooth frond, angles very blunt and destitute of processes, and the orbicular form of its front view.

Plate X. fig. 4. *S. orbiculare*: *a*, front view; *b*, end view; *c*, frond dividing.

5. *S. mucronatum*. Fronds smooth; end view three-lobed; lobes inflated, blunt, mucronate.

α. In the front view the segments are transversely elliptic, and the mucro straight.

β. Segments lunate, mucro curved outwards.

γ. Mucro curved inwards.

In shallow pools, not uncommon. Weston Bogs near Southampton; Ashdown Forest, Sussex, *Mr. Jenner*; Dolgelley and Penzance.

Fronds smooth, deeply constricted in the middle; segments broader than long, rounded at the sides, which are furnished with a mucro. In α. and γ. the segments are transversely elliptic, but in β. they are lunate. The end view shows three mammillate lobes or rays, each of which is terminated by a hair-like mucro.

The smooth frond, the peculiar inflated or mammillate form of the lobes in the end view, and the terminal hair-like points, well characterize this species.

P.S.—During the past summer I several times observed, scattered amongst various *Desmidieæ*, orbicular spinous bodies, the colouring matter of which formed a dense green mass, which tested by iodine assumed a dark blue colour, showing its vegetable nature. On careful examination I found that each of these bodies was usually accompanied by two empty fronds of *Staurastrum mucronatum*, and was placed between them, though not in actual contact. Still it appeared so unlike any sporangium I was acquainted with, that I arrived at the conviction that it was the reproductive organ of the *Staurastrum*, only after repeated observations and tracing the formation from the commencement.

I then transmitted specimens to Mr. Jenner. He also at first doubted the connexion between the fronds and the spinous body, but after a minute inspection he confirms my observations in the following words: "I think I can *say positively* that I have traced them from the first conjugation to the full-formed spinous body, and I now feel satisfied that they are the spores or sporangia of the *Staurastrum*."

The difficulty in detecting the connexion between the empty fronds of the *Staurastrum* and the sporangium depends upon the tenuity of the connecting membrane; the fronds also are generally at a considerable distance, and soon become detached.

In the conjugated specimens the fronds are always smaller than usual; I have already noticed a similar fact respecting *Tetmemorus granulatus*.

In *Staurastrum mucronatum* the conjugated fronds are at first closely connected by the formation of a bag-like receptacle which is colourless and very thin, and therefore difficult of detection. As this enlarges the fronds become more remote from each other, their segments partially separate at the constriction on the inner side, the endochrome of both passes out, unites and forms an orbicular body between them. In this state it resembles the sporangium formed in some species of *Closterium*. At first it is inclosed in an orbicular membrane larger than itself, but as it increases in size and density, fine hairs make their appearance on the surface and gradually become stout spines, the membrane lastly disappears and the sporangium acquires its perfect state, covered with conspicuous acute spines.

In this stage the empty fronds of the *Staurastrum* seem scarcely connected with the sporangium; except that they are on opposite sides of it, have an opening towards it, accompany it in its movements, and always retain the same relative position.

The fronds of the *Staurastrum* in an end view had sometimes three and sometimes four rays; in conjugating a four-rayed variety would often unite with one having three rays, and occasionally a frond might be seen having four rays on one segment and three on the other. These facts are another proof that the number of rays on a segment cannot constitute a generic distinction in these plants.

It is probable that, under favourable circumstances, conjugation takes place in all the *Desmidieæ*. It is not uncommon in various species of *Closterium*; I have seen it in this genus and in *Tetmemorus*, and Meneghini mentions its occurrence in *Desmidium* *. That the sporangia are not more frequently detected may be partly owing to their minuteness, but I believe that once formed they descend to the bottom of the pool and become mixed with the mud. It is well known that in the *Conjugatæ*, when all the sporangia are formed, the plant sinks to the bottom; and I may remark in support of the opinion I have advanced, that in a small pool at Dolgelley after a shower I could not obtain a single specimen of the *Staurastrum* in a conjugated state, although the day before the sporangia were abundant. In a few days the *Staurastrum* was again plentiful, but I no longer met with any conjugated specimens, although I frequently sought for them.

Plate X. fig. 5. *S. mucronatum*: *a*, front view; *b*, end view. Fig. 6. *a*, fronds conjugated; *b*, endochrome uniting between the fronds in order to form the sporangium; *c*, *d* and *e*, different stages of the sporangium; *f*, perfect state.

6. *S. muricatum*, Bréb. Fronds muricated; end view triangular with convex sides. Mgh. *l. c.* p. 226. *Binatella muricata*, Bréb. Alg. Fal. p. 66 (1835). *Desmidium apiculosum*, Ehr. Infus. p. 142; Pritch. Infus. p. 184.

β. Fronds furnished with numerous short spines. *Xanthidium deltoideum*, Corda, Observ. Microscopiques sur les Animalcules de Carlsbad, p. 29. pl. 5. figs. 38, 39.

In small pools. Cheshunt, *Mr. Hassall*; Weston Bogs, Hants; Rackham Common near Pulborough; Piltdown Common near Uckfield; Mayfield and Heathfield, Sussex, *Mr. Jenner*; Dolgelley and Penzance.

β. Sussex, *Mr. Jenner*; Dolgelley.

Fronds deeply constricted in the middle; segments broader than long, transversely elliptic, but frequently both are in close apposition for their entire breadth, and by their union form a

* Speaking of the joints he says, "demum Diatomatum more secedant, hasque simul e latere copulare in speciebus nonnullis detexit cl. Brébisson." —*Menegh. l. c.* p. 203.

suborbicular frond; the sides are rounded and have no processes. The end view is bluntly triangular, with convex sides and rounded angles. In both views the frond is copiously furnished with scattered apiculi; when it is young these are merely rough points, but in the mature plant they resemble short hairs or bristles. The former state may be mistaken for *Staurastrum tricorne* by those not familiar with that plant, but the convex sides in the end view distinguish *S. muricatum* at all stages of its growth.

In this and the two preceding species, as the segments are not much twisted, the angles only of the adjacent segment are seen in the end view; they also agree in having rounded angles which are not prolonged into processes in either view.

At Dolgelley I once gathered the conjugated state of this species before the sporangium was formed.

Plate XI. fig. 1. *S. muricatum*: *a*, front view; *b*, end view; *c*, fronds conjugated; *d*, empty frond; *e*, front and end view of variety.

7. *S. tricorne*, Mgh. Fronds rough; end view triangular with concave sides and blunt entire angles. Menegh. *l. c.* p. 225. *Binatella tricornis*, Breb. Alg. Fal. p. 57 (1835). *Desmidium hexaceros*, Ehr. Infus. p. 141. tab. 10. fig. 10; Pritch. Infus. p. 184. fig. 99.

In shallow pools. Weston Bogs, Hants; Rusthall Common near Tunbridge Wells; Piltdown Common near Uckfield; Rackham Common near Pulborough; Ashdown Forest and Mayfield, Sussex, *Mr. Jenner*; Barmouth, *Rev. T. Salwey*; Dolgelley and Penzance.

Fronds rough with minute granules, deeply constricted in the middle, the constriction forming a rounded sinus on each side; segments obtuse at the sides, about twice as broad as long, transversely oblong. The segments are twisted, and in the front view one of them appears shorter and thicker at one of its sides in consequence of the blending together of two of the angles. The end view is triangular, with concave sides and very obtuse entire angles.

The conic granules, arranged in transverse lines at the angles, are generally very minute, but in some Sussex specimens gathered by Mr. Jenner they are large, and on the margin produce a dentate appearance.

Staurastrum tricorne connects the three preceding with the two following species. It agrees with the former in having rounded entire angles, but in other respects more nearly approaches the latter. It may be known from all states of *S. muricatum* by the rounded sinuses of its front view.

Plate XI. fig. 2. *S. tricorne*: *a*, front view; *b*, end view; *c*, empty segment.

8. *S. gracile*. Fronds rough; segments in the front view elongated on each side into a slender process, which is terminated by three

minute points ; end view triradiate. *Euastrum*, No. 13, Bailey in American Bacillaria, pl. 1. fig. 2—5.

Boggy pools, Dolgelley and Penzance.

Fronds rough with minute granules, deeply constricted in the middle ; segments two or three times longer than broad, and tapering on each side into a slender, straight and colourless process, which is terminated apparently by three minute points: Mr. Jenner, however, informed me that the processes really terminate in four points, although this can only be ascertained when a process is so situated as to present its extremity to the observer. On the processes the granules are more conspicuous and arranged in transverse lines. The end view is triradiate, and the colouring matter is confined to the centre, and forms three rays which often appear bifid.

Staurastrum gracile differs from *S. tricorne* in its slender processes, minutely trifid at the apex. The end view somewhat resembles that of *S. paradoxum*, but this species is easily distinguished by the parallel processes of its front view.

Plate XI. fig. 3. *S. gracile* : *a*, front view ; *b*, end view ; *c*, empty segment.

9. *S. aculeatum*, Mgh. Fronds spinulose ; segments in the front view with a process on each side, terminated by three minute spines ; end view triradiate. Mgh. *l. c.* p. 226. *Desmidium aculeatum*, Ehr. Infus. p. 142. tab. 10. fig. 12 ; Pritch. Infus. p. 184.

β. End view quadrangular, with four distorted rays.

In pools and slow streams. Cross-in-Hand, Sussex, *Mr. Jenner* ; Dolgelley.

β. Woking Common, Surrey, and Piltdown Common, Sussex, *Mr. Jenner* ; Penzance.

Fronds spinulose, much constricted in the middle ; segments broader than long, and having at each side a hyaline process which is terminated by three minute spines and frequently distorted. The end view is triradiate.

The acute, conic spines, scattered over the surface, sufficiently mark the present species.

Plate XI. fig. 4. *S. aculeatum* : *a*, front view ; *b*, frond dividing ; *c*, end view ; *d*, end view of four-rayed variety ; *e*, empty frond.

10. *S. dilatatum*, Ehr. Fronds rough ; end view with four short, broad, truncate and entire rays. Ehr. Infus. p. 143. tab. 10. fig. 13 ; Pritch. Infus. p. 185. figs. 100 and 101 ; Menegh. *l. c.* p. 227.

In pools amongst aquatic plants. Rusthall Common near Tunbridge Wells, and Rackham Common near Pulborough, Sussex, *Mr. Jenner* ; Dolgelley.

Fronds very minute, rough, with minute granules, deeply constricted in the middle, the sinuses rounded ; segments transversely oblong, twice as broad as long, obtuse at the sides and not elongated into processes. In the end view, which is quadrangular, the sides are concave, and the angles form short, very broad, truncate rays, on which the granules are arranged in transverse lines.

All the specimens of *S. dilatatum* which I have examined have agreed with the above description, but Meneghini describes the end view as showing from three to five rays. The broad, truncate and entire rays of this plant will always distinguish both its three-rayed state from all the preceding species and its five-rayed variety from *S. margaritaceum.*

Plate XI. fig. 5. *S. dilatatum*: *a*, front view; *b*, end view; *c*, empty frond.

*** *Front view without diverging processes; end view circular, with five or more marginal rays or lobes.*

11. *S. Arachne.* Fronds rough; segments suborbicular with elongated, slender, incurved processes; end view with five slender rays.

Boggy pool near Dolgelley: very rare.

Fronds minute, deeply constricted in the middle; segments about as long as broad, having on each side an elongated process which is hyaline and incurved, and appears as if transversely striated on account of the minute granules. When the frond is viewed obliquely, so that three or four of the long curved processes are seen at the same time, its resemblance to an insect is considerable. The end view is circular with five slender rays.

This plant is remarkable for its slender processes, which will easily distinguish it from *S. margaritaceum.* It cannot be a five-rayed variety of *S. gracile,* for the rays are longer, more slender, remarkably incurved, and also entire at the extremity.

Plate XI. fig. 6. *S. Arachne*: *a*, front view; *b*, end view.

12. *S. margaritaceum*, Mgh. Fronds rough; front view with short, lateral, converging processes which are entire at the apex; end view with five or more narrow, short, obtuse rays. Mgh. *l. c.* p. 227. *Pentasterias margaritacea,* Ehr. Infus. p. 144. tab. 10. fig. 15 (1838); Pritch. Infus. p. 185. fig. 104.

α. Rays five.
β. Rays six.
γ. Rays seven.

In peat pools near Dolgelley, *J. R.*; Ashdown Forest, Sussex, *Mr. Jenner.*

Fronds rough with minute granules; in the front view the segments are convex at the ends and slightly attenuated where they are connected, and on each side is a short, linear, obtuse and entire process which is generally somewhat incurved. The end view is elevated in the centre, and has from five to seven short, narrow, obtuse marginal rays.

In the front view this species differs from all the preceding by its segments being of a subglobose form and attenuated at their junction, and by the short, linear, obtuse, lateral processes which also appear more distinct from the body of the segment; its end view may be distinguished from that of their many-rayed varieties by the elevation of the centre, and the short, narrow, entire rays.

PLATE XI. fig. 7. *S. margaritaceum*: *a*, front view; *b*, end view.

13. *S. Jenneri*. Segments in the front view with a toothed angle at each side; end view circular, with five or six broad, short, toothed lobes or processes.

Mayfield, Sussex, *Mr. Jenner*.

Fronds large, rough, with conic granules which give a dentate appearance to the outline; segments about as broad as long, produced into a toothed angle on each side, where also a triangular sinus is formed between the angles. The end view is circular and elevated in the centre, and has five or six broad, short, toothed marginal lobes. The transverse view has a large central opening surrounded by a row of large granules.

PLATE XI. fig. 8. *S. Jenneri*: *a*, front view; *b*, end view; *c*, transverse view of empty frond.

**** *Front view without diverging processes; end view compressed, and having a process or mucro at each extremity.*

14. *S. convergens*, Mgh. Fronds smooth; in the front view the segments are elongated at each side into a conic spine which is curved inwards; end view compressed with a spine at each extremity. Mgh. *l. c.* p. 228. *Arthrodesmus convergens*, Ehr. Infus. p. 152. tab. 10. fig. 18; Pritch. Infus. p. 190. figs. 112 and 113. *Euastrum*, Bailey, American Bacil. pl. 1. fig. 11.

In pools. Brambletye near East Grimstead, and Rackham Common near Pulborough, Sussex, and Rusthall Common near Tunbridge Wells, *Mr. Jenner*; Dolgelley and Penzance.

Fronds smooth, deeply constricted in the middle; segments broader than long; their spine-like processes, by curving inwards, converge towards each other on the same side.

This plant was placed by Ehrenberg in *Arthrodesmus* (*Scenedesmus*); but it has no affinity with the true species of that genus.

PLATE XII. fig. 1. *S. convergens*: *a*, front view; *b*, end view.

15. *S. Incus*, Mgh. Fronds smooth; in the front view the segments are lunate and have a mucro at each angle; end view elliptic, with

a mucro at each extremity. Mgh. *l. c.* p. 228. *Euastrum*, Bailey, Amer. Bacil. pl. 1. fig. 12?

Shallow pools. Weston Bogs near Southampton; Rackham Common near Pulborough, Sussex, *Mr. Jenner*; Dolgelley and Penzance.

Fronds very minute, smooth, deeply constricted in the middle; segments externally lunate, about twice as broad as long, their angles with a mucro which is generally curved outwards. The end view is elliptic with a mucro at each extremity.

The front view of this species bears a considerable resemblance to that of *Staurastrum mucronatum*, but the end view is very different.

Plate XII. fig. 2. *S. Incus*: *a*, front view; *b*, frond dividing; *c*, end view.

16. *S.? octocorne.* Fronds smooth, compressed; segments broader than long, with four angles, each terminating in a spine; end view subelliptic, with a spine at each extremity. *Arthrodesmus octocornis*, Ehr. Infus. p. 152.

Boggy pools near Dolgelley: rare.

Fronds minute, deeply constricted in the middle; segments broader than long, having four angles, each of them terminated by a slender spine, the intervals between them concave. The spines diverge from each other. Endochrome pale.

The newly-formed segments at first have only two spines, and in this state somewhat resemble those of *Staurastrum Incus*, of which indeed this plant may eventually prove a variety. But *S. Incus* has only two spines on each segment, and its end is not concave but truncate.

Meneghini refers the *Arthrodesmus octocornis*, Ehr., to *Micrasterias*; but if the plant above described be identical with Ehrenberg's, of which I have little doubt, it cannot be placed in a genus distinguished by its deeply lobed and incised fronds, and I therefore presume the *Micrasterias octocornis*, Mgh., must be a different plant from the *Arthrodesmus octocornis* of Ehrenberg*.

The characters of *Staurastrum* are not strictly applicable, but I have placed this plant in that genus because it cannot be separated from *S. Incus*. Further examination has indeed led me to doubt whether the two preceding and allied species do not equally require removal, but as their description is already in the press, I must here content myself by stating the change in my views respecting them.

* "*Arthrodesmus octocornis*. Corpusculis viridibus, leviter compressis quadrangulis binis singulis quadricornubus," Ehr.

"*Micrasterias octocornis*, cellulis inciso-radiatis, radiis quatuor, attenuatis, acutis, divergentibus; e latere elongato-ellipticis, medio compressis, superficie lævi."—Mgh. *l. c.* p. 216.

In all three species the frond is compressed, and the acute subulate spines seem more like those present in some species of *Xanthidium* than the processes which terminate the angles in *Staurastrum*. They may therefore form a section of *Xanthidium*, or what is perhaps better, a distinct genus, for which Ehrenberg's name *Arthrodesmus* should be retained.

Plate XII. fig. 3. *S. octocorne*: *a*, front view; *b*, frond dividing; *c*, end view.

Analysis.

1.	Front view with straight, diverging processes	2
	Front view with the processes, if any, parallel or converging	4
2.	Processes smooth, deeply divided at the apex	*bifidum.*
	Processes rough with minute granules, entire or terminated by three minute points	3
3.	End view compressed and having an entire process at each extremity	*tetracerum.*
	End view with three or four rays, each terminated by three minute points	*paradoxum.*
4.	End view compressed and having a spine or mucro at each extremity	5
	End view with five or more angles or rays	6
5.	Segments with four spines	*octocorne.*
	Segments with two spines	5*
5*	Segments transversely elliptic: spines incurved	*convergens.*
	Segments with truncate ends; spines generally directed outwards	*Incus.*
6.	End view with three or four angles or rays	7
	End view circular, with five or more marginal rays or lobes	13
7.	End view with four broad, truncate, entire rays	*dilatatum.*
	End view with three angles or rays, each of which is either rounded or else terminated by minute spines.	8
8.	Each ray terminated by three minute spines	9
	End view with rounded and entire angles	10
9.	Fronds spinulose	*aculeatum.*
	Fronds rough with minute granules	*gracile.*
10.	Fronds muricated, or rough with minute granules	11
	Fronds smooth	12
11.	End view with convex sides	*muricatum.*
	End view with concave sides	*tricorne.*
12.	Angles inflated, mucronate	*mucronatum.*
	Angles neither inflated nor mucronate	*orbiculare.*
13.	End view with broad, toothed lobes	*Jenneri.*
	End view with entire rays	14
14.	Processes short, stout	*margaritaceum.*
	Processes long, slender	*Arachne.*

XXII.—*On the Morphology of the different Organs of Zoophytes.* By R. Q. Couch, M.R.C.S.L.*

[With a Plate.]

The subject which I have to bring under the notice of the Society today is, if it proves true, one of great beauty and unusual interest, inasmuch as the lowest forms of animal life will in the development be found to be governed by the same laws that govern the growth of flowering plants. The vegetable law to which I refer is the metamorphosis of the leaf into the various organs which constitute the perfect plant. This law is now so well established and so generally allowed that nothing is required to be said of it; on the present occasion I shall therefore proceed to discuss its application to the animal kingdom. To Professor E. Forbes belongs the merit of first promulgating the theory of the morphology of the reproductive system of the Sertularian Zoophytes and its analogy with the reproductive organs of flowering plants. This he did at the late meeting of the British Association held at York†. It is an opinion I have long entertained, and in elucidation of which I have for some time been examining almost all the species found on our shores. The views were so new that I hesitated to adopt them, and had I not found that they were held and published by others, I should not now have brought them before this meeting. I do so to show how far the theory of Professor E. Forbes is supported by inductive observations; and that though we pursued in a great measure different paths, we yet arrived at similar conclusions. As Professor Forbes confined his observations to the genera *Sertularia* and *Plumularia*, they are the ones which will be referred to here, though the same observations may be extended to several genera of the Ascidian Zoophytes; *Crisia* and *Cellularia* for instance. In making these observations I shall refer to their growth *ab ovo*, and trace the different parts through their development to the fully formed character. These creatures resemble plants in their arborescent appearance, rooted character, and the transient nature of their reproductive organs. The Sertularian genera have an external horny, elastic and irritable sheath, and this incloses a central granular pulp which extends into all the ramifications and from which all the other parts are formed. On the branches are numerous variously shaped and variously arranged cup-like cells; but their arrangement and shape are always alike in the same, but different in different species. These are the polype cells, in

* Read before the Natural History Society of Penzance, Dec. 3, 1844, and communicated by the author.

† As reported in the Athenæum. The entire paper, illustrated by a plate, was inserted in our Number for December 1844.

which the polypes or prehensile portions are situated. The polypes are attached inferiorly to the central granular pulp which ramifies through the centre of the trunk and branches, and are indeed formed of it. These are the only portions of the creatures exposed to the influence of the surrounding water, and by these the food is taken, digested, and the nourishment distributed to all the other parts. In many species the polypes are exceedingly numerous, but though they are entirely independent of each other as regards their individual life and nourishment, yet they cannot be considered as distinct animals; for the whole production seems to be but one compound creature, derived from the same source, the pulp and all tending to carry out the same object. In this respect they resemble trees; each branch is independent of all the others and may be cut off without injury to the whole, and yet all together they constitute the perfect polypidom. At particular seasons, extending from the middle of summer to autumn, and in fine weather to the early parts of winter, there are other and differently shaped cells developed, which are larger than those previously mentioned as containing the polypes. These are the ovigerous vesicles, which after having performed their function drop off and disappear. In this they differ from most other animals, in which the reproductive organs are, in duration, coextended with the lives of the creatures, and offer a remarkable analogy to similar parts in plants both in their decay and periodical re-appearance. "These organs," Professor Forbes says, "in their nature, have often been discussed but never explained." By their nature the Professor cannot mean the function they perform in the œconomy of the creature's existence, since that is established by numerous and accurate observations; but rather I presume the *nature of the type* from which they have undergone their *ideal* metamorphosis. In this he is certainly correct, and the present observations are intended to elucidate this, and in some measure to extend it. The reproductive gemmules are very minute globular bodies, surrounded by numerous vibratory cilia which are in constant action. The mode in which they are formed will be briefly described hereafter. As soon as they have escaped from the ovigerous capsule into the surrounding water, they move about with great rapidity in a revolving manner, like the earth on its axis. While examining them in a bottle I could perceive that they occasionally stopped, and then again would rapidly move from spot to spot. In this way they move about from one hour to nearly two days, depending apparently on the temperature and the nature of the surrounding surfaces. They would occasionally rest on the glass for a few minutes, and then, as if the spot was an unfavourable one, again start off and revolve as rapidly as before, frequently changing their form from the circular to the oval; sometimes acquiring an hour-glass contraction, and at others assuming the appearance of having an enlarged head and a narrow and contracted tail. But having once fixed itself, it remains rooted ever after. From the period it first becomes fixed it speedily undergoes a change in tint, but this however would hardly be perceptible except to a practised eye. When this has taken place small fibres are given out from the base, or all that portion in contact with the glass. These constitute the roots by which the creature becomes fixed. From this point it quickly rises into the arborescent form of the adult. This is a remarkable change; for here we see a creature in its youngest form moving about with almost the irregularity of voluntary motion, yet in a short time becoming rooted and taking on so much of the vegetable form and appearance, as to have required, at the hand of Ellis, repeated observations and accurate demonstrations to persuade us to the contrary. The seed being fixed, the upper portion becomes elongated without any distinction of parts, and the first joint of the creature is formed. Taking the sea-thread, *Laomedea geniculata*, as an example best calculated to show the analogies between the formation of the polype cells and ovarian vesicles, the central pulp of the seed becomes the central granular pulp of the adult. After the *ovule* has become superiorly elongated to a distance equal to the usual length of the cell and its footstalk, it enlarges and becomes bulbous. All is now one undefined mass; but in the course of a few hours the stalk becomes shrivelled, and the bulbous termination acquires a deeper tint towards the centre and lighter towards the circumference. At first this central shade is slight and indistinct, but it soon becomes darker and more defined. As this condensation or organization advances, the pulp becomes more transparent at its circumference, and darker towards the centre. At this stage the transparent circumference appears to be drawn into transverse folds, as if from a force acting towards the centre, and leaves behind a transparent horny covering which eventually forms the walls of the future cell. In this way the whole of the pulp becomes separated from the investing sheath. This being effected, the upper edge of the bulbous portion of the pulp acquires a serrated edge, which in a short time becomes more and more distinct and enlarged, and finally is produced into finger-like prolongations forming the tentacula of the polype. It is by an extension of development that the horny cell is opened, and not by any mechanical pressure as has been supposed, since the only source of pressure is from the polype, and that is not in contact with it at the time. In this the polypes are formed from the central granular pulp in all the Sertularian species, having but very slight modifications in the different genera. The prolongation of the stem is formed in precisely the same manner, but without a bulbous termination. The granular matter or pulp, which is at first diffused, becomes condensed or organized towards the centre, leaving the investing sheath in its annular form, and no further development goes on. It is this cessation of growth for the purposes of organization that regulates the length of the internodes both of the trunk and branches. Hence also arise many of the irregularities so frequently observed. If growing in a variable situation, some of the internodes are short, while others are nearly double the usual length, depending on the vigour with which each portion is developed. These variations are more observable in *Sert. pumila* than in the Sea-thread (*Laomedea*).

The formation of the ovarian vesicle, in this genus at least, occurs in a very similar manner to what has been described in the polype cell and trunk. The ovarian vesicles are cells formed during the summer and autumn in situations varying with the different species; and these having performed their function of reproduction are periodically shed, to be replaced by others at some future time. Their first appearance are small protuberances or elongations of the part on which they rest. At first a darker appearance of the pulp and sheath is observed on the part in which the vesicle is about to be produced. This is prolonged precisely in the manner noticed in the formation of the polype cell and trunk, and the separation of the pulp from the sheath occurs also in the same manner. It increases in length to the usual length of the vesicle, and with the exception that its axis is larger, resembles a branch in everything. But instead of being produced into a polype as in the polype cell, the surface becomes marked with circular lines, which, as development goes on, assumes the form of small grains or globules, more or less embossed according to the stage of advancement. They rapidly become more and more defined and separated from each other, but remain attached to the central pulp by an umbilical cord. This also becomes more attenuated and finally gives way, and the gemmule remains free in the horny case. These gemmules have a central granular pulp surrounded by a semitranslucent zone or case, and have their surfaces covered from a very early stage of their formation with numerous vibratory cilia. In this free state they remain in the case a short time, for the upper portion of the vesicle opens and the remarkably active gemmules revolve rapidly from spot to spot, as has been previously described. From this it will be perceived that the function of these periodic vesicles is reproduction, and therefore, when Prof. Forbes says that their nature is unknown, he can mean only the *ideal* form, from which he supposes them changed during their development.

From the foregoing observations it will appear, that in the earliest stages of growth, the stem, the polype cells and the ovarian vesicles of the *Sea-threads, Laomedea,* are precisely alike, and that at a particular point of their development each assumes its individual character. The stem advances to one point and is there arrested in its organization; the polype cell advances to the same point, but instead of being arrested, the pulp becomes developed into a polype and the sheath into a cell. This however seems to be only the case when the termination is bulbous; for in many instances I have seen that where the pulp was not bulbous, but of the same diameter throughout, and about the size of the stem, that no polype has been developed, but merely a distorted branch. Where specimens grow in unfavourable situations, such distortions are not unfrequently to be found; and most of them I believe are attributable to this cause. This malformation is most frequently to be seen in *Sert. polyzonias, rosacea,* and a few other kindred species.

The ovarian vesicle also advances as the branch and cell, but instead of being of equal diameter throughout, as the former, or bulbous at its extremity, as the latter, it is enlarged or bulbous throughout its extent, and is united to the branch or trunk by a narrow and short peduncle. Instead of the vesicle being arrested in its growth at the same point as the stalk, or organized into a polype as in the cell, it becomes developed into numerous minute globes covered with vibratory cilia as previously mentioned. Here then we see a great similarity between the different organs of these creatures,—a similarity so great as to warrant the supposition of their primary identity and subsequent individualization, even if there were no others. In *Sertularia polyzonias* I have several times seen a polype cell terminate in a distorted branch; and on the other side I have seen a branch terminate in a polype cell, showing a convertibility into each other.

In all my examinations I have never seen the ovarian vesicle occupied by a polype. Ellis, however, has figured something like this with the polype protruding, but he says nothing of the kind in his text, and I am unacquainted with any one who has witnessed anything of the sort, though observers have become numerous since Dr. Johnston's work has been published. I have however seen a cell, apparently designed for a vesicle, small in its growth and occupied by a polype. This form of vesicle has been selected for my illustration, because, if I understand Prof. Forbes, it is the one about which he had doubts. At some future time, when I have a little more leisure, I should like to offer a few observations on others and diversified forms of these transitory cells.

EXPLANATION OF PLATE XIII. A.

Fig. 1. Earliest state of branch.
Fig. 2. Earliest state of polype cell.
Fig. 3. Earliest state of ovarian vesicle.
Fig. 4. A second state of fig. 1.
Fig. 5. A second state of fig. 2.
Fig. 6. A second state of fig. 3.
Fig. 7. Perfect state of branch fig. 1.
Fig. 8. Perfect form of fig. 2.
Fig. 9. Perfect form of fig. 3.
Fig. 10. Showing a cell of *Sert. polyzonias* converted into an imperfect branch.
Fig. 11. An abortive branch of *Sert. polyzonias* converted into a polype cell.

Chapel Street, Penzance, Dec. 3, 1844.

XXIII.—*Ornithological Notes.* By John Blackwall, F.L.S.

The Osprey, *Pandion Haliaëtus.*

On the 2nd of November 1844, Lord Edward Thynne obligingly sent to me a specimen of the osprey, which had been shot by Mr. Griffith Jones of Glyn, on the same day, near the banks of the Lleder, a small river in Caernarvonshire, which flows past the village of Dolwyddelan. It was a male bird, and measured five feet and an inch from tip to tip of the extended wings; twenty-two inches from the point of the bill to the extremity of the tail; and weighed three pounds and a quarter, after the remains of a bull-trout, which, when newly captured, must have weighed about two pounds, had been taken from its craw.

Several days previously to the 2nd of November this bird had been seen flying about the river Conway in the vicinity of Bettws y Coed, and it is a remarkable fact, that three years since another individual of the same species was killed within a hundred yards of the spot where this was shot.

The Tawny Owl, *Syrnium Aluco.*

A hole in a decayed tree is usually selected by the tawny owl for the reception of its eggs; but in the neighbourhood of Llanrwst, where this species is numerous and decayed trees are comparatively scarce, it frequently deposits its eggs in an old nest of the carrion crow.

In May 1844 one of a brood of young owls bred in a crow's nest accidentally fell to the ground before it was fledged, and was as carefully attended to by the parent birds under this change of circumstances as those were which remained in the nest, being abundantly supplied with mice and small birds. When any person approached the spot where the young owl stood, one of the parent birds, probably the female, invariably made its appearance, and with looks and gestures expressive of the utmost solicitude reiterated a loud sharp cry, and snapped its mandibles together by way of menacing the unwelcome intruder.

Possessing a voice susceptible of considerable modulation, the calls of the tawny owl are, perhaps, more varied than they are generally supposed to be; the cry termed hooting, by which it is most familiarly known, may be heard to the distance of a mile and a half or even two miles under very favourable circumstances, and is attended by a peculiarity deserving of notice. In the first instance a plain hoot is ejaculated, which is soon followed by a tremulous one, and in the interval between the two a low abrupt note occurs, which immediately precedes the latter; such is uniformly the order of succession when nothing unusual happens to interrupt it.

Some years ago a pair of barn owls reared their young in the deserted nest of a magpie, built in a spruce fir growing in a wood at Blackwall, the family estate, in Derbyshire.

The Pied Flycatcher, *Muscicapa luctuosa.*

In my 'Researches in Zoology,' p. 166, I have succinctly noticed the fact that the pied flycatcher breeds in Gwydir woods, near Llanrwst. From more extended observations subsequently made in the same district, I may now add, that this interesting species is to be seen every summer sparingly dispersed throughout the entire extent of the valley of the Conway.

For a long series of years a pair of pied flycatchers had incubated their eggs and nurtured their young in security in a small aperture close by the portico to the principal entrance of my father's residence, Hendre House, Denbighshire, undisturbed, apparently, by the frequent passing and repassing of its inmates. The lively effect of the well-defined and strongly-contrasted black and white plumage of the male, his short but pleasant song, and the confiding habits of both sexes rendered them objects of great interest to all the members of the family, who did not allow them to be molested on any pretext whatever. Unfortunately, on the 18th of June 1843, a swarm of bees discovered the aperture, which then contained a brood of nestlings nearly fledged, and by hurrying in and out of it and flying about the entrance in large numbers, seemed determined to dispossess the rightful owners. Whenever the parent birds attempted to approach the spot for the purpose of feeding their young, they were instantly attacked and repelled by the excited bees, from which they took refuge among the branches of an oak growing near, and there manifested their anxiety by notes and actions expressive of extreme uneasiness. After having been severely stung, the nestlings fluttered to the mouth of the aperture and descended to the ground, where they all perished, their bodies being much swollen.

Towards the close of April 1844, the same pair of birds returned to their favourite breeding haunt, and repeatedly visited the aperture so long occupied by their nest; but being again assailed by the bees, which had removed to a parallel aperture on the other side of the portico, it is probable that the incident recalled the destruction of their progeny in the preceding year, for they eventually deserted the place, and selected a hole in a low stone wall by the side of the avenue leading to the house, in which they constructed a nest and brought up their young.

This instance, and other cases might be adduced, evidently tends to show that the pied flycatcher resorts annually to the same locality for the purpose of continuing its species, and that, like its congener the spotted flycatcher, it is a very familiar bird during the breeding-season.

The Carrion Crow, *Corvus Corone.*

It is evident from repeated inspections of the indigestible parts of objects swallowed by the crow as food, which, like the magpie and birds of the order *Raptores,* it ejects from the mouth, that vegetable substances form no inconsiderable portion of its aliment; it devours fish also, particularly eels, in pursuit of which it wades into the shallow water of rivers and brooks that flows over beds of stone and gravel, seizing the object of its search with the bill and conveying it to land, where it is eaten at leisure. Crows thus occupied may frequently be seen by the salmon-fisher when following his exciting diversion on the banks of the Conway in the picturesque valley which derives its name from the stream.

The Rev. John Boulger of Llanrwst informs me that in June last he saw a crow on the wing with a fine living eel in its bill; the contortions of the fish as it endeavoured to escape from its formidable enemy and the varied gesticulations of the bird, occasioned by its efforts to retain a prey so muscular, flexible, and slippery, were very grotesque and amusing; at length the eel extricating itself from the grasp of the crow fell to the ground, and as there was not any water in the immediate vicinity, Mr. Boulger availed himself of the opportunity to examine the fish and satisfy his mind that it was not a snake.

Though of a much less social disposition than the rook, nevertheless the crow is not so solitary in its habits as it is generally represented to be in works on ornithology. When the breeding-season is over, and the young birds are capable of providing for themselves, the crows belonging to this district assemble in large flocks about the close of day, preparatory to repairing to their roosting-haunts in the higher parts of Gwydir woods; they are very clamorous on these occasions, and do not finally retire to rest till it is nearly dark, but frequently after they seem to have settled for the night, rise suddenly in a body, renewing their vociferous calls and wheeling about in involved curves, as they are joined by newly-arrived groups, or even without any apparent cause whatever. This habit of congregating in an evening continues till the next breeding season, and I have sometimes observed betwen 100 and 200 individuals in a flock.

The Rook, *Corvus frugilegus.*

Bewick, in treating upon the rook in his 'History of British Birds,' vol. i. p. 71, has remarked that he is inclined to consider the naked condition of the base of the bill and the anterior region of the head in this species as an original peculiarity, apparently intending to intimate thereby a belief that at no period of its existence are the parts in question covered with feathers, a construction of the passage which is countenanced by his having omitted to notice the fact that young rooks, before their first moult, do not exhibit this deficiency of plumage. Now as young rooks, when they quit the nest, have the base of the bill and the anterior part of the head amply provided with feathers, the question naturally arises, How is the nudity of these parts in old birds occasioned?

On referring to my 'Researches in Zoology,' p. 174–175, it will be seen that in the year 1834 I advocated the opinion prevalent among ornithologists, that the loss of the feathers alluded to above is attributable to the habit which the rook has of thrusting its bill into the ground in search of food.

An extensive examination and comparison of specimens had led me to observe that the nudity extends further and is more complete in some individuals than in others; that the more prominent and exposed parts are first deprived of feathers, and that short filiform processes, bearing a close resemblance to new feathers enveloped in membrane, frequently occur on the less prominent and less exposed parts, particularly on the flaccid skin which occupies the angle at the base of the lower mandible. In addition to these facts, I may remark that an opportunity had presented itself of inspecting a rook whose mandibles were so greatly curved in opposite directions, and, consequently, so much crossed at the extremities, that it could not possibly thrust its bill into the ground, and the base of that organ and the anterior part of the head did not manifest the least deficiency of plumage.

With such evidence in its favour, I was induced to adopt the popular hypothesis, which I now abandon in consequence of having recently proved by experiment that it is erroneous.

Being supplied by George Davies, Esq. with two young rooks taken from a nest in his rookery at Cyffdu on the 17th of May 1843, I put them into a large wooden chicken-pen, purposing, when they could take their food without assistance, to remove one of them to a garden enclosed with walls, where it might have an opportunity of employing the means of procuring sustenance common to the species, and to let the other remain in the pen. This plan was frustrated by the unexpected death of one of the young birds soon after it came into my possession; but the result of the experiment, as will be seen in the sequel, was not at all affected by this untoward circumstance. In the month of August the surviving rook lost only a few feathers from various parts of its body, but did not moult regularly till July and August 1844, when the feathers at the base of the bill and on the anterior region of the head were cast off, and have not been renewed to the present hour, though the bird has always been remarkably healthy and has never on any occasion been suffered to leave the pen for a moment. That rooks in a state of liberty usually moult in the autumn of the year in which they are disengaged from the egg may be inferred from the fact, that although numerous individuals, whose shrill voices evidently denote that they are young birds of the season, may be seen in the months of June and July with the base of the bill and anterior part of the head abundantly supplied with feathers, yet for several months prior to the breeding-season not one can be perceived, at least as far as my own observations extend, which has not those parts denuded.

From what has been stated, it is evident that the phænomenon under consideration has a physiological, not a mechanical cause, though the removal of the plumage may be facilitated by the frequently repeated act of thrusting the bill into the ground, and the circumstances which seemed to support the opposite conclusion admit, for the most part, of an easy explanation upon this view of the subject. The difference observable in the extent and completeness of the nudity at the base of the bill and the anterior part of the head of the rook probably depends upon the progress which has been made in moulting, especially among the younger birds; and the earlier denudation of the more prominent parts may be occasioned by the friction consequent upon the manner in which the bill is employed in procuring food. The short filiform processes so common on the depressed and less-exposed parts present a difficulty of which no satisfactory solution suggests itself; but the state of the plumage on the head of that rook whose mandibles were greatly crossed may be accounted for on the supposition that it was a young bird which had not moulted.

Had the experiment recorded by Mr. Waterton in his 'Essays on Natural History,' p. 136–139, been successful, this question, upon which public opinion has been so long divided, would have been settled some years earlier; unfortunately, however, both the young rooks selected for the purpose of deciding it met with untimely deaths, one before it had begun to moult, and the other soon after it had commenced moulting. On Mr. Waterton's return from Bavaria, his gamekeeper, to whose care the latter bird had been consigned, informed him that at the period when its existence terminated "the lower mandible had begun to put on a white scurfy appearance, while here and there a few feathers had fallen from the upper one." It is to be regretted that the issue of this experiment was not more satisfactory, as from the nature of the case it was impossible to determine whether the feathers lost from the base of the bill would be renewed or not, though feathers shed from other parts in the act of moulting are known to be reproduced.

The rook visits orchards and gardens when cherries and walnuts are ripe, for the purpose of feeding on those fruits; it also devours grain of various kinds, and frequently commits depredations in potato-grounds by abstracting the newly-planted sets; but I entirely concur with those naturalists who maintain that the injuries it inflicts on the farmer and gardener are vastly more than compensated by the benefits it confers upon them by the destruction of noxious insects.

XXIV.—*On the "Nigger" or "Cotton Spinner" of the Cornish Fishermen.* By Charles William Peach, of Goran Haven, Cornwall*.

[With a Plate.]

Through the kindness of Mr. Couch of Polperro, some time ago, I was gratified with a sight of Professor Forbes's 'History of the British Echinodermata.' In that interesting work, at page 241, he says, "We have as yet no representative of the typical Holothuria with twenty tentacula in the British fauna." It is gratifying to me to be able to present to your notice that link, which was then wanting,—a Holothuria with twenty tentacula; and as it is a *new* and interesting subject, I trust I shall be pardoned in giving you a lengthened history of its appearance, habits, &c.

This Holothuria is very common in deep water off the Deadman in certain localities (rocky ground), and is called by the fishermen a "Nigger," and at times a "Cotton Spinner"; it is held by them in great detestation, from its throwing out what they call "cotton," of which more by and by, and from its slimy nature, and also because where the "Niggers" are numerous and get into the crab-pots, it is very rarely that either crabs or lobsters are caught, and therefore they kill all they come near with their knives, because they do not like to touch them. This is not wonderful, for their appearance is anything but prepossessing; yet they are interesting objects to me, and no doubt will prove so to others, after I have described them.

* Read before the Royal Polytechnic Institution of Cornwall, and communicated by the author.

First, then, their appearance, when closed up, very much resembles a small cucumber, the back being dark—almost black at times—and the under part light yellowish green, which, with the thorn-like appendages on the back, make the appearance more complete. On being handled they stain the hand light green: this colour is not easily washed out. The head is furnished with twenty tentacula, which surround the mouth; the opening is tolerably large, and can be very much expanded; and it is amusing to watch the motions of the tentacula acting as feeders; they place them one by one over the mouth, and when one is about to leave the mouth another may be seen bending to supply its place. The tentacula vary in colour as well as the animals. Some are very dark brown, and indeed all shades from sienna to rose-colour and delicate pink. If the tentacula are viewed from the upper part they are club-shaped on the top, this club being placed on a foot-stalk an inch in length, which is retractile, and is invariably of a lighter colour than the top. When seen from the under side, (Pl. XIV. fig. 2,) they appear like the umbels of the elder, and are beautifully branched and tipped, much in the manner of the elder flowers; indeed they might be mistaken (if large enough) for that flower, only the foot-stalk is so much thicker in proportion. There is a dark spot at the junction of each fork of the umbel, each division is thrice-branched, and a similar dark spot may be observed at the lower part of each tentacle. They can completely close in their tentacula, which they do on being disturbed; and they use them at times as organs of locomotion. Outside the tentacula is a border of spines like processes on a skin, which reaches a short way up the tentacula, and serves as a covering when these are withdrawn. These spines very much resemble the thorns of the brier; the back and sides are covered with similar ones, but not in rows. Near the tip of each spine is a small calcareous piece which is again tipped with dark. The under side is furnished with feelers in very great numbers; these feelers are *in four rows,* the two centre ones being nearest together. The feelers being in four rows *only* is singular, being a departure from the usual numbers in the Echinodermata, namely five. Still I saw only *four rows in several.* It is a most difficult matter to be able to count the rows, from the slimy and decomposing nature of the animal. I will follow this up and try to set the matter at rest; *at present* I am satisfied they have only four rows. They very much resemble those of an Echinus, but are not in equal numbers in each row, being from one to four, side by side, across the row. These feelers they stretch out to a great length, and attach themselves firmly by them; so much so, that in trying to detach them the feelers have been frequently left behind. Each feeler has a small, round, calcareous plate at the tip, which, under the microscope, shows that it is composed of innumerable plates, an object of great beauty; these plates effervesce with acid, and so do the plates of the mouth and tips of the processes.

When the softer parts of the feelers are cut transversely, they are composed of fine tubes, and when magnified have very much the appearance of some of the corals. The animal is covered with a dark slimy mucilaginous skin, which peels off freely; underneath this it is light gray, and has a reticulated appearance, resembling bird's-eye maple. They are of various sizes and lengths, often nearly a foot in length and thick in proportion; they sometimes draw themselves almost into a ball, at others are much inflated in the centre. At times they lie motionless, but generally they are in motion. So much for the external appearance.

The jaws are composed of five strong calcareous plates, to these the tentacula are attached, and from the under side in the interior of the animal extend five broad muscles, which reach the whole length. These are again held together by a great number of smaller ones placed transversely, until nearly reaching the lower part, when they are diagonal, no doubt for the purpose of closing the opening at the opposite end to the mouth.

They eat portions of dead fish, shells, &c. (I have reasons for believing Terebella). I have found in their intestines a *Buccinum incrassatum*, with the animal in it, portions of Balani, Echini, Nullipora, sand, &c. The fæces are thrown out with a jerk, and are of an oblong-oval shape, strung together like the eggs of a snake, and are of a dark mud-colour.

There is one circumstance connected with these things of interest,—they are enveloped in a film so tenacious that it is a difficult matter to rub them to pieces in the water; on exposure to air they lose their tenacity and crumble to pieces. The circumstance I allude to is, that this tenacious covering will explain in some measure the *preservation of the coprolites of the ancient Saurians found in the blue lias; for in all probability they were enveloped in a similar tenacious covering.*

In Professor Forbes's work there is a question how the water which is found in the interior enters. If I understand it right this is a doubtful matter; probably the following may in some measure explain it:—Theyraise the opening at the opposite end to the mouth, open it wide, and I expect create a vacuum; the water then flows into it freely. After a short time they close this, and by a muscular motion it may be observed as if passing towards the head. This taking in the water is repeated several times with short intervals, and after a little rest the whole of the water, by the same orifice, is thrown out in a continuous stream. It then commences again to take in more.

It is extremely irritable, and on being touched or disturbed, throws out a bunch of white tapered threads about an inch in length and one-eighth in thickness; these soon become attenuated, either by the agitation of the water or the coming into contact with something, and are drawn into very long threads of great tenacity; they stick to everything they touch, and from these the animals are called "cotton spinners" by the fishermen. This small bunch is drawn into a large mass of threads, so small that the finest sewing-cotton is not equal to it, and is no doubt one of the means of defence provided for its preservation; for I have seen a crab so completely entangled in it as not to be able to move, and a fish only able to get away after a long struggle. If much irritated they throw out the whole of their intestines; this is invariably the case after being kept in confinement two or three days; and even after they have done so they have lived three days, and their tentacula performed all their offices as if the animal was strong and healthy. They soon decay when dead if left out of the water, and from their peculiar construction it is a difficult matter to preserve or dissect them. To the physiologist they offer a rich treat. I know nothing of this science; I regret it: my object has been to watch their actions and habits, and I fear I have too long occupied your time. I would here just mention that this Holothuria differs from the *Psolus Forbesii* of Mr. Couch, noticed in the second part of his 'Cornish Fauna,' in having *twenty tentacula* instead of *eighteen*, and *the suckers are in rows*, which was not the case in his. I therefore claim it as *new to the British fauna*, which latter circumstance Professor Forbes confirmed at the late meeting of the British Association at York.

The annexed engraving, Plate XIV., represents the "Nigger" of the natural size; fig. 2, the head with the mouth downwards, showing the tentacula spread out.

XXV.—*On the Import of the inferior Paleæ of the Grasses.* By Hugo von Mohl*.

[With a Plate.]

There are few points in vegetable morphology respecting which so great a difference of views prevails as that relating to the origin of the floral envelopes of the Grasses. To remove this difference of opinion, at least with respect to one of the points in question, it is above all requisite to ascertain with certainty whether the inferior palea takes its origin from the same axis as the superior palea (or, according to Robert Brown's view, the two leaves composing the upper palea), or whether the two result from different axes. In the first case we undoubtedly accede to

* From the Botanische Zeitung for Jan. 17, 1845. Translated and communicated by W. Francis, Ph. D., F.L.S.

the representation of the inflorescence of grasses which Robert Brown (General Remarks, p. 580) has advanced,—not, it is true, as the only one possible, but as the most probable,—viz. that the two leaves which have cohered to form the superior palea and the inferior palea, notwithstanding the oblique direction of its insertion, form a trimerous verticil and the outer leaf circle of a perigonium, the inner circle of which is constituted by the scales (lodiculæ); but if, on the contrary, it can be proved that the inferior and superior paleæ belong to two distinct axes, it is thus shown that the inferior palea must be considered a bract from whose axis the floral axis takes its origin; a view which has been adopted with various modifications by several authors, and which has been explained in a most lucid manner by Döll (Rhein. Flora, p. 58). The circumstance that a difference of opinion has prevailed on this fundamental point in the morphological consideration of the inflorescence of the *Gramineæ*, undoubtedly proves that the examination of the normal flowers of grasses does not afford sufficiently certain and convincing proofs to decide with positive certainty the question respecting the derivation of the paleæ; it appears, therefore, to be safest in this case, as in so many other morphological questions, to look out for monstrosities from which we may be able to deduce the normal structure; and if I am not very much deceived, the variety *vivipara* of *Poa alpina*, so widely diffused in the Alps, is fully adapted to solve the doubt existing on the above question. I trust, therefore, that a description of this monstrosity, drawn up with reference to the morphological relations of the spicula of grasses, will not be without interest.

In the viviparous spikes of the *Poa alpina* I have found the two calycine valves (Pl. XIII. B, fig. 1 to 4 *c c*) always perfectly normal, and only the paleæ deformed; the deviation from the normal structure is generally less in the most inferior flower than in the succeeding one, so that frequently the lowest is still perfectly normal (fig. 2), or approaches more to the normal structure than the flower situated higher up (fig. 4).

The axis of the spicula exhibits the least variations. It is, as far as it bears abnormal flowers, more or less thickened, full of sap, presents an unlimited growth superiorly, and frequently small rootlets shoot out from its inferior internodes; in short, it has assumed the characters of an axis of vegetation, and perfectly resembles with its leaves a small culm of grass (Pl. XIII. fig. 1); while its inferior portion, which bears the calycine valves and forms the petiole of the spicula, is of the same small diameter as in the normal spicula, and, like the fruit-bearing spicula, dries up after the flowering season, which admits of the falling off and independent vegetation of the upper deformed portion.

In the monstrous flowers the inferior palea presents an increase in size, and a more or less perfect metamorphosis into the form of a vegetative leaf. Generally, and especially upwards from the second flower, this metamorphosis into a leaf provided with sheath, ligula and lamina is perfect (fig. 4 p'', fig. 5 p''); while even when the lowermost flower is partially abnormal, its inferior palea (fig. 4 p', fig. 5 p') frequently forms an intermediate stage between the normal form and that of a vegetative leaf. The latter cases are naturally best suited for allowing us to obtain an insight into the manner in which the metamorphosis of the palea into the vegetative leaf takes place. It is seen by the comparison of several such intermediate stages that the normal palea does not solely correspond, as we might at first be inclined to admit, to the sheath of the vegetative leaf, and that the metamorphosis of the palea into a leaf does not consist in a budding forth of the lamina from the apex of the palea, but that a separation of the various parts of the palea, which are intimately fused together, takes place, and a dismemberment of them one from the other results. The normal palea possesses five nerves, of which the central one extends to the apex of the palea, while the lateral nerves are lost within the transparent scarious membrane. On its metamorphosis into a leaf the palea becomes elongated; its inferior portion surrounds the superiorly-situated portion of the spicula in the form of a vagina, while its upper portion bends more or less outwards and becomes changed into the lamina of the leaf (Pl. XIII. B, fig. 1, fig. 2 to 5 p''). In those paleæ in which this metamorphosis is merely indicated, the palea still retains nearly its proper form and the reddish colour which is diffused over the normal palea, and it is only its apex which has become thicker, of a greenish colour, uncinate and recurved superiorly (fig. 4 p', fig. 5 p'): a separation into vagina, ligula and lamina is not yet indicated. When the metamorphosis has advanced further, the whole palea is lengthened considerably, its upper portion has become thicker, green and leaf-like, while the lower portion has retained its more delicate texture, transparency, and likewise frequently the reddish colouring; the nerves, which are still present to the number of five, have acquired a more parallel position in consequence of the elongation of the leaf, and become confluent towards the uncinately-curved apex of the latter. The margin is scarious as in the normal paleæ. The separation into the various parts of the vegetative leaf now begins, and is terminated by the development of the ligula and the transverse separation between the upper green and the lower brighter-coloured parts of the palea.

The formation of ligula frequently occurs only at one part of the leaf, in its central line, or on one of the lateral halves, or on a part of one of these, while in the other portion lamina and vagina still pass immediately into each other (fig. 6—8). The ligula is formed by the elevation of a transparent scale on the upper surface of the leaf in a transverse or somewhat oblique direction. Very frequently it is developed only on the central portion of the leaf, and has then usually a crescent shape (fig. 7); in other cases this incipient ligula is only met with on one of the sides of the leaf (figs. 6, 8); very frequently it does not extend to the margin of the leaf, and every trace of its auricle is still wanting (figs. 7, 8); in other cases the auricle is developed without the central portion of the ligula being present. The development of the auricle takes place in the following manner: the scarious margin of the leaflet, which extends at a less advanced stage of transformation to its apex, retracts itself as it were from above downwards, and instead of gradually becoming acute and disappearing in the green-coloured margin of the leaf (fig. 6), now projects in the form of a rounded prominence on the margin of the leaflet, and passes into a scale projecting on the upper surface of the leaflet (fig. 6 *a*). In this manner the ligula appears, not as a part foreign to the leaf and adnate with it, but as an exuberant growth from it like the corona of the petals of a pink. Simultaneously with the perfect development of the ligula occurs the formation of the node between the vagina and lamina, and thereby a distinct separation of the two parts of the leaf.

Far more important is the consideration of the base of the metamorphosed paleæ, as regards the question which principally occupies our attention. While the base of the normal palea always surrounds only a portion of the axis, and consequently leaves it doubtful whether the palea is the product of the primary axis of the gramineous flower, or whether it forms a verticil with the two leaves composing the superior palea, not the least doubt can exist respecting this point in the metamorphosed palea; for not only does its base surround the stem entirely, but both its margins cohere towards its lower extremity (fig. 5 *p'*). Now it is perfectly evident in this case, that the axis which is surrounded by the leaflet, and from which this takes its origin, is the primary axis of the spicula, and that the superior palea belongs to the floral axis, situated in the axis of the inferior palea; consequently that the inferior palea must not be considered as a perigonial leaf, but as a bract.

In proportion as the above-described metamorphosis of the palea into a vegetative leaf advances, the flowering organs decrease in size. In the axis of the palea of the lowest flower of a spicula, we generally find the whole of the floral parts in a crippled state; the superior palea is generally still very large in comparison to the other flowering organs, and bifurcate at the apex, but not separated into two distinct leaflets. In the axis of the paleæ transformed into perfect vegetative leaves of the flowers situated higher up, all the flowering organs have generally disappeared without leaving a trace behind them.

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

No. I. Valencia, middle of May 1844.

On the first days of my stay in Valencia, where I arrived on the 5th of May, my operations were confined to making acquaintance with the scientific institutions and the surrounding neighbourhood of the town. I was the more invited to do this, since the continued rainy weather offered an obstacle to longer excursions. Indeed the Valencians themselves could scarcely remember it to have rained so abundantly and uninterruptedly, and this weather was even a subject of public discussion in the newspapers. The temperature was almost to be called cool; since at this time of year the mean daily temperature is usually 20° C., and it amounted then barely to 15°—17° C. One of my first walks was to the Botanical Garden by the Puerta de Cuarte: into this you enter through a rather insignificant building in which the lectures on botany and agriculture are delivered. The garden, laid out in a magnificent style, occupies a very large space, and considering the glorious climate and the uncommon fertility of the soil, might, under the direction of an able man, become one of the most important gardens in Europe, if the government would do something for its maintenance. It has it is true the appearance of a botanical garden, since one sees many rows of labels, but the plants are wanting. What plants there are, are the remnant of those placed there through Cavanilles, and exotic shrubs and trees of a still earlier date. The fault of this lamentable decline of so well-arranged an institution is partly to be laid to the deficiency of interest on the part of the government in all that relates to science, partly and chiefly to the want of a well-informed director. Considering how luxuriantly everything grows up in this happy land in a few years, without any care, much might be accomplished with very little money. Of plant-houses there is no trace; they are indeed superfluous, since a great number of tropical plants may be cultivated very well here in the open ground; at the utmost only a green-house would be necessary in the short winter. The present director of the garden is named Don José Pezcuerda, so far as I may judge, a tolerably ignorant man, whose whole knowledge of literature is confined to little more than the works of Linnæus, Cavanilles, Clemente, Lagasca, Buffon and DeCandolle. Of Germany he knew almost nothing; neither does he possess a herbarium. Nevertheless the garden is in somewhat better condition in his hands than under the direction of his predecessor, the present Cathedratico of agriculture, Don Joaquin Carrascosa, formerly Archdeacon in Alicant. Although

* Translated from the Botanische Zeitung, Aug. 9, and Oct. 18, 1844, and communicated by A. Henfrey, F.L.S.

Don Antonio Blanco, the occupant of the post before him, a younger but very well-informed man who had prosecuted his studies partly in Paris, had begun to arrange the plants according to DeCandolle, Carrascosa re-introduced the sexual system, which Pezcuerda has retained, and has here displayed his ignorance in the grossest blunders against system, since, for instance, he arranges *Leguminosæ* in the nineteenth, *Cruciferæ* in the sixth class, &c. At last, as Carrascosa had suffered two show-plants of the garden, a very large old specimen of *Sophora japonica* and another of *Parkinsonia aculeata*, to be cut down —he having taken them for mulberry-trees (!), it was too outrageous, and Carrascosa was removed from the directory of the garden. The directory was taken from Prof. Blanco last year on political grounds, which is much to be lamented. Of the present condition of the garden, little can be said. The interior is divided into regular compartments, surrounded by orange-hedges; these are sufficiently watered by means of stone water-courses, and separated from each other by an elegant trellis-work of Spanish cane. Each plant, or place where once one has been, is furnished with a label of fire-glazed white clay, on which the number stands, but no name. The names of the classes and orders of the sexual system are marked on larger labels in the Spanish language. There is a special quarter for water-plants, where however I saw only *Canna indica* and one other apparently determined as a fern, but which was only *Pteris aquilina* cultivated. Enormous cypresses, great trees of *Cassia corymbosa*, *Pistacia Terebinthus*, *Acacia Farnesiana*, *Bignonia Catalpa*, *Melia Azedarach*, *Schinus molle*, shrubs of arborescent *Malvaceæ*, of *Solanum Bonariense*, *Bignonia radicans* and other exotic vegetables, ornamented the borders of the garden,—remnants of former splendour! Especially worthy of mention are a beautiful date-palm, and, particularly, an old specimen of *Chamærops humilis* with a stem 10 feet high, as also a showy *Yucca gloriosa* with a stem about 6 feet high and nearly 1 foot thick, which were just in full bloom.

More directly interesting is the rural or agricultural garden, which is situated behind the botanical garden, and was established six years ago. Its present director is the already often-mentioned Carrascosa, to whom however the credit of having established the garden is not due. Although it has only been laid out six years, there are transplanted into it trees and shrubs already so large, that one would take the garden to be much older,—an evidence of the luxuriant fertility of the soil. The garden is divided into twelve compartments. Two of these are designed for officinal plants, and surrounded by a hedge of *Cactus Opuntia*, L. (sp. Nopal). Here are collected the dye-plants, which are arranged according to the different colours, the plants which yield soda and potash, as also those used in the manufacture of textile fabrics. Under the latter the celebrated Esparto (*Macrochloa tenacissima*, Kth.) is especially to be mentioned, which, growing on many of the hills situated near the sea, forms a not unimportant article of trade in South Spain, since this tough grass is used partly for the plaiting of coverings for rooms and balconies, and for making various sorts of baskets, especially panniers for mules, chairs, and the peculiar sandals which are worn all over the kingdom; and partly worked into ropes which are in great request, and for instance, are manufactured in great quantity in Marseilles. In two other quarters of the garden, 400 varieties of apple- and pear-trees are in cultivation, chiefly brought over from North America; also in another, a collection of 95 varieties of apricots, peaches and the like. In one division, surrounded by 36 varieties of almond-trees, are 308 kinds of Spanish vines, which are arranged according to the classical work of Don Roxas Clemente (*Ensayo sobre la vin comun*). Other quarters are designed for the fodder-plants, for trees and shrubs, which are to be used partly for planting forests, partly for gardens and parks. The back part of the garden is closed in by a very long hedge of *Agave americana*, L. (sp. Pita), behind which stand the collected varieties of olives and algarrobas (*Ceratonia Siliqua*, L.). The first ground for this garden was laid out in the year 1835; however the money was insufficient to the purchase of the required area, which was first accomplished in the year 1839. There is here a theatre for the lectures on agriculture, also a collection of instruments and models. The chair of agriculture was established by royal command in the year 1834. Since that time nothing more has been done by the government for natural science in the university of Valencia, although this is among the most frequented of the Spanish universities, since it numbers at present 1800 so-called students and some 60 professors.

The immediate neighbourhood of the city, known and famous as the Huerta de Valencia, is very astonishing to every foreigner. The fertile plain watered by the Rio Turia (in the midst of which lies the city about a mile distant from the sea), is, in a circuit of from three to five miles round, converted by the indefatigable activity of the Valencians into a garden verdant throughout the whole year. Innumerable water-courses traverse the Huerta, and numerous water-wheels conduct this element, so precious in Spain, into all the fields and gardens. The culture of wheat forms the chief branch of agriculture; besides which, a particularly large quantity of hemp, and westward of Valencia, toward the lake of Albufera, a great deal of rice is also grown. The fields are surrounded with rows of mulberry-trees, and in the east and north the Huerta presents extended plantations of olives, which are here much larger and more beautiful than the dwarf shrub-like olive-trees of Provence. It has also many fig, citron and orange trees, especially in the neighbourhood of the country-houses, while the roads and streets are ornamented with rows of elms, *Populus canescens*, *nigra* and *monilifera*. The date-palm is rather a rare object, although it attains here a height of as much as 40 to 60 feet. They are seen most abundantly in the gardens and courts of the numerous monasteries in and around Valencia. For instance, I have seen in the court of the monastery of San Miguel de los Reyes twelve, in that of the Cartucha Ara Christi, not far from Murviedro, about thirty high-stemmed palms. The private estates in the Huerta are mostly surrounded with a hedge of *Arundo Donax*, L., which in damp places in the warm region grows wild everywhere, or of *Tamarix gal-*

lica, L., in the neighbourhood of the sea, as well as of *Agave americana* and *Cactus Opuntia*. The last is also cultivated in many gardens for the sake of the cochenille, although it occurs everywhere wild on stony, sunny places in the warm sea-region; for instance, the whole south and east slopes of the castle of Murviedro are covered with impenetrable bushes of a man's height, in which stems of 4 or 5 inches diameter are frequently seen. Of herbaceous vegetables are grown in the Huerta very many strawberries, artichokes, onions, garlic, beans, peas, *Vicia Faba*, L., and especially the Garbanzos (*Cicer arietinum*, L.), so much loved by the Spaniards. The water-courses are almost universally decked with *Iris Pseudacorus*, and filled with our species of *Lemna* and *Potamogeton*. A pretty red-flowered *Silene* is not uncommon, and on the walls *Hyoscyamus alba* grows everywhere in luxuriant abundance, while the hedges are overrun with *Fumaria capreolata*, L., and *Rubiaceæ*. All sandy places, particularly the shore of the Rio Turia, are covered with *Plantago Coronopus*, L., *Calendula officinalis*, Erodias and Euphorbias.

As soon as the weather permitted, I made an excursion to the lake of Albufera, which is situated about two leagues westward of Valencia, and is connected with the sea by a narrow canal. Almost the whole of its shores are covered with rice-fields, yet the strip of land, about three-quarters of a mile broad, which separates it from the sea and which is little else than a mound of sand, is occupied by a wood of *Pinus Halepensis*, Mill. This little wood is one of the spots richest in plants in the neighbourhood of Valencia, on which account I have often visited it. The ground is covered with a low underwood which is chiefly composed of *Quercus coccifera*, *Myrtus communis* and *Chamærops humilis*; beneath these frequently occur bushes of *Juniperus Oxycedrus*, L., *Rhamnus Lycioides*, L., *Erica arborea*, L., *Rosmarinus officinalis*, L., *Ruscus aculeatus*, L., *Pistacia lentiscus*, L., &c. On the shore of the Albufera in loose quicksands are pretty frequently found great bushes of *Solanum Sodomæum*, L., with stems as thick as a man's arm, and *Trixago Apula*, Col., *β. versicolor*, *Lagurus ovatus*, L., &c. clothe the more grassy places. In the interior of the wood occur many *Helianthema*, *Coronilla juncea*, L., *Urospermum picroides*, Desf., and frequently *Elæoselinum fœtidum*, Boiss., which however was not yet in fruit. In the thick bush grows very rarely *Lonicera implexa*, Ait., and in the neighbourhood of the coast the beautiful *Iris filifolia*, Boiss., but also very sparingly. The numerous shallow lagoons which occur between the Albufera and the sea are filled with Charas and Potamogetons; these also cover the bottom of the Albufera, and *Juncus acutus*, L., the margin. The grassy sand-hills in front of the pine-wood are covered over and over with *Cistus albidus*, L., and *C. salvifolius*, L., while the bare sand-downs near the sea are overgrown with *Asphodelus fistulosus*, L., Euphorbias, and *Passerina hirsuta*, L. In the neighbourhood of the sea *Ononis Natrix* is pretty well scattered, and a silky-haired *Lotus*. In the Albufera also the *Vallisneria spiralis* presents itself, which Cavanilles, and, quite lately, Blanco have found here; I however have not met with it, although I have often taken a boat on the lake on purpose to look for it.

No. II. Valencia, end of May 1844.

Sierra de Chiva.

The Sierra de Chiva, so called from the market-town of Chiva, situated four leagues north of Valencia, like all the mountains of the kingdom of Valencia, belongs to the limestone formation, and indeed is chiefly composed of Muschelkalk. It consists of a number of parallel mountain ridges extending from west to east, which are divided by deep cross-valleys (in Spain called Barrancos); it is of very considerable breadth, and rises gradually to a height of 6000 feet from the great plain, which is bounded eastward by the Sierra de Murviedro, westward by the Sierra de Cullera and other mountains, and is traversed by the Rio Turia. This thinly inhabited, but very romantic mountain district was, it is said, in former times covered with dense pine-forests, of which remain only isolated trees of *Pinus Halepensis*, Mill., and another species of Conifer called by the people *Pino Roveno*, which however is said to be very rare (I have only seen one low shrub of it). At present the whole of this mountainous region is entirely bare, or only covered by a low underwood, which at different heights is composed of different species of plants. The highest peaks want even this, and especially on the north and east aspects, where the moist cliffs are clothed with grasses and herbaceous vegetables. True meadows however are wholly absent here. The whole mountain tract is uncommonly dry; even in the valleys we find a little brook but rarely; although there is no want of springs on the declivities, their water wholly evaporates before it can reach the bottom of the valleys. The cause of this is, the very elevated temperature produced by the reflexion of the sun's rays from the white limestone rocks which form the walls of the valleys. Hence the vegetation in the valleys is far more scanty than on the slopes of the higher mountains; and even where a brook runs through the valley, the banks are overspread with a broad deposit of sand and pebbles, devoid of vegetation, which makes its first appearance at the foot of the slope bordering the valley. From the investigations of the condition of vegetation which I was enabled to make during my fortnight's sojourn in this mountain district, I am inclined to admit the five following regions in the Sierra de Chiva, which may perhaps be applicable to the other mountains of the province of Valencia; I will endeavour to describe their vegetation as briefly as possible.

1. *Lower warm region*, to a height of about 500 feet, characterized by the culture of *Ceratonia Siliqua*, L., and the presence of *Agave americana*, L., and *Cactus Opuntia*, L.—To this region belong the immediate environs of Chiva, Cheste and Buñol, as also the plains and outlets of the valleys at the foot of the Sierra. Besides the already-mentioned St. John's bread-tree, olive, fig, and mulberry trees are universally cultivated, also wheat, hemp, maize, and in hilly

places, vines. The streamlets coming from the Sierra and many other springs water this soil, in itself fertile (and, as may be conjectured from its general red colour, containing much oxide of iron), calling forth a tolerably rich vegetation, which however contains no rarities. The sandy places on the roads and under plantations are overspread with the splendid *Convolvulus althæoides*, L., which of itself is quite characteristic of this region; the vine-hills with *Anchusa italica*, L., *Cynoglossum cheirifolium*, L., *Psoralea bituminosa*, L., *Gladiolus segetum*, Gawl., *Mercurialis tomentosa*, L., *Helianthema*, *Silenes*, *Salviæ* and *Cichoraceæ*. I observed here also a flesh-coloured *Orobanche*, which however appears more abundant in the higher regions. Among the corn, *Arthrolobium ebracteatum*, DC., occurs plentifully in company with *Scorpiurus vermiculata*, L., *Hypecoum procumbens*, L., *Papaver Rhœas*, L., and a *Bupleurum*. On shady, moist walls, *Telephium Imperati*, L., is not uncommon, with other *Crassulaceæ*, and *Adiantum Capillus-Veneris*, L., thrives everywhere in the crevices. Under luxuriant hedges of *Rubus fruticosus*, *Rosa canina*, *Lonicera Caprifolium*, *Punica Granatum*, L., *Pistacia Lentiscus*, L., *Myrtus communis*, &c., are found *Vinca media*, L., *Hyoscyamus albus*, L., *Smilax aspera*, L., and other plants, matted together with *Rubiaceæ* and *Fumaria capreolata*, and overgrown with *Arundo Donax* and *Agave americana*, which in many places had already shot up a flower-stem from 6 to 8 feet high. I also found pretty abundantly in such shady hedges an *Antirrhinum*, which appears to be different from *A. majus* and *molle*, since it has very slender, linear, channeled leaves, and a very long, almost twining stem; it must therefore be the variety *angustifolium* of *molle*, discovered by Boissier in Granada. The banks of the streamlets are densely covered with thick bushes of *Myrtus communis*, *Nerium Oleander*, *Ficus Carica*, L., &c.; while the hillocks are clothed with *Chamærops humilis*, L., *Erica arborea*, L., *Daphne Gnidium*, L., *Retama sphærocarpa*, Boiss., various dwarf oaks, *Ulex australis*, L., and *Rosmarinus officinalis*, L.

2. *Upper warm region*, from 500 to 2000 feet high, to the limit of *Chamærops humilis*.—Of cultivated plants, olives, wheat, and especially the vine, are universally grown. To this region belong the calcareous uplands of the Sierra as well as the lower part of the mountains. The soil is far less fertile, mostly very dry (as there are few or no springs in this region), and clothed with low bushes, chiefly composed of *Rosmarinus officinalis* and *Chamærops humilis*, and under these *Rhamnus lycioides*, L., *Juniperus Oxycedrus*, L., *Retama sphærocarpa*, Boiss., *Pistacia Terebinthus*, L., *Erica arborea*, L., *Linum fruticosum*, L., *Cisti* and *Helianthema*. Of herbaceous plants occur everywhere here, *Stipa juncea*, Ait., *Macrochloa tenacissima*, Kunth (not yet in flower), the above-mentioned *Orobanche* plentifully, *Biscutella saxatilis*, Boiss., γ. *angustifolia* (*B. lævigata*, L., var.), a *Lavandula*, *Linum*, *Leguminosæ* and *Cruciferæ*. On some places (castle near Chiva, Barranco de Ballestero) I found *Digitalis obscura*, L., and on very sunny slopes under bushes *Dictamnus Fraxinella*, Pers., *Ruta montana*, L., and a *Passerina*, but all three very sparingly; while

in the valleys in moist shady spots *Cerinthe major*, L., many *Lathyri*, a *Nigella*, *Bellis*, &c. occur abundantly.

3. *Lower mountain region*, from about 2000 to 4000 feet high, to the limit of the cultivation of olives and wheat.—Only on the declivities of the mountains, in the vicinity of the here tolerably numerous springs, are tracts of cultivated land now found, belonging to retired country-houses; all else is untilled mountain land. To this region belong the upper part of all valleys, the lower peaks of the Sierra, and the wide, waste table-land that stretches between the mountain ridges. The 'Monte bajo,' as the so-often-described dwarf underwood is called in Spain, is here composed of pretty much the same plants as in the preceding region, except that here appear the first fir-bushes and shrubs of *Juniperus phœnicea*, L. (here called *Sabina*), while *Juniperus Oxycedrus*, *Pistacia Lentiscus*, *Retama sphærocarpa* and *Chamærops humilis* are no longer to be met with. In this region occur not unfrequently shrubs of *Fraxinus excelsior*, L., *Arbutus Unedo*, L., many oaks, especially a peculiar form of *Quercus Ilex*, L. Many *Labiatæ*, the already-mentioned *Lavandula* with *L. Spica*, L., a golden-yellow *Teucrium*, *Thymi*, *Marrubium sericeum*, Boiss.?, numerous *Leguminosæ*, especially at a height of 3000 to 4000 feet, a blue-flowered prickly *Astragalus*, species of *Ononis* and *Hippocrepis*, also *Convolvulus saxatilis*, Vahl., *Silenes*, *Centaureæ*, and on the higher slopes *Orchis mascula*, L., and *Asphodelus ramosus*, L. (which here first began to flower), grow under and among these shrubs. In the neighbourhood of the springs, on damp declivities, occur also meadow-like grassy places, chiefly made up of *Ægilops triuncialis*, L., and species of *Medicago* and *Lotus*, which however offer no remarkable vegetation.

4. *Upper mountain region*, from about 4000 to 5500 feet.—To this are to be referred the higher peaks of the Sierra, as la Casoleta, el Cerro la Grana, Pico de Pascual, Monte de los Ajos, &c., which are void of all culture. Isolated firs, and a 'Monte bajo' chiefly composed of *Ulex australis* and *Juniperus phœnicea*, L., characterize this region, in which however solitary springs are still met with. Of herbaceous plants occur, particularly, a *Jasione* (perhaps *foliosa*, Cavan.?), an almost shrubby flesh-coloured *Anthyllis*, *Iberis nana*, All.?; on the declivities *Salvia officinalis*, L., *Orchis mascula*, L., and an *Ophrys*; and on very rocky places, a *Bunium* with tubers very deeply implanted in the crevices. About the springs I observed *Nasturtium officinale*, as it is chiefly in this region that many of our commonest plants appear, ex. gr. *Malva sylvestris*, *Euphorbia Helioscopia*, *Lamium amplexicaule*, *Capsella Bursa-pastoris*, *Papaver Argemone*, &c.

5. *Alpine region*.—This includes in the Sierra de Chiva only the upper part of the highest mountain, called Monte de la Santa Maria. On the very steep and damp eastern slope of this mountain, I found of woody plants chiefly *Arctostaphylos Uva-ursi*, Adans., not yet in flower, and *Taxus baccata*, L., abundantly, more rarely a *Cotoneaster*. A proper 'Monte bajo' is wholly wanting here. A *Saxifraga* thrives in luxuriant tufts on the damp mould at the foot and in the

crevices of the limestone cliffs which encompass the summit, as also on the steep slopes, which were, besides, covered with *Asphodelus ramosus*, L., the before-mentioned *Iberis* and *Anthyllis*. Here too occurred, although but very few specimens, in the region of the Saxifrages, a pretty *Tulipa*, which appears to be new, since it differs from *T. Celsiana*, which it resembles in the colour of its flower, by "*foliis reflexis, flore nutante (nec erecto) et perigonii segmentis lanceolatis (nec oblongo-lanceolatis)*," setting aside the difference of habitat, since *T. Celsiana* only presents itself in the warm region. Lastly, on the highest rocks of Sta Maria flourish *Muscari botryoides*, and especially *Armeria alliacea*, W., in great abundance.

The very small number of Cryptogamia, even in the mountain and alpine regions, is striking. The bark even of the older trees is generally quite bare, or at the most covered with a layer of *Parmelia parietina*; the rocks also are for the greater part devoid of all Lichens. In the springs a *Chara* is found, yet no Algæ, and of mosses and ferns, very few occur in the upper mountain and alpine region. Of ferns I have observed, on the rocks of Sta Maria, only *Ceterach officinarum*, *Asplenium Trichomanes* and *A. fontanum*; of mosses, besides some barren *Hypna*, only an *Encalypta* and *Frullania hispanica*, N. ab Es.; the latter indeed, like the liverworts of our mountains, in thick tufts. The cryptogamic flora is said to be more considerable in winter.

BIBLIOGRAPHICAL NOTICES.

Die Kieselschaligen Bacillarien oder Diatomeen. Von Dr. F. T. Kützing: Nordhausen, 1844. Tab. 30. p. 152.

The beauty and correctness of the plates in the 'Phycologia Generalis,' which we have already reviewed in our Journal, has excited the admiration of all who have noticed or consulted the work. Those of the present are equally deserving of praise, and maintain the reputation of the author as an excellent draughtsman and accurate observer. A certain proportion of the figures are professedly copies, but wherever the author has been able to prepare the illustrations himself he has not failed to do so, and the instances to the contrary are not so numerous as to detract from the originality of the work. Dr. Kützing, to whose kindness we are indebted for our copy, has profited by all the materials which came within his notice, and if we mistake not also by the criticisms to which his former work was subjected, not indeed as regards the illustrations but in respect of its plan, and especially of his notions of genera and species. In the present instance the species are all defined, the principal synonyms noticed, and some details given under each generic head, in all which points the 'Phycologia' was very deficient. It is we understand his intention to publish the *Desmidiaceæ* in a similar form, and we do not doubt that we shall find the same progressive improvement which we so gladly hail in the present instance. He will we know be most grateful to those who have studied this curious and interesting group for the communication of any new or rare British species. We are also rejoiced to hear that he contemplates preparing a 'Phycologia Germanica,' a work which cannot fail to prove most instructive.

The points of interest which are presented by the minute objects, of which so many species are here illustrated, are surpassed perhaps in scarcely any order of created beings, and the results which have arisen from their study, which is but yet in its infancy, are as important as unexpected. Not only is the question of their nature and affinity a very interesting one, and the variety and beauty of form most striking, but the study of these organized atoms bids fair to afford the geologist quite a new resource in his investigation of the comparative age or identity of strata. They exist in all climates, and in situations where neither other animals nor vegetables (to whichever class we assign these beings) can exist. Above 120 species were discovered by Dr. Hooker in very high latitudes, and by soundings far beyond the limits of ordinary vegetable or animal forms, and many of these when sent to Dr. Ehrenberg after a long voyage were all but alive. Whole strata are formed of their siliceous skeletons, and it seems that sometimes they are propagated to a certain extent in subterranean strata at the present day.

Authors have been much divided as to their nature, and while Dr. Ehrenberg doubts not they are animals, and believes that he has discovered within them a digestive apparatus and other organs such as exist in acknowledged infusoria, others, amongst the number of whom we must confess ourselves to be, as decidedly incline to consider them Algæ, and as constituting a most important link in the series. This question, like others relating to the group generally, is well discussed by Kützing, and we think it may be acceptable to our readers to offer them a translation of his remarks.

The following arguments are brought forward by Ehrenberg in favour of their being animals:—

1. They have, in part, a peculiar spontaneous motion which is effected by particular organs.

2. Many have a lateral opening, round which are seated globular bodies, which, like the cæca of Infusoria, become blue in an infusion of indigo in water, and must therefore be regarded as stomachs.

3. The shells of many *Diatomeæ* remind us by their structure and form of that of Gastropods and similar Mollusca.

As regards the first it may be remarked, that spontaneous motion also takes place in lower vegetable forms, which likewise is effected by peculiar ciliary organs. Witness the observations of Unger on the spores of *Vaucheria clavata*, and those of Flotow on *Hæmatococcus pluvialis**. And I may here mention my own in the 'Phycologia Generalis' on *Ulothrix zonata* and other Algæ, which show that in all these lower forms appearances of motion are exhibited, which cannot be distinguished from those which take place in the Infusoria.

* To these may be added various observations of Thuret and Decaisne, not only in the lower Algæ, but in the acrosperms of Fuci.

The animal nature then of *Diatomeæ* is not proved by such spontaneous motion.

As regards the so-called stomachs, I have before proved, that their coloration by indigo is possibly a mere mechanical effect, and that the assertion therefore that they are really stomachs is unauthorized, and the more especially as these parts are so often wanting.

As to the third point, the shell has indeed in many cases a great similarity with that of Mollusca in form, structure and marking, but this is not constantly the case, and we find, in the higher families of plants, cells, which in marking, form and other points present similar appearances. Witness the various forms of pollen, in which the angles, spines, openings, &c. are not wanting. In this respect, then, the approximation of *Diatomeæ* to different vegetable forms is as great as to that of animals.

On the other hand, the following points speak for their vegetable nature :—

1. The great similarity of the compound forms to the Algæ and their origination by division.

There are indeed also compound Infusoria, for example compound monads and polypidoms ; but these are themselves questionable animals, and there is in them this great difference, that the individual animal extends itself freely beyond its cell, while the Naviculæ in *Encyonema*, *Schizonema* and *Micromega* and similar genera grow in the inner substance, and increase there as the cells of plants, and vegetate only as cells. And the individuals in *Fragilaria*, *Melosira*, *Himantidium*, &c. are as confined and unfit for the exhibition of animal motion.

2. The internal soft organic parts, which I have indicated as gonimic substance, possess, as well in their chemical comportment as in their mode of development, peculiarities which are identical with those of the contents of the cells in conferva-like Algæ.

This is especially shown in the genus *Melosira* and its allied genera, which not only in the form but also in the chemical properties of their contents (through the presence of chlorophyll, which is indeed present in all *Diatomeæ*) perfectly agree with Confervæ.

3. The formation of seed or fruit takes place similarly in different Algæ, never in true animals.

4. The *Diatomeæ*, and especially the free motile *Naviculæ*, develope under the rays of the sun oxygen, like other decided plants.

The evolution of oxygen is indeed remarked also in green monads and *Euglena*, yet this proves nothing in favour of the animal nature of *Diatomeæ*, but makes the real nature of those beings very doubtful, and the more so as late observations show the origination of lower vegetables from monads and *Euglenæ*.

The weight of argument is we think certainly on the side of Dr. Kützing, whatever may be thought of particular points, and the whole seems to show, as Dr. Kützing had already distinctly stated in a separate pamphlet, and as indeed was indicated in the 'Gleanings of British Algæ' many years since, that there are beings in which vegetable and animal life are so intimately combined, that according as the animal or vegetable element is predominant, they can at one time exhibit an animal, at another a vegetable life, without altering their originally received form.

In the genus *Micromega* the author has made some observations, which, if confirmed, are of very great importance, and more than any other point will tend to establish the true position of these beings in a natural system. He informs us that he has seen the naviculæ or frustules in this genus metamorphosed into green globular spores. An Alga was discovered by Dr. Dickie at Aberdeen, which was alluded to before in this Journal, which seems to confirm these views; but Mrs. Griffiths, than whom no one is able to form a better judgement, or whose opinion is entitled to greater weight, and Mr. Ralfs are inclined to think that the appearance is produced by parasites of the genus *Cocconeis* and similar productions. The point cannot therefore be received at present as established, though we ourselves are persuaded that Dr. Kützing's views will be found correct.

Our British coasts abound in species of *Schizonema* and *Micromega*, and we regret much that Dr. Kützing had not the command of better materials as regards the British species. We fear that some communicated by Binder were not authentically named, and this is the more to be regretted, as far the greater part of the species described in Harvey's 'Manual' are well understood by the author, and especially by Mrs. Griffiths, who has so largely contributed to the illustration of the genus. In this indeed our friend Dr. Kützing is not to be blamed, but the writer of the present remarks is rather inclined to reproach himself for not having, by some inadvertence, communicated specimens when it was in his power to do so. Our only reason for calling attention to the subject is to induce due caution in the examination of this part of the work.

We trust that it will receive the support it deserves, and we have little doubt that it will do so, as it is no less indispensable to the geologist than to the botanist.

The Botany of the Voyage of H.M.S. Sulphur. Edited by R. B. Hinds, Esq. The Botanical descriptions by G. Bentham, Esq. Nos. 2, 3, 4.

We have already noticed the first number of this valuable work, of which three additional numbers have recently reached us. The expectations which were raised by an examination of that number are fully answered by these. Indeed it seems to us that the plates have improved in the successive numbers. The description of the plants of California is concluded, and the remaining portion is occupied with those of Western Tropical America.

Several new genera are described and very many new species. It is quite unnecessary to add that these descriptions possess great excellence; the name of Bentham is a sufficient security on that point.

Such books as that now before us are the strongest proof of the value of the assistance of late afforded by Government for the publication of the results in natural science obtained by officers on board of Her Majesty's ships; and the general approbation of the scientific world will we hope cause similar applications of small portions of the public money in future.

Algæ Hibernicæ. By Wm. M^c^Calla, Associate of the Edinburgh Botanical Society. Vol. I. Dublin, S. B. Oldham, 8 Suffolk Street, 1845.

Under this title Mr. M^c^Calla has just published a very handsome volume in large-sized quarto, price 1*l.*, containing beautifully preserved specimens of fifty different species of Irish Algæ; and proposes in future similar volumes to edit the remainder of our species, as well freshwater as marine. The volume is bound in strong boards covered with purple grained cloth, and the specimens are fixed on peculiarly stout and thick paper, so that they may be turned over with great facility and without danger of injury. Those in the present volume have been collected chiefly in Roundstone Bay, county Galway, a locality well known to science by Mr. M^c^Calla's very numerous zoological and botanical discoveries, and are as follows:—

1. Griffithsia multifida, *Ag.*
2. ——— corallina, *Ag.*
3. Callithamnion plumula, *Lyngb.*
4. ——— pedicellatum, *Ag.*
5. ——— Hookeri, *Ag.*
6. ——— corymbosum, *Ag.*
7. ——— tetragonum, *Ag.*
8. ——— Arbuscula, *Ag.*
9. ——— Daviesii, *Ag.*
10. ——— polyspermum, *Ag.*
11. ——— byssoides, *Arn.*
12. Delesseria ruscifolia, *Lx.*
13. ——— Hypoglossum, *Lx.*
14. Berkeleya fragilis, *Grev.*
15. Chætophora tuberculosa, *Hook.*
16. Gloiosiphonia capillaris, *Carm.*
17. Nitophyllum punctatum, *Grev.*
18. Striaria attenuata, *Grev.*
19. Batrachospermum atrum, *H.*
20. ——— moniliforme, *Ag.*
21. ——— vagum, *Ag.*
22. Dasya Arbuscula, *Ag.*
23. Mesogloia multifida, *Ag.*
24. Gelidium corneum, *Lx.*
25. Ulva crispa, *Lightf.*
26. Ulva bullosa, *Roth.*
27. Conferva rectangularis, *G.*
28. ——— Hutchinsiæ, *Dill.*
29. ——— Kaneana, *M^c^C.*
30. Fucus balticus, *Ag.*
31. ——— Mackaii, *Turn.*
32. Gigartina Griffithsiæ.
33. Lyngbya majuscula, *Harv.*
34. Schizonema quadripunctatum.
35. Chylocladia clavellosa, *Hook.*
36. Rhodomenia bifida, *Grev.*
37. Porphyra vulgaris, *Ag.*
38. Ralfsia deusta, *Grev.*
39. Haliseris polypodioides, *Ag.*
40. Helminthocladia virescens.
41. ——— Griffithsiana.
42. Rivularia nitida, *Ag.*
43. Ceramium ——?
44. Polysiphonia byssoides, *Gr.*
45. ——— violacea, *Grev.*
46. Bryopsis hypnoides, *Lx.*
47. Sporochnus rhizodes, *Ag.*
48. Laurencia obtusa, *Lx.*
49. Enteromorpha intestinalis, *Lk.*
50. Bangia fuscopurpurea.

Several in this list are of great rarity, and others very local. Among the first we may mention *Gloiosiphonia capillaris* (of which Mr. M^c^Calla's specimens are the finest we have ever seen), *Striaria attenuata, Batrachospermum atrum, Conferva rectangularis, Haliseris polypodioides, Helminthocladia Griffithsiana* and *Bryopsis hypnoides* (very fine); and among the latter, *Callithamnion pedicellatum, C. Arbuscula, Berkeleya fragilis, Dasya Arbuscula, Conferva Hutchinsiæ, Fucus balticus* and *Fucus Mackaii.* Besides these rarities there is one entirely new species, *Conferva Kaneana,* M^c^C., a delicately beautiful plant resembling in many respects *Conf. gracilis*, Griff., but much more slender, and indeed nearly as soft and fine as an Ectocarpus. This is dedicated to Mrs. Kane, lady of Professor Kane, who was present at its discovery, and who some years ago published an Irish Flora.

Much praise is due to Mr. M^{c}Calla for the zeal and ability with which he has explored the west coast, and the creditable manner in which he has edited the present work. His future volumes will, we doubt not, contain an equal number of interesting plants. He proposes, we understand, shortly to visit our northern shores, so famous for the magnificent growth of *Florideæ*, and his second volume will be ornamented with the finest of these. We heartily wish him the success which so praiseworthy an undertaking deserves.

Prodromus Systematis Naturalis Regni Vegetabilis, editore et pro parte auctore Alph. DeCandolle. Vol. ix. Paris, 1845.

We have just received the new volume of this valuable work, which is far too well known to require any praise from us. The orders *Loganaceæ, Gentianeæ, Bignoniaceæ, Cyrtandraceæ, Polemoniaceæ, Convolvulaceæ*, part of *Boragineæ*, and a few lesser orders are included in this volume. A considerable portion is from the pen of the elder DeCandolle, and is illustrated by notes from his son's hand; the remainder consists of the labours of well-known botanists, each upon that order with which he is best acquainted. The additional observations appended to the specific character of each species seem to be rather fuller than in former volumes. It is stated that vol. x. is in the press.

Works just Published.

Descriptions of the Grasses of Britain, illustrated by 210 *Figures drawn and engraved by the author*, Richard Parnell, M.D., F.R.S.E.

The work contains a figure and description of every grass found in Britain, with their agricultural uses, &c.

Cornish Fauna, being a Compendium of the Natural History of the County. Part 3: *Zoophytes and Calcareous Corallines*. By R. Q. Couch, M.R.C.S.L.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

June 18, 1844.—The Lord Bishop of Norwich, President, in the Chair.

Read the conclusion of Mr. Griffith's memoir "On the Root-Parasites referred by authors to *Rhizantheæ*, and their Allies."

This extensive memoir, or series of memoirs, commences with "An Attempt to analyse *Rhizantheæ*," as established by Prof. Endlicher and by Prof. Lindley, from which the author deduces the inference, "that in the construction of the group called *Rhizantheæ*, a remarkable diversity of characters has been sacrificed to an appearance resulting from parasitism on roots, and to an assumed absence of any ordinary form of vegetable embryo."

In arriving at this conclusion, his line of argument is summed up as having especial reference to the three following points: "In the first place," he says, "I have endeavoured to extend the objections urged by Mr. Robert Brown, founded on the presence of a vascular system, and the absence of any abstract peculiarity in the embryos of these plants. I have also attempted to show that these plants are not similar in their parasitism, and that even in those which I have examined, there would appear to be two remarkably different types of development of the embryo. Secondly, I have alluded to the opposition presented, as it seems to me, by *Rhizantheæ* to the system of Nature, a chief point of the plan of which seems to me to consist in an extensive interchange of characters, either positively by structure or negatively by imitation of structure. Thirdly, I have adverted to a want of uniformity in opinion of the founders regarding its rank or value, incompatible, as it appears to me, with any group of the system of Nature. And in conclusion, I beg to add that my impression is that *Rhizantheæ* are an entirely artificial group, not even sanctioned by practical facility, which is the only merit of an artificial association, and that its adoption is a retrograde step in the course of philosophical botany."

To the family of *Rafflesiaceæ*, Mr. Griffith adds a new genus with the following characters:—

Sapria.

Char. Gen.—*Flores* dioici. *Perianthium* duplici serie 5-partitum, æstivatione imbricativum; faux coronâ foratâ clausa; tubus intùs 20-carinatus. *Mas*: *Antheræ* 20, uniseriatim infra caput columnæ fungiforme verticillatæ, discretæ, 2—3-loculares, apice porosæ. *Ovarii* cavitas nulla. *Fœm*: *Antheræ* castratæ. *Ovarium* 1-loculare; placentæ indefinitæ, parietales; ovula indefinita. *Columnæ* apex fungoideo-dilatatus (e medio conum verrucosum exserens, disco piloso). *Fructus* ——.

Planta *parasitica, habitu* Rafflesiæ. Flos *magnus, carnis colore, odore putrido.*

Sapria Himalayana.

Hab. in Jugi Himalayani Montibus Mishmee Assamiæ Superioris ad lat. Bor. 27° 50′, long. Orient. 96° 27′, altit. pedes 3000—5000.

The description of this plant is accompanied by observations on its mode of parasitism, on its vascular structure, on the plicæ of the inside of the tube of the perianthium (which the author suggests may perhaps be considered to represent a second series of stamina), on the inner membrane of the cells of the anthers, on the obstacles to independent impregnation, and on the natural relations of the genus, and the characters by which it differs from *Rafflesia* and *Brugmansia*, between which Mr. Griffith places it.

Mr. Griffith next proceeds to offer some observations on *Cytineæ*, and on the genera *Hydnora* and *Cytinus*. He believes that the difference in the direction of the nuclei of the ovula in *Cytineæ* and

Rafflesiaceæ may perhaps be of some use in discriminating them; but thinks it necessary to observe that in *Nepenthes distillatoria* of the Calcutta Botanic Garden, the most marked instances of *ovula anatropa* and *antitropa* are to be met with in the ovaria at their mature state, to which circumstance he attributes the discrepancies in the accounts of the direction of the radicle of the ripe seed of that genus. His observations on *Hydnora* were made on specimens of *H. africana* both in the dry state and in pyroligneous acid sent to him by Mr. Harvey from the Cape of Good Hope. He regards the anthers as indefinite, and describes the stigma as "discoideum, trilobum, e lamellis plurimis in placentas totidem pendulas undique ovuliferas productis," a structure which, if correctly determined, appears to him to present another objection to the placentary hypothesis of M. Schleiden. He also notices the apparent opposition of the lobes of the stigma to the lobes of the staminal column. In regard to the composition of the pistillum he hesitates between regarding it as highly compound and analogous to *Papaver* and *Nymphæa*, the space between each lamella corresponding with a carpellary leaf, and each lamella itself being compound, or considering it as made up of only three parts, to which latter opinion his own observations and those of Mr. Harvey would lead.

Mr. Griffith's observations on *Cytinus* are derived from specimens of *C. dioicus*, Juss., also sent to him from the Cape of Good Hope by Mr. Harvey. He follows Jussieu and Endlicher in referring the Cape species to the genus *Cytinus*. He regards the terminal teeth or lobes of the staminal column as productions of the connectivum, and not as rudiments of stigmata; and believes the anthers to be unilocular.

To his remarks on *Cytineæ* Mr. Griffith appends an account of two Asarineous plants, natives of Malacca, *Thottea*, Rottb., and *Asiphonia*. To the description of the former of these given by Rottböll from Kœnig's MSS. he adds several particulars. Of the latter, discovered by himself, he gives the following generic character:—

Asiphonia.

Perianthium æquale, rotatum, tripartitum, tubo nullo. *Stamina* 8—10, uniseriata; filamentis nullis. *Stigma* discoideum, sinuoso-lobatum. *Pericarpium* siliquæforme, 4-loculare, 4-valve, polyspermum. *Semina* trigona, rugoso-papillosa.

Frutex *subscandens, facie Piperis fruticosæ cujusdam; articulis tumidis.* Folia *venatione melastomaceo-piperoideâ.* Corymbus *terminalis*; spicis *paucifloris*; floribus *sursùm secundis bibracteolatis.*

Asiphonia piperiformis.

Hab. in Provinciâ Malacca, ad margines sylvarum primævarum, copiosè versùs Ayer Punnus Rhim.

Mr. Griffith points out the near relationship of this genus to *Bragantia*, Lour., from which it is chiefly distinguished by the absence of any tube to the perianthium, its cordate sessile anthers, and discoid sinuate stigma. He suggests, however, that it may possibly be regarded as only a subordinate modification of that genus, and gives an arrangement of the known species in conformity with that view.

In connexion with these genera Mr. Griffith gives his views of the nature and composition of the stigma, which are essentially similar to those published by Mr. Brown in the second part of Dr. Horsfield's 'Plantæ Javanicæ Rariores,' to which work Mr. Griffith refers in a note stating that he did not become acquainted with it till several months after his own observations were written. He defines the stigma to be "the external communication of the conducting tissue, which itself communicates with the placentæ, and is in several cases at least (as in *Trewia nudiflora*) manifestly a continuation from them." Of its theoretical origin he desires to speak with caution, but notices two distinct cases of monstrosities affecting two Leguminous plants, in which the stigmatic surface is evidently a continuation of the placental margins of the carpellum. The ordinary relations may, he thinks, be obscured by several causes; such as separation of parts usually cohering, cohesion of parts usually distinct, division of the stigmatic part of the style, and division of the style of the simple carpellum. The stigmata of each carpellum may be distinct from each other or from those of the next carpellum; or adhesion may take place between stigmatic surfaces ordinarily distinct, whereby the stigmata so resulting appear to alternate with the styles. Instances of the former occur in *Euhalus*; of the latter in *Orobanche*, if the author's observations are correct, in *Papaveraceæ*, and perhaps in all cases in which the stigmata, being apparently equal in number to the placentæ, are said to be opposite to them.

The succeeding portion of Mr. Griffith's memoir relates to *Mystropetalon*, Harv., referred by Sir Wm. J. Hooker to the order *Rhizantheæ*, group *Balanophoreæ*. Mr. Griffith, on the contrary, who describes the *Mystropetalon Thomii* from specimens obtained from Mr. Harvey, regards it as a plant *sui ordinis*, having no relation to any other plant admitted into *Rhizantheæ* except *Cynomorium*, to which it seems to him to present considerable resemblance in the structure of the stamen and of the female flower. It also offers, he thinks, curious agreements with *Loranthaceæ*, and he would at present consider it (doubtfully) as the homogeneous-embryo form of that order which he takes to include *Proteaceæ*, *Santalaceæ*, &c., and which nearly agrees with Prof. Lindley's alliance *Tubiferæ*.

Sarcophyte also is described from specimens transmitted by Mr. Harvey. Mr. Griffith regards its affinities as very obscure; he objects to its being placed either in *Cytineæ*, *Cynomoriaceæ*, or *Balanophoreæ*, and suggests that on the whole the general tendency of the plant is towards *Urticeæ*.

Mr. Griffith next examines the family of *Balanophoreæ*, and gives distinctive characters of *Balanophora*, *Langsdorffia*, *Phæocordylis*, *Helosis* and *Scybalium*. The following are the characters which he assigns to *Balanophora* and *Phæocordylis*:—

BALANOPHORA, *Forst.*

Sexus diclines, rarissimè monoclines. *Flores masculi* bracteati. *Perian-*

thium 3—5-sepalum, æstivatione valvatum. *Stamina* totidem opposita, monadelpha, bilocularia (in unicâ specie multilocularia). *Flores fœminei*: *Ovaria* stipitata, receptaculis apice incrassato-glandulosis affixa, nuda. *Stylus* setaceus, persistens. *Stigma* inconspicuum. *Fructus* pistilliformes, sicci.

PHÆOCORDYLIS, *Griff.*

Sexus diclines. *Flores masculi* ignoti. *Flores fœminei*: *Ovaria* in axi sessilia, nuda, pilis paraphysiformibus immixta. *Stylus* filiformis, exsertus, deciduus. *Stigma* subcapitatum. *Fructus* compressi (striati) apice subpapillosi.

Of *Balanophora* he describes as new five species with the following characters :—

B. BURMANNICA, squamis laxè imbricatis, bracteis truncatis parùm canaliculatis, perianthio masculo extùs carneo demùm sanguineo, columnâ staminum elongatâ, antherarum locellis basi discretis.
Hab. in Regno Burmannico, ad fl. Salueen.

B. AFFINIS, squamis et bracteis præcedentis, floribus (masculis) pallidis, columnâ staminum brevi subrotundâ, locellis antherarum basi confluentibus.
Hab. in Collibus Khasiyanis.
Præcedenti minor; an verè distincta ?

B. ALVEOLATA, squamis arctè imbricatis, bracteis profundè canaliculatis inter se favi instar dispositis, columnâ staminum subrotundâ.
B. dioica, *R. Br. in Royle, Illustr.* p. 330. t. 99?
Hab. in Collibus Khasiyanis.

B. PICTA, squamis distantibus laxis (luteis), spicâ fœmineâ obscurè sanguineâ.
Hab. in Montibus Mishmee jugi Himalayani.

B. (POLYPLETIA) POLYANDRA, columnâ stamineâ brevi latâ, antheris indefinitis 1-locularibus.
Hab. in Collibus Khasiyanis.

With reference to these species Mr. Griffith enters at considerable length into their anatomical and external structure, and in the course of his observations directs attention to the resemblance of the pistilla to the pistilla of *Musci*, and more especially to those of some evaginulate *Hepaticæ*, and to the effects produced by the action of the pollen on the styles. "Indeed," he observes, "in the development of the female organ, the continuous surface of the style before fecundation, and its obvious perforation after, *Balanophora* presents a direct affinity to a group of plants, with which otherwise it has not a single analogy." On this ground he objects to the association of *Balanophoreæ* with such highly developed families as *Rafflesiaceæ* and *Cytineæ*. "As a mere hypothesis," he adds, "I would consider it as the homogeneous-embryo form of *Urticinæ*, forming a direct passage in one, and usually the more perfect, structure to *Musci* and *Hepaticæ*."

Of *Phæocordylis* (a name used by him to prevent confusion, as he has not sufficient knowledge of Dr. Wallich's plant to determine whether his genus is the same as that doubtfully proposed in Dr. Wallich's list under the name of *Sarcocordylis*) he describes and figures a single species, *Phæocordylis areolatus*, collected in the Khasiya Hills. He compares its structure with that of *Balanophora*, notices several curious peculiarities, and adverts to the structure of the hairs in which the fruits are imbedded as presenting a remarkable analogy with the paraphysiform appendages of *Drepanophyllum* and certain *Neckeræ*, and also with the bodies which he suspects to be the male organs of Ferns.

Lastly, Mr. Griffith adds the description of a new genus which he dedicates to the memory of Mr. Thomas Smith, referred to by Mr. Brown in terms of high commendation in his remarks on *Kingia*. This genus is characterized as follows under the anagrammatized name of

THISMIA.

CHAR. GEN.—*Perianthium* superum, campanulatum (caducum), 6-partitum; laciniis 3 exterioribus (brevibus) oblongis, 3 alternis interioribus (longissimis) subulatis; fauce annulo semiclausâ. *Stamina* 6, fauci inserta, perianthii laciniis opposita, deflexa insuper parietem tubi internum; filamenta brevia, discreta; antheræ (maximæ) secus margines connatæ, membranâ bilamellosâ terminatæ, biloculares, loculis parvis distantibus adnatis. Ovarium inferum, 1-loculare; placentæ 3 parietales, supra medium ovuligeræ; ovula indefinita, anatropa. *Stylus* brevis. *Stigmata* 3 bifida. *Fructus* carnosus, truncato-turbinatus, apice pericarpii circumscisso dehiscens, 1-locularis. Semina indefinita, placentis 3 parietalibus demùm liberis affixa. *Embryo* indivisus, homogeneus.

Planta *pusilla, aphylla, radicum parasitica, aspectu cereaçeo.* Perianthium *luteum, coccineo pictum.*

THISMIA BRUNONIS.

Hab. ad pedes Bambusarum in humo ligno semiputrido farcto prope Palar Oræ Tenasserim, ad grad. lat. bor. 12° 50′, long. orient. 98° 20′.—Flor. et fruct. lect. Mense Octobris, 1834.

Some observations follow on the mode of venation of the perianthium, on the dehiscence of the fruit, and on the position of the plant in the natural system, which the author regards as intermediate between *Tacceæ* and *Burmanniaceæ*. He adds that he is disposed to consider it as a Monocotyledonous form of the albuminiform homogeneous embryo, and as the analogue of *Rafflesiaceæ* and *Cytineæ* of Dicotyledons.

Associated with *Thismia* grew a species of *Salomonia* and a species of *Burmannia*, both having the ordinary appearance of plants parasitic on roots. The former is characterized as

SALOMONIA APHYLLA, parasitica, floribus pentandris.

The paper was accompanied and illustrated by an extensive series of coloured drawings.

November 5.—E. Forster, Esq., V.P., in the Chair.

Joshua Clarke, Esq., presented specimens of *Galium Vaillantii*, DeC., gathered by himself at Saffron Walden, in the county of Essex.

James Backhouse, jun., Esq., and G. S. Gibson, Esq., presented specimens of *Spergula stricta*, Swartz, from Widdy Bank, Teesdale, Yorkshire, and of *Equisetum Drummondii*, Hook., from Winch Bridge, Teesdale; both species gathered for the first time in England.

William Borrer, Esq., F.L.S., presented specimens of *Leersia oryzoides*, Sw., discovered by himself in Sept. 1844, fringing the ditches in Henfield Level, Sussex.

Read, a memoir "On the *Medusa proboscidalis* of Forskähl." By Prof. Edward Forbes, F.L.S. &c.

The author met with this Medusa on the coast of Asia Minor, and communicates the result of his examination of its form and structure. The umbrella of the specimen described measured two inches and three quarters in diameter, and was perfectly hemispherical and transparent. The margin had a pink border, from which sprung at regular intervals six very long extensile tentacula, at the base of each of which is a minute ocellus. Opposite and above the origin of each of these tentacula, and on the inner surface of the bell, is a phylliform space, of a different tissue from the rest of the umbrella: these have hitherto been described as stomachs, but are in reality the ovaries; through the centre of each runs a narrow canal, and between each in the interspace are seven lanceolate, truncate markings. From the centre of the inferior surface springs a proboscis or peduncle, four inches in length, down which the gastric vessels run; this peduncle is marked by six longitudinal bands of pinkish contractile tissue; at its extremity it bears a hollow bell-shaped body, bordered by six triangular lips: the cavity of this is the true stomach; the gastric vessels spring from it, and go to open into a circular vessel surrounding the margin of the umbrella.

The author's observations, demonstrating the true position of the stomach and reproductive organs in this animal, do away with the anomalous definition formerly given of the genus *Geryonia*, to which it belongs, and require the substitution of a new generic character, which may be expressed as follows:—

GERYONIA, *Eschscholtz.*

Umbrella hemisphærica: ovaria plura phylliformia in circuitu disci: cirrhi marginales distantes: ocelli nudi: pedunculus elongatus, pyramidatus, ventriculum parvum in extremitate gerens; ore lobato, fimbriato.

Type, *Geryonia proboscidalis.*

November 19.—R. Brown, Esq., V.P., in the Chair.

Read a Note by William Griffith, Esq., F.L.S. &c., to his paper "On the Ovulum of *Santalum*, *Osyris*, *Loranthus*, and *Viscum*," printed in the last Part of the Society's Transactions.

In this note Mr. Griffith states, that "having had opportunities, after my revised examination of *Santalum album*, of examining a Malacca species of *Osyris* (belonging to a section characterized by a quinary number of parts of the flower, a less tendency to separation of the sexes, and habit), I find full grounds for believing that the mode of development of the ovulum of *Osyris napalensis* is altogether like that of *Santalum album*, the only difference being the unimportant one of the short anterior prolongation of the embryo-sac outside the nucleus. The minuteness of the ovulum, and the rapidity with which the anterior exserted part above the septum becomes filled with albuminous tissue, during which the proper membrane of this part of the sac becomes incorporated with the albuminous tissue, must be my apologies for this additional and very important error.

"I may take this opportunity of stating, that this Malacca *Osyris*, deducting the great minuteness of the ovulum, has given me as good evidence as *Santalum* in my opinion has, of the non-existence of any cell or body of or in the embryo-sac, from which the embryo is derived, *independent of the pollen-tube*. The vesicle from which the embryo is to be derived does not appear to exist before the application of the pollen-tubes to the sac, it being in fact, so far as my means of observation enable me to go, the anterior extremity of the pollen-tube itself."

Read also a paper "On the Development of the Ovulum in *Avicennia*," by William Griffith, Esq., F.L.S. &c., containing a more detailed description of the process than the note referred to in the 'Annals,' vol. xii. p. 209.

Mr. Griffith states that *Avicennia* has, like *Santalum* and *Osyris*, a free central placenta with pendulous ovula; the same posterior elongation takes place in the embryo-sac; and the embryo is, at least when matured, external to the nucleus or body of the ovulum. The ovula of *Avicennia* appear to be nucleary; their central tissue first becomes denser than the rest, and in this denser tissue, at a period antecedent to fecundation, is found the embryo-sac, having usually an enlarged apex or head and a subcylindrical body. Subsequent to the application of the pollen-tubes to the apex of the sac, and the formation of cellular tissue, the head of the embryo-sac acquires a short prolongation posteriorly in the direction of the axis of the ovulum, and its subcylindrical body is also prolonged posteriorly within the inner side of the same organ. While the albuminous tissue in the head of the sac increases in bulk, and the rudiment of the future embryo is developing, the head enlarges and passes out of the apex of the ovulum, and the prolongation of the subcylindrical body continues to increase in length. At a subsequent period there is formed on the anterior surface of the albuminous mass, now become external to the ovulum, a curved furrow or groove, corresponding with the points of the cotyledons of the young embryo; and the posterior prolongation of the body of the sac passes backwards into the placenta, within which it is divided in a digitate irregular manner. In the next stage the points of the cotyledons protrude through the groove, and as the embryo increases in size they become more and more exposed, the part of the albumen situated between the inner cotyledon and the body of the ovulum becoming at the same time enlarged and flattened, and increasing in length equally with the cotyledons themselves. In the mature embryo the radicle alone remains imbedded in the albuminous tissue, the cotyledons being quite naked.

"It is curious," Mr. Griffith observes, "that this prolongation [of the embryo-sac] has only been observed in association with a particular form of the free central placenta. So far as I know," he adds, "it is the only instance of an embryo-sac prolonged posteriorly, it may be said, from two points of its surface." And further: "In all the really analogous instances in which the albumen is exterior to the ovulum, it is *always* exterior, that part of the embryo-sac in which it is developed being protruded long before any albuminous tissue has been developed*."

In conclusion, Mr. Griffith refers to the observations of Mr. Brown on the ovula of *Avicennia* in the 'Prodromus Floræ Novæ Hollandiæ,' and in Dr. Wallich's 'Plantæ Asiaticæ Rariores,' and states that the most important difference between this last account and that which he has given is, that he finds the embryo *only* to be erect. "The embryo, in its earlier stages of development, undergoes a degree of change of direction, but only sufficient to enable it to pass up outside the ovulum in the same direction it would have maintained had it been ordinarily developed."

The paper was illustrated by a series of coloured drawings.

December 3.—E. Forster, Esq., V.P., in the Chair.

Read, some "Remarks on Vegetable Physiology." By Mr. James Main, A.L.S.

Mr. Main's object in the present paper appears to be the reproduction before the Society of the leading ideas on vegetable growth contained in his 'Illustrations of Vegetable Physiology,' published in 1833, and to state his objections to some received theories on that important subject. He denies the descent of the sap, and asks, "Who has met with sapless branches in winter, or surcharged roots at the same season?" He states that "the spring movement of the sap

* In a Memoir by M. Planchon, published at Montpellier, 1844, "Sur les développements et les caractères des vrais et des faux arilles, suivi de considérations sur les ovules de quelques Véroniques et de l'*Avicennia*," it is shown that in two species of *Veronica* (*V. hederæfolia* and *V. Cymbalaria*) (and consequently in plants with the ordinary form of placenta) the nucleary ovula are furnished with embryo-sacs, acquiring during the progress of their growth two tubular prolongations, one from near each extremity, the upper of which passes into the placenta, and there becomes digitately divided. In these plants also the albuminigerous portion of the embryo-sac becomes, during the progress of its development, external to the nucleus. In other species of the same genus (*Ver. agrestis* and *V. arvensis*) the ovula are equally reduced to a nucleary form; but the embryo-sac is much less developed at its extremities, and a tegument derived from the nucleus continues to enclose it up to the complete maturity of the seed. Comparing these observations on *Veronica* with the description given in 1818 by M. A. de St. Hilaire of the development of the ovulum of *Avicennia*, M. Planchon comes to the conclusion, that "Il devient impossible de ne pas considérer, avec Brown, comme l'ovule lui-même le corps oblong pris [par M. A. de St. Hilaire] pour un cordon ombilical, et de ne pas voir dans le tubercule arrondi qui sort de la fente du corps oblong, un sac embryonnaire analogue à celui de la Véronique, et destiné, comme ce dernier, à accomplir, hors du nucelle, toutes ses évolutions."—Secr.

begins (and necessarily *must* begin) at the top of the tree, and its fluxion is generated gradually downwards until the whole is in motion." It is by means of this descending fluidity, and not by any descent of the sap itself, that he explains the callosities or swellings observed above a ligature, on the upper edge of a wound, and in various other circumstances. Instead of attributing the formation of the tissues of the plant to the organizable property of the elaborated sap, he believes that the membranes and every other organic part or constituent of the plant have rudimental existence and identity before development. He regards the *cambium* as the seat of vegetable life and the origin of all vegetable growth. From this living body (which he calls the *indusium* or *vital membrane*) he believes that the axis of wood is annually enlarged in diameter, and the bark is thickened; from this, and this only, buds and roots are produced; and wounds are healed by its gradual extension. The paper concludes by a reference to the opinions of Bonnet, DeCandolle, Mirbel, and Dutrochet.

ZOOLOGICAL SOCIETY.

July 9, 1844.—William Horton Lloyd, Esq., in the Chair.

"Descriptions of new species of Tritons, collected chiefly by H. Cuming, Esq. in the Philippine Islands," by Lovell Reeve, Esq.

Triton gallinago. *Trit. testâ abbreviato-clavæformi, varicibus duobus, rotundis, solidis; spirâ breviusculâ, acuminatâ; anfractibus supernè angulatis, tuberculorum serie unicâ ad angulum armatis, tuberculis peculiariter plano-vellicatis, acutis, anfractûs ultimi valdè irregularibus; anfractibus infra costatis, costis crenulatis, sub tuberculis flexuosè nodulosis, costarum interstitiis elevato-striatis; albâ, varicibus aurantio-fusco vividè tinctis; columellâ rugoso-plicatâ, aperturæ fauce albâ, labro intus fortiter denticulato; canali subelongato, ascendente.*

Conch. Icon., *Triton*, pl. 2. f. 5.

Hab. Cagayan, province of Misamis, island of Mindanao, Philippines (found in sandy mud at the depth of twenty fathoms); Cuming.

The ribs of this delicate species are noduled, and more strongly developed on the varices than on the body of the shell; and the central dorsal tubercle of the last whorl is unusually prominent, with all the appearance of a double tubercle. The canal is much shorter than that of most of the club-shaped Tritons, and is particularly curved or bent upwards.

Triton Ranelloides. *Trit. testâ Ranellæformi, varicibus decem nodiferis; spirâ elevatâ; anfractibus, superficie totâ subtilissimè reticulatâ, supernè depressis, infra nodis grandibus biseriatim, anfractu ultimo triseriatim, cinctis, nodis inferioribus minoribus; luteo-albidâ, fuscescente variâ, tæniis subtilissimis fuscescente alboque articulatis, lineis fuscis fortioribus inter nodos, cinctâ; columellâ maculâ purpureâ albirugosâ supernè tinctâ; aperturæ fauce albâ, labro intus leviter denticulato; canali brevissimo.*

Conch. Icon., *Triton*, pl. 3. f. 10.

Hab. Matnog, province of Albay, island of Luzon, Philippines (found on the reefs); Cuming.

Partaking as this shell does in almost equal proportion of the characters of both *Triton* and *Ranella*, it has been a matter of some difficulty to decide to which of the two genera it might with the greater propriety be referred.

Triton exilis. *Trit. testâ clavæformi, varice unico parvo; spirâ breviusculâ; anfractibus supernè angulatis, infernè coarctatis, transversim subirregulariter costatis, costis liris parvis longitudinalibus decussatis, tuberculatis, tuberculis grandibus, prominentibus, subcompressis; albâ, aurantio-fusco sparsim tinctâ; columellâ plicatâ, plicis superioribus valdè majoribus, aperturæ fauce albâ, labro intus rugoso-denticulato; canali longissimo, supernè peculiariter contorto.*

Conch. Icon., *Triton*, pl. 4. f. 11.

Hab. San Nicolas, island of Zebu, Philippines (found in sandy mud at the depth of ten fathoms); Cuming.

This highly interesting species has been erroneously published by Mr. Sowerby in his 'Genera of Shells,' and by myself in my 'Conchologia Systematica,' vol. ii. plate 243. fig. 3, for the *Triton clavator*, and demonstrates how necessary is the examination of an entire genus by comparison for the proper discrimination of the species. No question as to the specific difference of these two shells could however be urged, for they vary materially both in form and detail of sculpture. The *Triton clavator* is comparatively full and ventricose, with the upper ribs only moderately tubercled; the *Triton exilis* is small, peculiarly contracted round the lower part, with the tubercles very prominently developed entirely across the whorls: in the former species there is a varix on the penultimate whorl as well as upon the last whorl; in the latter species, as in the *Triton canaliferus*, there is no varix upon the penultimate whorl; lastly, the mouth of the former species is either yellowish or yellowish scarlet, whilst that of the latter exhibits not the slightest indication of colour, and the stains of orange-brown with which it is marked externally are of a character not to be misunderstood.

Triton Pfeifferianus. *Trit. testâ fusiformi, varicibus septem prominentibus, acutangularibus; spirâ elatâ; anfractibus subirregulariter convolutis, convexis, supernè plano-depressis, leviter canaliculatis, transversim costulatis, costulis irregularibus, nunc angustis, nunc latioribus, striis elevatis longitudinalibus noduloso-decussatis, anfractuum parte medianâ nodosâ, nodis distantibus, longitudinaliter subplicatis; fuscescente, fusco pallidè variâ; columellâ rugulosâ, labro intus rugoso-denticulato; canali subelongato.*

Conch. Icon., *Triton*, pl. 4. f. 14.

Reeve, Pro. Zool. Soc., 1844.

Hab. —— ?

This species may probably be recognised as one of not uncommon occurrence, though not hitherto described; its leading features are the rude manner in which one whorl is deposited on the other, the prominent sharp-angled structure of the varices, and the delicate granulated sculpture of the ribs where they are crossed by the raised striæ; and its general appearance is altogether peculiar.

I take the liberty of dedicating this characteristic species to Dr. Pfeiffer of Cassel, Germany, on account of the diligence that gentleman has exercised in arranging the synonyms of the genera *Triton* and *Ranella* in his "Memoir of the genus *Tritonium*," Revue Zoologique de la Société Cuviérienne.

TRITON SAULIÆ. *Trit. testâ elongato-conicâ, tubæformi, paululùm contortâ, basim versus subangulato-attenuatâ, varicibus novem decemve plano-depressis; spirâ acuminatâ; anfractibus subangulatis, nodorum prominentium seriebus duabus infra angulum armatis, subtilissimè liratis, liris apicem versus minutissimè crenulatis; albido aut lutescente, rubido-fusco variegatâ et maculatâ; epidermide tenui; columellâ lævi, obsoletè plicatâ, plicâ albâ unicâ supernè munitâ; labro intus denticulato; aperturâ angulato-ovatâ, fauce cærulescente-albâ.*

Conch. Icon., *Triton*, pl. 5. f. 17.

Hab. Matnog, island of Luzon, Philippines; Cuming.

I was about to figure a somewhat discoloured specimen of this shell, collected by Mr. Cuming at the above-mentioned locality, when a smaller but very richly painted example presented itself for comparison from the collection of Miss Saul. It is unquestionably distinct from any of the trumpet-shaped species, though curiously intermediate between the *Triton variegatus* and *australis*. I now dedicate it with great pleasure to a much-esteemed collector, whose cabinet bears interesting testimony of her excellent discrimination of species.

TRITON SINENSIS. *Trit. testâ elongato-clavæformi, varicibus duobus rotundis; spirâ subelatâ; anfractibus costis duplicibus subdistantibus undique cinctis, striâ unicâ elevatâ interveniente, costis superis leviter nodosis, costis interstitiisque subtilissimè crenulatis; albidâ, lutescente tinctâ, varicibus inter costas lutescentibus; columellâ multirugosâ; labro denticulato; aperturæ fauce albâ; canali elongato, subcontorto.*

Conch. Icon., *Triton*, pl. 6. f. 18.

Hab. China.

This shell is not uncommon in collections, though it appears to have been singularly neglected by naturalists. It presents a most remarkable modification of the *Triton canaliferus*: the entire sculpture of the two species—such as, for example, the double rib, the intervening raised line, the two only varices, the profusely wrinkled columella, the long slightly twisted canal, &c.—is the same in both; but the canaliculated structure of the sutures, which forms so very important a specific character in the *Triton canaliferus*, is wanting. The *Triton sinensis* might therefore be recognised as an example of the *Triton canaliferus* with the spire pushed out as it were; or one in which the whorls have not been subject to that peculiar depression which forms so deep and characteristic a channel round the suture.

Triton grandimaculatus. *Trit. testâ ovato-turritâ, crassâ, infernè coarctatâ, varicibus tribus; spirâ subobtusâ; anfractibus supernè angulatis, transversim exiliter striatis et liratis, liris superis tuberculato-nodosis; fuscescente-fulvâ, varicibus et columellæ parte superiori maculis grandibus nigerrimo-fuscis ornatis; columellâ lævi vel obsoletè plicatâ; labro intus dentato, dentibus nigerrimo-fuscis; aperturæ fauce albâ; canali breviusculo, subascendente.*

Conch. Icon., *Triton*, pl. 6. f. 20.

Hab. Matnog, province of Albay, island of Luzon (found on the reefs); Cuming.

This shell appears at first sight to be nothing more than a casual variety of the *Triton lotorium*; it will be found, however, upon examination to differ materially. The large tuberculated humps of the *Triton lotorium* are here represented by regular series of small rounded knobs, which impart a kind of cancellated structure to the earlier whorls which is very characteristic; the lower part of the shell is not distorted, and the varices, especially at the back, are vividly painted with large distinct brown blotches.

Triton sarcostoma. *Trit. testâ subabbreviato-clavæformi, varicibus duobus, rotundis, solidiusculis; spirâ brevi, apice subdepresso; anfractibus supernè angulatis, transversim costatis, costis noduloso-crenatis, costarum interstitiis subtiliter crenato-liratis, costis superis tuberculatis, tuberculis grandibus, prominentibus, subcompressis; spadiceo-fuscescente, costis inter tubercula albimaculatis; columellâ supernè et infernè leviter corrugatâ, labro intus fortiter rugoso-denticulato; columellâ labroque carneo eximiè tinctis.*

Conch. Icon., *Triton*, pl. 7. f. 21.

Hab. Island of Ticao, Philippines (found on the reefs); Cuming.

This shell has somewhat the aspect of the *Triton cynocephalus*; it differs in being much less ventricose, and in having very prominent tubercles round the upper part of the whorls. The mouth is stained with a pale flesh-tint without any indication of dark colour on the columella.

Triton aquatilis. *Trit. testâ fusiformi-turritâ, varicibus septem octove rotundis, prominentibus; spirâ elatâ; anfractibus convexis, transversim costatis, costis duplicibus, subdistantibus, liris undatis tuberculiferis longitudinaliter decussatis; pallidè rufescente-fuscâ, fusco maculatâ et variegatâ; columellâ et aperturæ fauce carneo-tinctis, albirugosis, labro intus albidenticulato; canali brevi, ascendente.*

Conch. Icon., *Triton*, pl. 7. f. 24.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

The longitudinal waved ridges which adorn the surface of this interesting species have, in the fine specimen before me, a beautiful ripple-like appearance which is very characteristic. The columella and interior are covered with enamel of a bright uniform flesh-tint, and the varices are very round and prominent. I have seen several examples of this species in different stages of growth, all exhibiting the above peculiarities with remarkable specific distinctness.

Triton trilineatus. *Trit. testâ clavato-fusiformi, varicibus tribus; spirâ breviusculâ; anfractibus supernè angulatis, ad angulum compresso-tuberculatis, transversim plano-liratis, liris subtilissimè crenulatis, interstitiis lineis tribus elevatis sculptis; albidâ, fusco variegatâ, varicibus fusco-maculatis; columellâ lutescente-albâ, costatâ; canali subelongato, leviter ascendente; labro fortiter denticulato-costato; aperturæ fauce albâ.*

Conch. Icon., *Triton*, pl. 10. f. 31.

Hab. Philippine Islands; Cuming.

This is a strongly marked species, with the denticulated sculpture of the lip extending into the aperture after the manner of ribs; and the body of the shell is crossed by flattened ridges, between each of which are three very characteristic raised lines.

Triton ægrotus. *Trit. testâ subpyriformi, varicibus validis duobus; spirâ acutâ; anfractibus supernè angulatis, transversim costatis, liris minutis tribus vel quatuor inter costas decurrentibus, costis superis tuberculatis, tuberculis infernè evanidis; albidâ, fuscescente maculatâ; columellâ plicatâ; canali subelongato, subascendente; aperturæ fauce albâ; labro intus denticulato.*

Conch. Icon., *Triton*, pl. 12. f. 42.

Hab. China.

Care must be taken not to confound this shell with the *Triton trilineatus*, in which the dorsal tubercles are more strongly developed, and which has no varix on the back of the penultimate whorl.

Triton encausticus. *Trit. testâ pyriformi, varice unico depressiusculo; spirâ rotundato-depressâ; anfractibus transversim costatis, tuberculorum seriebus plurimis longitudinalibus armatis, inferioribus minoribus; albidâ, fusco variè tinctâ; columellâ lævi, crassissimè encausticâ, aurantio-lutescente; canali elongato, ascendente; labro aurantio-lutescente, intus denticulato.*

Conch. Icon., *Triton*, pl. 12. f. 43.

Hab. Island of Ticao, Philippines (found on the reefs); Cuming.

The enamelled character of the mouth of this shell is somewhat like that of the *Triton tuberosus*; the form is that of the *Triton retusus*.

Triton ridens. *Trit. testâ elongato-ovatâ, subfusiformi, solidiusculâ, distortâ, varicibus quinque sexve subindistinctis; spirâ acuminatâ; anfractibus liris angustis elevatis prominentibus distantibus eleganter clathratis, liris transversis duplicatis; cærulescente-albâ, epidermide sericâ indutâ; columellâ fortiter rugosâ, aurantio tinctâ; canali breviusculo, vix ascendente; aperturâ parvâ, coarctatâ; labro intus fortiter dentato, albo, aurantio marginato.*

Conch. Icon., *Triton*, pl. 12. f. 46.

Hab. Philippine Islands; Cuming.

Although this species exhibits little more than a modification of the characters of the *Triton cancellinus*, the difference is of good specific importance. The cancellated sculpture is wider and more prominent, whilst the ridges are more sharply noduled in crossing over each other. The wrinkles and denticulations which surround the aperture are much more strongly developed, and the orange-stained colouring of the enamelled disc is peculiarly characteristic.

Triton Thersites. *Trit. testâ subfusiformi, varicibus quatuor; spirâ exsertâ; anfractibus transversim granoso-liratis, angulatis, ad angulum tuberculatis, tuberculis validis, valdè prominentibus, anfractuum totâ superficie subtilissimè granulosâ; columellâ albâ, subexcavatâ, leviter rugosâ, callositate supernè armatâ; canali longiusculo, subascendente; labro intus leviter denticulato.*

Conch. Icon., *Triton*, pl. 13. f. 48.

Hab. —— ?

Several shells have been named after the rude enemy of Achilles as significant of their deformity. The *Triton* under consideration, though it has quite a hump-backed appearance from the prominence of the dorsal tubercles, is however beautifully granulated, the granulated ridges being especially neatly sculptured in passing over the tubercles and varices.

Triton moritinctus. *Trit. testâ ovato-oblongâ, ventricosâ, varice unico elevato; spirâ depressâ; anfractibus supernè plano-angulatis, transversim crenulato-costatis, ad angulum fortiter tuberculatis, tuberculis acutis, infernè evanidis, transversim subtiliter sulcatis; rubidâ, varicibus albimaculatis; epidermide subsetosâ; columellâ rufo-aurantiâ, maculâ grandi, nigricante-purpureâ, albirugosâ, tinctâ; canali subelongato, subcontorto; aperturæ fauce rufo-aurantiâ; labro intus fortiter dentato.*

Conch. Icon., *Triton*, pl. 13. f. 49.

Hab. Philippine Islands; Cuming.

This shell, which is not uncommon in collections, approximates very closely to the *Triton cynocephalus*; it is however specifically distinct. The whorls of the *Triton moritinctus* are very strongly tubercled, the tubercles being disposed in waved longitudinal rows, whilst in the *Triton cynocephalus* the tubercles have more the appearance of regular nodules.

Triton exaratus. *Trit. testâ subtrigono-fusiformi, varicibus duobus; spirâ elevato-turritâ; anfractibus supernè planissimo-angulatis, ad angulum subnodosis, transversim liratis, liris compressis, duplicatis, crenulatis, interstitiis excavato-sulcatis; albidâ, fuscescente cæruleoque variè tinctâ; columellâ albâ, subrugosâ; canali longiusculo; aperturâ rotundâ; labro intus dentato.*

Conch. Icon., *Triton*, pl. 13. f. 50. *a* and *b*.

Var. *β. Testâ nigricante-fuscâ, albibalteatâ.*

Hab. North coast of New Holland.

This is a very characteristic species, with the transverse ridges standing out in bold relief, and the upper part of the whorls peculiarly flat and indented at the sutures.

Triton ficoides. *Trit. testâ trigono-ficiformi, varicibus quinque;*

spirâ brevi, obtusâ; anfractibus dorsim tumidiusculis, transversim liratis, liris nodosis, super varices duplicatis; columellâ nodosâ et rugosâ, infernè luteo-sanguineo tinctâ; canali brevi; labro intus fortiter dentato.

Conch. Icon., *Triton*, pl. 13. f. 51.

Hab. Africa.

M. Kiener should have been sure of this shell being the *Ranella caudata* of Say, before he ventured to question the generic appropriation of that species. It is quite another thing, and I much doubt if a shell of such bright and vivid colour were ever found within the latitude of New York. The *Ranella caudata* belongs to a small group of *Ranellæ*, of which the *R. Muriciformis* is the type.

Triton acuminatus. *Trit. testâ subfusiformi, varice nullo; spirâ acutissimè acuminatâ; anfractibus numerosis, transversim elevato-striatis, longitudinaliter costatis, costis subobliquis, crebriusculis; columellâ subtilissimè rugosâ; canali breviusculo, ascendente; aperturâ parvâ, rotundâ; labro intus denticulato.*

Conch. Icon., *Triton*, pl. 14. f. 54.

Hab. China.

The *Triton acuminatus* is another very aberrant form, though belonging to that interesting section of the genus of which the *Triton niveus* is the type.

Triton gracilis. *Trit. testâ gracili-fusiformi, varicibus tribus; spirâ subelatâ; anfractibus tuberculato-nodosis, liris parvis subtiliter decussatis; lutescente-albâ, vel fuscâ, albibalteatâ, epidermide tenui subsetosâ indutâ; columellâ fortiter rugosâ, albâ; canali subelongato, ascendente; aperturæ fauce albâ; labro intus peculiariter rugoso-denticulato.*

Conch. Icon., *Triton*, pl. 15. f. 58.

Hab. Philippine Islands; Cuming.

A delicate little species, in which the outer lip is peculiarly fully wrinkled within.

Triton elongatus. *Trit. testâ elongato-fusiformi, varice unico subindistincto; spirâ acuminatâ; anfractibus supernè leviter angulatis, transversim liratis et striatis, liris striisque granuloso-crenatis, æquidistanter nodulosis; cinereâ, liris livido-purpureis; columellâ excavatâ, rugosâ, callositate supernè armatâ; canali elongato, subcontorto; labro intus dentato, dentibus binis.*

Conch. Icon., *Triton*, pl. 15. f. 59.

Hab. Philippine Islands; Cuming.

This shell approximates very closely to the *Triton vespaceus*; so closely indeed, that I may be thought rather venturous to describe it as a new species. The differences however are as follows: the canal is much more elongated, the whorls are not tubercled, and the beaded ridges are of a peculiar livid-purple colour.

Triton gemmatus. *Trit. testâ elongato-oblongâ, varicibus quatuor vel quinque; spirâ subobtusâ; anfractibus liris, pulcherrimè gemmatis, cingulatis, interstitiis striis elevatis longitudinalibus et transversis eximiè clathratis; aurantio-lutescente; columellâ rugosâ,* *callositate supernè armatâ; canali breviusculo; labro intus dentato, dentibus binis.*

Conch. Icon., *Triton*, pl. 15. f. 60.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

Var. β. *Testâ albâ, varicibus duobus ad sex; liris subnodosis.*

Hab. Island of Annaa (Chain island), South Pacific Ocean, and island of Burias, Philippines (found under stones in both localities at low water); Cuming.

The sculpture of this shell is very similar to that of the *Triton rubecula*; the beaded ridges are however wider apart, and on the varices have three smaller ridges between them.

Triton obscurus. *Trit. testâ elongato-turritâ, varicibus undecim; spirâ acuminatâ; anfractibus transversim granulosis, longitudinaliter subobsoletè sulcatis, sulcis creberrimis; fuscescente, fusco pallidè balteatâ, maculis fuscis quadratis perpaucis seriatim pictâ, varicibus fusco maculatis; columellâ lævi, crassissimè encausticâ; canali brevissimo, labro intus denticulato.*

Conch. Icon., *Triton*, pl. 16. f. 63.

Hab. East. Indies; Lieut. Babb.

This shell may have been probably confounded with the *Triton maculosus*; it differs however in not being transversely grooved, in having a different arrangement of the varices, and in other minor particulars.

Triton crispus. *Trit. testâ ovatâ, subfusiformi, varicibus duobus vel tribus; spirâ breviusculâ; anfractibus liris crispis prominentibus, subdistantibus, decussatis, liris ad decussationem nodulosis, interstitiis striis crispis elevatis subtilissimè cancellatis; cinereo-cærulescente, varicibus lirisque albidis; columellâ excavatâ, rugosâ, callositate supernè armatâ; canali breviusculo; labro intus fortiter denticulato.*

Conch. Icon., *Triton*, pl. 17. f. 68.

Hab. ——?

Quite distinct from any hitherto described species.

Triton eburneus. *Trit. testâ ovato-oblongâ, varicibus tribus vel quatuor remotiusculis; spirâ brevi; anfractibus liris parvis obtusis creberrimè decussatis; intus extusque albâ; columellâ excavatâ, infernè subrugosâ; canali brevissimo; labro intus denticulato.*

Conch. Icon., *Triton*, pl. 17. f. 69.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

This shell has somewhat the form of the *Triton Quoyi*, an interesting little New Holland species, which M. Kiener thought to be the recent analogue of Lamarck's fossil *Triton viperinum*.

Triton verrucosus. *Trit. testâ subpyramidali-oblongâ, varicibus quatuor vel quinque; spirâ mediocri; anfractibus supernè impressis, transversim striatis et liratis, liris longitudinalibus prominentioribus decussatis, ad decussationem nodosis; aurantio-fuscescente,* *anfractuum parte inferiori fusco inter nodos articulatâ; columellâ excavatâ, vix rugosâ; canali brevissimo.*

Conch. Icon., *Triton*, pl. 17. f. 71.

Hab. —— ?

Care must be taken not to confound this shell with the lesser New Holland species, *Triton Quoyi.*

Triton tortuosus. *Trit. testâ oblongo-turritâ, subangustâ, varicibus octo obliquè invicem subsequentibus; spirâ tortuosâ; unfractibus granulis parvis subtiliter reticulatis; lutescente, maculis fuscis grandibus, longitudinaliter undatis, eleganter pictâ; columellâ excavatâ, subgranulosâ; canali brevissimo, recurvo.*

Conch. Icon., *Triton*, pl. 17. f. 74.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

This interesting species approximates very closely to the *Triton distortus*; it differs in being of a more delicate and slender form, in the granules being less prominent, and in the peculiar waved style of the painting.

Triton sculptilis. *Trit. testâ oblongo-turritâ, varice nullo; spirâ exsertâ; anfractibus longitudinaliter costellatis, costellis angustis, interstitiis striis elevatis cancellatis, anfractûs ultimi parte inferiori conopeo carinæformi prominente peculiariter ornatâ; albidâ, suturis fuscis; columellâ lævi; canali brevissimo.*

Conch. Icon., *Triton*, pl. 18. f. 76.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming.

In addition to the above account of this beautiful species, it may be noticed that the transverse striæ are brown upon the ribs and white in the interstices; the sutures are brown in consequence of the whorls being encircled with a brown line just at the point where one whorl lodges in its spiral growth upon the other, over the basal canopy, as if to mark out the exact plan of convolution.

Triton eximius. *Trit. testâ oblongo-turritâ, varice nullo; spirâ acuminatâ; anfractibus costellis minutis eximiè cancellatis, longitudinalibus majoribus, valdè remotioribus; albâ, fuscescente obscurè fasciatâ; canali brevissimo.*

Conch. Icon., *Triton*, pl. 18. f. 77.

Hab. Lord Hood's Island, Pacific Ocean (on the reefs), and island of Capul, Philippines (under stones at low water); Cuming.

A neatly cancellated, almost colourless, shell.

Triton egregius. *Trit. testâ elongato-ovatâ, varice nullo; spirâ acutâ; anfractibus longitudinaliter costatis, striis elevatis transversis cancellatis; albâ, costis medio albis, supra et infra fuscis; canali brevi, recurvo.*

Conch. Icon., *Triton*, pl. 18. f. 78.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

The style or arrangement of the sculpture not much unlike the preceding species; the shell is however larger, more globose, and has a very pretty appearance, arising from the dark brown upper and lower portions of the ribs being crossed by white striæ.

Triton siphonatus. *Trit. testá fusiformi-turritá, varicibus novem, subindistinctis; spirá acuminatá; anfractibus creberrimè reticulatis, ultimo anticè quasi siphonato; roseo- aut cæruleo-albidá, aurantio-fusco sparsim maculatá; lamina columellari tenui, lævi; aperturá elongato-ovatá; labro subtilissimè denticulato.*

Conch. Icon., *Triton*, pl. 18. f. 81.

Hab. —— ?

Chiefly distinguished by its anterior extension.

Triton decapitatus. *Trit. testá elongato-turritá, varice nullo; spirá decollatá; anfractibus longitudinaliter concentricè costellatis, costellis angustis, numerosis, confertis, transversim striatis; lutescente, fusco subindistinctè maculatá; costellis aurantio-fuscis, lineá lutescente anticè interruptis, anfractu ultimo lineis lutescentibus duabus; canali brevissimo.*

Conch. Icon., *Triton*, pl. 18. f. 85.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

Care must be taken not to confound this species with the *Triton truncatus*, in which the ribs are larger and wider apart, and the colour not interrupted.

Triton digitale. *Trit. testá oblongá, varice nullo; spirá acuminatá; anfractibus seriatim granulosis, granulis numerosis, confertis, obtusis; albidâ, fuscescente sparsim punctatá; canali brevissimo.*

Conch. Icon., *Triton*, pl. 19. f. 86.

Hab. Island of Capul, Philippines (found under stones at low water); Cuming,

The sculpture of the shell is much like the granular surface of a thimble.

Triton concinnus. *Trit. testá oblongá, tenuiculá, varice nullo; spirá subacuminatá; anfractibus longitudinaliter concentricè costellatis, transversim creberrimè striatis; lutescente, aurantio-fuscescente peculiariter pictá, apice roseo-purpureo; canali brevissimo.*

Conch. Icon., *Triton*, pl. 19. f. 87.

Hab. Philippine Islands; Cuming.

The bright orange-brown painting is peculiarly festooned, as it were, round the upper part of the whorl next the suture.

Triton angulatus. *Trit. testá oblongá, turritá, varice nullo; spirá acuminatá; anfractibus supernè angulatis, longitudinaliter costellatis, transversim striatis, striis prominentibus, confertis; luteá, aut lutescente-albá, rubido-fusco alboque sparsim punctatá; canali brevissimo.*

Conch. Icon., *Triton*, pl. 19. f. 88.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

Chiefly distinguished by the angular structure of the whorls next the suture.

Triton lativaricosus. *Trit. testâ oblongâ, solidâ, subcompressâ, varicibus tribus vel quatuor latis; spirâ subobtusâ; anfractibus longitudinaliter concentricè costellatis, costellis solidis, subdistantibus, transversim creberrimè striatis; canali brevissimo.*

Conch. Icon., *Triton*, pl. 19. f. 90.

The varices of this shell are unusually broad, and the ribs are wider apart on the back of the whorls than on the side.

Triton tessellatus. *Trit. testâ elongatâ, varice nullo; spirâ acuminatâ, acutâ; anfractibus striis longitudinalibus et transversis subtilissimè reticulatis; albidâ, maculis grandibus rubido-fuscis subirregulariter tessellatâ; canali brevi, subrecurvo.*

Conch. Icon., *Triton*, pl. 19. f. 91.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

This shell may be easily recognised by its rude tessellated spots.

Triton bacillum. *Trit. testâ elongato-clavæformi, solidâ, varicibus duobus; spirâ elongatâ, subretusâ; anfractibus obtuso-granulosis; cærulescente-albâ; canali brevissimo, recurvo; aperturâ breviusculâ.*

Conch. Icon., *Triton*, pl. 19. f. 94. *Hab.* —— ?

This is the only species of *Triton* I have noticed with a single varix on each side.

Triton carduus. *Trit. testâ globosâ, ventricosâ, varice nullo; spirâ brevi, acutissimâ; anfractibus longitudinaliter costatis, transversim striatis, striis valdè elevatis, costas super submuricato-nodosis; albidâ, fuscescente variâ; columellâ excavatâ; canali brevi.*

Conch. Icon., *Triton*, pl. 19. f. 95. *Hab.* —— ?

A rather thin shell, of very sharply cancellated sculpture.

Triton pagodus. *Trit. testâ pyramidali-ovatâ; spirâ acuminato-turritâ, varice nullo; anfractibus subventricosis, supernè angulatis, transversim creberrimè elevato-lineatis, longitudinaliter costatis, costis compressiusculis, subdistantibus; albidâ, rubido-castaneo multifasciatâ; canali brevi, valdè recurvo; aperturâ rotundâ; labro intus elevato-striato.*

Conch. Icon., *Triton*, pl. 20. f. 97.

Hab. Bay of Montija, West Columbia; Cuming.

This species partakes more of the character of *Nassa* than the preceding; it might be referred indeed to that genus with almost as much propriety as to *Triton*.

Triton pictus. *Trit. testâ oblongo-ovatâ; spirâ subacuminatâ, varice nullo; longitudinaliter creberrimè costatâ, transversim elevato-striatâ; rubido-fusco alboque tessellatâ; canali brevi; aperturâ parvâ, fauce albâ.*

Conch. Icon., *Triton*, pl. 20. f. 97.

Hab. Gallapagos Islands (found under stones at low water); Cuming.

An interesting species tessellated with white and very rich dark brown, in which the latter colour greatly preponderates.

Triton decipiens. *Trit. testâ elongato-ovatâ, subfusiformi, dis-*

tortâ, varicibus quinque sexve indistinctis; anfractibus liris angustis elevatis clathratis; albido-lutescente, epidermide sericâ indutâ; columellâ profundè excavatâ, rugosâ, subobsoletè umbilicatâ, callositatibus plurimis supernè armatâ, rufo-aurantiâ; labro plano-concavo, rufo-aurantio radiato, intus fortiter rugoso-dentato.

Conch. Icon., *Triton*, pl. 20. f. 102.

Hab. Island of Mindanao, Philippines; Cuming.

I have long hesitated to consider this shell any other than a variety of the *Triton cancellinus*: the differences, though slight, seem however to remain constant. It is uniformly of smaller size, the transverse ridges are not duplicate, and the colour and wrinkled denticulations of the columella and outer lip are of a peculiar and distinct character.

ROYAL INSTITUTION.

Feb. 14, 1845.—W. R. Hamilton, Esq., V.P. and Treasurer, in the Chair.

Professor E. Forbes delivered a lecture "On some important Analogies between the Animal and Vegetable Kingdoms."

The Professor commenced by briefly adverting to the distrust with which, as he was well aware, speculations on the analogies of animated beings were regarded, especially among British naturalists. He stated his own firm persuasion, however, that the transcendental philosophy of natural history was one of the most important developments of that science.

He proceeded to represent the relations on which he was about to discourse as consisting,—1. *Of the relation of analogy*, depending on the manifestation of common laws relating to animals or vegetables composing a species, or else to the groups under which species are assembled; and 2. *Of the relation of polarity*, depending, not on the resemblance, but on the opposition or divergence of beings composing the animal and vegetable kingdoms. This relation of *polarity* was thus illustrated. The animal is superior in structure and function to the vegetable; yet, from whatever point of the vegetable kingdom we may begin, we cannot proceed by a series of continually advancing organisms to the highest point of the animal. Thus, instead of finding, as we might expect *à priori*, the most perfectly developed vegetable bearing the closest resemblance to the lowest animal form, we find, on the contrary, that it is at the lowest points of both systems (the Sponges, &c. in the one, and the marine Fuci in the other) that the closest resemblance exists. Reverting to the *relation of analogy*, the Professor noticed that every composite organism, as, for instance, a plant in flower, was not a single being, but a combination of individuals; that each leaf, in its ordinary form, was an individual, serving one purpose (that of maintaining the existence of the plant), but that, for the purpose of reproduction, it was transformed into flower, petal, stamen, pistil, &c. This metamorphosis was first declared by Linnæus in the 'Philosophia Botanica,' then maintained by Wolf, and still later by the poet Goethe; and as this principle of morphology had been generally accepted by botanists, the Professor now applied it to zoology. Among the lowest zoophytes there are found, as the relation of *polarity* prepares us to expect, animals so nearly resembling sea-weeds, as often to be confounded with them. These are found to be a multitude of individuals, arranged in a definite form on a common axis. To these branch-like beings, constituting the *entirety* of the zoophyte, vesicles are suspended, containing eggs, in cup-shaped bodies of various and beautiful forms. Professor Forbes discovered, from a series of elaborate researches in the genus *Plumularia*, that there was the same analogy between this *polype-vesicle* and the creature which produces it, that there is between the green leaf and the flower and fruit of the plant. This proposition the Professor illustrated by instancing six orders of zoophytic form, in which this metamorphosis was distinctly traceable.

Having thus developed his views on morphological analogy, *that of combination*, Prof. Forbes entered upon what he admitted to be a more doubtful part of his system—*the analogies between parallel groups*. Having noticed that organized beings are grouped in types, the members of each type being formed on the same model, he declared his opinion that the members of every type which differ from the typical form, *differ by adopting the characteristic of the nearest type*. Thus, assuming the Mollusca and Annelida to be parallel types, the Pectenibranchous gasteropod, which is typical of the former, comes into the same group with the shell-less, worm-like nudibranch, which possesses so many of the external characteristics of the latter. [The Professor here laid great stress on the difference between *analogy*, which chiefly regards *form*,—and *affinity*, which respects *structure and function*.]

Again, in the case of *species*, whenever any individual of any species of one group becomes monstrous as to number, this monstrosity is shown by assuming the dominant number of the corresponding group. Thus, the Arachnoderms and Echinoderms are in this relation of parallelism (the former having their organs arranged in multiples of *four*, the latter in multiples of *five*). Now, according to Prof. Forbes, whenever a monstrous example of either tribe occurs, the number assumed is that of the parallel tribe (*four* in the case of Echinoderms, and *five* in that of Arachnoderms).

Again, throughout the parallel groups of nature there is a mutual representation of each other's characteristics. Thus, the animal is characterized by concentration of essential parts, and by being organized with a view to the development of the individual: the vegetable is characterized by elongation of essential parts, and by being organized with a view to extensive reproduction of the species. In proportion as the animal approaches the vegetable, it does so by assuming the vegetable characteristics. Thus, while there is a tendency to concentration (animal characteristic) in Vertebrata, there is a tendency to extension (vegetable characteristic) in Articulata. Again, there is an universal tendency to the formation of an *endo-skeleton* in Vertebrata, and of an *exo-skeleton* in Articulata; so, in the higher plants, there is a tendency to an *endo-skeleton* and concentration in the *exogens*, to an *exo-skeleton* and extension in the *endogens*. These principles were illustrated by these, among other examples:—The Gasteropodous mollusca contain the Patella and Chiton; the one characterized by concentration, the other going off to the articulated type by extension. In fishes, the *osseous* have the strong *endo-skeleton* of Mammalia, while the *cartilaginous* have the feeble *endo-skeleton*, compensated by a tough integument, the analogue of the *exo-skeleton* of the Articulata. And, as an example from the vegetable kingdom, the Professor finally noticed the parallel groups of *Leguminosæ* and *Rosaceæ*, orders so truly parallel, that though easily distinguished by habit and non-essential characters, the true line of distinction between them was not made out until investigated by the profoundest of botanists, Mr. Robert Brown, where in the one the *exo-skeleton* in the fruit is developed at the expense of the *endo-skeleton*; in the other, there is the concentration of fruit and the development of the *endo-skeleton*; the representation of the two spheres being here manifested in the reproductive system, characteristic of the vegetable kingdom, even as in the animal instances it is chiefly exhibited in organisms devoted to the nervous system, characteristic of the animal kingdom, and progressive manifestation of intelligence.

In conclusion, the Professor gave the following abstract expressions of the leading ideas which he had endeavoured to illustrate in this communication:—

1st. The unity of the transformations and combinations of individual animated beings, with a view to physiological ends serving the species.

2nd. The harmonious duality pervading the arrangements of the animal and vegetable kingdoms.—*Athenæum*, No. 904.

GEOLOGICAL SOCIETY.

Jan. 22, 1845.—The following communications were read:—

"Geological Features of the country round the Mines of the Taurus." By W. W. Smyth, Esq.

The mines described in this paper appear to be worked in great masses rather than beds or veins. They consist of two, one containing ores of copper, and the other argentiferous ores of lead worked for silver. The former at Arghaneh Maden is worked in igneous and altered rocks in the neighbourhood of Diarbekr, the average annual supply being about 3500 tons of ore, producing about 380 tons of copper, but it is thought that the return of metal from the ore might easily be doubled. There are several mines of silver and lead worked at Kiebban Maden, the proportion of silver being about an ounce or an ounce and a half per hundred pounds. About 900 lbs. weight of silver are produced annually, and a small quantity of lead. The geological date of the formations in the Taurus seems to be, in most cases, that of the cretaceous period, but there are also some metamorphic rocks of more ancient origin.

"On the newer Coal Formations of the Eastern part of Nova Scotia." By J. W. Dawson, Esq.

The paper was an appendix to a communication made last year before the Geological Society, and completed the account prepared by the author of the Carboniferous Formation. The paper also contained a notice of some footmarks observed in the sandstone, which were considered by the author to be those of a bird. In an appendix a notice was given of the junction of the Carboniferous and Silurian rocks at a locality called M'Cara's Brook.

Feb. 5.—A paper was read "On Raised Beaches and the Shells found in them, occurring on the coast of Essex near Walton." By J. Brown, Esq., of Stanway.

The object of this paper was to direct attention to the fact, that low raised beaches exist on this part of the eastern coast, and that they contain fossils, not only marine but freshwater, and confined to a small number of species, though individuals are very numerous. It was also the wish of Mr. Brown to bring these raised beaches into comparison with the beds called "Till" in the Clyde valley.

A paper was next read "On the Geology of the vicinity of the Wollondilly River, in Argyle County, in the colony of Sydney, New South Wales." By the Rev. W. B. Clarke.

The district described by the author is chiefly occupied by igneous rocks, upon which sedimentary rocks of the carboniferous period repose unconformably. The igneous rocks consist of granite and syenite, of porphyries, basalt and trachyte. They pass into and occasionally intersect one another, and are traversed by numerous dykes of igneous rocks of various kinds. The sedimentary rocks are not less violently disturbed, and have become greatly altered in every place where they have been brought into contact with the granite.

A communication was also made by Dr. Fitton, "On the Beds of the Lower Greensand of the Isle of Wight."

Dr. Fitton, after describing the general structure of the back of the Isle of Wight, alluded to the numerous fissures or *chines* found in these localities. He also described the different beds of the lower greensand, and mentioned the fossils most characteristic of each of them. He concluded by alluding to some of the fossils from the Neocomian beds of the Continent, and mentioned the fact that these foreign strata are strictly contemporaneous with the lower greensand of England.

MISCELLANEOUS.

FALCO ISLANDICUS.

A SPECIMEN of the Iceland falcon (*Falco Islandicus*) was shot near the North Tyne last week. It was a young male bird of the last year. This species was for a long time considered identical with the Gyr falcon of Greenland, until the difference was pointed out by Mr. J. Hancock, during the week that the meetings of the British Association for the Advancement of Science were held in Newcastle*. It is a very rare species in England, few instances of its capture being on record. In Iceland it appears to be not very uncommon during the summer months, where it breeds, but its equatorial migrations do not generally bring it so far south. The flight of these birds is powerful in the extreme. Montagu reckons that of the peregrine falcon (which is a closely-allied species to the present, but smaller) to be 150 miles an hour. At this speed, the distance from Iceland to this country would be easily performed. The present bird, which

* Mr. Hancock's paper will be found at p. 211, vol. ii. of the 'Annals.'

is now in the possession of Mr. Charles Adamson of this town, was in good condition, weighing $2\frac{1}{2}$ pounds.—*Morning Chronicle* of Feb. 6.

ON THE ORIGIN OF THE CORMS OF COLCHICUM.

At the sitting of the Society of the Friends of Natural History of Berlin on the 19th of November, M. Link exhibited a corm of *Colchicum arenarium*, on which a flower-bud and the traces of two stems past flowering occurred, one of which was situated in the middle with the root-fibres. This proves that the base of the flower whence the root-fibres take their origin, and which during the flowering period is very small, subsequently increases in size and forms the true corm, traces of the stem of which, raised by the upward growth, are long visible. The growth of the corm, in which many have expected to find some regularity, is very irregular. *Colchicum arenarium*, which developes more flowers at one time than *C. autumnale*, exhibits this most distinctly.—*Bot. Zeitung*, Jan. 10, 1845.

INFUSORIAL DEPOSITS IN AMERICA.

"Charleston is built upon a bed of animalcules several hundred feet in thickness, every *cubic inch* of which is filled with myriads of perfectly preserved microscopic shells. These shells however *do not*, like those beneath Richmond and Petersburg, &c., belong to the siliceous infusoria, but are all derived from those minute calcareous-shelled creatures, called by Ehrenberg Polythalamia, and by D'Orbigny the Foraminifera. You are aware that Ehrenberg proved chalk to be chiefly made up of such shells, and you will doubtless be pleased to learn that the tertiary beds beneath your city are filled with more numerous and more perfect specimens of these beautiful forms than I have ever seen in chalk or marl from any other locality.

"The following are some of the results I have obtained:—

"1. The marls from the depth of 110 feet to 193 feet are certainly *tertiary* deposits, for I found them to contain Polythalamia of the family *Plicatilia* of Ehrenberg (*Agathestegens* of D'Orbigny), which family, as far as is yet known, occurs in *no formation older than the tertiary*.

"2. The beds from the depth of 193 feet to 309 feet contain so many species in common with the beds above them, that although I have not yet detected the *Plicatilia*, I still believe they must also belong to the tertiary formation.

"3. The forms found in these beds agree much better with those detected by me in the eocene marls from Panumkey River, Virginia, than they do with miocene Polythalamia from Petersburg, Va., and I am consequently inclined to believe that they belong to the *eocene* epoch.

"4. All the marls to the depth of 236 feet present the Polythalamia in *vast* abundance, and in a state of surprising preservation. The most delicate markings of the shells are perfectly preserved, and some of the forms are so large that they may be easily seen with a common pocket-lens.

"5. The lithological characters of the marls from 236 feet to 309 yet differ from those above; and although the Polythalamia are still abundant, and many of the species appear to be the same as in the strata above, yet they are less easy to observe on account of the greater compactness of the marls, and the adherence of crystalline calcareous particles to the shells.

"6. The marls which you sent from the Cooper River, 35 to 38 miles above Charleston, also abound in Polythalamia, and so many of the species are identical with those found beneath Charleston, that they most probably belong to the same formation. This place on the Cooper River may be the outcrop of the very slightly inclined beds which exist under Charleston. [In this conclusion Prof. Bailey is correct.—J. L. S.]

"7. The Polythalamia, to whose labours South Carolina owes so large a portion of her territory, are still at work in countless thousands upon her coasts, filling up harbours, forming shoals, and depositing their shells to record the present state of the sea-shore, as their predecessors, now entombed beneath Charleston, have done with regard to ancient oceans. The mud from Charleston harbour is filled not only with beautiful Polythalamian shells, but is also very rich in siliceous infusoria."—*Extract of a letter from Prof. Bailey to J. L. Smith, in Silliman's American Journal*, Jan. 1845.

METEOROLOGICAL OBSERVATIONS FOR JAN. 1845.

Chiswick.—January 1. Foggy. 2. Cloudy: frosty. 3. Frosty: cloudy. 4. Overcast. 5. Rain. 6. Very fine. 7. Thick haze: very fine. 8, 9. Foggy. 10. Thick haze: boisterous at night. 11. Boisterous, with rain. 12. Hazy: rain: fine. 13. Overcast: clear. 14. Rain: drizzly: heavy rain. 15. Rain: fine. 16, 17. Overcast. 18. Densely clouded: heavy rain. 19. Clear: hail-shower at noon: constant heavy rain at night. 20. Boisterous. 21. Clear and frosty. 22. Sharp frost: hazy: fine: overcast. 23. Overcast: rain. 24. Fine: rain: frosty. 25. Clear and frosty: overcast: boisterous. 26. Boisterous: clear. 27. Rain: boisterous: cloudy. 28. Slight snow: fine, with sun: rain. 29. Overcast. 30. Hazy: frosty. 31. Frosty: cloudy: frosty.—Mean temperature of the month 2°·36 above the average.

Boston.—Jan. 1. Foggy. 2. Snow. 3, 4. Fine. 5. Cloudy: rain early A.M. 6—10. Cloudy. 11. Windy: rain early A.M.: rain P.M. 12. Foggy. 13. Foggy: rain A.M. 14. Cloudy. 15. Cloudy: rain early A.M. 16. Cloudy. 17. Fine. 18. Cloudy: rain P.M. 19. Cloudy. 20. Stormy: rain early A.M. 21. Fine. 22. Rain. 23. Cloudy. 24, 25. Fine. 26. Stormy. 27. Snow: rain A.M. 28. Fine: rain A.M. 29. Cloudy. 30, 31. Fine.

Sandwick Manse, Orkney.—Jan. 1. Bright: cloudy. 2. Clear: frost: cloudy. 3. Clear: frost: showers. 4. Showers: rain. 5. Showers: cloudy. 6. Showers: clear. 7. Bright: clear: aurora. 8. Clear: frost: clear. 9. Clear: cloudy. 10. Cloudy. 11, 12. Bright: clear. 13. Cloudy: drops. 14. Cloudy. 15. Bright: clear. 16. Clear: cloudy. 17. Showers. 18. Bright: cloudy. 19. Bright: frost: clear: frost. 20. Bright: frost: clear: aurora. 21. Cloudy: frost: drops. 22. Bright: showers: halo. 23. Showers. 24. Showers: clear. 25. Rain. 26. Showers: hail-showers. 27. Cloudy. 28. Snow-showers: clear: aurora. 29. Snow-showers: drift. 30. Clear. 31. Showers.

Applegarth Manse, Dumfries-shire.—Jan. 1. Frost: dull. 2. Slight frost. 3. Thaw: frost A.M. 4. Frost A.M.: rain P.M. 5. Rain A.M. 6. Dry and mild. 7. Rain early A.M. 8. Fair, but dull. 9. Fair: slight frost. 10. Fair, but dull: rain P.M. 11. Heavy rain A.M.: flood. 12. Fair and mild. 13. Rain: frost. 14. Fair. 15. Dull and cloudy. 16. Frost. 17. Slight frost: thaw P.M. 18. Rain. 19. Snow: rain P.M. 20. Frost: clear. 21. Frost: thaw P.M. 22. Thaw: fog. 23. Rain. 24. Rain early A.M. 25. Frost early A.M.: rain. 26. Rain: flood. 27. Snow: slight frost. 28, 29. Frost, severe: snow lying. 30. Frost, severe: snow. 31. Very hard frost.

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. Jan.	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.	30·146	30·121	29·85	30·05	30·05	30·17	30·18	45	34	36	35½	23½	44	41	ne.	calm	e.	sw.	......	......	......	......
2.	30·061	30·008	29·77	30·02	29·85	30·13	29·92	44	24	36	39½	33	34	37	n.	calm	n.	se.	......	......	......	......
3.	29·974	29·924	29·62	29·69	29·78	29·70	29·66	40	29	32	39	25½	37	43½	sw.	calm	n.	se.	......	......	......	......
4.	30·142	30·141	29·78	29·95	29·74	29·74	29·43	45	36	33·5	43	30	43½	45	sw.	calm	sw.	ssw.	·02	......	......	·14
5.	30·110	30·073	29·60	29·70	29·66	29·38	30·35	53	42	46	48½	41	49	49	sw.	w.	wsw.	sw.	·08	·31	......	·22
6.	30·100	30·084	29·60	29·75	30·00	29·56	30·03	54	43	46	49	44	40	40	sw.	w.	sw.	sw.	......	......	......	·12
7.	30·239	30·206	29·79	30·03	30 03	30·03	30·02	54	32	45	43	33½	42	40	w.	w.	n.	ssw.	......	......	0·55	......
● 8.	30·232	30·137	29·80	29·99	29·92	29·98	29·90	35	31	39	42½	34½	36	40	se.	calm	s.	s.	......	......	......	......
9.	30·089	30·047	29·77	29·88	29·75	29·82	29·66	35	28	35	40½	30	42½	42	se.	calm	nnw.	sse.	......	......	......	......
10.	29·946	29·764	29·63	29·54	29·20	29·43	29·17	49	30	33	47	34½	43	44½	s.	sw.	se.	se.	·04	......	......	......
11.	29·665	29·643	29·24	29·30	29·48	29·14	29·42	51	44	48	47	39½	43	39	sw.	sw.	se.	ssw.	·77	·09	......	......
12.	29·776	29·745	29·48	29·62	29·68	29·58	29·72	47	32	39	42½	35½	39	38	ne.	calm	sse.	s.	·16	·05	......	......
13.	29·662	29·555	29·37	29·46	29·30	29·72	29·64	51	30	39·5	41	31½	38	43	s.	calm	e.	cse.	·04	......	......	......
14.	29·730	29·606	29·33	29·44	29·63	29·78	29·75	50	35	40	44	36½	43	43	se.	calm	e.	se.	·12	·05	0·26	·05
☽ 15.	29·778	29·666	29·35	29·50	29·60	29 66	29·77	50	39	41	41	36	43	39	se.	calm	e.	se.	·02	·08	......	......
16.	30·080	29 983	29 64	29·81	29·81	29·85	29·78	48	32	42	38½	27	38	38	sw.	calm	e.	se.	......	......	......	......
17.	30·095	29·988	29·72	29·76	29·67	29·69	29·65	42	37	37	45½	31½	41½	42	s.	calm	se.	se.	......	......	......	·12
18.	29 801	29·560	29·45	29·43	29·26	29·46	29·32	46	33	40	43½	37	41	41½	s.	s.	se.	se.	·45	......	......	·22
19.	29·568	29·000	29·20	29·20	29·10	29·23	29·23	45	32	35	40	33	37	35½	sw.	calm	se.	s.	·88	·37	......	......
20.	29·878	29·117	28·90	29·40	29·73	29·38	29·82	45	24	43	41	29	40	39	n.	se.	nw.	nw.	·03	·15	......	·12
21.	30·210	29·998	29·77	29·99	29·92	29·96	29·73	45	21	31	41	26	37	44	s.	calm	w.	s.	......	......	......	·05
22.	30·199	30·178	29·82	29·92	29·88	29·81	29·71	48	38	35	47	38½	43½	44	s.	calm	w.	sw.	......	......	0·45	·04
○ 23.	30·135	29·677	29·60	29·59	29·34	29·34	29·40	48	39	47	47	41	43½	43½	sw.	calm	sw.	s.	·03	·04	......	·30
24.	29·937	29·586	29·16	29·36	29·75	29·53	29·65	46	25	40	46	41	43	43	w.	calm	nw.	nw.	......	......	......	·06
25.	30·038	29·680	29·60	29 60	29·14	29·29	29·00	51	42	34·5	48	32	45	49	sw.	calm	sw.	ssw.	·07	......	......	·43
26.	29·707	29·613	28·90	29·09	29·50	28·98	29·39	52	33	44	49	39	37	29	nw.	w.	nw.	nw.	·11	......	......	·91
27.	29·239	29·111	28·90	29·03	28·94	29·17	29·16	45	23	34	36½	30½	28½	32	w.	calm	wnw.	ne.	·04	......	......	......
28.	29·034	28 932	28·69	28·90	29·03	29·18	29·32	45	19	29	36	22	32	26	sw.	calm	nne.	ne.	·11	·20	......	......
29.	29·293	29·257	29·00	29·19	29·15	29·27	29·16	45	20	32	35	23	32	34	w.	calm	ne.	sse.	......	·08	1·25	......
30.	29·212	29·171	28·97	29·10	29·18	29·16	29·30	34	27	18	30	21	32	24½	sw.	calm	ne.	wsw.	......	......	......	......
☾ 31.	29·601	29·131	29·14	29·49	29·74	29·60	29·76	35	22	21·5	31	07	34	35½	n.	calm	ne.	n.	......	......	......	·19
Mean.	29·860	29·700	29·43	29·247	29·574	29·571	29·580	45·90	31·48	37·1	41·9	31·8	39·41	39·50					2·97	1·42	2·51	2·94

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 98. APRIL 1845.

XXVII.—*On the Penetration of the Cuticle into the Stomata.* By Hugo von Mohl*.

Three observers have nearly at the same time, and perfectly independent of one another, discussed a point which, notwithstanding the numerous investigations made respecting the stomata, had hitherto been entirely overlooked in their anatomy; they are, however, far from agreeing in the descriptions they give of the circumstance discovered by them.

Gugliemo Gasparrini† states, that beneath the stomata of the stem of *Cacteæ*, in particular of *Cereus peruvianus*, of the stem of *Euphorbia officinarum*, and of herbaceous leaves, there is situated a vesicular organ, which he terms *Cistoma*. Its walls are said to consist of delicate fibres connected by a membrane, which form a sphincter at the upper end of the cistoma, situated beneath the closed aperture of the stoma. The vesicular organs the author separated with the cuticle from the epidermis by boiling the latter in dilute nitric acid.

Hartig, in his 'Lehrbuch der Pflanzenkunde,' part 4, 1842, describes the same organ as an appendage of the cuticle. To the latter he ascribes a very complicated structure, separating it into three different layers: 1. *an external membrane, epichroa*; 2. *an internal membrane, endochroa*; 3. a central mass situated between these membranes, the *central cement, mesocolla*. It is stated of the external membrane, that it extends over the entire leaf, penetrates into the area in front of the stomata, but nevertheless continues further over the stoma itself without interruption, while the inner membrane is immersed in the form of folds between the cells of the epidermis and penetrates in various plants, more or less deeply into the subjacent cellular tissue, in which case it then takes its course through the intercellular passages in the form of vessels (*intercellular vessels*). In like manner the inner

* From the Botanische Zeitung for Jan. 3, 1845. Translated and communicated by W. Francis, Ph.D., F.L.S.

† Rendiconto delle adunanze e dei lavori dell' Academia delle Scienze, Napoli, 1842.

membrane is said to penetrate through the stomata into the spiracles, clothe their walls, and extend thence, in the leaves of *Narcissus Jonquilla,* in the form of vessels into the intercellular passages.

Payen* states that the cuticle enters the stomata and, in *Cactus peruvianus,* extends down through the layers of the epidermis as a thin membrane in the form of a muff. This membrane, like the cuticle itself, is said to be coloured yellow by iodine, and to exhibit the same resistance to the action of sulphuric acid.

These statements induced me to institute some investigations on the subject in question. For this purpose I adopted the method of soaking the sections of the leaves for examination in tincture of iodine, washing them with water, and then submitting them to the action of sulphuric acid. This latter not only heightens the yellow tint of the cuticle coloured by iodine, but it has especially this advantage, that the cells of the epidermis of most plants are disintegrated with the production of a blue colouring or entirely dissolved, according to the strength of the acid employed, when the cuticle can be very readily distinguished and separated from them. From these investigations this general result was obtained, that, as asserted by Payen, a direct continuation of the cuticle penetrates into the stomata and proceeds down between the porous cells to the spiracles in the form of a tube very highly compressed on both sides. No doubt can be entertained, on a careful examination, that this tube is not closed either at the entrance into the stomata or lower down between the porous cells. Arrived at the inner termination of the stomatic aperture, this tube dilates into a smaller or larger funnel-shaped expansion, which clothes the inferior surface of the epidermis so far as it closes the spiracle externally.

Some differences occur with respect to this funnel-shaped expansion in various plants. Generally the expansion of the funnel extends only as far as true cells of the epidermis form the outer wall of the spiracles; and it is cut off short at the limit of the outer wall and of the lateral walls of the spiracles formed of green parenchymatous cells, so that the margin of the funnel presents irregularities corresponding to the rounded-off lateral walls of the parenchymatous cells. In general no appendages penetrate from the margin of the funnel into the intercellular passages running beneath the epidermis and connected with the spiracles; for instance, in the stem of *Euphorbia officinarum, Cacalia Kleinia, Lepismium Myosurus,* in the leaves of *Agapanthus umbellatus, Narcissus Jonquilla, Pothos lanceolata,* and in the leaf-like branches of *Ruscus aculeatus.* In other cases, on the contrary, appendages proceed from the margin of the funnel-shaped expansion through

* Mémoire sur le Développement des Végétaux.

the intercellular passages on the inferior surface of the epidermis to neighbouring funnels, and form in this manner connexions with one another; for instance, on the under side of the leaves of *Helleborus niger* and *viridis*, and in the leaves of *Euphorbia Caput Medusæ.* Lastly, it occurs in some plants, for instance, in the leaves of *Betula alba* and *Asphodelus luteus*, that such appendages penetrate into all the intercellular passages situate beneath the epidermis, and extend in the form of a reticulate membrane over the whole under surface of the epidermis, so that the epidermatous cells are clothed on both sides by a true cuticle, in which the inner cuticle does not, it is true, form a continuous membrane, not passing in between the epidermatous cells and the parenchymatous cells adherent to them, but exhibiting at the place of connexion of every parenchymatous cell with a cell of the epidermis, a void corresponding to the size of the place of connexion. A similar inner perforated cuticle may likewise occur without the epidermis being interrupted by stomata; but this is rare, at least I have hitherto found it only in the epidermatous cells of the upper surface of the leaf of *Helleborus niger* and *viridis*.

When the epidermis consists of several superposed layers of cells, as in *Cereus peruvianus* and *Cactus Opuntia*, the continuation of the cuticle clothes the lateral walls of the portion of the spiracle situated in this thickened epidermis; it consequently appears not merely in the form of a wide expanded funnel, but rather in that of a tube, and then constitutes the organ described and figured by Gasparrini under the name of cistoma. In this case the tube-like continuation of the cuticle likewise terminates with an open embouchure at the inferior limit of the epidermis; although it sometimes appeared to me to continue for a short distance into the portion of the spiracle situated between the green parenchymatous cells; for instance, in *Cereus peruvianus* and likewise in *Protea mellifera*, whose leaves, moreover, possess a simple epidermis.

This continuation of the cuticle penetrating into the interior of the organs, is acted upon, as already observed by Payen, by iodine and sulphuric acid precisely like the cuticle situated on the outer side of the epidermis. A composition of fibres, which is ascribed to it by Gasparrini, can no more be demonstrated in it than in any other vegetable membrane; but just in like manner as fibre-like thickened bands occur on the cuticle of many plants, so do we find the same circumstance in some of the plants I have examined; for instance, *Cereus peruvianus* and *Helleborus niger*, and likewise on the funnel-shaped membrane clothing the outer side of the spiracles. As, moreover, the cuticle of most plants does not admit of our distinguishing any composition of individual pieces correspondent to the subjacent epidermatous cells, so is it likewise with their appendages situated in the interior of the leaf. It is true they sink into the furrows proceeding between the adjacent cells, and are frequently provided at these places with projecting bands immersed in the furrows; but a composition of originally distinct pieces is in so far incapable of being detected, as it is impossible to separate them into the individual pieces corresponding to these divisions by the application of acids. This circumstance will naturally be considered by those phytotomists who, with Treviranus, Schleiden and Payen, look upon the cuticle as a part distinct from the epidermatous cells, as a hardened secretion, to support their view; but in reference to this point, it is in my opinion requisite to take the greatest precaution not to be led to a rash conclusion.

I have already in my memoir on the cuticle, 'Linnæa,' vol. xvi., not by any means denied that important reasons appear to speak in favour of this view, and I am at present just as far from wishing to deny the possibility that this view is correct and the one supported by me erroneous; but nevertheless I still believe, that the view according to which the cuticle is formed of the outer layers of the epidermatous cells themselves is far more probable. If the cuticle owed its origin to a secretion taking place at the surface of the epidermis, it ought to be possible to find the primary membrane of the epidermatous cells beneath it, and observe it pass into the lateral walls of these cells. I have not succeeded in doing this, but, on the contrary, I believe I have traced in many cases the primary membrane of the lateral walls of the epidermatous cells through the cuticle to the surface of the latter, and I thence concluded that the cuticle was not a peculiar membrane distinct from the epidermis, but owed its peculiarities to a metamorphosis of the substance of the outer layers of the epidermatous cells themselves. Undoubted analogies may be adduced in support of such metamorphoses of individual parts of the cell-wall (or according to the views of Payen, in favour of a deposition of organic substances in the *cellulose* of the original cell-wall, whence this acquires different properties). I would especially call to mind, in this respect, the nature of the primary membrane of the prosenchymatous cells of most woods, which membrane originally exhibited all the characters of pure *cellulose*, while in the developed wood it presents the same property as the cuticle, of being coloured yellow by iodine and of resisting the action of sulphuric acid. I would moreover call to mind the brown-coloured parenchymatous cells which inclose the vascular bundles of ferns, and in which, in some cases, not all the walls, but only that directed towards the vascular bundle and a portion of the lateral wall, undergoes that metamorphosis into a thickened brown substance resisting the action of sulphuric acid. But whatever be the case with regard to the origin of the cuticle, I must certainly protest most decidedly against Hartig's representation that the cuticle consists of three layers, and that the membranes penetrating into the interior of the leaf are a continuation of only one of these layers, the innermost, and that they form hollow, vessel-like tubes in the intercellular passages, since I have not observed a single circumstance that would afford a confirmation of any one of these statements.

XXVIII.—*Researches into the Structure, Functions and Œconomy of the* Araneidea. By John Blackwall, F.L.S.*

In essaying to give an epitome of some investigations recently made in this country relative to the organization, physiology and œconomy of the *Araneidea*, I shall endeavour to accomplish the undertaking in as compendious a manner as may be deemed compatible with a perspicuous statement of the various facts to be detailed, distinguishing those already before the public from such as are not by references to the works in which they have appeared.

Without further preface, I proceed to the consideration of those remarkable appendages termed *scopulæ* or brushes, with which the tarsi of numerous species of spiders are provided. This apparatus, consisting of coarse, compound, hair-like papillæ either distributed along the inferior surface of the tarsi or situated immediately below the claws at their extremity, bears a close analogy to the tarsal cushions of insects, enabling its possessor to ascend the perpendicular surfaces of highly polished bodies and even to adhere to smooth objects in an inverted position by the emission of a viscous secretion†. The different plans according to which the papillæ are disposed upon the tarsi are respectively represented by two common British spiders, *Drassus sericeus* and *Salticus scenicus*.

Some of the spiders belonging to the families *Theridiidæ* and *Epëiridæ* have the sides and lower part of the tarsi, at their extremity, supplied with several small, curved, dentated claws, in addition to the three larger ones common to them all. *Epëira quadrata*, *Epëira apoclisa*, and, indeed, most of the larger species of *Epëiræ* indigenous to Great Britain, exhibit this structure to advantage under the microscope; they have, besides, a strong, moveable spine, inserted near the termination of the tarsus of each posterior leg, on the under side, which curves a little upwards at its extremity, and presents a slight irregularity of outline at its superior surface. These spines, which have been denominated *sustentacula*, subserve an important purpose. By the contraction of their flexor muscles they are drawn towards the foot, and are thus brought into direct opposition to the claws, by which means the animals are enabled to hold with a firm grasp such lines as they have occasion to draw from the spinners

* From the Report of the Meeting of the British Association held at York 1844.

† Transactions of the Linnæan Society, vol. xvi. pp. 768, 769. Researches in Zoology, p. 289.

with the feet of the hind-legs, and such also as they design to attach themselves to*.

There are on the superior part of the metatarsus of the posterior legs of all the *Ciniflonidæ* two parallel rows of moveable spines commencing just below its articulation with the tibia and terminating near its lower extremity. In a state of repose, the spines composing both rows are directed down the joint and are somewhat inclined towards each other; those of the upper row have a considerable degree of curvature and taper gradually to a fine point, those of the lower row being stronger, more closely set, and less curved. Employed to transform, by the process of curling, certain lines proceeding from the spinners into the small flocculi characteristic of the snares of the *Ciniflonidæ*, the double series of spines has received the name of *calamistrum*.

When a spider of this family purposes to form a flocculus, it presses its spinners against one of the glossy lines constituting the foundation of its snare, and, emitting from them a small quantity of liquid gum, attaches to it several slender filaments, drawn out by advancing the abdomen a little, and kept distinct by extending the spinning mammulæ laterally. The posterior legs are then raised above the plane of position, and the tarsal claws of one of them are applied to the superior surface of the metatarsus of the other, near its articulation with the tarsus, and the *calamistrum* is brought immediately beneath the spinners, at right angles with the line of the abdomen. By a slight extension of the joints of the posterior legs the *calamistrum* is directed backwards across the diverging extremities of the spinners, which it touches in its transit, and is restored to its former position by a corresponding degree of contraction in the joints. In proportion to the continuation of this process the inflected lines of the flocculus are produced, the spider making room for them as they accumulate by elevating and at the same time advancing the abdomen a little, which it effects by slightly extending the joints of the third pair of legs and contracting those of the first and second pairs. When the requisite quantity of inflected filaments is obtained, the spider again applies its spinners to one of the glossy lines and attaches the flocculus to it. In this manner it proceeds with its labours, occasionally employing both *calamistra*, till the snare is completed. The *modus operandi* appears to be this. The points of the lower row of spines in passing over the extremities of the spinners draw from them lines which run into numerous flexures in consequence of not being kept fully extended, and the purpose subserved by the spines of the upper row is the detachment of these lines from the spines of the lower row by a motion upwards†.

If the metatarsus of one of the posterior legs of *Ciniflo ferox*, a spider of frequent occurrence in the interior of buildings, be examined under the microscope with a moderately high magnifying power, the arrangement of the spines composing the two rows which constitute the *calamistrum* will be apparent.

* Transactions of the Linnæan Society, vol. xvi. p. 476; vol. xviii. p. 224, note *.
† Ibid. pp. 471–475; vol. xviii. pp. 224, 606.

Four, six, or eight mammulæ, somewhat conical or cylindrical in figure, and composed of one or more joints each, constitute the external spinning apparatus of the *Araneidea*: they are usually closely grouped in pairs at the extremity of the abdomen, and are readily distinguished from each other by their relative positions. The pair situated nearest to the anus may be denominated the superior spinners; that furthest removed from the anus, the inferior spinners; and the mammulæ placed between these extremes, the intermediate spinners; distinguishing them, when there are two pairs, by prefixing the terms superior and inferior. Exceedingly fine, moveable papillæ or spinning tubes, for the most part dilated at the base, occur at the extremity of the mammulæ, or are disposed along the inferior surface of their terminal joint, whence issues the viscous secretion of which all the silken lines produced by spiders are formed. The papillæ connected with the mammulæ vary greatly in number in different species of spiders, and also differ considerably in size, not only in individuals of the same species, but often even on the same mammulæ.

Among our native spiders, the larger species of *Epëiræ* have the mammulæ most amply provided with papillæ; it is probable, however, that the total number does not greatly exceed a thousand even in adult females of *Epëira quadrata*, whose weight is about twenty grains, and in many other species it is much smaller. In *Tegenaria civilis* the total number of papillæ does not amount to four hundred; in *Textrix lycosina* and *Clubiona corticalis* it is below three hundred; in *Segestria senoculata* it scarcely exceeds one hundred; and in many of the smaller spiders it is still further reduced.

A difference in the number and size of the papillæ connected with the several pairs of mammulæ in the same species, and with similar pairs in different species, is also very apparent. In spiders of the genera *Epëira*, *Tetragnatha*, *Linyphia*, *Theridion* and *Segestria*, they are generally much more numerous and minute on the inferior spinners than on the superior and intermediate ones; the last are the most sparingly supplied with them, and in the case of *Segestria senoculata* each has only three large papillæ at its extremity. An arrangement nearly the reverse of this takes place in some of the *Drassi*, and is conspicuous in *Drassus ater*, which has the intermediate spinners abundantly furnished with papillæ, those on the inferior spinners being very few in number and chiefly of large dimensions, emitting the viscous secretion copiously. The papillæ connected with the short terminal joint of each inferior spinner of this species vary in number with the age of the animal; the young, on quitting the cocoon, are provided with four only; individuals which have attained nearly a third of their growth have five or six; those about two-thirds grown, six or seven; and adults, which have acquired their full complement, eight; two of them, situated on the inferior surface of the spinner, at a greater distance from its extremity than the rest, are minute and almost contiguous. It is a fact deserving of notice, that the papillæ are not always developed simultaneously on these spinners, six, seven, or eight being sometimes observed on one, when five, six, or seven only are to be seen on the other; and this remark is applicable, not to the inferior spinners alone, but to the intermediate ones also, which, in mature individuals, are further modified by having the extremities of the terminal joints directed downwards at right angles to their bases. The same law of development holds good as regards the papillæ connected with the inferior spinners of *Drassus cupreus* and *Drassus sericeus*, and though their number is not uniformly the same even in adults of either of these or the preceding species, yet the two minute ones belonging to each mammula are present invariably *.

The superior spinners of many spiders are triarticulate; and when the terminal joint is considerably elongated, thickly clothed with hairs, and tapers to a point, the papillæ, in the form of hair-like tubes dilated at the base, are commonly distributed along its inferior surface, as in the case of *Agelena labyrinthica*, *Tegenaria domestica*, and *Textrix lycosina*. This deviation from the prevailing structure has induced Lyonnet, Savigny, Treviranus, Audouin, and other skilful zootomists, who have failed to detect the papillæ, to regard the superior mammulæ, thus modified, as anal palpi, and to deny that they perform the office of spinners; but if these parts be carefully examined with a powerful magnifier in living specimens during the exercise of their function, the fine lines of silk proceeding from the papillæ cannot fail to be discerned, and a correct knowledge of their external organization may thus be obtained. Not being aware, apparently, of the publication of this discovery in the 'Report of the Third Meeting of the British Association for the Advancement of Science, held at Cambridge in 1833,' p. 445, Baron Walckenaer, in the Supplement to the second volume of his 'Histoire Naturelle des Insectes Aptères,' p. 407, has ascribed it to M. Dugès, whose observations on the subject in the 'Annales des Sciences Naturelles,' seconde série, t. vi., Zoologie, p. 166, were not published till 1836.

One of the most striking peculiarities in the structure of the *Ciniflonidæ*, which serves to distinguish them from all other animals of the order *Araneidea* at present known, is the possession of a fourth pair of spinners. These spinners are shorter and further removed from the anus than the rest, being situated at the base of the inferior intermediate pair, by which they are almost concealed when in a state of repose. Their figure is somewhat conical, but compressed and truncated, so that the base and apex are elliptical with long transverse axes. Consisting of a single joint only, each is connected with the other throughout its entire length, the extremity alone being densely covered with exceedingly minute papillæ, which emit the viscous matter that is formed by the *calamistra* into a delicate tortuous band constituting a portion of every flocculus in the snares of these spiders, and chiefly imparting to them their most important property, that of adhesion †.

Arachnologists have not bestowed that degree of attention on the

* Transactions of the Linnæan Society, vol. xviii. p. 219–224.

† Ibid. pp. 223, 224, 606.

palpi of spiders to which their diversified structure and important functions undoubtedly entitle them.

Much difference is observable in the relative proportions of the several joints of the palpi of female spiders, not only in species constituting the same family, but even in those belonging to the same genus; while, on the other hand, it frequently happens that females belonging to different genera bear a striking resemblance to each other in this particular. It is among male spiders, however, that these peculiarities are the most marked, and to them may be added structural differences and resemblances both of the palpi and sexual organs still more conspicuous.

A great similarity in the form of the organs of reproduction, in the simplicity of their structure, and in the manner of their connexion with the digital joint of the palpi, which has no cavity opening externally, may be seen in certain males of the family *Dysderidæ*; in *Dysdera erythrina*, *Dysdera Hombergii*, *Segestria perfida*, *Segestria senoculata*, and *Oonops pulcher*, for example; and this similitude is extended to the males of various species belonging to the family *Mygalidæ*.

Between the males of *Pachygnatha Clerckii* and *Tetragnatha extensa* there is a near approximation in the structure of the palpi and sexual organs, yet these spiders are not included in the same family, the former belonging to the *Theridiidæ*, and the latter to the *Epëiridæ*.

If the spiders constituting the genus *Clubiona* be compared with those of the genus *Drassus*, and those of the genus *Linyphia* with the species comprised in the genus *Neriëne*; or, extending the investigation still further, if the genera *Walckenaëra*, *Theridion*, *Epëira*, *Eresus*, *Salticus*, *Thomisus*, and *Philodromus* be compared together, numerous instances of correspondence in the relative proportions of the joints of the palpi will be perceived immediately; at the same time, striking contrasts will present themselves to the eye of the observer, not as regards proportion alone, but organization also, even among nearly allied species.

As the full development of the palpi and the organs of generation connected with them indicates a state of maturity in male spiders, the skilful arachnologist is enabled, by attending to this circumstance, not only to distinguish adult males from females, but likewise from immature individuals of both sexes. This knowledge is useful in preventing him from falling into the too common error of mistaking young spiders for old ones, and of describing them, and the sexes of spiders of the same kind, as distinct species. When any doubts exist as to the specific identity of adult spiders of different sexes, they frequently may be set at rest by placing the spiders together in captivity and noticing whether they pair or not.

The great diversity of structure observable in the palpi and sexual organs of male spiders supplies excellent specific characters, and, indeed, frequently presents the only available means of distinguishing species of similar colours and dimensions from each other; but when it is borne in mind that this diversity of structure extends to spiders connected by the closest relations of affinity, it is, perhaps, in vain to expect that it will ever be applied with much success to the establishment of genera.

From remarks on the structure of the palpi to the consideration of the functions they perform the transition is easy and natural.

Many spiders employ their palpi in assisting to collect the slack line which results from their operations when engaged in ascending the silken filaments by which they have lowered themselves from stations previously occupied, or in drawing in such as have been emitted from the spinners for the purpose of facilitating a change of situation in some other direction. The silk collected on these occasions is formed into a small heap, which is either attached to some fixed object, or is transferred to the maxillæ, and, after having been mixed with saliva and reduced in volume by repeated acts of compression, is ultimately allowed to fall to the ground.

In conjunction with the mandibles, the palpi are employed by females of the species *Dolomedes mirabilis* and *Dolomedes fimbriatus* to retain their cocoons under the sternum, in which situation those spiders usually carry them wherever they move. The *Lycosæ* also avail themselves of the same parts in regaining possession of their cocoons when detached from the spinners.

Certain spiders belonging to the genus *Mygale* have the inferior part of the tarsi furnished with a dense brush of hair-like papillæ for the emission of a viscous secretion, which enables them to ascend bodies having smooth perpendicular surfaces. Now, as the females of these species usually have the under side of the digital joint of their palpi, which are remarkably long and powerful, supplied in like manner with papillæ, analogy would lead to the conclusion that, in harmony with their organization and distribution, they also constitute a climbing apparatus.

Various species of *Salticidæ*, to which distinctness and accuracy of vision are of the utmost consequence, as they do not construct snares, but capture their prey by springing suddenly upon it from a distance, have the terminal joint of the palpi abundantly supplied with hairs, and constantly make use of those organs as brushes to remove dust, or any other extraneous matter, from the corneous coat of the anterior eyes.

The palpi appear to afford direct assistance likewise to spiders in general in securing their prey, in changing its position while they are feeding upon it, and in restraining the action of the wings of all their victims which happen to be provided with them*.

With regard to the function exercised by the remarkable organs connected with the digital joint of the palpi of male spiders there exists some difference of opinion. Taking anatomy as his guide, Treviranus arrived at the conclusion that the parts in question are used for the purpose of excitation merely, preparatory to the actual union of the sexes by means of appropriate organs situated near the anterior part of the inferior region of the abdomen. This view of

* Report of the Twelfth Meeting of the British Association for the Advancement of Science, held at Manchester in 1842; Transactions of the Sections, pp. 67, 68.

the subject, which is very generally adopted, is opposed to that derived from physiological facts by Dr. Lister and the earlier systematic writers on arachnology, who regarded the palpal organs as strictly sexual.

Rejecting the opinion of Treviranus, Baron Walckenaer has given his support to that entertained by Lister and the physiologists, having endeavoured to establish its accuracy by pursuing the imperfect method of investigation employed by the latter, which chiefly consists in examining the condition of the palpal organs when applied by male spiders to the vulva of females and carefully noticing the changes they undergo ; but as it is possible that such females, should they prove to be prolific, may have been impregnated at a former period, and as other organs than those connected with the digital joint of the palpi may have been instrumental in producing the result, observations of this description appear to be quite inadequate to effect the object proposed.

An attempt to relieve the inquiry from objections so weighty is recorded in the 'Report of the Third Meeting of the British Association for the Advancement of Science, held at Cambridge in 1833,' pp. 444–5, and the result arrived at has a direct tendency to confirm the truth of the opinion promulgated by Dr. Lister. Since that time, researches in connexion with this subject have been greatly extended and varied, and it is satisfactory to add, that they supply a body of evidence which appears to be conclusive as to the agency of the palpal organs.

The following is a concise summary of the more important particulars elicited by this investigation.

It is an admitted fact, that female *Aphides*, when impregnated, are capable of producing females which, without sexual intercourse, are prolific through several successive generations. In order to determine whether this is the case with spiders or not, young females of the species *Tegenaria domestica*, *Tegenaria civilis*, *Agelena labyrinthica*, *Ciniflo atrox*, *Drassus sericeus*, *Theridion quadripunctatum*, *Segestria senoculata*, &c., were placed in phials of transparent glass and fed with insects. Most of these individuals remained in captivity from one to three years after they had completed their moulting and attained maturity ; yet three only, an *Agelena labyrinthica*, a *Tegenaria domestica*, and a *Tegenaria civilis*, produced eggs, and they proved to be sterile, though several of the others, to which adult males were subsequently introduced, laid prolific eggs after coition. It is worthy of remark, that the spiders which produced unfruitful eggs deposited them in cocoons and bestowed the same care upon them as if they had been fertile.

This preliminary point being settled, attention was directed in the next place to spiders in a state of liberty, when it was perceived that the males of various species do not bring any part of the abdomen near the vulva of the females in the act of copulation, and that this is the case with the *Lycosæ* in particular ; for example, the male of *Lycosa lugubris*, after having made the customary advances, springs suddenly upon the back of the female with his head directed towards her spinners and the anterior part of the inferior surface of the abdomen resting upon her cephalothorax; then placing the first pair of legs immediately behind her posterior pair, the second pair between her second and third pairs, the third pair between her first and second pairs, and the posterior pair before her first pair, he thus embraces her, and applies the palpal organs to the vulva by inclining to one side or the other as the occasion may require. In this situation the male remains till the act of union is consummated and then quits it with precipitancy, so that his abdomen is not even brought into contact with that part, much less with the vulva, of the female.

Precisely the same manner of proceeding is pursued by *Lycosa agretyca*, *Lycosa saccata*, *Lycosa pallida*, and *Lycosa obscura*; and females of the last species have been seen to receive the embraces of several males in immediate succession, and to copulate even at the time they had cocoons containing newly-laid eggs attached to their spinners, which circumstances serve to support the opinion that some spiders pair oftener than once in the course of their lives.

When in captivity, the sexes of *Lycosa lugubris* sometimes continue paired more than four hours, during which period the male applies the palpal organs several hundred times to the vulva of the female.

Notwithstanding the important bearing of these observations upon the physiological problem under consideration, something was still wanting to complete its solution, and recourse was had to direct experiment to supply the desideratum.

On the 4th of May 1842, an adult male *Tegenaria civilis* was procured, and, being held by the legs in an inverted position, the inferior surface of the abdomen was moistened by applying to it a camel's hair pencil which had been dipped in water. The entire interval between the plates of the spiracles, supposed by Treviranus to be the seat of the sexual organs in male spiders, and even a considerable space below that interval, was then covered with strong, well-gummed writing-paper cut into a suitable form and closely applied, and when the paper became thoroughly dry and firmly attached, the spider was placed in a phial with a female of the same species, which had been in solitary confinement from the 2nd of June 1841, and had cast its skin twice during its captivity. With this female the male paired on the same day he was introduced to her, applying the palpal organs to the vulva in the usual manner, and immediately after the union was completed he was removed from her. On the 23rd of May she deposited a set of eggs in a cocoon spun for their reception, and on the 11th of June she constructed another cocoon in which she laid a second set of eggs. All these eggs proved to be prolific, the extrication of young spiders from the first set commencing on the 26th of June, and from the second set on the 13th of July, in the same year. Without renewing her intercourse with the male, this female deposited a set of eggs in a cocoon on the 2nd of April, the 9th of May, the 4th of June, the 22nd of June, and the 9th of July 1843, and on the 22nd of April, the 30th of May, the 29th of June, and the 1st of August 1844, respectively, nine sets in number, all of which produced young.

Another male *Tegenaria civilis*, after undergoing the same treatment exactly as that in the preceding experiment, was introduced, on the 6th of May 1842, to a female of its own species, which had been in solitary confinement from the 25th of January 1840, and had cast its skin three times during its captivity. This female received the embraces of the male as soon as he was admitted into the phial to her, and laid a set of eggs on the 27th of the same month, all of which were productive, the young beginning to be disengaged from them on the 27th of the ensuing month.

In stating a further repetition of this experiment with spiders of the same species, it is only necessary to premise that the female had cast her skin three times in captivity, and that the male had but the right palpus, the other having been removed by amputation. They were placed together on the 16th of May 1842, paired the same day, and were separated as soon as their union was accomplished. On the 19th of June the female deposited a set of eggs in a cocoon, which began to be hatched on the 24th of the following July, and all produced young. Without further sexual intercourse, in 1843 she enveloped a set of eggs in a cocoon on the 7th of April, the 5th of May, the 1st of June, the 18th of June, and the 3rd of July, respectively, from all which young were disengaged.

Promptness in accommodating itself to the restraint of confinement, together with the certainty of being able to procure specimens whenever they might be required, led to the selection of *Tegenaria civilis* as a suitable subject for the foregoing experiments, from which, conjointly with the preceding observations, the following inferences may be deduced:—

1st. That female spiders are incapable of producing prolific eggs without sexual intercourse.

2nd. That females which have not been impregnated occasionally produce sterile eggs.

3rd. That the female of *Tegenaria civilis*, when impregnated, is capable of producing several sets of prolific eggs in succession without renewing its intercourse with the male*, two years or more occasionally elapsing before all are deposited, and a period of ten months nearly intervening sometimes between the deposition of two consecutive sets.

4th. That spiders of various species copulate without the abdomen of the male being brought into contact with that of the female.

5th. That male spiders, in which the part, stated by Treviranus to be the seat of the sexual organs, is entirely covered with strong, well-gummed writing paper closely applied, nevertheless possess the power of exercising the function of generation unimpaired.

6th. Lastly, that males so circumstanced invariably consummate the act by applying the palpal organs to the vulva of females, plainly demonstrating thereby the interesting truth, that those organs, however anomalous their situation may be, are the only efficient

* *Tegenaria domestica* (*Aranea domestica*, Linn.), *Agelena labyrinthica*, and *Epëira cucurbitina* are endowed with similar powers of production. *Vide* the Report of the Third Meeting of the British Association, p. 445.

instruments employed by male spiders in the propagation of their species.

Before they arrive at maturity spiders change their skin several times: the manner in which these moults are effected may be illustrated by describing the proceedings of an individual of the species *Epëira calophylla*. Preparatory to casting its integument, this spider spins some strong lines in the vicinity of its snare, from which it suspends itself by the feet and a filament proceeding from the spinners. After remaining for a short time in this situation, the coriaceous covering of the cephalothorax gives way laterally, disuniting at the insertion of the legs and mandibles; the line of separation pursues the same direction till it extends to the abdomen, which is next disengaged, the extrication of the legs being the last and greatest difficulty the spider has to overcome. As the suspensory filament connected with the spinners of the exuviæ is considerably shorter than the legs and does not undergo any sensible alteration in length, the abdomen, during the process of moulting, becomes gradually deflected from its original horizontal direction till it assumes a vertical position nearly at right angles with the cephalothorax. By this change of posture, attended with numerous contortions of the body, and alternate contractions and extensions of the limbs, the spider is ultimately enabled to accomplish its purpose. When it has completely disengaged itself from the slough, it remains, for a short period, in a state of great exhaustion, suspended solely by a thread from the spinners, connected with the interior of the abdominal portion of the cast skin, which is much corrugated. After reposing a little, the spider further attaches itself to the suspensory lines by the claws of the feet, and when its strength is sufficiently restored, and its limbs have acquired the requisite degree of firmness, it ascends its filaments and seeks its retreat*.

Recent observations establish the fact, that the number of times spiders change their integument before they become adult is not uniformly the same as regards every species. A young female *Epëira calophylla*, disengaged from the egg on the 30th of March 1843, moulted on the 8th of the ensuing month in the cocoon, which it quitted on the 1st of May; moulting again, in the same year, on the 4th of June, the 22nd of June, the 12th of July, and the 4th of August, respectively, when it arrived at maturity, having cast its skin five times.

An egg of *Epëira diadema*, hatched on the 14th of April 1843, produced a female spider, which moulted in the cocoon on the 24th of the same month; on the 3rd of May it quitted the cocoon, and moulted again on the 21st of June, the 10th of July, the 3rd of August, and the 23rd of August, in the same year. On the 28th of February 1844 it died in a state of immaturity after having completed its fifth moult.

On the 27th of June 1842 an egg of *Tegenaria civilis* produced a female spider, which underwent its first moult in the cocoon on the 10th of the ensuing July; quitting the cocoon on the 21st of the

* Transactions of the Linnæan Society, vol xvi. p. 482–484.

same month, it moulted again on the 17th of August, the 4th of September, and the 26th of September, in the same year; and on the 26th of January, the 9th of April, the 24th of May, the 21st of June, and the 5th of August in 1843, when it arrived at maturity, having changed its integument nine times.

A male *Tegenaria civilis*, extricated from the egg on the 27th of June 1842, also moulted nine times, casting its skin in the cocoon on the 10th of the following July; on the 21st of the same month it abandoned the cocoon, moulting again on the 13th of August, the 10th of September, and the 13th of October, in the same year; and on the 1st of February, the 25th of April, the 17th of June, the 13th of July, and the 17th of October in 1843, when its development was complete.

Modifications of food and temperature exercise a decided influence upon the moulting of spiders. A young female *Tegenaria civilis* disengaged from the egg on the 24th of July 1842, on the 2nd of the following August moulted in the cocoon, which it quitted on the 12th of the same month, casting its skin again on the 29th of August, and the 10th of October, in the same year; being scantily supplied with nutriment, it increased very little in size, and died on the 4th of July 1843, having changed its integument three times only. Another female of the same species, which was extricated from the egg on the same day as the foregoing individual, and was well-fed, on the 13th of July 1843 had moulted seven times. It is apparent also from the particulars already stated, that the intervals between consecutive moults are much shorter when the temperature of the atmosphere is high than when it is low.

Immature spiders infested by the larva of *Polysphincta carbonaria*, an insect belonging to the family *Ichneumonidæ*, which feeds upon their fluids, never change their integument*.

Like certain animals of the class *Crustacea*, spiders possess the property of reproducing such limbs as have been detached or mutilated, and this curious physiological phænomenon is intimately connected with the renovation of the integument, as it is observed to take place at the time of moulting only. Experiments illustrative of this interesting subject have been multiplied to a very great extent; in introducing some of them to notice, such have been selected, as from the novel and important conclusions deducible from them are best deserving of attention.

1. A young male *Textrix lycosina* had half of the terminal joint of each superior spinner amputated, and the posterior leg on the right side detached at the coxa, on the 3rd of August 1838. It moulted on the 10th of September, reproducing the detached parts, which were small but perfect in structure. On the 23rd of February 1839 it moulted again and became adult; at the same time a sensible increase took place in the bulk of the reproduced parts, which, nevertheless, were still defective in point of size.

2. On the 23rd of August 1838 a young female *Tegenaria civilis*

* Annals and Magazine of Natural History, vol. xi. p. 1–4.

had the anterior leg on the right side and the third leg on the left side detached at the coxa, the terminal joint of the superior and inferior spinners on the right side being amputated at the same time. This spider moulted on the 27th of September, when the detached parts, of a smaller size than the corresponding parts on the opposite side, but perfect in structure, were reproduced. On the 6th of November it changed its integument a second time, and on the 16th of June 1839 a third time, when it arrived at maturity. The reproduced parts advanced perceptibly in growth at each successive moult, but did not ultimately acquire their full dimensions.

3. A young male *Tegenaria civilis* had the digital joint of the left palpus, which was very tumid, detached on the 6th of October 1838. It moulted on the 17th of June 1839 and reproduced the left palpus, which, though small, had the radial joint provided with the apophysis characteristic of a state of maturity in this species. The sexual organs, however, were altogether wanting, and the digital joint was slightly modified in size and form by this circumstance. It is scarcely necessary to remark that the sexual organs connected with the right palpus were fully developed.

4. The digital joint of the left palpus of a young female *Segestria senoculata* was amputated on the 18th of May 1839. This spider cast its integument on the 8th of July, the left palpus, of a small size, being reproduced. It moulted again on the 28th of June 1840, when the reproduced palpus had its dimensions enlarged and the spider arrived at maturity. On the 12th of December 1842 it died, having existed nearly three years and a half in captivity.

5. On the 8th of June 1839 a young female *Agelena labyrinthica* had the terminal joint of each superior spinner amputated. Bringing the extremities of the tarsi of the posterior legs to the mouth, it moistened them with saliva, and repeatedly applied them to the mutilated parts. On the 21st of the same month it moulted, and the superior spinners, of a small size, were reproduced. It moulted again on the 12th of the ensuing July, when the reproduced spinners were increased in size, and it arrived at maturity.

6. A young male *Textrix lycosina* had the terminal joint of each superior spinner amputated, and the third leg on the right side detached at the coxa, on the 25th of July 1839. This spider cast its integument on the 6th of the ensuing August, when the stumps only of the mutilated parts were produced. On the 2nd of December, in the same year, it moulted again; the superior spinners and third leg on the right side, of a small size, were then reproduced, and it arrived at maturity.

7. The left palpus of a young male *Tegenaria civilis*, the digital joint of which was very tumid, was amputated at the axillary joint on the 15th of January 1840. On the 22nd of June, in the same year, it moulted, reproducing the left palpus, which was of small dimensions. The radial joint was provided with an apophysis, indicating the mature state of the spider, but the digital joint was somewhat modified in size and form, and the sexual organs were not reproduced.

8. A young male *Tegenaria civilis* had the right palpus amputated at the axillary joint on the 15th of January 1840. It moulted on the 2nd of the following June, when the detached part, of a small size, was reproduced and the digital joint became very tumid. On the 12th of August, in the same year, it moulted again; the right palpus was augmented in size, the radial joint was furnished with an apophysis, and the sexual organs, complete in their organization, were developed; these several parts, however, were still decidedly smaller than the corresponding parts of the left palpus.

9. On the 25th of January 1840 the left palpus of a young female *Tegenaria civilis* was amputated at the axillary joint. This spider moulted on the 1st of the ensuing May, at which time the detached part, of a small size, was reproduced. On the 20th of June and the 6th of August, in the same year, it moulted again and arrived at maturity, the left palpus receiving an increase in size at each successive moult.

10. A young male *Ciniflo ferox* had the cubital, radial and digital joints of the left palpus amputated on the 26th of May 1840. It moulted on the 18th of the following June and reproduced the left palpus, which was small, with the digital joint very tumid. On the 8th of August, in the same year, it moulted again, when the left palpus was enlarged, the apophyses of the radial joint were produced, and the sexual organs were developed. Though the several parts of the left palpus were smaller than the corresponding parts of the right palpus, yet they were perfect in their organization.

11. The left palpus of a young male *Ciniflo atrox* was amputated at the axillary joint on the 28th of May 1840. This spider changed its integument on the 27th of the following June, and reproduced the left palpus, which had the digital joint very tumid. On the 11th of August, in the same year, it moulted again, when the apophyses of the radial joint and the sexual organs, perfect in structure, were developed, but all the parts of the left palpus were smaller than the corresponding parts of the right palpus.

12. A young male *Linyphia cauta* had the right palpus at the axillary joint, the cubital, radial and digital joints of the left palpus, and the tibiæ and tarsi of the first, second and third legs on the left side amputated on the 30th of May 1840. On the 25th of the ensuing June it moulted, when the stumps only of the palpi were produced, but the mutilated legs, of small dimensions, were reproduced. It moulted again on the 21st of July, in the same year, and though the palpi still were not reproduced, yet the newly-formed legs were augmented in size and the spider arrived at maturity.

13. The digital joint of the left palpus of a young male *Linyphia cauta*, which was very tumid, was amputated on the 20th of July 1840. The spider moulted on the 19th of the following August, reproduced the left palpus, of a small size, with the digital joint considerably modified, and at the same time arrived at maturity; but the sexual organs were not reproduced.

14. A young male *Tegenaria civilis* had the right palpus amputated at the axillary joint on the 9th of June 1841. On the 13th of

the following July it cast its integument and reproduced the right palpus, which, though small, had the digital joint very tumid. It moulted again on the 20th of August, in the same year, when the dimensions of the right palpus were augmented, the radial joint was provided with an apophysis, and the sexual organs were developed. The organization of the right palpus was perfect in all its parts, but they were smaller than the corresponding parts of the left palpus.

15. On the 25th of June 1841 a young male *Drassus sericeus* had the cubital, radial and digital joints of the left palpus amputated, the digital joint being very tumid. It moulted on the 16th of the ensuing August and reproduced the left palpus, of a small size; the radial joint was provided with an apophysis, indicating the mature state of the spider, but the sexual organs were not reproduced.

16. A young male *Ciniflo ferox* had the right palpus amputated at the axillary joint on the 2nd of July 1841. On the 19th it moulted, but the stump only of the mutilated part was produced. On the 28th of the same month the left palpus was amputated at the axillary joint. The spider moulted again on the 28th of the ensuing August, when both the palpi, of a small size, were produced.

17. The anterior leg on the left side of a young female *Tegenaria civilis* was amputated at the coxa on the 1st of September 1842. This spider was dissected on the 14th of the following October, when on the point of moulting, as was evident from the deepened hue of the integument and from the perfect structure of the tarsal and palpal claws, visible through it. The anterior leg on the left side, which was reproduced, was complete in its organization, $\frac{7}{24}$ths of an inch in length, and was curiously folded in the integument of the old coxa, which measured only $\frac{1}{24}$th of an inch in length.

18. A young male *Tegenaria civilis* had the posterior leg on the left side amputated near the middle of the tibia on the 24th of April 1843, when it moistened the tarsus of the third leg on the same side with saliva and repeatedly applied it to the mutilated limb. Being about to moult, this spider was dissected on the 5th of the ensuing June; the posterior leg on the left side, which was reproduced, was found to have its tarsal and metatarsal joints folded in the undetached half of the integument of the old tibia.

A recapitulation of the more remarkable results obtained from the experiments, elucidated in several instances by additional facts and observations, will not, it is presumed, be deemed superfluous.

Physiologists, in conducting researches relative to the reproduction of the limbs of spiders, seem to have limited their investigations to the legs of those animals; whereas, in the experiments detailed above, the palpi and spinners, as well as the legs, were operated upon; and all these parts are found to be renewed, and afterwards to have their dimensions enlarged at the period of moulting only; it appears also that if a part of a limb be amputated, as the tarsus of a leg or the digital joint of a palpus, the whole is reproduced, all the joints of the new limb, though small, being proportionate to those of the corresponding limb on the opposite side, with the exception of the digital joint of the palpi of male spiders when the sexual organs are not reproduced, which is usually somewhat modified in size and form by that circumstance.

At the penultimate moult of male spiders the digital joints of the palpi become very tumid, in much the greater number of species, by a sudden and rapid advance towards development in the sexual organs, and should those parts be detached during the interval which elapses between that and the succeeding moult, though the palpi, indicating by their organization that the animal has arrived at maturity, may be reproduced, yet the sexual organs are always absent. (See experiments 3, 7, 13, 15.) Adult males of the species *Lycosa obscura*, *Dysdera Hombergii*, and *Philodromus dispar* have been found in a state of liberty with the palpi unequal in size and the smaller one entirely destitute of the sexual organs.

When the palpi of male spiders, which had been amputated before the penultimate moult, are reproduced, the sexual organs, perfect in structure, are reproduced also (see experiments 8, 10, 11, 14); unexceptionable evidence in support of this singular fact is to be found in their reduced dimensions and integrity of form, but it will scarcely be denied that the original germs of those organs must have been removed with the detached palpi. That the function of the sexual organs is not in the least affected by their reproduction there exists the most satisfactory proof. In the last of those experiments, having for their object the determination of the seat of the sexual organs in male spiders, recorded in this report, the male *Tegenaria civilis*, stated to have possessed the right palpus only when introduced to the female, is identical with that which was the subject of experiment 8 in the foregoing series; consequently, its sexual organs had been reproduced, yet the fertility of its mate bore ample testimony to the unimpaired efficiency of their generative agency.

If experiments 6 and 16 be referred to, it will be seen that the stumps only of mutilated parts are occasionally produced at the following moult, and that the entire parts, of a small size, are sometimes restored at a subsequent moult.

Experiment 12 presents an extraordinary case of the stumps of the palpi being produced at two consecutive moults after they had suffered mutilation, though several legs of the same spider, mutilated at the same time, were renewed at the next moult after the infliction of the injury.

The fact, that reproduced legs, immediately antecedent to the process of moulting, are folded in the integument of the undetached portion of the mutilated limbs, is clearly established by experiments 17 and 18.

With some spiders the duration of life does not exceed the brief space of twelve months, whereas it may be safely inferred from experiment 4 that *Segestria senoculata* does not even complete its several changes of integument and arrive at maturity in less than two years. The individual there stated to have had the digital joint of the left palpus detached on the 18th of May 1839 was then about two-thirds grown, and must have been disengaged from the egg in the summer of the preceding year, as this species breeds in the months of May and June in North Wales. On the 28th of June 1840, the third summer of its existence, it underwent its last moult and became adult. Subsequent experiments made with both sexes of this spider tend to corroborate the accuracy of the above conclusion.

Variations in the colour and size of spiders of the same kind, resulting from differences in age, sex, food, climate, and other conditions of a less obvious character, as they conduce largely to the introduction of fictitious species, have long engaged the attention of arachnologists, while those arising from extraordinary organic modifications, in consequence, perhaps, of their less frequent occurrence, have been almost entirely overlooked. The importance which cases of the latter description possess in relation to physiology and systematic arrangement will be best illustrated by a few examples.

1. A supernumerary eye, situated between the two small ones constituting the anterior intermediate pair, has been observed in an adult female *Theridion filipes.* The total number of eyes possessed by this individual was nine and their arrangement symmetrical.

2. An immature female *Thomisus cristatus* had the two lateral pairs of eyes only; the four small intermediate ones were altogether wanting, not the slightest rudiment of them being perceptible even with the aid of a powerful magnifier.

3. A short but perfectly formed supernumerary tarsus, connected with the base of the tarsal joint of the right posterior leg on its outer side, has been noticed in an adult female *Lycosa campestris.*

4. Deficiency of the right intermediate eye of the anterior row has been remarked in an adult male *Lycosa cambrica.*

5. The left intermediate eye of the posterior row was perceived to be wanting in an adult female *Epëira inclinata*, and the right intermediate eye of the same row was not half the usual size.

6. An adult female *Ciniflo atrox* was found to be without the left intermediate eye of the posterior row.

7. The right intermediate eye of the posterior row in an adult female *Epëira inclinata* had not one-eighth of the natural size, being merely rudimentary.

The particulars stated in the foregoing cases, which serve to establish the fact, that spiders, in common with many other animals, occasionally exhibit instances of anomalous structure, derive no small degree of interest from their novelty; but when it is borne in mind that all the examples except one have reference to those important organs the eyes, important, not only as regards the function they perform, but also on account of the extensive use made of them in the classification of the Araneidea, that interest becomes greatly augmented.

As spiders with four eyes have not yet been found, it is a matter of some consequence to caution observers against mistaking a mere defect in structure, like that recorded in case 2, for such a discovery. Whether there are species provided with an odd number of eyes or not is at present conjectural; should such exist, symmetry in the arrangement of their visual organs certainly may be expected to obtain; consequently, cases 4, 5 and 6, which present instances of an odd number of eyes disposed irregularly, would be regarded at all times with suspicion; as no such objection, however, can be urged against case 1, a solution of the difficulty it presents must be sought for in a more accurate acquaintance with the species.

Interesting chiefly in a physiological point of view, cases 3 and 7 show that a liability to irregularity in structure is not limited to the eyes, and that those organs are subject to preternatural variations in size as well as number.

The obscurity in which the cause of these remarkable organic modifications is involved, careful investigation, conducted upon sound philosophical principles, can alone dispel*.

Argyroneta aquatica, *Dolomedes fimbriatus*, and *Lycosa piratica* are known to descend spontaneously beneath the surface of water, the time during which they can respire when immersed depending upon the quantity of air confined by the circumambient liquid among the hairs with which they are clothed. There are, however, some spiders of small size, *Erigone atra* and *Savignia frontata*, for example, which, though they do not enter water voluntarily, can support life in it for many days, and that without the external supply of air so essential to the existence of *Argyroneta aquatica* under similar circumstances. It is probable that this property may contribute to their preservation through the winter, when their hybernacula are liable to be inundated†.

Spiders, though extremely voracious, are capable of enduring long abstinence from food. A young female *Theridion quadripunctatum*, captured in August 1829, was placed in a phial and fed with flies till the 15th of October, in the same year, during which period it accomplished its final moult and attained maturity. It was then removed to a smaller phial, which was closely corked and locked up in a bookcase, its supply of food being at the same time discontinued. In this situation it remained till the 30th of April 1831, on which day it died, without receiving the slightest nourishment of any description. Throughout its captivity it never failed to produce a new snare when an old one was removed, which was frequently the case; and it is a fact particularly deserving of attention, that the alvine evacuations were continued, in minute quantities and at very distant intervals, to the termination of its existence‡.

When about to deposit their eggs, spiders usually spin for their reception silken cocoons displaying much diversity of form, size, colour, and consistency. Those of the *Lycosæ* have a lenticular, or spherical figure and compact structure, with the exception of a narrow zone of a delicate texture by which they are encircled. In constructing their cocoons, these spiders slightly connect the margins of the two compact portions, beneath which the thin fabric of the zone is folded. This simple contrivance affords an admirable pro-

* Annals and Magazine of Natural History, vol. xi. p. 165–168.

† Report of the Third Meeting of the British Association for the Advancement of Science held at Cambridge in 1833, p. 446.

‡ Researches in Zoology, pp. 302, 303

vision for the development of the young in the fœtal state by an enlarged capacity in the cocoons consequent on the margins of the compact parts becoming detached by the expansive force within, the eventual liberation of the young being effected by the rupture of the zone.

Theridion pallens fabricates a very remarkable balloon-shaped cocoon about one-eighth of an inch in diameter. It is composed of soft silk of a loose texture and pale brown colour, inclosed in an irregular network of coarse, dark red-brown silk; several of the lines composing this network unite near the lower and smaller extremity of the cocoon, leaving intervals there through which the young pass when they quit it, and, being cemented together throughout the remainder of their extent, form a slender stem, varying from one-tenth to half of an inch in length, by which the cocoon is attached to the surface of stones and fragments of rock, resembling in its figure and erect position some of the minute plants belonging to the class Cryptogamia. The eggs are large, considering the small size of the spider, five or six in number, spherical, not agglutinated together, and of a brown colour *.

An elegant vase-shaped cocoon, composed of white silk of a fine compact texture, and attached by a short foot-stalk to rushes, the stems of grass, heath, and gorse, is constructed by *Agelena brunnea*; it measures about one-fourth of an inch in diameter, and contains from forty to fifty yellowish-white, spherical eggs enveloped in white silk connected with the interior of the cocoon contiguous to the foot-stalk. Greatly to the disadvantage of its appearance, the entire cocoon is smeared with moist soil, which drying serves to protect it from the weather, and as an additional security, the extremity is closed and directed downwards.

Theridion riparium fabricates a slender, conical tube of silk of a very slight texture, measuring from one and a half to two and a half inches in length, and about half an inch in diameter at its lower extremity. It is closed above, open below, thickly covered externally with bits of indurated earth, small stones, and withered leaves and flowers, which are incorporated with it, and is suspended perpendicularly, by lines attached to its sides and apex, in the irregular snare constructed by this species. In the upper part of this singular domicile the female spins several globular cocoons of yellowish-white silk of a slight texture, whose mean diameter is about one-eighth of an inch, in each of which she deposits from twenty to sixty small spherical eggs of a pale yellowish-white colour, not agglutinated together. The young remain with the mother for a long period after quitting the cocoons, and are provided by her with food, which consists chiefly of ants†.

Oonops pulcher constructs several contiguous, subglobose cocoons of white silk of a fine but compact texture in the crevices of rocks and walls, and among lichens growing on the trunks of trees; each

* Transactions of the Linnæan Society, vol. xviii. p. 629.

† Researches in Zoology, p. 356.

measures about one-sixteenth of an inch in diameter and usually comprises two spherical, pink eggs, not agglutinated together. It may be remarked, by way of contrast, that *Epëira quadrata* frequently deposits between nine hundred and a thousand spherical eggs of a yellow colour, in a globular cocoon of coarse yellow silk of a loose texture, measuring seven-tenths of an inch in diameter, which is attached to the stems of heath, gorse, and other vegetable productions in the vicinity of its haunts.

Among the silken snares fabricated by spiders for the purpose of capturing their prey, the most elegant are those constructed with the appearance of geometrical precision in the form of circular nets. They are composed of an elastic spiral line thickly studded with minute globules of liquid gum, whose circumvolutions, falling within the same plane, are crossed by radii converging towards a common centre, which is immediately surrounded by several circumvolutions of a short spiral line devoid of viscid globules, forming a station from which the toils may be superintended by their owner without the inconvenience of being entangled in them. As the radii are unadhesive and possess only a moderate share of elasticity, they must consist of a different material from that of the viscid spiral line, which is elastic in an extraordinary degree. Now the viscidity of this line may be shown to depend entirely upon the globules with which it is studded, for if they be removed by careful applications of the finger, a fine glossy filament remains, which is highly elastic, but perfectly unadhesive. As the globules, therefore, and the line on which they are disposed, differ so essentially from each other, and from the radii, it is reasonable to infer that the physical constitution of these several portions of the net must be dissimilar.

An estimate of the number of viscid globules distributed on the elastic spiral line in a net of *Epëira apoclisa* of a medium size, will convey some idea of the elaborate operations performed by the *Epëiræ* in the construction of their snares. The mean distance between two adjacent radii, in a net of this species, is about seven-tenths of an inch; if, therefore, the number 7 be multiplied by 20, the mean number of viscid globules which occur on one-tenth of an inch of the elastic spiral line, at the ordinary degree of tension, the product will be 140, the mean number of globules deposited on seven-tenths of an inch of the elastic spiral line; this product multiplied by 24, the mean number of circumvolutions described by the elastic spiral line, gives 3360, the mean number of globules contained between two radii; which multiplied by 26, the mean number of radii, produces 87,360, the total number of viscid globules in a finished net of average dimensions. A large net, fourteen or sixteen inches in diameter, will be found, by a similar calculation, to contain upwards of 120,000 viscid globules, and yet *Epëira apoclisa* will complete its snare in about forty minutes if it meet with no interruption.

In the formation of their snares the *Epëiræ* appear to be regulated solely by the sense of touch, as various species when confined in spacious glass jars placed in situations absolutely impervious to light construct nets which do not exhibit the slightest irregularity of plan or defect of structure *.

Dr. Lister supposed that spiders are able to retract the lines they spin within the abdomen, and whoever minutely observes the *Epëiræ*, when fabricating their snares, will almost be induced to entertain the same opinion. The viscid line produced by these spiders in their transit from one radius to another is sometimes drawn out to a much greater extent than is necessary to connect the two, yet, on approaching the point at which it is to be attached, it appears to re-enter the spinners, till it is reduced to the exact length required. This optical illusion, for such it is, is occasioned by the extreme elasticity of the line, which may be extended greatly by the application of a slight force, and on its removal will contract proportionally. By this property the viscid spiral line is accommodated to the frequent and rapid changes in distance which take place among the radii when agitated by winds or other disturbing forces, and by it insects, which fly against the snare, are more completely entangled than they otherwise could be without doing extensive injury to its frame-work †.

Complicated as the processes are by which these symmetrical nets are produced, nevertheless, young spiders, acting under the influence of instinctive impulse, display, even in their first attempt to fabricate them, as consummate skill as the most experienced individuals.

Although spiders are not provided with wings, and, consequently, are incapable of flying, in the strict sense of the word; yet, by the aid of their silken filaments, numerous species, belonging to various genera, are enabled to accomplish distant journeys through the atmosphere. These aërial excursions, which appear to result from an instinctive desire to migrate, are undertaken when the weather is bright and serene, particularly in the autumn, both by adult and immature individuals, and are effected in the following manner. After climbing to the summits of different objects, they raise themselves still higher by straightening the limbs; then elevating the abdomen, by bringing it from the usual horizontal position into one almost perpendicular, they emit from the spinners a small quantity of viscid fluid, which is drawn out into fine lines by the ascending current occasioned by the rarefaction of the air contiguous to the heated ground. Against these lines the current of rarefied air impinges, till the animals, feeling themselves acted upon with sufficient force, quit their hold of the objects on which they stand and mount aloft.

Spiders do not always ascend into the atmosphere by a vertical movement, but are observed to sail through it in various directions; and the fact admits of an easy explanation when the disturbing causes by which that subtile medium is liable to be affected are taken into consideration. A direction parallel to the horizon will be given by a current of air moving in that plane; a perpendicular one, by

* Zoological Journal, vol. v. p. 181–188. Transactions of the Linnæan Society, vol. xvi. p. 477–479. Researches in Zoology, p. 253–270.

† Researches in Zoology, pp. 267, 268.

the ascent of air highly rarefied ; and directions intermediate between these two will, in general, depend upon the composition of forces. When the horizontal and vertical currents are equal in force, the line of direction will describe an angle of 45° nearly with the plane of the horizon ; but when their forces are unequal, the angle formed with that plane will be greater or less as one current or the other predominates.

The manner in which the lines of spiders are carried out from the spinners by a current of air appears to be this. As a preparatory measure, the spinning mammulæ are brought into close contact, and viscid matter is emitted from the papillæ ; they are then separated by a lateral motion, which extends the viscid matter into fine filaments connecting the papillæ ; on these filaments the current impinges, drawing them out to a length which is regulated by the will of the animal ; and on the mammulæ being again brought together the filaments coalesce and form a compound line.

Many intelligent naturalists entertain the opinion that spiders can forcibly propel or dart out lines from their spinners ; but when placed on twigs set upright in glass vessels with perpendicular sides containing a quantity of water sufficient to immerse their bases completely, all the efforts they make to effect an escape uniformly prove unavailing in a still atmosphere. However, should the individuals thus insulated be exposed to a current of air either naturally or artificially produced, they immediately turn the abdomen in the direction of the breeze, and emit from the spinners a little of their viscid secretion, which being carried out in a line by the current becomes connected with some object in the vicinity, and affords them the means of regaining their liberty. If due precaution be used in conducting this experiment, it clearly demonstrates that spiders are utterly incapable of darting lines from their spinners, as they cannot possibly escape from their confinement on the twigs in situations where the air is undisturbed, but in the agitated atmosphere of an inhabited room they accomplish their object without difficulty. Similar means are frequently employed by spiders in their natural haunts for the purposes of changing their situation and fixing the foundations of their snares.

The webs named gossamer are composed of lines spun by spiders, which on being brought into contact by the mechanical action of gentle airs adhere together, till by continual additions they are accumulated into irregular white flakes and masses of considerable magnitude. Occasionally spiders may be found on gossamer-webs after an ascending current of rarefied air has separated them from the objects to which they were attached, and has raised them into the atmosphere ; but as they never make use of them intentionally in the performance of their aëronautic expeditions, it must always be regarded as a fortuitous circumstance*.

* Transactions of the Linnæan Society, vol. xv. p. 449–459. Researches in Zoology, p. 229–252.

XXIX.—*On the Preservation of Objects of Natural History for the Microscope.* By William Reckitt, M.R.C.S.L.

To R. Taylor, Esq.

Dear Sir,

Having read in the present Number (February) of the 'Annals' a paper by the Rev. M. J. Berkeley on the mode of mounting objects of natural history for the microscope, I am induced to offer for your perusal a few remarks on the same subject, and to suggest to you what appears to me a surer and a better plan. For the last few years I have been engaged in microscopical investigations, during which time I have frequently had occasion to regret that many of my best preparations were rendered entirely useless by preservation in balsam of Canada, the only method of mounting with which I was acquainted, which was entirely unfitted for exhibiting the structure of vegetable tissues, as well as the delicate parts of insects, frequently converting them into a confused hyaline mass, in which nothing of their structure was recognisable.

In the spring of last year I requested the publication of a few remarks on the best mode of mounting in the 'Annals,' which was answered obligingly by the appearance of a paper on the subject by Dr. J. W. Griffith. Consequently I set to work on the plan proposed by that gentleman, but was much disappointed at the length of time which was necessary to allow them to dry. I then made a variety of experiments to invent a varnish which would present the two grand desiderata of perfect fluidity, allowing it to be easily applied, together with the property of drying quickly. All my endeavours to succeed in this would I believe have failed, had I not in my inquiries luckily stumbled on a drunken painter, who suggested the employment of old black japan. This, which can be obtained at any painter's, I have used ever since, and found to answer every expectation. It is absolutely necessary that it should be old to ensure it drying speedily.

The object should be mounted in a cell in the way described by the Rev. M. J. Berkeley, however minute it may be, as it prevents the varnish from insinuating itself between the upper and lower glasses; the fluid should be soaked up to the margin of the top glass by a small piece of blotting-paper, and then a very thin delicate coating of black japan is to be applied with a fine camel-hair pencil; this will be perfectly dry on exposure to the atmosphere in twenty-four hours, when another coating rather thicker is to be applied, and on the third day another, which should have two days allowed for it to dry in, when the slider may be papered. I usually make a number of cells of different sizes at a time.

These are made by merely painting the glass slider with a thin coating of varnish so as to leave an empty clear space of the size desired. These will be ready for use in twenty-four hours. If time is an object, they may be placed on the fire "hob," and in a quarter of an hour your cell will be ready for use. If a thick cell be required, a second or third coating should be applied : it is far better to make deep cells by three or four coatings, letting the preceding one be quite dry, than to form it at once by a single thick application of the varnish. And now with regard to the fluid for preserving the objects in, Mr. Berkeley and Dr. Griffith recommend Goadby's solution. This does very well for animal substances, but is totally inadmissible, so far as my experience goes, in a very great number of vegetables. The endochrome of the *Zygnema* is coagulated by it, and the beautiful spiral in the interior of the cell is destroyed, and the same has been the case in other delicate confervoids where I have tried it; in place of the bright green in many of these, they have presented a dull leaden appearance. Pollen tubes mounted in it are invariably spoiled. This obtains equally where spirit of wine is made use of, even though used in a very dilute state; it has also the additional disadvantage of corrugating and making opake.

The fluid I make use of is simply cold water; perhaps it would be better if previously boiled and allowed to stand for a short time: filtering in my opinion should never be had recourse to with any fluid used for microscopical purposes, as the liquid in passing through the bibulous paper will always carry with it small flocci from the paper, and the presence of these materially interfere with the beauty and perfection of the object to be viewed. When the object is varnished down and all contact with the atmosphere is cut off, it is impossible that decomposition can take place. In the case of *marine* Algæ I make use of salt water which has been allowed to stand for some little time in order that all the impurities may subside. Many hundred objects have been mounted by me in the manner described, which are as perfect in every respect as they were on the day in which they were first prepared, in shape, colour, &c.: probably the most delicate preparation I possess is a slider of the cells of the anther of *Chara hispida*, in which the spermatozoa are beautifully shown, some in the cells, others in the act of quitting the cell, and some spread over the surface of the glass in the cell. Now if decomposition did take place in this method of mounting, it would doubtless have attacked and destroyed long before this these delicate little animalcules, animal matter being much more liable to the destructive process, *cæteris paribus*, than vegetable. Many months have elapsed since they were mounted (in May last).

Every working microscopist examines with the object immersed in a drop of water and covered with a top glass. Now it is a very great advantage to be able at once to mount anything without being obliged to shift the top glass in order to introduce a different fluid; in doing this the relative positions of parts are frequently changed, or in the case of animalcules the latter may be lost, and many a rare thing have I irrecoverably been deprived of by having recourse to a different fluid before I was led to adopt my present mode. If any person could discover a method of mounting marine Algæ so as to prevent the loss of the beautiful tints in many of the more delicate, he would confer a great boon on microscopists. I regret to say that every method of preserving colour in the *Griffithsiæ*, the *Calithamnia* and *Ceramia* have with me signally failed; their delicate rose-coloured tints are soon lost, even though the cell is allowed to dry and the preparation ever afterwards kept in a dark place.

Inclosed I forward to you a cell, also a slider containing a portion of *Batrachospermum vagum* according to Sowerby, but in my humble opinion a variety only of *B. moniliforme*, together with the spiral vessels of the garden Nasturtium. These are all prepared in the manner detailed above, have been mounted nearly a year, and have suffered no change during this time.

I have the honour to be, Sir, your obedient servant,

William Reckitt, M.R.C.S.L.

Boston, Lincolnshire.

XXX.—*On the genera* Eleutheria *and* Synhydra. By P. J. Van Beneden, Professor at the University of Louvain*.

In order that physiological researches may extend the state of our knowledge in zoology, it is requisite that the limits of the genera and species composing the scale of beings should be well determined. The object of the naturalist should be to become acquainted with the animal in the different phases of its development. A celebrated professor has said, that we do not know a species, if we have not studied it from its exit from the egg up to the period of its decrepitude.

M. de Quatrefages has communicated to the French Academy of Sciences, a memoir on a new animal which he has called *Eleutheria*. While our work on the *Tubulariæ* was in the press, we received this memoir†, and we could not but express a doubt of the zoological value of this new genus. It might indeed be a young animal, we said, which in the adult state would come to

* From the Bulletin de l'Acad. Roy. de Bruxelles, vol. xi. no. 10. Translated from a separate impression kindly furnished by the author.—Ed.

† Annales des Sciences Naturelles, 2nd series, tom. xviii. p. 270.

be classed among the *Tubulariadæ**. This subject seems to be of sufficient importance for us to recur to it; for the opinion which we then advanced has been confirmed by subsequent researches.

The first idea of M. de Quatrefages, at the sight of the beings which he has called *Eleutheria*, was, that they were in the state of larvæ; but on detecting eggs in the majority of them he had no longer any doubt as to the perfect state of the new polyp; since it is only in the adult state that generally, or rather among the superior animals, reproduction takes place.

If we had only the observation of M. Sars on the *Medusæ*†, which are reproduced by buds in the state of larvæ, the importance of this character would already be considerably lessened; but several authors have pointed out examples of larvæ which produce and lay eggs. It must however be admitted that these facts were badly interpreted. In our memoir on the *Campanulariæ*, and more particularly in that on the *Tubulariæ*, we have endeavoured to explain these phænomena, by comparing the ascertained facts with our own researches.

M. R. Wagner‡, one of the most able naturalists of Germany, inserted in the 'Isis,' in 1833, an observation of this kind which he made on a *Coryne* from the Adriatic. Upon the side of the body, M. Wagner observed a young *Coryne* developed of a form quite different from that of its mother, and which produced eggs.

M. Lovèn§, who has made so many beautiful observations of late years on the inferior animals of the Baltic, has also furnished an example of this kind of reproduction; but instead of taking the animal containing eggs for a young one, he regarded it, with M. Ehrenberg, as an adult female. Figs. 12 and 13 A. illustrating his memoir represent compartments in which are formed medusiform larvæ, and, even in the midst of these larvæ, ciliated eggs are visible: figs. 2 and 7 B. furnish another example: the first contains also eggs, the second represents a single larva. Cavolini‖ had observed the same phænomenon; he saw a young *Pennaria* also produce ciliated eggs.

We thus find several polyps in their young stage containing eggs, and the chief reason which has led the author of this genus to believe his animal perfect loses all its importance. We repeat, with M. de Quatrefages, that we must guard against premature general conclusions, since we every moment see fresh

* Mémoire sur l'Embryogénie des Tubulaires. Bruxelles, 1844, p. 54.

† Ann. Sc. Natur. vol. xvi. 2nd series. [Ann. Nat. Hist. vol. viii. p. 48. —Ed.]

‡ Isis, 1833, pl. 12. figs. 4, 6, 8.

§ Verhand. der Königl. Schwed. Académie, 1835. Wiegmann's Archiv, t. v. 1837. Annal. des Sciences Natur. 2nd series, vol. xv. 1841.

‖ Cavolini, Polyp. Mar., Napoli, 1785.

proofs of infinite variety in the works of nature. Although the superior animals are only produced after their complete development, we have thence no right to conclude that the lower animals are similarly circumstanced.

We have no doubt that the new animal named *Eleutheria* is the first stage of a polyp allied to *Tubularia*. Even the other characters peculiar to this genus furnish new proofs in favour of what we have stated.

The *Eleutheria* has the eyes at the base of each of the tentacles. Some years ago importance might have been attached to this character, as in general larvæ do not possess these organs; but the organ of vision has now been observed in several of these, and even solely in this first stage. In the *Campanularia* we have seen as many as eight eyes during the time that the polyp is free, but in its medusa-like form these organs of relation disappear. Thus here the reverse happens of what occurs generally in the other classes. Being young, these polyps enjoy their full and entire liberty; they move about as long as they are larvæ, but as soon as they become perfect they only vegetate; they fix themselves on some body,—their condition becomes wholly passive; and the functions are limited, as in plants, to nutrition and reproduction.

The arms or tentacles have been investigated with great care by M. de Quatrefages. As the author himself admits, they are perfectly similar, with respect to their composition, to those of the *Syncorynes*. These tentacles are bifurcate, and here we find another relation with the *Eudendrium*. They become in fact divided under our eyes in this genus, and the four become eight. The *Eleutheriæ* approach the larvæ of the *Syncorynes* in general form, but we have observed the separation of the tentacles only in *Eudendrium*.

Each arm terminates in a kind of rounded cushion which we have observed in the genera which we have just cited; but this swelling has, in our opinion, no other object than to permit the extension of the tentacle, and we have always seen them disappear when this organ was completely expanded. They are in reality merely the effect of the contraction and of the agglomeration of the cellules; this is at least the opinion we have come to.

A difference which we have to indicate is, that we have not perceived in any one of the genera the spiculiferous sacs which M. de Quatrefages has noticed on the arms of the *Eleutheria*. He has represented them as seen with a magnifying power of 900 diameters. We have rarely employed a power of more than 300 or 400, and this is probably the reason we have not noticed them.

Whatever be the difference, it does not seem to us improbable that the *Eleutheria* are the early stage of the *Synhydra* or of an allied genus.

During late years we have seen several examples of animals which, after having escaped the most minute researches of naturalists, are all at once discovered at the same time in countries very distant from one another. We have lately had a very remarkable example of this kind: the *Branchiostoma lubricum*, the most curious being perhaps of the whole animal creation, was discovered by Costa in the Bay of Naples, almost at the same time as MM. Sundewall and Lovèn found it in the Baltic, and Yarrell on the English coast.

We may ask if these animals make their appearance all at once in different localities, as some seem to think, or whether it is the state of science that leads to this result. We confess we are strongly disposed to believe that it is an inevitable result of the progress which science is constantly making. The attention of naturalists is at the present day concentrated on these lower animals which have been so long despised; for indeed their organization and their development must throw an important light upon the obscure functions of the higher animals.

We may point out here a further example of what we have just said. In my memoir on the *Tubulariæ* I established a new genus in that family. In the month of January 1839, I discovered it after a great storm in the midst of many objects cast upon our coast. In the sitting of January 6th, 1841, I mentioned it, and designated it by the name of *Hydractinia*.

After the publication of my notice, my friend M. Gervais recalled to my recollection that we had observed during our stay at Cette in 1838 a very closely allied polyp, probably of the same genus, and of which he had preserved a rude sketch. He had observed it whilst I was engaged in studying the embryogeny of *Aplysia*. He has mentioned it under the article *Zoophyte* in the 'Dictionn. Pittoresque d'Histoire Naturelle.'

In 1842 M. Philippi published a description in Wiegmann's 'Archiv' of a new polyp under the name of *Dysmorphosa conchicola* from the Bay of Naples. It only requires to cast one's eye upon the figure to see that it is the same animal which we observed at Ostend.

At the meeting of the British Association at Cork in 1843, Mr. Allman mentioned a new hydroid zoophyte which formed the link between the *Corynes* and the *Hermiæ*. He calls it *Cordylophora**. The few words of the author leave no doubt that it is the same animal which we had figured.

[* Ann. Nat. Hist. vol. xiii. p. 328.—Ed.]

Just before the publication of my memoir I received the number of the 'Annales des Sciences Naturelles' for October 1843, which contains a memoir by M. de Quatrefages on the *Synhydra parasitica,* a new genus of polyp allied to *Hydra.* M. de Quatrefages has observed this polyp several times at Saint-Vast-la Houque (on the coast of Normandy), and once at Brehat, on the coast of Brittany. This is again the same animal as our *Hydractinia,* and we are surprised that this identity with the animal which we had already figured in 1841 has escaped M. de Quatrefages.

If it is true (and we for our part do not doubt it), that in the *Synhydra* the supposed ovigerous individuals have no mouth, it is only the repetition of what we see in the *Campanulariæ* and in other polyps. There are in fact in this genus compartments which contain only a part of the common substance in which the eggs are formed, and that part has been also regarded, but wrongly, as female individuals without tentacles. The sole difference in this case is, that the stem, instead of being erect and ramified as in the *Campanulariæ,* is spread horizontally, forming a crust, from the surface of which both the tentaculated polyps and the fleshy bodies which produce the eggs rise. It is M. de Quatrefages who observed that the mouth is wanting in those which have eggs. But this fact is not general among the polyps of this family; in the *Corynes* the individuals which bear eggs are as perfect as the others.

Our observations on *Hydractinia* scarcely agree with those of M. de Quatrefages on the *Synhydra,* although it may be the same animal, especially in all that regards reproduction. We shall soon have occasion to return to this subject. The difference in our results probably arises from my having devoted more time in the investigation of the embryogeny of these animals in different genera.

The following is the synonymy of the new genus :—

HYDRACTINIA.

Hydractinia, Van Beneden, Recherches sur la Structure de l'Œuf dans un nouveau genre de Polype. (*Hydractinie*), (Bulletin de l'Académie Royale de Bruxelles, tom. viii. 1841, p. 89. pl. 1—5.) Recherches sur l'Embryogénie des Tubulaires. (Mémoires de l'Académie Royale de Bruxelles, tom. xvii. pl. 6.)

Dysmorphosa, Philippi, Zoologische Beobachtungen, Wiegmann's Archiv, 1842, p. 33. pl. 1. fig. 2—3.

Cordylophora, Allman, Synopsis of the genera and species of Zoophytes inhabiting the fresh waters of Ireland, British Association, Thirteenth Meeting held at Cork in 1843. [Inserted in Ann. Nat. Hist. vol. xiii. p. 328.]

Synhydra, Quatrefages, Mémoire sur la Synhydre parasite. Annales des Sciences Naturelles, Octobre 1843.

We propose to divide the genera and the species of the *Tubulariæ* as follows:—

The *Hydræ* do not belong to this family, on account of their arms or tentacles, which are hollow and in direct communication with the digestive cavity. The tentacles are solid in all the *Tubulariæ*. There are besides differences in the embryo. The *Campanulariæ* are more nearly related to the *Tubulariæ* than to the *Sertulariæ*. Their mode of reproduction is identical.

I. Genus Pennaria, Goldf.

Polyps with polypidoms; tentacles of two kinds, of which the superior ones are scattered and in several rows.

P. Cavolinii = *Sertularia pennaria*, Cavol.
Bay of Naples.

II. Genus Tubularia, Pallas.

Polyps with polypidoms; tentacles of two kinds, in two rows.

T. calamaris, Pall. = *Tubularia indivisa.*
Coasts of England and Belgium.
T. coronata, Abildg.
Coasts of Belgium and Heligoland.
T. Dumortierii, Van Ben., nov. spec.
Coast of Belgium.

III. Genus Syncoryna, Ehrenb.

Polyps with polypidoms; tentacles all alike, in several rows.

S. pusilla, Ehr. = *Coryne pusilla*, Gærtner.
Coasts of England and Belgium.
S. Listerii, Van Ben. = *Coryne*, Lister.
Coasts of England and Belgium.
S. ramosa, Sars = *Stipula ramosa*, Sars.
Coast of Norway.
S. Sarsii, Lovèn.
Coast of Sweden.
S. Chamissonis, Ehr. = *Coryne ramosa*, Cham. et Eysenh.
Coast of England.

IV. Genus Corydendrium, nov. gen.

Polyps with polypidoms; tentacles all alike, scattered.

C. parasiticum = *Sertularia parasitica*, Cavol.
Bay of Naples.

V. Genus Eudendrium, Ehrenb.

Polyps with polypidoms; tentacles in one row.

E. ramosum, Ehr. = *Tubularia ramosa.*
Coasts of Ostend and England.
E. brioïdes, Ehr. = *Tubularia muscoïdes.*
Coasts of Ostend and England.

E. splendidum, Ehr.
Coast of Norway, by Ehrenberg.

E. racemosum, Ehr. = *Sertularia racemosa*, Cavolini.
Bay of Naples.

VI. Genus Coryne, Gærtner.

Polyps without polypidoms; tentacles all alike, scattered.

C. squamata, Müller.
Coasts of Belgium, England, the Baltic, &c.

C. aculeata, Wagner.
Coast of the Adriatic.

VII. Genus Hydractinia, nov. gen.

Polyps without polypidoms; tentacles in one row.

H. lactea, Van Bened. = *Synhydra parasitica*, De Quatref.
Coasts of Belgium, Normandy, Brittany, the port of Cette? Bay of Naples.

H. rosea, Van Bened.
Coast of Belgium.

We are not sufficiently acquainted with the genera *Echinochorium** of Hassall and *Corimorpha* of Sars† to assign their place. We prefer simply to mention them.

Unless we are mistaken, the two proposed genera (*Eleutheria*) and *Synhydra* should therefore not be inserted in the zoological system, the one being a transitory form, a larva; and the other having been already described under another name.

XXXI.—*Description of a new Species of* Pecten. By Thomas Edmondston, F.B.S.E. & L.

Pecten MacGillivraii, *Edmondston*.

Sp. Char.—Shell orbicular, white, the upper valve with twenty, the lower with eighteen ribs, which, with the interstices, are quite destitute of longitudinal or transverse striæ; each interstice terminates in two acute trigonal teeth.

This highly beautiful Pecten, which can never be confounded with any other British species, and which, so far as I can ascertain, is equally distinct from any hitherto described, is of a pure snowy white colour, a slight tinge of pink near the umbo on the upper valve alone excepted; the surface shining with a satiny lustre; the upper valve is more convex than the lower and has twenty ribs, the lower valve has eighteen; in both the ribs are rather depressed and evanescent towards the umbones, which are acute;

* Annals of Natural History, vol. vii. p. 371.
† Beskivelser og jagttagelser. Bergen, 1835.

the auricles are unequal and acute; the intercostal spaces are, like the ridges, destitute of striæ or other markings, and each terminates in two acute teeth; internally the colour is pure white with the muscular impressions large and well-defined. The substance of the shell is singularly thin and delicate.

Length $1\frac{10}{12}$ inch; height $1\frac{9\frac{1}{2}}{12}$; breadth $\frac{6}{12}$.

It is difficult to say what species this highly elegant and interesting shell is most allied to. In form it perhaps approaches nighest *P. opercularis*, but from it, as will be seen, it differs in the total absence of striæ or other markings which are so constant in all the varieties of the latter shell; and in the inequality of the auricles. The number of ribs furnish additional distinctive marks, not to speak of the marginal toothing, which latter remarkable character indeed, combined with the great delicacy and satiny-like surface of the shell, separates it from every other species with which I am acquainted.

The single specimen from which the above description was drawn up, was brought up by the fishing lines off Aberdeen in the beginning of February 1845, and was given me by a Foot Dee fisherman. The shell was quite fresh and perfect, and according to the fisherman, contained the animal; indeed a portion of the adductor muscle still remained attached when I procured it. Its natural habitat was probably gravelly, as it was accompanied by *Buccinum undatum* and dead shells of *Astarte elliptica* and *Tellina proxima*.

I have much pleasure in dedicating this beautiful shell to my esteemed friend and master in science Dr. MacGillivray, whose merits need no panegyric of mine, and who by the publication of his admirable 'Mollusca of Aberdeenshire' has set an example which I should much like to see more extensively followed.

XXXII.—*Account of a Dredging Excursion.* By the Rev. David Landsborough.

A cruise is rather an anomalous event in the life of a sober country minister, and a dredging excursion is what seldom falls to the lot of even zealous naturalists. Few have at their command the vessel, the sailors, and the dredging apparatus; and most of us are thankful if we can find time for an occasional ramble for a few hours, in a wild glen, or on the mountain side, or on the teeming shore of the beautiful sea. Great then was my happiness in being invited to spend a few days in dredging along with Mr. Smith of Jordan Hill, in his nice little yacht the *Raven*; a pleasure I had not enjoyed since I had been with him in his still nicer yacht the *Amethyst*.

Though the excursion proved a very delightful one, the weather and the scenery being charming, it was not very productive; it was at first too calm for dredging, and latterly it became rather too rough for the purpose. But dredging was not our only object. Mr. Smith is well-known in the scientific world from what he has done for geology, especially for a branch of it which bears on "the last changes in the relative levels of the land and sea in the British Islands." In carrying on his researches he saw that it was of importance to make a catalogue of the recent shells found at present in our seas, as well as a catalogue of those that are found in our most recent deposits, that they might be compared with each other. At the outset he thought that all these comparatively recent deposits were of the same age; but he has been led to conclude that there are recent, and more recent deposits. The older of these he calls by the usual name, the *newer Pliocene,* as it contains a few shells not found at present in our seas. The other he calls *post-tertiary*; for though it contains no shell that is not at present found in the adjoining sea, it has evidently been deposited when the sea was on a higher level. I concur with him in the propriety of this distinction. His lists of recent, newer pliocene, and post-tertiary shells are now long, and I have had the pleasure of adding to all the three lists.

But let us begin with the sea. On the 13th of last August we *shot* our dredge in the bay of Rothesay, and were in high expectation of a rich haul, when, lo! all that was brought up was a heather besom. Still everything from the deep sea should be regarded with a keen eye. I scrutinized it branch by branch; but all that I could discover were some small specimens of *Pecten opercularis* and of *Galathea squamifera.*

From Rothesay we sailed up the Kyles, and had one haul of the dredge before we came to anchor near to Ru-bodach. It was not very productive. There were hundreds of pretty *Ophiuræ, O. texturata, O. albida, O. rosularis, O. granulata, O. bellis*; but as there seemed to be nothing rare among them they were returned to the deep. There were some good specimens of *Emarginula fissura*; and two examples of a rare and beautiful *Trochus,* found for the first time in this country some dozen years ago by Major Martin on the Stevenston strand. As it was thought to be a new species it was called *Trochus Martini,* but it has since been ascertained that it is *Trochus millegranus* of Philippi.

We afterwards rowed to shore in the boat, and landed near Balnacoolie, where Mr. Smith and Mr. Sowerby some years ago had discovered a rich newer pliocene deposit. We had not been long ashore until we found two or three specimens of *Panopæa Bivonæ,* a rare subfossil shell which we were chiefly in search of, as it had been found for the first time in Scotland by Mr. Smith and Mr. Sowerby in this same locality. The shells are deposited in thick clay. We got some from which the clay had been washed away, and some more by digging. The predominant shells are *Mya truncata, Venerupis virginea, Cyprina Islandica, Panopæa Bivonæ, Nucula rostrata, Pecten Islandicus* and *Tellina proxima.* This pretty little shell is the most abundant, and marks the deposit as newer pliocene.

Next morning we set out in the boat for Ru-bodach, where Mr. Smith and Mr. Sowerby got the first of the Panopæas, and there also we got some more of all the species that we had obtained at Balnacoolie.

We afterwards visited a vitrified fort discovered some years ago by Mr. Smith on one of the little islands in the Kyles of Bute. When, how, and why were these forts formed? We cannot give any very satisfactory answer. History does not tell. A Roman lamp in my possession, found in the vitrified fort at Dundonald near the Roman camp, leads us to conjecture that they existed when the Romans had possession of parts of our country. The one in the Kyles seems to have been a place of defence, in which the inhabitants were secured not only by the firmness of the walls, but by a surrounding ditch, the remains of which are still evident.

On returning to the yacht we dredged for some time; and on hauling the dredge we found it almost full of fine, black mud. Among the mud we got some more *Ophiuræ,* and a specimen of *Laomedea dichotoma,* and also of *Antennularia antennina,* var. *ramosa.* And moreover, caught in the meshes of the dredge, we got a fine large specimen of *Brissus lyrifer,* the fiddle heart-urchin, first discovered by Professor E. Forbes, when a few years ago he was dredging in the Kyles with Mr. Smith. This prize being left at my disposal by Mr. Smith, I sent it to Mr. Bean of Scarborough, who I knew would value it. It was $2\frac{1}{3}$ inches in length by 2 inches in breadth. I kept it alive in a vase of sea-water several days after I returned home.

After this we sailed for Arran and entered Lamlash bay in the evening during a stiff breeze. In the forenoon of next day it "took off" a little, according to the phraseology of our sailors, so as to allow us to dredge. To a naturalist it is exceedingly exciting to see a well-filled dredge spreading its treasures on the deck. On the first haul we had a considerable load of animal and vegetable matter. On *Laminaria saccharina* I got good specimens of *Lepralia annulata,* which I discovered some years ago on the Ayrshire coast, the first time that it had been found in Britain, and which I was well-pleased to find here. There were several large examples of *Uraster glacialis*; three examples of the rarer *Goniaster Templetoni,* which I have found also on the Ayrshire coast; innumerable *Ophiuræ,* many examples of *Echinus* *miliaris,* one live example of *Echinocyamus pusillus,* and the most beautiful *Solaster papposa* I had ever seen, so bright in the colours and so beautifully shaded as to be well-deserving of the name of the sun-star. It had one defect. By some enemy, or by some of the hard rubs of life, from which the inhabitants of the deep are not exempted, it had lost one of its toes or fingers or rays; but the *vis medicatrix* of nature was hastening to make up the want.

The kindness of Nature's God is very manifest even to these inferior animals. They lose their limbs; but it would appear that they do not suffer much thereby, for in emergences they often throw them off of their own accord.

But as the time was now at hand when the steamer was to start in which I was to be homeward-bound, we *shot* our dredge for the last time. Up came some sea-weeds and abundance of sand. Entangled among the roots of *Laminaria saccharina* I discovered something that seemed new to me. Though when lurking among the roots it seemed scarcely deserving of notice, when I had disentangled it, and had returned it to its native element in a tumbler of sea-water, I was delighted with its beautiful appearance, and soon found that it was *Comatula rosacea,* the feather-star. Let any person who has not seen it look at the graceful figure of it in Forbes's 'Starfishes,' and he will have some idea of its surpassing beauty when it is seen with its numerous scarlet plumes waving in life. Mr. W. Thompson says that it is not uncommon in Ireland; Mr. Goodsir I observe has found it in Shetland; but I do not know that it had been obtained anywhere else in Scotland till found in Lamlash bay.

But the puffing steamer was now sending up its volumes of smoke, reminding me that I must quit the *Raven*; and what was worse, must leave Mr. Smith, whose urbanity of manners, scientific knowledge and great kindness had contributed so much to my enjoyment of the excursion. There was not time to examine the sand with which the dredge had been loaded; but fortunately before it was all swept back into the deep I remembered that Mr. Bean had asked me to send him some shelly sand, and accordingly I made up a small packet of it for him. By applying a lens to it I soon saw that it was valuable, and I sent half a dozen handfuls of it to him and kept one for myself. He wrote to me that it was the richest shelly sand that he had ever got, except from Guernsey. Many of the shells it contained were very minute, and as the study of microscopic shells was in some degree new to me, I requested him to name for me those he found in his larger portion of the sand, as well as the additional ones I found in my handful. I shall subjoin the list. I have inserted *Terebratula aurita* and *Cardium medium* which were found by me some years ago in sand from the same delightful bay.

Dredged in Lamlash Bay.

1. Dentalium trachea, *Mont.*
2. ——— glabrum, *Mont.*
3. ——— imperforatum, *Mont.*
4. Vermiculum subrotundatum, *Fl.*
5. ——— bicorne, *Flem.*
6. ——— intortum, *Flem.*
7. ——— concentricum.
8. ——— oblongum.
9. Renoidea oblonga, *Brown.*
10. Nautilus crispus, *Mont.*
11. ——— Auricula.
12. Rotalia Beccaria.
13. ——— Beccaria, var.
14. Lobatula vulgaris, *Flem.*
15. ——— vulgaris, var.
16. Lagenula marginata.
17. ——— striata.
18. ——— globosa.
19. Nodosaria linearis.
20. Arethusa lactea.
21. Vermilia triquetra, *Lam.*
22. Serpula vermicularis.
23. Pectinaria belgica.
24. Spirorbis lucidus, *Flem.*
25. ——— corrugatus.
26. ——— heterostrophus, *Flem.*
27. Lottia virginea.
28. ——— testudinalis, on stones in shallow water.
29. Chiton, species, only single valves.
30. Bulla truncata, *Mont.*
31. ——— pellucida, *Bean.*
32. ——— hyalina, *Turton.*
33. ——— mammillata.
34. Bulimina, species.
35. Eulima polita.
36. Turritella unica.
37. ——— ambigua.
38. Rissoa rufilabrum, *Alder.*
39. ——— costata.
40. ——— striata.
41. ——— Beanii, *Hanley.*
42. ——— striatula.
43. ——— decussata.
44. ——— reticulata.
45. ——— costulata, *Alder.*
46. ——— labiosa.
47. ——— Harveyi, *Thompson.*
48. ——— semistriata.
49. ——— vittata.
50. ——— parva.
51. ——— vitrea.
52. ——— interrupta.
53. ——— fulgida.
54. ——— Balliæ, *Thompson.*
55. Rissoa minutissima, *Bean.*
56. Odostomia interstincta.
57. ——— unidentata.
58. ——— cylindrica, *Alder.*
59. Skenea depressa.
60. ——— divisa, *Flem.*
61. Natica Alderi.
62. Trochus umbilicatus.
63. ——— cinerarius.
64. ——— millegranus, *Phil.*
65. ——— subcarinatus.
66. ——— Magus.
67. Nassa macula.
68. Cerithium reticulatum.
69. ——— adversum.
70. Parthenia turrita.
71. Fusus attenuatus.
72. ——— purpureus.
73. ——— septangularis.
74. ——— retroversus, *Flem.*; Peracle Flemingii, *Forbes.*
75. Cemoria Flemingii.
76. Terebratula aurita, found at Lamlash some years ago.
77. Pecten opercularis.
78. Lima fragilis.
79. ——— tenera.
80. Anomia squamula, *Mont.*
81. Arca lactea.
82. Nucula margaritacea.
83. ——— nitida, *Sowerby.*
84. ——— minuta.
85. Cardium exiguum.
86. ——— nodosum.
87. ——— fasciatum.
88. ——— medium, one specimen some years ago.
89. Mactra truncata.
90. ——— solida.
91. ——— elliptica.
92. Kellia suborbicularis.
93. Amphidesma, species.
94. Tellina donacina, *Mont.*
95. Lucina radula.
96. ——— flexuosa.
97. ——— spinifera.
98. Cyprina minima.
99. Cytherea sinuata.
100. Hiatella minuta, *Turton.*
101. Montacuta bidentata, *Turton.*
102. Lacuna vincta.
103. ——— canalis, *Turton.*
104. Unknown.
105. ———.
106. ———.

Rockvale, Saltcoats, Ayrshire.

XXXIII.—*A Century of new Genera and Species of* Orchidaceous *Plants.* Characterized by Professor Lindley.

[Continued from p. 108.]

Decade 4.

31. Epidendrum (*Euepidendrum*) *piperinum*; caule ramuloso, foliis distichis succulentis oblongis obliquis obtusis laxe vaginatis, pedunculis brevissimis terminalibus subbifloris, sepalo dorsali petalisque filiformibus erectis lateralibus ovato-lanceolatis carinatis horizontalibus, labello ovato cochleato ecalloso venis radiantibus in margine confluentibus.

Quito (Hartweg).

A small succulent species, when dried beautifully netted. It looks like a *Peperomia*.

32. Epidendrum (*Euepidendrum*) *orgyale*; caule orgyali distiche foliato, foliis ovato-oblongis margine vaginisque scabris, racemo sessili erecto cylindraceo bracteis membranaceis subulatis, floribus carnosis, sepalis ovalibus, petalis spathulato-linearibus serrulatis, labello cordato serrulato callis duobus juxta basin unoque sulcato minore sub apice.

Near *Santa Fé de Bogota* (Hartweg).

Stem 5 feet high. Flowers apparently yellow. The fistula of the ovary inflated.

33. Microstylis *tipuloides*; foliis pluribus radicalibus obovato-lanceolatis, racemo longissimo laxo, petalis filiformibus reflexis, labello multo majore ovato-lanceolato ciliato.

Popayan (Hartweg).

34. Odontoglossum *revolutum*; foliis ensiformibus rigidis margine revolutis scapo rigido apice paniculato brevioribus, bracteis laxis acutis cucullatis, panicula subcorymbosa densa, sepalis petalisque lanceolatis unguiculatis acutis, labello conformi sessili cordato lamellis 5 carnosis integris quarum tres superiores multo breviores: lateralibus subulatis, columna aptera.

Popayan (Hartweg).

Scape above 2 feet long.

35. Odontoglossum *crispum*; foliis lanceolatis scapo multifloro paniculato (nunc brevi racemoso) brevioribus, sepalis ovato-lanceolatis, petalis ovatis acutissimis crispis membranaceis, labello subconformi dentibus duobus validis in fronte paucisque minoribus utrinque versus laminæ basin, columnæ alis rotundatis laceris.

Bogota (Hartweg).

A most beautiful species, occasionally as much as 3 feet high and more. Flowers large, yellow, with a purple centre.

36. Masdevallia *racemosa*; caulescens, folio coriaceo lanceolato

acuto petiolato, racemo elongato flexuoso multifloro, flore cylindracco basi gibboso, sepalis lateralibus subrotundis semiconnatis dorsali ovato acuminato breviore.

Popayan (Hartweg).

A charming plant. Flowers an inch and a half long, scarlet, arranged in a raceme of from four to eleven flowers.

37. Masdevallia *rosea*; folio lanceolato trinervi longe petiolato scapo longiore v. breviore, flore cylindraceo tubo limbo æquali, sepalis lateralibus semiconnatis dimidiatis setaceo-acuminatis dorsali e basi triangulari setaceo æquali.

Loxa (Hartweg).

Flowers pink, 2 inches long, very showy.

38. Masdevallia *Meleagris*; foliis oblongo-lanceolatis acutis longe petiolatis trinerviis scapo unifloro brevioribus, sepalis oblongis abrupte in setam ipsis duplo longiorem productis.

Bogota (Hartweg).

The upper sepal banded with violet; the lateral ones smaller, apparently without bands, but stained with rose-colour, 4 lines long below their bristle. Leaves 3-toothed, about 2 inches long. Flower-stalk the same length.

39. Masdevallia *lævis*; foliis oblongo-lanceolatis acutis trinerviis in petiolum ipsis æqualem angustatis, scapo foliis breviore, sepalis campanulatis antice infractis acuminatis lateralibus intus pubescentibus, petalis oblongis truncatis hinc crassissimis, labello oblongo apice rotundato lævi.

Popayan (Hartweg).

Flowers apparently purple.

40. Masdevallia *coriacea*; foliis lineari-oblongis in petiolum sensim angustatis coriaceis marginatis mucronatis scapi longitudine, sepalis acuminatis obtusis intus pubescentibus subringentibus, petalis obovato-lanceolatis, labello oblongo unguiculato apice rotundato intra apicem glanduloso scabro.

Bogota (Hartweg).

The flowers, which are yellow and an inch and a half long, correspond with Humboldt and Bonpland's figure of *M. uniflora*; but the leaves are quite different. I suspect that figure to have been made up with the flowers of this *M. coriacea* and the leaves of *M. lævis*.

XXXIV.—*On the Animal of* Spirula. By J. E. Gray, Esq., F.R.S.

[With a Plate.]

To the Editors of the Annals of Natural History.

Gentlemen,

Mr. Cuming has kindly placed in my hands for examination and description the animal of the genus *Spirula* which he has just procured from Mr. P. Earl.

I need scarcely make any other remark on the great interest of this animal, than to observe that there is every reason to believe that it is the nearest recent ally of the *Ammonites* so abundant and so numerous in kinds found in the different fossiliferous strata.

The animal of this genus has only hitherto been known from a figure in the Atlas of Peron and Lesueur, 'Voyages,' t. 30. f. 4, copied in Blainv. 'Man. Mol.' t. 4. f. 1, and in Rang. 'Man. Moll.' t. 1. f. 4. A very slight sketch of it is engraved in the 'Encyclopédie Méthodique,' t. 465. f. 5, from a drawing made by Lamarck with chalk to illustrate his lectures, and from a shell with part of the skin of the mantle attached to it, which was found by Cranch and brought home from the Congo expedition.

Lamarck's figure above-mentioned gives a better general idea of the animal than was expected. Peron and Lesueur's figure on the other hand erroneously represents the animal as having ten arms of unequal length like the Sea-spiders (*Octopus*); probably in his specimens the long arms had been broken off, as in the one brought home by Mr. Earl, and the peduncles of these arms were mistaken for short arms. Cranch's specimen was so imperfect that it only showed that the skin was like that of other cuttle-fish, and it appears to have an opening at the hinder extremity of the body not found in cuttle-fish which could not be understood, but which is explained by Mr. Cuming's specimen.

The long arms unfortunately have lost their terminal club.

The shorter arms are triangular, gradually tapering, flattish, rounded, and without any fin-like edge behind or on the hinder edges. Their inner surface is covered with numerous equidistant, very small, slightly pedicelled, circular *acetabula* or suckers, strengthened with an entire or very minutely denticulated horny ring, placed in about six longitudinal series, and diminishing in size as the arms become attenuated. They are equidistant, except the two lower or ventral pair, which are separated by a broad shallow groove on the lower side of the head; the lower pair on each side are united together by a short membrane on the inner and outer side, which together form a short sheath round the base of the pedicel of the longer arm.

The animal has all the general external characters of the cuttle-fish; that is to say, it has a large distinct head with eyes on each side, eight short conical arms with series of small discs on the inner side, two long arms with elongated peduncles, and a bag-like mantle with a process in the middle above, and one on each side of the anal tube below; but it differs from the cuttle-fish in being entirely destitute of any fins, being rather compressed behind, and showing in the specimen under examination a part of the whorls of the shell above and below; but from the ragged edges of the skin it appears as if this shell was covered with a skin when the animal is alive, and that the exposure of the surface of the shell has only been caused by the contraction of the animal, and especially of the skin over the shell, from the animal having been placed in very strong spirits when it was first caught. The shell is placed symmetrically, the larger part being on the hinder part of centre of the back and the smaller whorls below on the hinder part of a line drawn down the centre of the lower or anal surface of the mantle; the extremity of the body behind the shell is rounded and covered with a large, round, rather thick gland with a circular central cavity, and the line between the gland and the mantle is covered with sandy particles probably attached to this place by the secretion of the gland, and these particles are most abundant on the side near the skin covering the shell.

In this specimen, which has been preserved in spirits, the head and arms are reddish with a multitude of minute rusty spots; the mantle is nearly uniform pale yellowish, and the gland at the end of the body is uniform reddish brown. It is to be observed that the shell in this animal is placed on the animal in the normal position, that is, on the dorsal surface of the body, with the spire bent towards the ventral sides, as in almost all other Mollusca but the *Nautilus* and the *Patella*.

The mantle is free from the body on all sides at its oral edge, and without any cartilaginous ridges; this edge is formed into a point on the centre of the dorsal aspect, and into two mesial processes, one situated on each side of the anal funnel on the ventral side; the funnel is quite free from the mantle.

The part of the shell which is exposed is covered with minute rugosities and indistinct reticulations, somewhat like the surface of a cuttle-fish bone, as figured in 'Ann. Sci. Nat.' 2nd series, xvii. t. 11. f. 9, 10.

I am informed by M. Clausen that he had several specimens of this animal alive, and kept them some time in a vessel filled with sea-water, and that they had the power of ascending and descending at pleasure.

The *Spirulæ* will constitute a group of the Decapodous Cephalopods, forming a passage to the *Octopodidæ*; for, like the latter, they are entirely destitute of any dorsal fins, and well-characterized by the presence of a regularly chambered internal shell, furnished with an internal marginal siphon.

The examination of this animal confirms me in the opinion which I expressed in the 'Synopsis of the British Museum' (1840, p. 149), that the *Ammonites*, from their texture and the small size of the last chamber, are internal shells, and should be arranged with the Decapodous Cephalopods, being chiefly distinguished from the *Spirulæ* by the siphon being always on the dorsal margin of the whorls, and the septa being foliated on the edge. I am aware that this opinion is not in conformity with the ideas of many zoologists and comparative anatomists, for Mr. Owen, in the last arrangement of these animals (Todd. Ency. Comp. Anat.), though he places the *Spirulæ* with the *Dibranchiate* Cephalopods, places the *Ammonites* with *Tetrabranchiate* next to *Nautilus*, with the following character, "animal unknown, presumed to resemble the *Nautilus*."

It is very desirable that other specimens of this animal should be preserved and brought to Europe, that we may have the opportunity of examining its internal structure, for I can fully sympathize with Mr. Cuming in not wishing to have the single specimen which he possesses in any way injured or cut.

EXPLANATION OF PLATE XV.

Fig. 1. The back of the animal.
Fig. 2. The ventral surface with the anal tube.
Fig. 3. The side, showing the shell, the dorsal and ventral process of the mantle and the anal tube.
Fig. 4. Extremity of the body, with the gland and its central aperture as contracted in spirits.
Fig. 5. The figure copied from Lamarck's sketch, 'Enc. Méthodique.'
Fig. 6. Animal and shell, copied from De Blainville's 'Manuel.'
Fig. 7. The figure copied from Peron and Lesueur's 'Atlas.'

XXXV.—*On* Cyanocitta, *a proposed new genus of* Garrulinæ, *and on* C. superciliosa, *a new species of Blue Jay, hitherto confounded with* C. ultramarina, *Bonap.* By H. E. Strickland, M.A.

I lately received from Prof. Brandt of St. Petersburg a bird from California, labelled "*Corvus ultramarinus*, Audub., pl. 362. fig. 3," but which was evidently distinct from the true *C. ultramarinus* of the Prince of Canino. The latter species is found in Mexico, and has received the synonymous names of *Garrulus sordidus*, Swainson, and *Pica Sieberi*, Wagler. It is nearly uniform blue above without any superciliary mark, and cinereous below, becoming whitish on the belly and vent. In the bird from California on the contrary the dorsal feathers are cinereous brown; above the eye and ear-coverts is a narrow row of white dots; the cheeks are blackish with a bluish tinge on the lower part; the chin and throat white, faintly streaked with gray, the sides of each feather being margined with the latter colour. The blue of the crown and nape descends on each side and forms a collar around the white of the throat. The rest of the lower parts are very light brownish ash-colour. The wings and tail are blue as in *C. ultramarina*, with which it agrees in general form, except that the wings are much shorter. Total length 11 inches; beak to front 1 inch, to gape $1\frac{1}{4}$ in.; wing $4\frac{1}{2}$ in.; medial rectrices 5 in., external ditto $4\frac{3}{8}$ in.; tarsus $1\frac{1}{2}$ in.

This bird is accurately figured by Audubon in his 'Birds of America,' pl. 362. fig. 3, and described in his 'Ornithological Biographies' and 'Synopsis of the Birds of N. America,' but he erroneously refers it to the *Garrulus ultramarinus* of the Prince of Canino. The Prince himself also appears not to have detected this error, as he quotes Audubon's plate under his *Cyanocorax ultramarinus* in the 'Comparative List of the Birds of Europe and North America.' As however the present bird is clearly distinct, and, as far as I am aware, unnamed, I would propose for it the specific name of *superciliosa*.

This species is more nearly allied in plumage to the *Cyanocorax floridanus* than to the *ultramarinus*. The *floridanus* is however distinguished, as Audubon remarks, by its smaller size, more rounded tail, and whitish band on the forehead, extending thence over the eye.

The birds of which I have been treating appear to be in want of a generic name. They stand in the same relation to the South American genus *Cyanocorax*, typified by *C. pileatus*, and of which *Cyanurus*, Swains., is a synonym, which *Garrulus* bears to *Corvus*, being essentially *Blue Jays*, while the species *pileatus*, *cristatellus*, *peruvianus*, *azureus*, *cyanopogon*, and one or two others composing *Cyanocorax*, are *Blue Crows*. Mr. G. R. Gray's genus *Calocitta* (typified by *C. Bullocki*, and perhaps including the Asiatic species *erythrorhynchus*) is distinguished by great length of tail, and there is consequently no generic name for these Blue Jays, which I would therefore propose to name *Cyanocitta*, taking *C. cristata*, Linn. sp., as the type, and including the species *ultramarina*, Bonap., *superciliosa*, mihi, *floridana*, Bartram, *stelleri*, Pall., *coronata*, Swains., and probably a few others. The beak is much more slender, more depressed, and the culmen straighter than in *Cyanocorax*.

XXXVI.—*Note on Mr. W. Thompson's Paper on the Ova of the Large Spotted Dog-fish.* By Capt. Portlock, R.E.

Corfu, Jan. 23, 1845.

On receiving this paper, I turned to a large collection of the ova of dog-fish which I had purchased from the fishermen in May 1844, and at the time classed as ova of *Scyllium Catulus*, the large spotted dog-fish, both on account of the great difference between them and the ova of either *S. Canicula* or of *Pristiurus melanostomus*, and from the fact that the *Scyllium Catulus* is the common species of Corfu. The resemblance in form between

Mr. Thompson's drawings and these specimens is certainly very great, though the anterior end in mine is rather more closed than in his, by the bending over of the edges through which the tendrils of the two sides have become entangled together. None of the markings are so strong as in the figures, the transverse markings on the broad flat sides being scarcely perceptible in any of the specimens, and the striæ on the flattened edges not extending in general very far from the posterior end, where they are in some specimens tolerably strong and extend over the inner edge of the rim as shown in the figure. The dimensions in length, at least of my specimens, were all less than those of Mr. Thompson, viz.

Extreme length	4	inches.
Width	$1\frac{1}{4}$	,,
Thickness rather more than	$\frac{1}{4}$	,,

The colour when fresh was a pale horn as usual, but becomes brown by keeping.

As regards the period of protrusion, from May when I procured my first specimens until the end of November and beginning of December the fish became scarce, when they again appeared in the market, and on the 27th of December I procured some fresh eggs, one pair of which was said to have been taken from a large female then lying opened before me. Others I saw subsequently, and in one I observed the ovaries to contain eggs still in a soft state and without their covering; this was a large specimen, measuring 28 inches. There can therefore be no doubt that the eggs of these fishes are protruded at least at two periods of the year.

XXXVII.—*Note on* Euplocamus, Triopa *and* Idalia. By Joshua Alder, Esq.

In the second volume of the 'Enumeratio Molluscorum Siciliæ,' Dr. Philippi under the head of *Idalia* (to which he now refers his genus *Euplocamus*) makes some strictures upon a notice that appeared in this Journal (vol. vi. p. 217) from Professor E. Forbes, stating that the lateral appendages of *Euplocamus* of Philippi (*Triopa* of Johnston) had no vibratile cilia, and consequently were not branchial. The same notice also stated that the lateral appendages of *Tritonia* and *Eolis* were ciliated, but the branchial appendages of *Polycera* were not so.

To these observations Dr. Philippi makes several objections. In the first place, after asking on what species of *Euplocamus* the observations were made, he says that a mere inspection of the figure of his *E. croceus*, without any microscopic disquisition, will show that the lateral appendages serve the office of respiration, and from this species, he adds, the transition is evident to

E. laciniosus. Upon this I would remark, that the function here attributed to the lateral appendages of *E. croceus* is probably correct, yet not so self-evident but that it would be desirable to bring them to the test of the microscope,—a mode of investigation which this distinguished naturalist appears to hold in slight esteem. With regard to the latter part of the observation, which implies that if the appendages of *E. croceus* are branchial those of *E.* (*Idalia*) *laciniosus* are so also, I cannot assent to it. Indeed Dr. Philippi would appear to have some doubts upon the point, for, referring to his descriptions, I find that these processes are called "*branchiæ*" in *E. croceus* and *E. ramosus*; in *I. cinigera* "*branchiæ?*" (with a query); and in *I. laciniosa* they are simply called "*cirrhi*," the term branchiæ being properly reserved for those processes surrounding the vent.

The animal examined by Professor Forbes was not one of the Sicilian species, but the only British species referred to the genus by Dr. Philippi (and which is also the type of Dr. Johnston's genus *Triopa*), viz. *Doris clavigera* of Müller.

Dr. Philippi next asks, whether it is a fact that all the organs serving for respiration are furnished with vibratile cilia, and says he can scarcely believe that the branchiæ of *Eolis* are ciliated, because they appear not to differ in anything from the lateral appendages of *Euplocamus*. It is unfortunate that the learned author has not been in the habit of using a microscope in the examination of these animals, as, had he done so, he could immediately have satisfied himself of the fact, and thus have avoided the disadvantage of offering an opinion in opposition to the testimony from observation not only of Professor Forbes, but of several other naturalists who have lately written on the subject.

To the question, whether the branchial organs are always ciliated, the concurring observations of anatomists will, I think, justify a reply in the affirmative; at least I am not aware of any case to the contrary. The absence of vibratile cilia therefore may be taken as a fair presumption that an organ is not adapted for respiration. Their presence however does not always imply that function, as several other delicate tissues in the animal œconomy, especially when currents are required, are well known to be ciliated.

The next question asked by Dr. Philippi is, whether the genus *Triopa* is really the same as his *Euplocamus*; and he infers from an observation of mine that "*Triopa Nothus* of Johnston is probably a *Polycera*," that *Triopa* and *Polycera* are the same, and as *Polycera* is different from *Euplocamus*, we must have very lax notions of what constitutes a genus. "Cum iis, qui tales differentias ad distinctionem generum non valere putant, litem habere nolo; sed iis adsentire non possum."

These conclusions are founded upon imperfect and erroneous data that might have been avoided by consulting the papers on Scottish Nudibranchiata in the first volume of this Journal. Dr. Johnston there institutes the genus *Triopa* for the *Doris clavigera* of Müller, but while taking this species for his type he acknowledges that he has characterized the genus rather loosely on purpose to include in it another animal not very perfectly understood, which I have since suggested may be the young of a *Polycera*. Now from this circumstance it does not necessarily follow that *Triopa clavigera* is also a *Polycera*. In calling the latter species an *Euplocamus*, Professor Forbes followed the opinion of Dr. Philippi himself, who in describing the genus (Enum. Moll. Siciliæ, vol. i. p. 104) says, " Altera hujus generis species est *Doris clavigera*, O. Fr. Müller, Zool. Danica," thus referring to his genus a species without lateral branchiæ; and he has since united this genus with *Idalia*, Leuck., in which lateral branchiæ are also wanting.

If, as Dr. Philippi states, and I am inclined to believe, the typical *Euplocami* have lateral branchiæ, it is an interesting circumstance, as it will be the only genus in which the two kinds of branchiæ are known to exist in the same animal.

On this view of the subject, I should propose that the genus *Euplocamus* be retained for *E. croceus* and *E. ramosus*, and that *Doris clavigera*, Müll., be considered the type of the genus *Triopa*, to which may perhaps be added *Doris fimbriata* and *D. lacera* of the same author.

Idalia cerrhigera and *I. laciniosa* are very properly placed in the genus of Leuckart.

XXXVIII.—*On the Occurrence of Phytozoa in Phanerogamous Plants.* By Dr. A. Grisebach*.

The observation recently published by Nägeli, that the tailed globules which occur in the antheridia of mosses are likewise found in organs possessing a similar structure on the germ-leaf of ferns, excited my interest, the more so as in this case it is requisite to abstract these globules entirely from any connexion with the production of spores or with any process analogous to impregnation in animals. I examined these organs first on a germinating *Adiantum concinnum*, Kth., and had occasion to confirm Nägeli's discovery in every essential point. I will here mention the remarkable phænomenon, that in *Adiantum* these organs, which, to prevent any comparison with the anthers, I have called *Corynidia*,

* From the Botanische Zeitung, Sept. 20, 1844. Translated by W. Francis, F.L.S.

are not situated on the surface of the germinating leaf, but sunk into its margin. Its position therefore as regards other ferns is exactly in the same relation as the development of the spores on the frond, which in general are situated on the surface, but in *Adiantum* are on the margin. Now although in this case the corynidia by no means project freely from the cellular tissue of the germ-leaf, there will be seen, just as in all other cases, an outer layer of cells, differing in the present instance by the absence of chlorophylle globules from the other adjacent cells, and leaving the inner sac in which the minute free cells occur, every one of which encloses a phytozoon. The structure therefore is perfectly similar to the antheridia of mosses, and I have found it precisely as described by Nägeli: the same with respect to the form of the phytozoa, but not the motions, which I am not able to distinguish from inorganic molecular motions.

The occurrence of phytozoa in decidedly vegetative parts of plants increased my hope of detecting them in Phanerogamia. I had frequently observed, in the investigation of leaf-buds, masses of black particles in the drop of water on the glass stage, which exhibited on being magnified 200 times a very lively molecular motion. Their origin was unknown to me, but on recently observing them again in the buds of *Rhamnus infectoria* and *pumila*, I immediately observed most distinctly with a magnifying power of 410 that they were phytozoa accurately agreeing with those in ferns. Like them they consist of long-tailed globules which are individually inclosed in a very minute spherical cell, or swim freely about in the water, oscillate in a lively manner, and sometimes move the tail. Since there was no doubt of the identity of this phænomenon, it now only remained to see whence these globules were derived. The place where the corynidia are situated was soon found, and it now became evident that exactly the same apparatus occurs here as in the ferns and mosses. In the *Rhamneæ* the stipules are formed very early, and we consequently find, even in the youngest parts of the leaf-bud, each leaf inclosed between two membranous stipules projecting beyond it and arising from a common basilary membrane: this, it may be observed *en passant*, is an argument in favour of Robert Brown's view that the *Rhamneæ* should be placed near the *Malvaceæ*, which exhibit the same development of stipules, while the *Celastrineæ*, as I find at least in *Euonymus*, form their teguments from leaves and only obtain stipules very late. At the basis of the two stipules in *Rhamnus*, on the upper surface, is situated a group of clavate bodies, which agree perfectly in their structure with the corynidia of ferns and mosses, and like these, the phytozotic cells discharge their contents by endosmosis. This phænomenon is *quite common* in leaf-buds with dormant vegetation. Where no stipules exist, they may sometimes be situated on the leaves themselves. Guettard's clavate glands appear to belong here. The object of the corynidia with their phytozoa seems to be rendered only more mysterious by their frequent occurrence in Phanerogamia.

XXXIX.—*On the Rats, Mice, and Shrews of the Central Region of Nepal.* By B. H. Hodgson, Esq., late British Resident at Nepal.

The Rats and Mice of the mountains of Nepal are as numerous and troublesome both in house and field as they are in Europe. Their forms are, in general, typical of the genus as now restricted, and the most common species are closely related to those most frequently met with in Europe; nor are there in the mountains any of the Jumping Rats (*Gerbillus*) or other types more especially characteristic of the plains of India, though we have the singular Bamboo Rats of China, Indo-China and the islands, being one instance of many in which our fauna inclines rather to China than India. With these few words of introduction I proceed to a summary description of the several species, which are eighteen in number, viz. eleven rats and seven mice, to which we will add the shrews, four in number.

Rats.

1. *Mus nemorivagus*, mihi.—A very large species, closely affined to the bandicoot, if not identical with it. It is much rarer in the mountains than in the plains, and is a house-, not wood-rat, as I had supposed. General structure typical, but distinguished by a præputial gland furnished with two pores, one placed on either side, the penis close to its point, and whence is emitted a quantity of thick yellow pus-like secretion of very offensive odour. I have not noticed this organ in the other rats. General colour very dark, brown-black above, hoary blue below; the limbs dark; the fingers only pale. Long piles very abundant and lengthened, but not rigid. Tail shorter than the body and head, nude and annularly scaled as usual. Snout to rump 12 inches; tail $9\frac{1}{2}$; head $2\frac{3}{4}$; ears $1\frac{1}{4}$; palma with nail 1; planta $1\frac{7}{8}$; weight 17 to 20 oz.

2. *Mus brunneus*, mihi? Common House-Rat of Nepal.—As nearly allied to *decumanus* as the last to the bandicoot. Above rusty brown; below rusty, more or less albescent. Extremities pale; fleshy white nearly. Tail barely longer than the head and body. Long piles sufficiently numerous, but not rigid. Snout to vent $9\frac{1}{4}$ inches; tail $9\frac{1}{2}$; head $2\frac{1}{4}$; ear 1; palma $\frac{7}{8}$; planta $1\frac{5}{8}$; weight 12 to 15 oz.

3. *Mus brunneusculus,* mihi, Lesser Brown Rat of Nepal.—Closely resembling the last but considerably smaller, as proved by numberless specimens; above rusty brown, below rusty. Extremities pale. Snout to vent $8\frac{1}{4}$ inches; tail 9; head $2\frac{1}{8}$; ears 1; palma —?; planta —?; weight 9 to 10 oz.

4. *Mus rattoides,* mihi, Black Rat of Nepal.—As similar to the black rat of Europe as the foregoing is to our brown rat, and bearing in Nepal the same relation the one to the other as in Europe. Above dusky or blackish brown, below dusky hoary. Limbs dark; fingers pale; tail decidedly longer than the body and head; long piles sufficiently numerous. Snout to vent $7\frac{1}{2}$ inches; tail $8\frac{3}{4}$; head $1\frac{7}{8}$; ears $\frac{7}{8}$; palma $\frac{13}{16}$; planta $1\frac{1}{2}$; weight 5 to 7 oz.

5. *Mus niviventer,* mihi, a House-Rat.—Proportions and characters of the last, but tail rather shorter and long piles of the pelage rarer. Size less. Above blackish brown, shaded with rufous; below entirely pure white, tail and all. Snout to vent $5\frac{1}{4}$ inches; tail 6; weight 4 to 5 oz. Of rare occurrence.

6. *Mus nitidus,* mihi.—Distinguished for its smooth coat or pelage, wherein the long hairy piles are almost wholly wanting. Is a house-rat like the foregoing, but much rarer, and frequents the mountains rather than the valleys. Structure nearest to *rattoides,* and colour very similar to that, or dusky brown above and dusky hoary below. Long piles $\frac{11}{16}$ths of an inch long; basally hoary, apically black. Short piles cinereous below, with pale rufous tips. Snout to vent $6\frac{1}{2}$ inches; tail $7\frac{1}{4}$; head $1\frac{11}{16}$; ears $\frac{3}{4}$; palma (with nail as before) $\frac{11}{16}$; weight $3\frac{1}{2}$ oz.

7. *Mus? Pyctoris,* mihi.—Tenants the woods only. Characterized by its bluff face with short thick muzzle, and by its short tail, one-third short of the length of the animal. Pelage of two sorts, with the long piles sufficiently abundant. Colours of *rattoides* or dusky brown, with a very vague rufous tinge. Below fulvescent; long hairs all black; rest with hoary bases and black points. Inner vest mostly dusky. Snout to vent 7 inches; tail $4\frac{1}{2}$; head $1\frac{7}{8}$; ears $\frac{13}{16}$; palma $\frac{5}{8}$; planta $1\frac{1}{4}$.

8. *Mus? Myothrix* mihi.—Tenants the woods solely. Remarkable for its soft mouse-like pelage, and for its tail covered with hairs, so as to conceal the annulated skin nearly. Dwells in burrows under roots of trees, but not gregariously. Fur soft, short, and of one kind only. Colours clear; above dull fawn, below fulvescent. The piles above are dusky at their roots, black in their centres, and red at their tips. The tail is still shorter than in *Pyctoris,* being not two-thirds of the length of the animal. Snout to rump 6 inches; tail $3\frac{3}{4}$; head $1\frac{1}{2}$; ears $\frac{11}{16}$; palma $\frac{7}{16}$; planta $1\frac{1}{16}$.

9. *Mus? hydrophilus,* mihi, Small Water-Rat of Nepal.—Dwells in holes on the margins of ponds and rivers. Characterized

by its small ears, which are hardly above one-third the length of the head; also by its short tail, and by a pelage that is short and fine, though not so mouse-like as in the last. Above dusky brown, below and the limbs nearly white. Long piles inconspicuous. Head larger and muzzle thicker than in the common land-rats. Snout to vent $3\frac{1}{2}$ inches; tail $2\frac{3}{4}$; head $1\frac{1}{4}$; ears $\frac{9}{16}$; palma $\frac{1}{2}$; planta $\frac{7}{8}$.

10. *Mus? macropus*, mihi.—A water-rat like the last, but twice as large. Distinguished by the largeness of its feet, and also by the fine pelage and the proportions of the last, as well as by a similar bluff face, though less so than in *Pyctoris*. Above smoky black, below smoky gray. Legs dark; toes pale. Snout to rump $7\frac{1}{4}$ inches; tail 6; head $2\frac{1}{16}$; ears $1\frac{1}{16}$; palma plus 1; planta $1\frac{13}{16}$; weight 6 oz.

11. *Mus Horeites*, mihi.—Dwells in houses and out-houses. Is a small land species with fine pelage, and no peculiarity of physiognomy or proportion. Tail longer than the animal. Colour above sordid brown, below sordid white. Snout to rump 4 inches; tail $4\frac{1}{4}$; head $1\frac{1}{4}$; ears $\frac{7}{16}$; palma $\frac{1}{2}$; planta $1\frac{1}{8}$.

Mice.

12. *Mus cervicolor*, mihi, Common Field Mouse.—Structure typical. Distinguished by its short tail. Above dull fawn, below sordid white. Lining of ears and extremities pale. Snout to rump $3\frac{1}{2}$ inches; tail $2\frac{7}{8}$; head 1; ears $\frac{9}{16}$; weight $\frac{3}{4}$ oz. Females less and having ten teats.

13. *Mus strophiatus*, mihi.—Another field-mouse closely allied to the last, but seemingly distinct. Bright fawn above, pure white below; a cross or gorget on the breast. Snout to vent $3\frac{1}{8}$ inches; tail $2\frac{7}{16}$; head less 1; ears $\frac{9}{16}$; weight $\frac{1}{2}$ oz.

14. *Mus* (*Vandeleuria*) *dumeticola*, mihi, Wood Mouse.—Tenants woods and coppices. Remarkable for the extreme length of its tail. Above fawn-colour, below white. Snout to rump $2\frac{7}{8}$ inches; tail 4; head $\frac{7}{8}$; ear $\frac{3}{8}$; weight $\frac{1}{2}$ oz.

15. *Mus dubius*, mihi.—A house-mouse, but also found in out-houses and gardens rarely. Allied to the last by its long tail. Above dusky brown, touched with fawn; below sordid fawn. Snout to rump $2\frac{1}{4}$ inches; tail $2\frac{3}{4}$; head $\frac{7}{8}$; ears $\frac{1}{2}$.

16. *Mus homoourus*, mihi, Common House Mouse.—Distinguished by a tail equal to the animal, being usually quite equal, but sometimes rather less. Coloured like *decumanus* but purer, or rufescent brown above and rufescent white below. Hands and feet fleshy white. Snout to rump $3\frac{1}{2}$ inches; tail $3\frac{1}{2}$; head $1\frac{1}{16}$; ears $\frac{9}{16}$; palma —?; planta —?; weight $\frac{3}{4}$ oz. It has eight teats only in the females? The other mice have ten and the rats twelve.

17. *Mus urbanus*, mihi, City Mouse.—Species usually found in the city of Katmandoo. Allied to *dubius* in its proportions and colours, and possibly *dubius* may be the immature. Above embrowned ruddy luteous; below luteous, more or less rufescent. Feet paler. Snout to rump $2\frac{3}{4}$ inches; tail $3\frac{3}{4}$; head $1\frac{1}{16}$; ears $\frac{6}{16}$; palma $\frac{3}{8}$; planta $\frac{5}{6}$; weight $\frac{1}{2}$ oz.

18. *Mus povensis*, mihi, the Powah Mouse.—Procured near the Powah or Caravansery of Jaher Sing; may be a house or coppice species; allied to *dumeticola* in proportions and in colours. Distinguished by a tail much longer than the animal. Above bright fawn, below pure white. Extremities nude and pale. Snout to rump 2 inches; tail 3; head $\frac{1}{1}\frac{3}{6}$; ears $\frac{3}{8}$; palma—?; planta—?; weight $\frac{1}{4}$ oz.

SHREWS.

Shrews are rarer in the hills than in the plains, though in the great valley of Nepal proper the species common to both (*murinus*) is perhaps as abundant within the mountains as without them. There are four species with us; whether the other three are found in the plains I do not know.

19. *Sorex murinus*, the Common House Shrew of the plains and also of the hills, up at least to 6000 feet.—It seldom or never quits houses, is nocturnal, omnivorous, dwells and breeds in holes and crannies and gutters: breeds frequently, and produces four or five young at a birth, which are nude and blind. Its six teats are inguinal and pubic. It has large anal as well as costal glands and pores, whence issues the strong smell of musk for which the animal is notorious. Its muzzle, ears and extremities are nude. Its tail is covered only with scattered and divergent hairs. The tail is but half the length of the animal, and is rounded and tapers from a thick base.

Colour uniform slaty blue, with the nude parts fleshy white. Snout to rump 6 inches; tail $3\frac{1}{8}$; weight 2 oz.; head $1\frac{3}{4}$; palma with nails $\frac{6}{10}$; planta 1.

20. *Sorex pygmæus*, mihi, Tiny Shrew.—Rarely found in houses. Dwells in coppices and fields. Structure typical, save that no odorous glands were detected, nor had the animal any musky smell.

Colour sooty brown, paler below. Naked parts of a dusky fleshy hue. Snout to vent less 2 inches; tail $1\frac{3}{16}$; head $\frac{1}{1}\frac{1}{6}$; palma $\frac{1}{4}$; planta $\frac{3}{8}$.

21. *Sorex? nemorivagus*, mihi.—Found only in woods and coppices. Differs from both the above by a stouter make, by ears smaller and less entirely nude, and by a longer and tetragonal tail. Colour sooty black with a vague reddish smear; the nude parts fleshy gray. Snout to rump $3\frac{5}{8}$ inches; tail 2; head $1\frac{1}{4}$; palma $\frac{1}{2}$; planta $\frac{1}{1}\frac{1}{6}$; weight less 1 oz.

22. *Sorex? soccatus*, mihi.—Size and proportions of the last nearly, but distinguished by its feet being clad in fur down to the nails, and by its depressed head and tumid bulging cheeks (mystaceal region). Ears large and exposed as in the first two species (*murinus* and *pygmæus*), and like them having a rounded tapering tail, but somewhat longer in proportion than theirs. Colour a uniform sordid or brownish slaty blue, extending to the clad extremities. Size nearly of the last. Snout to rump $3\frac{1}{2}$ inches; tail $2\frac{1}{8}$; head $1\frac{7}{16}$; palma $\frac{1}{2}$; planta $\frac{13}{16}$; weight $\frac{3}{4}$ oz.

This animal was caught in a wood plentifully watered, but not near the water. I never saw nor heard of it as a tenant of houses, any more than the last-named. It had no musky smell when brought to me dead. I did not examine its glands.

P.S.—The above paper completes the notices of Nepalese Mammals published in India, and, like the papers written there, has been composed without the aid of library or museum.

XL.—*Contributions to the Fauna of Ireland.* By Frederick McCoy, Esq., M.G.S.D.

[With a Plate.]

Notices of some of the following animals were read to the Natural-History Society of Dublin at the June meeting for 1844. The Invertebrata are a portion of a large series collected by Mr. McCalla on the west coast of Ireland, and placed in my hands for examination and description by my valued friend Dr. Scouler, whose kindness I have before had to acknowledge for the liberal manner in which he has always allowed me to examine and describe any specimens of interest either in the museum of the Royal Dublin Society or in his own private collection.

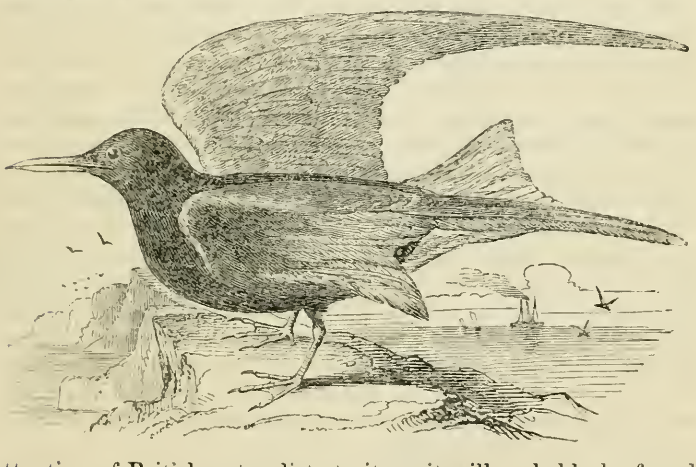
Mammalia.

Vespertilio Nattereri (Kuhl).—The singularly small number of bats found in Ireland only amounting at present to three, of which one (*V. Daubentonii*) has occurred but in a single instance, renders any addition to their number of peculiar interest to the Irish naturalist, or to those who take an interest in comparing the fauna of Ireland with that of England. The present species, the reddish gray bat of British authors, has not I believe been hitherto recorded in Ireland; a specimen however was brought to me last summer by G. Mangan, Esq., and is now in the museum of the Natural-History Society of Dublin; he killed it near that city, and was of opinion that it was the common species in his neighbourhood: whether the pipistrelle (the most common Irish bat) might have been confounded with it on the wing, or whether it is really a common species, I cannot say; I can only state the occurrence of the species, and so add it to the list of Irish animals.

AVES.

Tringa rufescens, Buff-breasted Sandpiper.—A specimen of this rare bird, shot by J. Hill, Esq. near the Pigeon House, Dublin, is preserved in the Museum of the Natural-History Society of Dublin. The specimen is in the same plumage as those described by Mr. Yarrell; the markings on the under side of the wings are very beautiful. The specimen noticed is the only Irish one I am aware of.

Sterna leucoptera (Temm.).—A specimen of this beautiful tern was shot by J. Hill, Esq. on the Shannon in 1841, in company with the black tern (*S. nigra*), with which it was confounded; the specimen was sent along with one of the latter species to the Natural-History Society of Dublin, in whose museum they are now preserved; but from their general resemblance to each other, the present species has remained there undistinguished till the present time. As I believe this to be the first record of the occurrence of this bird in Britain, I subjoin a short description of the specimen and a sketch half the natural size, to assist in drawing the



attention of British naturalists to it, as it will probably be found not unfrequent. *Measurement*—Total length, to extremity of tail, about 8 inches; bill from base $10\frac{1}{2}$ lines, from rictus 1 inch 5 lines; greatest depth of both mandibles $2\frac{1}{2}$ lines; middle toe, including the claw, 11 lines in length; tarsus 8 lines; naked portion of the tibia 4 lines. *Colours*—Legs and feet in the preserved specimen pale yellow, probably red in the living bird, claws darker; bill dark blackish brown; head, neck, breast, abdomen, under wing-coverts and back deep glossy black; small wing-coverts, tail, and upper and under tail-coverts pure white; first three quill-feathers black, with a broad longitudinal band of white on their inner webs; remainder of the wings ash-gray, becoming darker towards the body.

The form, proportions and size of this species are very nearly those of the black tern (*S. nigra*); like that species too the webs of the toes are very deeply indented, being reduced to a mere rudiment between the middle and inner toes. The two species are however easily distinguished,—the under wing-coverts of the *S. nigra* are white, of the *S. leucoptera* black; the tail of the former is dark gray, of the latter pure white; in the *S. nigra* the throat is white, breast and abdomen dark gray, and the back lead-colour, while in the *S. leucoptera* all those parts are black. I speak of both species in their perfect plumage.

Echinodermata.

Priapulus —— ? Pl. XVI. fig. 1.—A species of *Priapulus* is very common in the sand at low water mark in Connemara, and occasionally found on the east coast: as it does not agree with the figures of Müller or Prof. E. Forbes of the *P. caudatus*, nor agree exactly with their descriptions, I have made a drawing of a moderate-sized specimen for comparison. In a great number of specimens I have examined, the characters seemed to present no variation; in all of them the trunk is transversely striated, the general proportions thicker and more robust than in *P. caudatus*; the body uniformly cylindrical, not dilated at the extremities; the posterior extremity, instead of being dilated and open, is narrowed and closed; there is no longitudinal striation in any of the specimens at either end of the body; the posterior extremity is irregularly tuberculated; the caudal appendage is much thicker and more bushy than in the *P. caudatus*. As I have not seen living specimens I have left the species an open question; if it should prove distinct from the species described by Müller and Prof. Forbes, it might perhaps be called *P. hibernicus*. Specimens are in the museum of the Natural-History Society of Dublin, and a large series of them, of every age and size, in the museum of the Royal Dublin Society.

Syrinx granulosus (McCoy), Pl. XVI. fig. 2.—*Sp. Ch.* Body nearly smooth, very minutely and uniformly granulated, and obsoletely striated transversely; basal half of the proboscis and the posterior extremity of the body roughened by deep concentric rugæ and small crowded tubercles; proboscis from the anal pore to the mouth one-fourth the length of the body, posterior extremity mucronate.

This fine species is intermediate in character between the *S. pa-*

pillosus and *S. Harveii,* the body being entirely without the distinct distant papillæ of the former species; while on the other hand, instead of being smooth as in the *S. Harveii,* it is minutely but regularly granulated, the granules being close together and uniformly distributed over the body, except at the posterior extremity and basal half of the trunk, where the surface is rendered rugged by larger tubercles and deep transverse irregular rugæ. Colour usually a uniform dull brown. Length about 7 inches; diameter of body about 9 lines. Very common at Roundstone bay in certain localities.

Syrinx Forbesii (McCoy), Pl. XVI. fig. 3.—*Sp. Ch.* Posterior half of the body suddenly attenuated; extremity dilated, club-shaped; trunk slender, dilated towards the extremity, granulated its entire length to the base of the tentacula, remainder of the body perfectly smooth.

The form and proportions of this species are nearly those of the *S. nudus,* from which it is distinguished by its smaller size, perfectly smooth body, and in having the proboscis granulated to the base of the tentacula. The extremity of the trunk is conical, narrow, surrounded by a circle of short digitate tentacula, behind which the trunk is rather inflated for a short distance and marked with minute granules disposed in circular lines; the remainder of the proboscis, forming about one-fourth of the entire length of the animal, is of a considerably smaller diameter and covered with a minute crowded granulation; with the exception of the trunk, the entire animal is perfectly smooth: where the granular portion ceases the body is abruptly dilated to nearly four times the diameter of the trunk, and continues cylindrical for about the same length, when it again diminishes to about one-third its diameter, and so continues to the posterior extremity, which is dilated into a pear-shaped knob. The anal pore is situated on the dilated smooth portion of the body, a little below its junction with the trunk.

Not uncommon at Roundstone bay, Connemara, from whence there are specimens in the museum of the Royal Dublin Society.

Syrinx tenuicinctus (McCoy), Pl. XIV. fig. 4.—*Sp. Ch.* Cylindrical, diameter of body from the base of the trunk to the posterior extremity perfectly uniform; posterior extremity obtuse, slightly mucronate at the tip; trunk about one-seventh of the entire length; tip obtuse, surrounded by a few rows of minute puncta; entire surface of the animal sharply striated concentrically: with a lens the trunk and a small portion of the posterior extremity are seen to be also marked with numerous faint, short, rather distant, longitudinal striæ.

It is only after much hesitation that I have ventured to characterize this pretty species. I had long been struck by its peculiar uniform, cylindrical body, short proboscis, blunt posterior end, and tough, finely striated, glossy integument, the species being very common on the west coast of Ireland. I was uncertain whether the species might prove to be the young of the *S. granulosus* which I have just described; I have however recently been able to examine so large a number of the latter species at all ages, that my doubts are entirely cleared up. The adult length of the *S. tenuicinctus* seems to be about three and a half inches: young specimens of the *S. granulosus* of the same size may be readily distinguished by their granulated body (which is proportionably more distinct in the young than in the old individuals), and their posterior extremity being more gradually pointed and remarkably roughened both by transverse wrinkles and granules. From the *S. Harveii* it is distinguished by its tough striated integument, blunt posterior end, the faint and peculiar character of the reticulation at the two ends of the body, and in the entire of the trunk being marked in the same manner as its base. The colour is usually a clear, uniform hair-brown; length about 3 inches; diameter of body 3 lines; diameter of trunk 1 line. The figure given by Pennant of the *Siphunculus nudus* seems to belong rather to this species; the *Phascolosoma carneum* figured by Ruppell from the Red Sea is also similar, but is distinguished by its pink colour, perfectly smooth body and longer proboscis.

Specimens are in the collection of the Royal Dublin Society from the west coast.

BIBLIOGRAPHICAL NOTICES.

Illustrations of Indian Ornithology. By T. C. Jerdon. No. 1. 8vo. Madras, 1843. London, Richardson.

This work is intended, when complete, to contain fifty coloured plates of new or unfigured birds from the south of India. The present number comprises twelve of these plates, lithographed and coloured by native Indian artists, and in a style which does them great credit. With a few exceptions the designs are well-drawn, and the colouring is executed with a far higher degree of finish than European artists can generally afford to give to their publications. We understand however that Mr. Jerdon, anxious to make his work as perfect as possible, has made arrangements for the lithographs in the succeeding numbers to be executed in England, though we think that with the resources which the native talent of India can supply, this step was hardly necessary.

The letter-press is drawn up by Mr. Jerdon with much care and attention, comprising ample descriptions of the species figured, with many interesting observations on their habits, and critical remarks on the labours of other authors in the same field of research. The latter department is one in which naturalists, writing like Mr. Jerdon at a great distance from home, always experience much difficulty, from the want of access to scientific libraries and museums. Nevertheless Mr. Jerdon has turned to good account such works on Indian zoology as lay within his reach, and his identifications of species are in general correct. We will proceed to notice briefly the contents of the number before us.

Plate 1, *Nisaëtus grandis*, Hodgson, a species which is now considered to be synonymous with the *Aquila Bonelli* of Europe. 2. *Leucocerca albofrontata*, which, like the other species of Mr. Swainson's genus *Leucocerca*, it seems impossible to separate by well-marked generic characters from *Rhipidura*. 3. *Zanclostomus viridirostris*, Jerdon, a species which seems to be in fact a *Phœnicophaus*, though the compressed beak and diminution of the bare space round the orbits indicate an approach to the nearly-allied genus *Zanclostomus*. 4. *Accipiter besra*, Jerdon; this appears to be the young state of the *A. virgatus*, Temm. 5. *Picus Hodgsoni*, a new and handsome species, distinguished from the *P. javensis*, Horsf., by its white rump, and referable to the genus *Hemilophus*. 6. *Prinia cursitans*, Frankl., a small bird closely allied to the *Drymœca cisticola* of Europe, and generically identical with it. 7. *Muscipeta paradisi*; the specimen here figured is interesting as showing a state of plumage intermediate between the chestnut-coloured bird called *M. indica* and the pure white plumage of the adult *M. paradisi*, and thus proving their specific identity. 8. *Turdus Wardi*, Jerdon, a rare and beautiful thrush, typical in form, but anomalous in coloration. 9. *Scolopax nemoricola*, Hodgson, a large species of snipe, presenting in many respects an approach to the woodcock. 10. *Pterocles quadricinctus*, the true *quadricinctus* of Temminck and *indicus* of Gmelin; but its earliest specific name is *fasciatus*, given by Scopoli. 11. *Phœnicornis flammeus*; this is certainly the true *Muscicapa flammea* of Temminck, and consequently inhabits Java and Sumatra as well as Ceylon and S. India; but it is not the *Oranor* of Levaillant, Ois. Af. 155, as Mr. Jerdon supposes, that bird being the *P. peregrinus*. 12. *Falco shaheen*, Jerdon, a handsome species long ago noticed by Brisson as a supposed variety of *F. peregrinus*, and first defined specifically by Sundevall under the name of *F. peregrinator*.

Such works as this of Mr. Jerdon are deserving of every encouragement, for they supply us at small cost with accurate delineations and original descriptions of new species, and thus furnish science with materials intrinsically as valuable as can be found in the most expensive publications.

Salictum Britannicum exsiccatum. Fasc. II. By the Rev. J. E. Leefe.

We have recently received this fasciculus of Mr. Leefe's very valuable collection of dried specimens of British Willows, and have much pleasure in stating that it is fully as deserving of approbation as that which preceded it. The different forms contained in this fasciculus are the following:—

50. S. decipiens.
51. 52. 53. S. fragilis.
54. 55. S. Russelliana.
56. 57. 58. 59. S. alba.
60. 61. 64. 65. S. caprea.
63. S. caprea (androgyna).
66. S. caprea (sphacelata).
67. S. hirta.
68. 69. 70. 71. S. rupestris.
72. S. tenuior.
73. S. laurina.
74. S. Davalliana?
75. S. propinqua.
76. 77. S. Weigelliana, *E. B.*
78. 79. S. Weigelliana, *Forb.*
80. 81. 83. S. Crowiana.
82. S. nitens.
84.?
85. S. tetrapla.
86. S. fusca, repens.
87. S. f. prostrata.
88. S. f. ascendens.
89. S. f. argentea.
90. S. arenaria.

Many of these plants are identified with those of Koch by the inspection of authentic specimens, but we are sorry not to see more observations upon the rank as species or varieties which the several plants are entitled to claim. The valuable synoptical table given with the former fasciculus is not continued in that before us; for this however there is one consolation, namely, that the author states his intention of preparing a third fasciculus in which it will be contained.

We take the present opportunity of publishing some valuable notes upon Mr. Leefe's Fasc. I. with which we have been favoured by M. W. Sonder, the distinguished botanist of Hamburg.

Salictum Britannicum, Fasc. I.

1. Salix pentandra, *L.*!
2. S. pentandra, *L.*!
3. S. amygdalina = S. amygdalina *β*, *Koch*!
4—8. S. amygdalina, *Koch*!
9. S. undulata, *Ehrh.*!
10—13. S. purpurea, *L.*, et var.
14. S. Lambertiana = S. purpurea, var.
15, 16. S. rubra, *Sm.*—15 *varietas.*
17—24. Omnes S. viminalis, *L.*! Amenta mascula *S. Smithianæ* ab iis *S. viminalis* valde diversa sunt.
25, 26. S. Smithiana = S. Smithiana, *Koch*, et S. lanceolata, *Fries*!
27, 28. S. Smithiana ?=S. Smithiana, *Koch*, et S. lanceolata, *Fries.*
29. S. Smithiana ? Ramulos juniores a S. Smithiana distinguere nequeo.
30. S. rugosa, *Sm.*, est S. Smithiana, *Koch*, *β*. glabrata, *Sonder*, quæ in ripa Albis prope Hamburg non rara.

31—33. S. rugosa est S. Smithiana, *Koch*.
34. S. rugosa ? var. stipularis = S. holosericea, *Willd.* Mihi gratissima est; plantam fœmineam antea nondum vidi.
35. S. ferruginea, *And.*, folia—S. holosericea, *Willd.*, valde similis, sed incompleta.
36. S. ferruginea var. = Quoad folia et amenta valde affinis S. Smithianæ, *Koch*, sed tamen distincta videtur. Ab icone in Eng. Bot. Suppl. t. 2665. præter squamas rotundatas non distinguenda.
37. S. acuminata = An revera S. acuminata, *Sm.* ? quæ ad sectionem S. viminalis pertinet? Amenta desunt. An forsan varietas S. cinereæ?
38—42. Omnes formæ et varietates S. cinereæ, *L.*
43. Salix—an S. aquatica? Longe diversa, est sine dubio forma S. laurinæ, *Sm.*, confer amenta. Eandem plantam ex hort. bot. Berolinensi, et ex Silesia possideo.
44. S. oleifolia, *Sm.* ? = Pro var. S. cinereæ, *L.*, habeo, sed amenta non vidi.
45. S. aurita, *L.* = Forma sylvatica apud nos frequens.
46, 47. S. aurita, *L.*!
48, 49. S. reticulata et S. herbacea.

W. Sonder.

Hamburg, March 19, 1844.

Mr. Van Voorst has just published a very useful "Catalogue of British Vertebrated Animals, the names derived from Bell's British Quadrupeds and Reptiles and Yarrell's British Birds and Fishes: so printed as to be available for Labels." The label consists of the English and Latin names and a reference to the volume and page of the excellent works above-mentioned.

PREPARING FOR PUBLICATION.

A History of Infusoria, Living and Fossil: arranged according to "Die Infusionsthierchen" of C. G. Ehrenberg. By Andrew Pritchard, M.R.I.

Microscopic Illustrations of Living Objects, with Researches concerning the Methods of Constructing Microscopes, and Instructions for using them. To which is added, a Supplement on the Verification of Microscopic Phænomena, and an Exact Method of Testing Microscopes. By C. R. Goring, M.D. By Andrew Pritchard, M.R.I. Third Edition.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

March 21, 1844.—"A description of certain Belemnites, preserved, with a great proportion of their soft parts, in the Oxford clay at Christian Malford, Wilts." By Richard Owen, Esq., F.R.S., &c.,

Hunterian Professor of Anatomy and Physiology in the Royal College of Surgeons.

The author describes, in the present paper, specimens of Belemnite, discovered in the Oxford-clay at Christian Malford, Wilts, and which are remarkable for the preservation of many of the soft parts of the animal. After alluding to the various opinions promulgated by different authors respecting the nature and affinities of this extinct animal, he adverts more especially to the discovery of the ink-bag of the Belemnite, which was published in the Zoological Transactions, vol. ii., and in the Cyclopædia of Anatomy and Physiology (Art. Cephalopoda). This discovery led him, on the strength of deductions from the physiological relations of this organ, to remove the Belemnite from the *Polythalamacea* of De Blainville, and place it in the higher order of the naked Cephalopods.

The structure of the shell is next discussed, and the spathose dart, or guard, is proved to be the result of original organization, both by its microscopic structure and by the fact that the chambers of the phragmocone have not been infiltrated by mineral substance in any of the specimens described: the name *phragmocone* being applied to the chambered and siphonated conical division of the compound shell of the Belemnite; and the term *alveolus* being restricted, in the present paper, to the socket or cavity at the base of the guard, in which the phragmocone is lodged. A detailed description is given of the sheath of the phragmocone and of the structure of the chambers. The state of preservation of the present specimens has enabled the author to describe the form and extent of the mantle—its continuation over the exterior of the shell, and the arrangement of its muscular fibres. The animal is provided with two lateral fins of a semi-oval figure, which are attached to the middle of the mantle, in advance of the spathose dart.

The muscular fibres of the fins, the infundibulum and its muscles are next described; and also the head, the eyes, which are large and sessile, and the cephalic arms, which are eight in number; together with traces of two slender superadded tentacula. The ordinary arms are furnished with a double alternate row of sharp horny hooks, as in some existing species of *Onychoteuthis*, but the arms are relatively longer. Their muscular structure is traced in the fossil specimens, and compared with that in the recent Decapoda. The ultimate, or primitive fibres of the muscles of the Belemnite agree in size with those in the *Onychoteuthis*; but the character of the transverse striæ, which is feebly developed in the primitive muscular fibre of the Cephalopods, is not preserved in the fossil. Of the interior organs of the Belemnite, besides the ink-bag and duct, which had been before discovered by Drs. Buckland and Agassiz, the remains of the horny lining of the gizzard are preserved in the present fossils.

Thus the deduction that the higher, or dibranchiate type of Cephalopodal organization is necessarily associated with the presence of the atramental apparatus, is established by the demonstration, in these fossil Belemnites, of a fleshy mantle, inclosing the shell, and provided with a pair of muscular fins, of large and sessile eyes, and of few, but large and complex cephalic arms.

The author concludes by pointing out the more immediate affinities of the Belemnites, and showing that it combines characteristics which are now divided amongst distinct genera: as, for example, first, a complex internal shell, divisible into the same principal parts as that of the *Sepia*, but one of which has, secondly, the same essential chambered structure as the shell of the *Spirula*; thirdly, uncinated cephalic arms, as in the *Onychoteuthis*; and lastly, an advanced position of rounded fins, as in the *Spirula* and *Rossia*.

The paper is illustrated by drawings of the specimens described, with microscopic views of the shell and muscular tissue, and a restoration of the Belemnite according to the data afforded by the present fossils.

June 20.—"On the Structure of the Ultimate Fibril of the Muscle of Animal Life." By Erasmus Wilson, Esq., Lecturer on Anatomy and Physiology in the Middlesex Hospital; in a Letter addressed to Peter Mark Roget, M.D., Sec. R.S. Communicated by Dr. Roget.

By resorting to peculiar methods of manipulation, and employing a microscope of more than ordinary power, the author, with the assistance of Mr. Lealand, has succeeded in discovering the real structure of the ultimate muscular fibril, in a specimen taken from the arm of a strong healthy man immediately after its amputation. He finds each fibril to be composed of minute cells, disposed in a linear series, flattened at their surfaces of apposition, and so compressed in the longitudinal direction as to leave no marginal indentation on the surface; thus constituting a uniform cylinder, divided into minute subdivisions by transverse septa, which are formed by the adherent surfaces of contiguous cells. The diameter of the fibril, in the state of relaxation, is the 20,000th part of an inch. The cells are filled with a transparent substance, to which the author gives the name of *Myoline*, and which differs in its refractive density in different cells. In four consecutive cells the myoline is of greater density than in the four succeeding cells, and this alternation is repeated throughout the whole course of the fibril. In consequence of all the fibrils composing the ultimate fasciculus having the same structure, and the cells, which are in lateral juxtaposition, containing myoline of the same density, they act similarly on light, and the whole presents, to the eye of the microscopic observer, a succession of striæ or bands, dark and luminous alternately, and transverse to the direction of the fasciculus; an appearance which has been noticed by preceding observers, but of which the cause had not hitherto been ascertained. A dark stria may occasionally appear as a luminous one, and *vice versâ*, when viewed by light transmitted at different degrees of obliquity.

The structure here described, the author remarks, reduces the muscular fibre to the simple type of organization exhibited in the combination of a series of cells, associating it with other tissues of cell formation, and will probably, he thinks, open new sources of explanation of the immediate agency of muscular action, a power hitherto involved in the deepest mystery.

"On the Reproduction of lost parts in Myriapoda and Insecta."

By George Newport, Esq., F.R.C.S., President of the Entomological Society of London, and Corresponding Member of the Philomathic Society of Paris. Communicated by P. M. Roget, M.D., Sec. R.S.

It has long been known that the limbs of Crustacea and Arachnida, accidentally lost or designedly removed, are, in course of time, replaced by the growth of new limbs; and the same power of reproduction has been stated to have been observed in the Phasmæ, insects which undergo neither metamorphosis nor any change of habits. But whether such a power exists in those insects, such as the Lepidoptera, which undergo a complete metamorphosis, changing not only their form, but also their food and mode of life, in passing from the larva to the adult state, has been considered as very doubtful. The instances in which the reproduction of lost parts appeared to have occurred in some of the Myriapoda, were attributed to imperfect or arrested development. With a view to determine these unsettled points, the author commenced, in the summer of 1841 and 1842, a series of direct experiments on this subject in the Myriapoda; and in the present summer he has extended them to the Lepidoptera. The results of his labours are given in the present memoir.

In some specimens of Iulus, from which he had removed the antennæ and some of the legs, the lost organs were found to be completely reproduced after the next change of integument; differing from the original organs only in their smaller size, and the incomplete development of some of their minuter parts. The same results followed from similar experiments made on the Lithobris during the earlier periods of its growth. One individual of this genus, which had already acquired the tenth pair of legs, was by accident deprived of the eighth, ninth and tenth pair; at the next change of skin it not only developed two additional pair of legs, but also reproduced the three pair which had been lost. Some time after this it again lost one of the legs of the twelfth pair; a loss which was repaired at the next change by the growth of a new leg, while those previously reproduced acquired an increase of size.

The first observation which led the author to believe that true insects might possess the power of reproducing lost parts, was that of a specimen of Phasma in the collection at the British Museum, in which the right anterior leg had evidently been reproduced. He then instituted a series of experiments on the larva of the *Vanessa urticæ*, or common nettle butterfly, which belongs to the order Lepidoptera, and undergoes complete metamorphosis. He removed some of the true legs of the larva, sometimes in their tibial portion, and sometimes at their base: in the first case, parts similar to those removed were invariably reproduced in different states of development, and in the latter, entire new limbs were formed; in some instances, at the second change of the larva, when it passed into the pupa state; but in two or three instances no reproduction took place. At first view, this difference in the results might appear to favour the opinion that this reproduction of limbs depends on the existence of parts especially adapted to perform this function, and which, in those experiments that had failed to exhibit the phænomenon, had been themselves removed. But the author found that in every instance of the mutilations thus practised, the perfect insect possessed a coxa, or basilar part of the limb; and this was the case even in those in which a new organ was not reproduced. From this fact, taken in conjunction with the formation of new entire limbs in the Iulidæ after the removal of every portion of the previous ones, the author infers that the power of reproduction resides in the whole of the organized tissues.

The author found that each newly produced limb is, in every case, composed of all its essential parts, namely coxa, femur, tibia, tarsus and claw; but its development is scarcely ever entirely normal, being either deficient in some of the tarsal joints, or irregular in the development of its armature.

The following are the general conclusions which the author deduces from his investigations. Slight wounds in the larvæ of insects always heal, except when the viscera have protruded, or excessive hemorrhage has occurred: severe wounds, such as those attending the excision of a limb, also frequently heal. It is when the wound is in the line of action of the principal muscles of the body that protrusion of the viscera takes place. For the healing of wounds, the first requisite is the arrest of the hemorrhage; and this is effected, as in the higher animals, by the coagulation of the blood, and the formation of a clot; and then a complete union of the separated parts takes place beneath the eschar formed by the clot. After this union, the reparation of the injury is commenced by a development, from the injured surface, of parts corresponding to those that had been removed. For the production of a new limb, one change of skin, at least, is necessary. The healing of the wound after the removal of a part, and the subsequent reproduction, although they do not prevent, yet certainly retard the natural changes. Lastly, the author has established the fact, that reproduction of lost parts takes place in metabolic as well as in the ametabolic articulata.

Feb. 6th and 13th, 1845.—"On the Structure and Development of the Blood.—*First Series.* The development of the Blood-Corpuscle in Insects and other Invertebrata, and its comparison with that of Man and the Vertebrata." By George Newport, Esq., F.R.C.S., President of the Entomological Society, &c. Communicated by P. M. Roget, M.D., Sec. R.S.

The author commences his paper by remarking, that he was led to the present inquiry by some curious facts relating to the blood of insects, which attracted his notice while engaged on the last paper he presented to the Royal Society, on the reproduction of lost parts in insects and Myriapoda. Some of these facts he is desirous of making known at once to the Society, preparatory to his offering them more extended researches on the blood of the Invertebrata, and its comparison with that of the higher animals.

The chief purpose of the author in the present paper, is to show the analogy which exists between the different corpuscles in the blood of insects and of the Vertebrata, to trace the changes which the former undergo as compared with those of the latter, and to show that in development and function they are analogous to secreting cells.

In pursuance of this object, he premises a brief notice of what little was already known respecting the corpuscle in the Articulata, and of the different descriptions given of it by Carus, Spence, Wagner, Bowerbank, Edwards, Baly and some later observers, all of whom have described it differently, one only, Mr. Bowerbank, having correctly indicated its form.

He then proceeds to state, that while engaged on other observations in June last, he found that the oat-shaped corpuscles which are so abundant in the caterpillar state of the insect, almost entirely disappear before the insect has arrived at the perfect, or butterfly state, in which, a few days after the insect is fully developed, scarcely a single oat-shaped corpuscle is to be found; but that in the place of these, there are numerous very minute rounded bodies, spherules, and also many flattened, obtusely oval or barrel-shaped, double concave discs. Both these forms of corpuscle have molecular movements, which are most energetic in the spherules.

He next makes some general observations on the composition of the blood of the Invertebrata, and questions the accuracy of Professor Wagner's view in regarding the blood of these animals as analogous only to the chyle of the Vertebrata, at the same time stating his belief that it is not only analogous to true blood, but that it undergoes a continued succession of changes through the agency of the corpuscles. These minute bodies first derive nourishment, and the means of growth and increase from the fluid portion of the blood, and afterwards, when they have become fully developed, undergo dissolution, and help to supply the waste of the fluid that has been expended on the nourishment of the different structures, leaving other little bodies, which also undergo development, to assist in the further elaboration of this fluid. He states also, that the development of these latter bodies appears to have a certain relation to the type of each particular class of animals; and remarks that in the Vertebrata the size of the corpuscle is perhaps in a ratio inverse to that of the activity and extent of the function of respiration.

The author states that he has been led to these views, which appear to him to apply to animals generally, by an examination of the corpuscles, and by watching the changes which take place in the blood in lepidopterous insects, and he points out their accordance with those of Wagner, Henle, and Wharton Jones, with regard to the function of the corpuscles; but proposes to give the details on which his own view respecting the size of the corpuscle is founded on a future occasion.

He then enters more particularly on the consideration of the forms of corpuscle in the blood in the Articulata, which he marks as four; although, he observes, these are in reality only so many stages of development of one ultimate structure. These forms are,—*first*, the *molecules*, which he regards as comparable to the molecules observed in the chyle of Vertebrata by Mr. Gulliver; *secondly*, the *nucleated* or *oat-shaped corpuscle*, which he believes with Wagner are analogous to the white or chyle corpuscles of Vertebrata; *thirdly*, the *spherules*, or minute rounded bodies developed from the oat-shaped corpuscle, and which he believes are analogous to the free nucleoli of Valentin, and probably to the very minute white, opake granules constantly observed in the blood of Vertebrata; and *lastly*, the *discs*, which are further developments of the spherules, and analogous to the true red blood-discs of the higher animals, and which, as he states in a subsequent part of his paper, in his examination of the blood of the human fœtus, he believes that he has also traced from the white, opake granules or spherules.

The author then proceeds to describe these forms of the corpuscle in insects more minutely, and enters into considerable detail with reference to the oat-shaped corpuscle, tracing it from its earliest distinct form, before any nucleus is perceptible in it; and shows that the nucleoli which constitute this body are gradually increased in number, until the corpuscle has attained its full size, when it first changes its form and becomes shorter, then rounded, and afterwards entirely breaks up and liberates the nucleoli that have been developed within it. This change of form he shows always takes place very rapidly in all the oat-shaped corpuscles, large and small, when out of the body, and to this circumstance he attributes the diversity in the descriptions that have been given by various observers of the form of the corpuscle. He shows also, that, with reference to the function of this body, the corpuscles are usually found in greatest number during the act of breaking up, immediately before the larva is preparing to change its skin, at which time the blood is extremely coagulable; and that there are fewest corpuscles, or that there is the greatest number of small corpuscles of this kind, soon after the caterpillar has again begun to feed. When the insect has assumed the pupa state, nearly the whole of these corpuscles are broken up. The greatest abundance of them are found in the act of changing on the third or fourth day of the pupa, after which the number of these corpuscles is gradually lessened, until, when the insect has entered the perfect state, very few remain. When the change to the perfect insect occurs, there is another opportunity of watching the function of this corpuscle. When the wings are being expanded and still soft, a few oat-shaped corpuscles circulate through them; but as the wings become consolidated, these corpuscles appear to be arrested, and break down in the circulatory passages, supplying directly the material for the consolidation of these structures, as appears to be shown in the entire arrest of circulation in these parts, and by the granular remains of the corpuscles which may be seen by transmitted light in a wing completely denuded of its scales on the upper and under surfaces. The *spherules* and *discs* of the perfect lepidopterous insect are then noticed, and some peculiar clavate or fiddle-shaped bodies, which appear to be the transition forms between spherules and discs, are pointed out as occurring in the blood of one of the night moths, *Xylophasia polyodon*, and also in the butterfly soon after it has left the pupa state. These facts are regarded as proofs, by direct observation, of the function of the corpuscle, and of its analogy, both in function and development, to the secreting cells of glands.

In the second division of his paper, the author draws some comparisons between the blood-corpuscles of insects and the Vertebrata, and gives the details of a series of observations on the blood of a human fœtus that was born alive at the end of the sixth month. The blood of the parent, and of the placenta, was examined, and also of different parts of the body of the fœtus a few hours after death. The general results observed were, that the blood of the parent contained a very large quantity of white chyle corpuscles, and was extremely coagulable: the blood of the placenta contained, beside an abundance of chyle corpuscles, red blood-discs of extremely variable sizes, the largest being one-third or one-fourth larger than those of the mother, and the smallest scarcely more than one-fourth as large as the largest. There were also an immense abundance of molecules and nucleoli, from which latter the red blood-discs appeared to be developed. The blood of the vein and lungs presented a similar irregular condition as to size of the corpuscles, while that of the left auricle of the heart, aorta and arteries of the cord was more uniform in its character. From these observations the author concludes, that the blood of the Vertebrata is analogous in its mode of development to that of the insects and other Invertebrata, and that the red blood-discs are the ultimate developments of the opake white granules or nucleoli of the blood.

LINNÆAN SOCIETY.

December 17, 1844.—R. Brown, Esq., V.P., in the Chair.

Dr. Lankester, F.L.S., exhibited a specimen of an Agaric in which gills were developed on a portion of the surface of the pileus, directly over the stipes, resulting apparently from an extension of the growth of the stipes, and a rupture of the external membrane of the pileus, throwing up the internal or gill-producing membrane.

Read, "Additional Remarks on the *Spongilla fluviatilis*." By John Hogg, Esq., M.A., F.R.S., F.L.S. &c.

In this paper Mr. Hogg commences by claiming a priority to M. Laurent in the discovery of the locomotive germ-like bodies of *Spongilla*, and in comparing them with the spontaneously moving sporules of *Ectosperma clavata* of Unger. In proof of this priority he refers to his memoir, published in 1840, in the eighteenth volume of the Society's Transactions, in the first part of which, read before the Society on the 18th of December 1838, those bodies are described as having been observed by him in August 1838, and are compared with the locomotive sporules of the *Ectosperma*. An abstract of this part of Mr. Hogg's memoir appeared in the 'Proceedings' of the Society at the beginning of 1839, and was reprinted in the number of the 'Annals of Natural History' for March 1839. Of these several publications Mr. Hogg states that no notice is taken by M. Laurent in his recent work entitled 'Recherches sur l'Hydre et l'Éponge d'Eau douce,' Paris 1844, in which the discovery of the locomotive germs of the freshwater sponge is apparently claimed by the author as his own.

Mr. Hogg then proceeds to remark on the discrepancies of authors with regard to the existence of cilia on these bodies, and on the spores of the *Ectosperma*. He accounts for his having overlooked them in the *Spongilla*, on the supposition that the germs which he observed under a very high power of the compound microscope had reached the period when, as M. Laurent states, "ils perdent leurs cils pour toujours," and notices that it appears, from M. Thuret's recent observations, that the same circumstance occurs in the spores of the *Ectosperma*. This resorption or disappearance of the cilia after a certain period will readily account for the denial of their existence by practised microscopical observers.

The existence of cilia subservient to locomotion is far from determining, in Mr. Hogg's opinion, the question of the animal nature of the bodies to which they belong, although the zoocarpic theory, which he regards as most improbable, appears to be still gaining ground. He believes the motive power of the cilia of the sporules of *Spongilla* and the *Algæ*, as also of the Sea-Sponges, to be dependent on some peculiar organization not connected (as in the locomotive gemmules of a zoophyte) with any muscular apparatus; unless indeed, as he has before suggested, mere endosmosis and exosmosis should be found sufficient to produce it.

For these and other reasons which are detailed in his paper, Mr. Hogg still believes both the *River* and *Sea-Sponges* to be vegetable productions, and thinks that "until they shall be discovered to possess a stomach or a gastric sac, no zoologist can possibly consider them to belong to the Animal Kingdom."

January 21, 1845.—R. Brown, Esq., V.P., in the Chair.

A Note was read, addressed to the Secretary, by John Curtis, Esq., F.L.S. &c., containing the description of a cocoon of the Emperor Moth (*Saturnia Pavonia-minor*), which on being longitudinally divided was found to have internally, in place of the chrysalis, a series of cells so analogous to those represented by Mr. Curtis in the nineteenth volume of the Society's 'Transactions,' plate xxxi. fig. 5, as to leave no doubt on his mind that the woolly masses there exhibited are the cocoons of some large South American *Bombyx*, and that the substance of the caterpillar has been converted into cells by the larva of the Tenthredinidous insect. But although the theory of the nest there figured having been constructed by an insect of that family is thus set aside as erroneous, it is only to make evident a still greater anomaly in its economy, viz. that its larvæ are parasitic. In the present instance Mr. Curtis was unable, after the most rigid scrutiny, to find any vestige of a perfect insect. A dried and broken maggot was all that could be perceived, and its fragments on being put together bore more resemblance to the larvæ of the *Ichneumonidæ* than to those of the *Tenthredinidæ*.

Mr. Curtis states that the cells most analogous to these are those formed by the *Microgaster alvearia*, which are as regular as those of a honey-comb, and adds that it appears from a notice in the 'Transactions of the Entomological Society,' vol. iii. p. 35, that the pupæ of the Eggar-moths are also infested by parasitic *Ichneumonidæ*. A sketch of the cocoon of the Emperor Moth and of the cells formed by its parasitic inhabitants accompanied the note.

Read also, "Some Notes on the Natural History of Norfolk Island," extracted from the papers of Capt. Alexander Maconochie, R.N., late Lieutenant-Governor of the island.

ZOOLOGICAL SOCIETY.

August 13, 1844.—Professor Owen, V.P., in the Chair.

The following notes from Sir Robert Heron, on the Jerboas in his collection, were read :—

"June 14th, 1844.—The Jerboas were received into this menagerie in June 1843. They are in a box full of cotton : the box is in a room five and a half feet by four and a half, floored with wood, and warmed by a flue which has always been heated at night; the room opens into a pen secured with wire, nine and a half feet by eight and a half. They have been offered many kinds of food, but eat only wheat and lettuce ; they have never been seen to drink, but from the water diminishing and their parting with a considerable quantity of urine, we have no doubt of the fact. On the 14th of May last they produced two young ones; on the 12th inst. these young ones are still blind and unable to walk, also nearly naked, but they are grown and appear to be healthy : it is intended to make a pit in their abode about two feet square, filled with earth, where they may burrow.

"June 29.—It was not till their fifth week that the young Jerboas appeared to have the use either of their eyes or limbs ; they had still little fur, but were a good deal grown. Now, being forty-six days old, they are about three-quarters grown, are well-clothed and active; they have been seen to eat corn, and are apparently quite established. A second box has been put into their chamber, and last night all four had removed into it. They have never been seen to drink, but it is thought they do so, as the water is sometimes diminished.

"July 20.—The young Jerboas are now exactly like the old ones."

"Description of the *Felis Melanura*," by R. Ball, Esq., Secretary to the Royal Zoological Society of Ireland.

"*Felis melanura*, n. s. ?—Size larger than the Margay, but proportionately slighter ; on the fore-toes are longitudinal black stripes, on the hind-toes spots. Three irregular narrow stripes of white on the sides, connected by anastomosing branches, divide the coloured part into island-like irregular spaces, which are black on the edges, shading into fulvous in the centre ; these island-like spaces are spotted with black. The tail nearly touches the ground, is pointed and black, save at the under part near the anus, where it is marked with a little white, and shows as it were an imperfect attempt at annulation. The back is black, with a bright fulvous fleur-de-lis sort of marking on the neck; a narrow band of fulvous crosses below the scapulæ, from which run at right angles down the back to the rump two indistinct stripes of the same colour, about half an inch apart; the inside of the ears is fulvous, the outside black, with a white spot on each; the belly white, beautifully but irregularly spotted with black; a very distinct black band crosses the chest; a white spot on the lower eyelid and another longer on the upper; the cheeks are fulvous, striped with black; the forehead is fulvous, ornamented with black, two stripes of which run up the forehead from the eyes, parallel to each other; they are connected together above: immediately over the eyes are four longitudinal spots; above these may be traced three more irregular, and over these three, two, the three sets of spots being as it were ranged in ranks. The fulvous colour is chiefly confined to the fore-part of the animal. It was presented to the Royal Zoological Society of Ireland in the beginning of 1843 by Paymaster J. M'Creagh, of the 32nd Regiment. The foregoing description was taken in January 1844, and the animal was presented to the London Zoological Society in May 1844: when first obtained its colouring was very indistinct and confused; since the description was written some trifling change has taken place, particularly in the extension of the white on the tail, which makes the name not quite so applicable as it was."

Mr. Prichard read his paper "On the Crania of the Laplanders and Finlanders, with observations on the differences they presented from other European races."

"Little has hitherto been done to elucidate the physical characters of the Ugrian or Ugorian races, under which term late writers have comprised the Finns and Lappes, the Magyars or Hungarians, and several nations of Siberia*.

"This is owing to the fact that but few specimens of the skulls of these nations exist in any of the collections in Europe, and few and by no means perfect descriptions of them have been published. Blumenbach has given in his 'Decades Craniorum' a representation of the skull of a Lappe, and he describes it as approaching altogether to the Mongolian variety. Dr. Hueck gives an account of the appearance and general physical characters of the Esthonian Finns, and sums up his observations by pointing out some very considerable differences which he finds between them and the Mongolian form; in fact he says that he can discover nothing common to the Mongolian and Esthonian skulls, except a certain squareness of figure, which is not constant.

"From these statements we should be led to suppose that there is a great difference between the skulls of the Finns and Lappes, and we should be inclined to adopt the opinion maintained by Lehrberg, that they are two separate and distinct races, his argument being

* Der Ugrische Volkstamm von F. H. Müller.

founded upon the moral as well as the physical diversities between them*.

"On the other hand, the history of the people, and especially the great similarity of their languages, go far to prove a near relationship between the Finnish and Lappish nations; nor is a greater or less degree of civilization to be looked upon as a proof of diversity of origin, although it may be the cause of all the moral, and possibly of the physical differences also, which exist between the Finns and Lappes.

"From this uncertainty it becomes much more important to ascertain, by the examination of their skulls, what the physical characteristics of each nation are, and whether they exhibit any points of resemblance which may confirm the supposition that there is affinity between them, or whether, on the contrary, a sufficient degree of dissimilarity can be made out, from an accurate examination, to entitle us to set them down as separate races, and to class them with different grand divisions of the human species; whether, in short, these differences, if any such are found, are more than can be accounted for by the diversity of climate and modes of life which are well known long to have existed between them.

"The examination of these skulls for the purpose of furnishing an accurate description of their appearance is interesting in another point of view. In Scandinavia and in Denmark there are numerous tumuli which contain osteological remains of former inhabitants, and it is a disputed point whether they are the remains of a Finnish aboriginal stock or of Cimbrian or some unknown race, since they differ from the old German remains. Now if we could establish a correct notion of the Finnish description of skull, we should have no difficulty in deciding whether the remains before mentioned belonged to this stock.

"Having four specimens of these skulls, two of Finns and two of Laplanders, which my father has received through the kindness of Dr. Ilmoni and Mr. Daniel Wheeler, of Bristol, I have an opportunity of examining their peculiarities and of comparing them with each other and with the skulls of other Europeans, Chinese, American Indian, and the Esquimaux, the latter of which is a most remarkable specimen of the pyramidal and broad-faced skull.

"Upon taking a general view of these skulls, there are no remarkable features which strike us so forcibly as those which we see in the conformation of the Esquimaux. In fact, the only point worthy of notice here, before we commence the particular description, is a degree of general breadth in the face superior to that which is seen in the European generally, which gives to the whole an appearance of squareness when the lower jaw is attached, and causes the actual shortness of the face, which is remarkable in these skulls, to become still more apparent. The general resemblance between the Finnish

* Lehrberg, über die Wohnsitte der Jemen, ein Beitrag zur Geschichte Neu-Finnlands, in Untersuchungen zur Erlaüterung der alten Geschichte Russlands.

skulls and those of the Lappes is as strong as between four average European crania, even belonging to the same nation, and altogether their contour decidedly approaches what Blumenbach calls the Mongolian form of skull, the head appearing, as it has been noticed by an ocular observer, 'of the shape of a pent-house.'

"It will be found, however, that it is more especially in a close and minute examination that differences are seen to exist between the Lappes and Finns, on the one hand, and the European skulls on the other.

"Viewed from above and behind, there is a slight difference observable between the Finn and the Lappe: the posterior part of the Lappe is larger than the anterior, while the form of the Finn is more regular and rounded; that is, the line between the parietal protuberances exceeds the transverse diameter of the forehead more in the Lappe than in the Finn. I find, however, that there is equal difference in this respect between two European skulls even of the same nation. Again, from the same point of view the skulls of the Lappes present a central eminence or ridge, upon looking at the outline of the forehead (being the line of junction of the two halves of the frontal bone), which is much less marked, in fact scarcely discernible in the Finn, and altogether absent in the European, being on the contrary very strikingly prominent in the Esquimaux. Examined anteriorly, however, a general view of these skulls gives us exactly opposite results; for the sagittal suture, which is now the median line, and the continuation backwards of the frontal suture of early life, upon looking at the outline or horizon of the skull, is seen to project decidedly more in the Finn than in the Lappe; in both more than in other Europeans. Hence we may fairly lay down, that the skulls of the Finns and Lappes have (as far only as the vault of the cranium, exclusive of any effect produced by the width of the face, allows us to conclude,) more tendency to the pyramidal form than the European, but less than the Esquimaux.

"Examining these skulls anteriorly, taking into consideration the face, the triangular form is very evident, partly in consequence of the fact above mentioned respecting the vault of the cranium, and partly in consequence of the great width between the external surfaces of the malar bones, which in actual measurement in the two Lappes and the two Finns exceeds the length of the same diameter in other Europeans by at least half an inch, and in one case by nearly an inch, being equal to the same diameter in the Esquimaux; in the latter, however, which exhibits the pyramidal shape in a remarkable degree, the form is owing as much to the shape of the forehead as to the lateral projection of the anterior roots of the zygomatic processes. This width across the face is, as has been correctly observed by Dr. Hueck, not owing to the increased breadth or altered shape in the malar bone, so much as to the altered width and direction of the malar process of the superior maxillary bone.

"The outline of the external surface of this bone, viewed from a point exactly in front of the skull; that is to say, the line which runs from the furthest molar tooth that is visible from this point to the suture connecting the malar and superior maxillary bones, is, in the generality of European crania, either vertical, or sometimes even inclined inwards and upwards in the first part of its course, afterwards turning outwards to form the commencement of the zygoma. In the Esquimaux this line runs obliquely upwards and outwards, at an angle of 45° from its commencement; and in the skulls of the Finns and Lappes it is intermediate to the two directions, being however still inclined outwards. This obliquity is also decidedly more marked in the Finns than in the Lappes.

"Upon this the anterior view, more of the lateral aspect of the lower jaw is seen than is ordinarily observed, in consequence partly of the greater distance between the condyles, which will be again noticed in the examination of the base of the skull, and partly from the fact that the angles project more in a lateral direction, the entire bone being apparently more developed than in other Europeans.

"With respect to some more minute points regarding these skulls, the superciliary ridges are well-marked, the ossa nasi, and the ascending processes of the superior maxillary bones present a flatter and broader anterior surface than the European, and the cavities and foramina are well-marked. [In all these four skulls the supraorbital opening for the frontal nerve and artery is a complete foramen upon the left side, and merely a notch upon the right.]

"In consequence of the greater width of the superior maxillary bone, the shape of the circumference of the orbit is not so round as in the generality of European skulls, where the external inferior angle is the lowest, but it is square, with the angles rounded; and for the same reason the space for the antrum is increased, while the depth of the infraorbital or canine fossa is very materially decreased: in one of the Finnish skulls this surface, from the inferior edge of the orbit to the alveolar processes, is almost plane. There is nothing remarkable in the nasal aperture. The shape of the orbit differs materially from that of the Esquimaux, where it is almost round, and from that in the skull of an Indian of the Sioux tribe, where it much resembles the European.

"The distance from the inferior edge of the nasal aperture, that is, from the anterior nasal spine to the margin of the alveolar process, is in every specimen of these skulls of the Finns and Lappes decidedly less than in any other European with which I have compared them. The teeth are much ground.

"A lateral view of these crania shows that the forehead is somewhat more receding than in the generality of Europeans, although the difference is not great, probably not more than is frequently seen between two specimens of the same tribe.

"The general shape of the head resembles that of the European anteriorly, but the posterior part does not project so much. There is a marked difference between the posterior projection of the Finns and Lappes and that of the Esquimaux, the latter being much more prominent.

"The line which represents the outline of the ossa nasi, &c., *i. e.* the profile of the face of the skull, presents much less marked irregularities than the European in general. Thus although, as I have before observed, the superciliary ridges are well-marked, the frontal bone does not overhang the ossa nasi, as in the latter, where a decided angle is formed. In the Esquimaux the line from the forehead to the nose is nearly straight, and in the skulls of an Indian of the Sioux tribe and a Chitamache Indian the curve is very regular and open. The junction of the nose and forehead in the Lappes and Finns is therefore more angular than either of the three last-mentioned crania, but much less so than the European.

"Upon this the side view another remarkable fact is observed. The occipital bone being not so much developed downwards as in other Europeans (we observed just now that it had less posterior projection also), and the posterior edge of the lower jaw, from the condyle to the angle, being longer than in the latter, upon placing the skull upon a table or any plane horizontal surface, the inferior maxilla merely touches it by its angle, not resting upon the base of the jaw, as we observe in the English, Irish, ancient Irish (cast), Sioux, Italian and Mulatto skulls. The only ones which have this character in common with the Lappes and Finns are the Negro and the skull of a Hindu.

"The angle of the lower jaw is certainly more obtuse, seen upon comparing skulls in which the molar teeth remain perfect. In the form and direction of the coronoid process there seems to be no great difference.

"The temporal fossæ are well-marked, and in one of the Finnish skulls the anterior inferior angles of the parietal bones are connected to the great wings of the sphenoid by means of an os wormianum upon either side. This is not unfrequently the case in other crania.

"The general shortness of the face which has been observed to exist in these skulls, is more plainly seen by viewing them from the side, when we find that the inferior edge of the malar bone is very little higher than the edge of the alveolar process. This is owing not so much to the want of development downwards of these processes, although I have already noticed the shortness of the space between the nose and the mouth, but to the great breadth (from above downwards) of the malar bone, measured from its free inferior border to its junction with the external orbital process of the frontal bone; and it is a remarkable fact, that this measurement, in all the specimens of the skulls of Finns and Lappes, considerably exceeds that of any of the other specimens of European nations, and is equal to that of the Esquimaux and American skulls. The breadth of this surface of the malar bone in one Finn much exceeds that of any which I have had an opportunity of measuring.

"Thus the shortness of the face is more apparent upon the lateral view of the cranium, in consequence of the additional width of the malar bone.

"The general shape of the basis cranii presents nothing very striking, with the exception of the zygomatic arches. The foramen magnum is of a more oval form than usual, and there appears to be scarcely as great a development of the occipital bone. This agrees with what we observed when considering the lateral aspect of these skulls, and with what has previously been noticed by Dr. Hueck respecting the space for the cerebellum, which, upon an examination of the interior of the cranium, is said to be small, in consequence of the slight concavity of the inferior occipital fossa. The condyles of the occipital bone are remarkably large, being, in three out of four of these skulls, an inch in the long axis, and in one of them (the Finn) longer. They are not unusually broad. This is not the case in any other European cranium which I have examined, but is seen in the Hindu, Chitamache Indian, and to a certain extent in the Esquimaux. There must doubtless have been a much greater freedom of motion backwards and forwards in these joints than is usually the case.

"The zygomatic arches, which are best seen at the base, are much more curved than in the other Europeans, slightly less so than in the Esquimaux; and the anterior projection of the alveolar processes beyond the anterior termination of the zygoma is also intermediate between the European and the Esquimaux.

"The glenoid cavities are flatter, more widely separated, and not so well-defined as in the European generally, and a difference corresponding to this is seen in the lower jaw, where the condyles, besides being more widely separated from one another, are also more rounded in form, allowing of a greater degree of lateral motion. In correspondence with this fact we also find that the pterygoid processes of the sphenoid bone, especially the external plates, are widened and enlarged, extending farther outwards, affording a greater space for the attachment of the pterygoid muscles, whose duty it is to perform the lateral or grinding motion in mastication. I mentioned above the corresponding fact of the teeth being much worn down.

"The ridges for the attachment of the muscles on the palate bone are well-marked, and viewed from below it is seen that the alveolar processes do not project so much from the horizontal part of the palate; that is, that the entire hard palate presents a general curve throughout, instead of being at first plane with a sudden bend, or almost an angle, which is seen at the point where the alveolar processes are given off in the generality of European skulls.

"These skulls of the Finns and Lappes are very solid and heavy.

"Although this description of the Finnish skulls corresponds in very many respects with that given by Dr. Hueck, yet the examination leads us to an exactly opposite conclusion, viz. that there are very many points in common between the Finn and the races characterized by the pyramidal-shaped skull, and the conclusion with regard to the Lappe corresponds to that which was published by Professor Blumenbach. We are hence able to lay down, that there is no important difference between the skulls of the Finns and Lappes, but that, on the contrary, there is a very great resemblance between them; that altogether they are more nearly allied to the Hyperborean form than to the European; and that if any difference does exist between them, it is that the Finns approach more nearly to this conformation of skull than the Lappes."

MISCELLANEOUS.

On the Metamorphoses of the Strepsiptera. By Dr. Siebold of Erlangen.

The species on which Dr. Siebold has made his observations are *Stylops Melittæ*, and *Xenos Rossii* and *Sphecidarum*.

The diminutive, parasitic Strepsiptera, the giant of which scarcely exceeds one-fourth of an inch in length, are of especial interest to this Society. Discovered and first described by our venerable friend Mr. Kirby, we have adopted the Stylops as our emblem; any elucidation of its heretofore obscure natural history must therefore be of particular interest to us. This has been supplied by Dr. Siebold, who now shows that the Strepsiptera undergo a singular metamorphosis; that the males and females differ from each other, the metamorphosis of the males being complete, they alone being furnished with wings: the females, on the contrary, have neither legs, wings, nor eyes, and greatly resemble larvæ. These females are viviparous, and never quit the bodies of the Hymenoptera in which they live as parasites. The young Strepsiptera, at the moment that they burst the eggs in which they are developed, within the body of the parent, have six legs, and are furnished with organs of manducation. These are the diminutive objects described in Mr. Westwood's paper, in a former volume of our Transactions, as the parasites of Stylops; and as such they were regarded at first by Klug and also by Dr. Siebold. These little hexapodous larvæ infest the surface of the abdomen of bees, within which their parent-mothers live and die. In this way the young Stylops is carried into the nests of the Hymenoptera, and escaping on the bodies of the larvæ, penetrate their soft skins, and become parasites on them as their parents have been in the bodies of the female bees. These larvæ shed their skins, become apodal, and move very slowly. They have then a distinct mouth and jaws, and a simple cæcal intestine, but no anal aperture. The body is formed of nine segments, of which the first is the largest, and may be considered as a cephalothorax. In this state the males are easily distinguished from the females. The cephalothorax of the male larva is conical and arched, and the last segment of the body is straight and pointed. In the females the cephalothorax is truncated or rounded in front, and flattened, or scale-like, in the rest of its extent, and the terminal segment of the body is large and rounded.—*From the Anniversary Address delivered at the Entomological Society, Feb.* 10, 1845, *by the President, G. Newport, F.R.C.S.*

Description of a new species of Nymphon. By H. D. Goodsir, Esq.

Nymphon giganteum.—With the palpi twice as long as the rostrum, and the last two joints of equal length; with the pincers of the mandibles very long, slender and linear; and with the oviferous legs longer than the first four joints of the ambulatory legs.

Description.—The whole animal of a straw-colour, except the proximal extremities of the joints of the legs, which are pink-coloured. Two joints of the mandibles somewhat long and rather powerful: the pincers are weak, slender, and almost linear. The palpi are larger than the mandibles, five-jointed, slender, and the first or proximal joint is about one-sixth the length of the second; the second rather longer than the third and clavate; the fourth and fifth equal, which last is ovate and slender. The rostrum is hardly so long as the first joint of the mandibles, and is almost linear, having a very slight dilatation about the middle. It is concealed altogether on each side by the mandibles and palpi, and very slightly superiorly by the mandibles alone. The first segment of the body is much larger than any of the following, and is very much dilated anteriorly, for the attachment of the organs just described; posteriorly it is also dilated, and gives attachment on either side to the oviferous legs, and dorsally to the occeliferous tubercle, which is erect and truncated. The oviferous legs are very strong, and have the two middle joints robust and short; the distal joints are hispid. The ambulatory legs are long and slender; the two tarsal joints of equal length, claw strong. Span of the legs 6 inches.

The above-described *Nymphon* is very similar in its characters to *Nymphon Johnstoni*. The forms, however, of the mandibles, palpi and oviferous legs are very different and sufficiently strong to justify the formation of a new species.

Taken in the sea at Embleton.—*From the Proceedings of the Berwickshire Naturalist's Club*, vol. ii. No. xii.

DESTRUCTION OF THE ORANGE-TREES IN THE AZORES.

So complete have been the ravages of the Coccus of the orange-trees, that one of the Azores, the island of Fayal, lost its entire produce from this cause alone. The usual exportation of fruit from Fayal has been 12,000 chests annually, but in 1843 not a single chest was exported. This injury has already extended to St. Michael's, and is still continuing; and the inhabitants of the whole of that group of volcanic islands, depending almost entirely on the produce of their orange-groves, and despairing of retrieving their prospects, are fast turning their attention to the cultivation of other objects of commerce. This amount of injury to a whole population by a diminutive and apparently contemptible insect has been the result of but three years. The effects of this insect on a single article of luxury may fairly be adduced to show that entomological inquiries are deserving of full attention. The orange trade between this country and the Azores gives employment to upwards of 200 sail of vessels; and, as I am credibly informed, the orange trade alone returns to the revenue of this country an import duty of more than £50,000 per year. M'Culloch, in his 'Dictionary of Commerce' (1844), has shown that the amount of duty paid by the orange and lemon trade, on an average of three years, ending with and including the year 1842, was £70,833 per year. The number of boxes of fruit, imported for home consumption, on which this duty was levied, amounted to 334,070, and the estimated number of the fruit at 217,172, 363! The support of the numerous families, the fortunes of the merchants engaged in this commerce, and even the revenue of this country, and the wealth, ay, and even the very existence of a whole population, are thus directly affected by the operations of a diminutive insect.—*From the Anniversary Address delivered at the Entomological Society, Feb.* 10, 1845, *by the President, G. Newport, F.R.C.S.*

METEOROLOGICAL OBSERVATIONS FOR FEB. 1845.

Chiswick.—February 1. Sharp frost: snow-showers at night. 2. Clear and frosty: cloudy: clear and frosty. 3. Hazy and drizzly. 4. Overcast: cloudy: frosty. 5. Overcast: fine: clear. 6. Clear throughout: sharp frost at night. 7. Frosty: overcast: clear and frosty. 8. Overcast: frosty. 9. Clear and frosty: fine: slight frost. 10. Overcast: snowing. 11. Frosty: most intense frost at night, the lowest being 35° below the freezing-point. 12. Intense frost, only 4° above zero at 8 A.M.: dry air and frosty: bright sun: severe frost at night. 13. Overcast: snowing: sleet and rain. 14. Thawing: clear and fine: overcast. 15. Clear and frosty. 16. Fine: densely overcast: frosty. 17. Foggy: fine: clear and frosty. 18. Foggy: hazy clouds. 19. Overcast: clear: frosty. 20, 21. Clear and frosty throughout. 22. Snow-showers: foggy. 23. Snow: rain. 24. Cloudy and cold. 25. Frosty: fine: rain. 26. Clear: fine: densely overcast. 27, 28. Overcast.—Mean temperature of the month 8° below the average.

Boston.—Feb. 1. Cloudy: snow A.M. and P.M. 2. Fine. 3. Cloudy: rain A.M. and P.M. 4. Cloudy. 5. Fine: stormy night. 6. Windy. 7. Fine. 8. Cloudy. 9. Fine. 10. Snow. 11, 12. Fine. 13. Cloudy: rain and snow A.M. 14, 15. Fine. 16. Cloudy: rain early A.M. 17, 18. Fine. 19. Cloudy. 20. Fine. 21. Foggy. 22. Cloudy. 23. Snow: rain P.M. 24. Cloudy. 25. Fine: rain P.M. 26. Fine. 27. Cloudy. 28. Fine.

The above you will find a very cold month; I think you will find nothing like it since February 1838.

Sandwick Manse, Orkney.—Feb. 1. Frost: cloudy. 2. Rain. 3. Bright: cloudy. 4. Cloudy: sleet-showers. 5. Snow-showers. 6. Snow-showers: snow-drift. 7. Snow-showers. 8. Snow-showers: clear. 9, 10. Thaw: cloudy: drops. 11. Clear: showers. 12. Cloudy: showers. 13. Showers. 14. Snow: cloudy. 15. Showers: cloudy. 16. Fog: cloudy. 17. Bright: clear: fine. 18, 19. Fine: cloudy. 20. Showers. 21. Showers: clear: fine. 22. Showers: snow-showers. 23. Showers. 24. Cloudy: clear: aurora. 25. Clear: cloudy. 26. Cloudy: clear: frost. 27. Bright: cloudy. 28. Cloudy: clear.

Applegarth Manse, Dumfries-shire.—Feb. 1. Frost. 2. Severe frost: rain P.M. 3. Fine thaw. 4. Frost: thaw P.M. 5. Thaw A.M.: frost P.M. 6. Frost: clear and fine. 7, 8. Hard frost. 9. Snow. 10. Slight thaw. 11. Snow-showers. 12. Frost A.M.: rain P.M. 13. Heavy rain. 14. Frost: shower: snow and hail. 15. Frost: thaw P.M. 16, 17. Fine. 18. Fine spring day. 19. Frost: fine. 20. Slight frost: fine. 21. Fine: no frost. 22. Slight frost: snow. 23. Slight frost: fine. 24. Frost: rain P.M. 25. Fresh: fine. 26. Frost A.M.: fine. 27. Frost. 28. Frost: fine.

Mean temperature of the month	34°·5
Mean temperature of Feb. 1844	32 ·9
Mean temperature of Feb. for twenty years	36 ·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.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. Feb.	Max.	Min.	8¾ a.m.	9 a.m.	9 p.m.	9¼ a.m.	8½ p.m.	Max.	Min.	8½ a.m.	Max.	Min.	9¼ a.m.	8½ p.m.								
1.	29·824	29·747	29·57	29·75	29·88	29·92	29·88	38	27	30	36	20	35	25½	n.	calm	nw.	s.				
2.	29·984	29·862	29·71	29·89	29·80	29·67	29·70	40	21	31	37	10½	42	46	ne.	calm	nne.	w.				·70
3.	29·972	29·873	29·56	29·76	30·00	29·94	30·12	43	34	36	47	36	40	37	nw.	calm	nw.	nw.	·10			·18
4.	30·164	30·200	29·83	30·09	29·94	29·95	29·77	43	25	35	41	26	45	42	n.	calm	sw.	w.		·25		
5.	30·017	29·871	29·65	29·87	29·70	29·73	29·77	48	31	36	44	36	32	32	nw.	calm	w.	n.				·28
● 6.	29·940	29·851	29·50	29·83	29·96	30·02	30·11	43	19	32	37	29	27	27	n.	nw.	wnw.	n.				
7.	29·959	29·950	29·67	29·93	29·93	30·09	30·08	38	17	27·5	34	21	29	24½	n.	calm	ne.	s.				
8.	30·065	30·053	29·80	29·94	29·90	30·06	29·95	35	18	26·5	44	24	24	30	ne.	calm	wnw.	se.				·13
9.	30·093	29·934	29·79	29·75	29·58	29·67	29·54	36	27	29	32	28	32½	35½	se.	calm	e.	sse.				
10.	29·757	29·649	29·53	29·50	29·47	29·50	29·61	35	22	29	37	30	38	35½	se.	s.	e.	sse.			0·82	·08
11.	30·216	29·880	29·73	29·82	30·05	29·88	30·05	34	03	28	33	28	39	39	e.	se.	e.	sw.				·11
12.	30·409	30·400	30·11	30·12	29·99	30·05	29·76	32	12	23	35½	20	39½	39½	sw.	calm	e.	sse.				·10
13.	30·238	29·755	29·87	29·67	29·50	29·38	29·25	38	32	30	45	33	47½	41	sw.	sw.	sw.	w.	·30			·38
☽ 14.	29·796	29·696	29·40	29·51	29·75	29·56	29·80	45	27	35	43½	30	33½	36	sw.	calm	nw.	nw.		·25		·08
15.	29·966	29·876	29·62	29·82	29·80	29·80	29·87	45	33	33·5	43	28	39	36½	nw.	calm	w.	se.	·01			·04
16.	29·904	29·851	29·58	29·76	29·76	29·70	29·72	41	22	34	45	34½	40	41	ne.	calm	nne.	sse.		·11		
17.	29·959	29·944	29·64	29·73	29·80	29·71	29·80	44	23	30	44	35½	43	41½	e.	calm	sse.					
18.	30·021	30·007	29·72	29·84	29·95	29·87	29·98	41	21	30	45	34½	41½	42½	se.	calm	sw.					
19.	30·139	30·063	29·79	29·98	29·97	29·99	29·91	35	16	34	40	25	39½	41	e.	calm	s.	ssw.			0·00	
20.	30·164	30·029	29·86	29·92	29·85	29·78	29·79	37	22	27·5	45	31	41	39	se.	calm	ssw.	wnw.				·25
21.	29·946	29·757	29·60	29·74	29·53	29·73	29·63	44	20	30	46	35	38	34	se.	calm	s.	e.				·09
○ 22.	29·466	29·437	29·19	29·30	29·30	29·56	29·56	37	31	31	40	31	38	35	e.	calm	e.	e.	·10			
23.	29·467	29·377	29·63	29·29	29·30	29·44	29·42	44	31	32·5	38½	30	38	36	sw.	alm	ne.	ne.	·16			·05
24.	30·018	29·665	29·29	29·49	29·85	29·77	30·00	48	28	33	44	28½	33	30	nw.	w.	n.			·05		
25.	30·116	29·904	29·82	29·90	29·58	30·01	29·70	49	37	28	42	23½	29	35	s.	calm	nw.	se.	·26			
26.	29·768	29·624	29·24	29·40	29·66	29·65	29·86	52	35	40	49	36½	29½	35	nw.	calm	ne.	n.		·24		·09
27.	29·945	29·918	29·59	29·83	29·84	30·02	30·02	50	35	35.5	46	33	36½	36	sw.	calm	ne.	e.			0·30	
28.	29·933	29·917	29·67	29·80	29·80	29·98	29·88	45	29	34	40	32	36½	35½	e.	s.	ene.	se.				
Mean.	29·973	29·861	29·64	29·750	29·765	29·801	29·804	41·43	24·71	31·4	41·1	28·9	36·66	36·37					0·93	0·90	1·12	2·56

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 99. MAY 1845.

XLI.—*Description of a new genus of Calcareous Sponge.* By J. S. Bowerbank, F.R.S., L.S. &c.

[With a Plate.]

Dunstervillia.

Gen. Char.—Sponge calcareous, outer surface arranged in polygonal plates or compartments. Body composed of simple, straight, angulated canals radiating from the central axis of the sponge.

D. elegans.—Sponge sessile, sacculate, compressed; ventral orifice single, terminal, surrounded by a single or double fringe of erect, simple, asbestiform spicula. External oscula indistinct. Spicula of the body simple-double-pointed and triradiate.

This interesting little sponge was attached to the stem of a new species of *Corallina,* which I received among a valuable collection of Sponges, Zoophytes and Fuci from my kind and liberal friend Mr. George Dunsterville, surgeon of Port Elizabeth, Algoa Bay, after whom I have named it in acknowledgement of the repeated contributions which he has made to our knowledge of the marine natural history of that part of the world. It was found on the beach at Cape Receif, about ten miles from the town.

This singular sponge would naturally fall under Dr. Fleming's *Grantia,* if we were to confine ourselves to the brief description which he has given of that genus; and even under the enlarged generic character given by Dr. Johnston in his 'History of the British Sponges,' there is but a very slight distinction between them. But however well the material may accord with that of *Grantia,* the structural peculiarities are so strikingly distinct from any species of that genus with which I am acquainted, that I have ventured to make it the type of a new family; and I have been the more inclined to do so, as, although I know of no recent analogue, yet there is one in the fossil state which is found in one of our oldest geological strata, to which I believe I shall hereafter prove it to be very closely allied.

I possess but two specimens of the recent species; one of them is attached by a broad base to the stem of a *Corallina,* the other was found detached, but appears to have been based in a similar manner; so far therefore as I can judge from this limited number, the sponge is a sessile species. Plate XVII. figs. 1 and 2. represent them of the natural size.

Both of them present the same compressed character, the elongated one to a greater extent of the two; and this compression, it is evident from the mode of disposition and the proportions of the radiating canals, is natural, and not the effect of collapse from drying.

The ventral orifice in the larger specimen is nearly closed, and in the smaller one entirely so, by a thick fringe of long, attenuated, asbestiform spicula, which converge towards a point opposite the centre of the orifice; surrounding the base of this terminal fringe there is a second thin fringe of similar spicula based upon a ring slightly raised from the surface of the sponge. The latter radiate at nearly right angles from the surface of the animal; but as these appendages have evidently suffered much from mutilation, it may be that the second one is but the outer portion of one mass of spicula surrounding the great excurrent orifice.

The external surface of the sponge is composed of polygonal plates or compartments, usually four-, five- or six-sided, as represented by Plate XVII. fig. 3. with a power of forty-five linear, and also by fig. 4. with a linear power of ninety-four. In many parts of the surface they present the appearance of a quincuncial arrangement.

Upon examining a section of one of these plates or compartments made at right angles to the natural surfaces, the outer portion was found to be composed of a layer of minute, simple-double-pointed spicula, with their axes at right angles to the outer surface of the plate; and immediately beneath these there is a mass of large triradiate spicula, many of which have one ray much exceeding in length either of the other two; and this occurs more especially when they are in the neighbourhood of the under surface of the layer of simple spicula, and in these cases the long ray is usually imbedded amid the simple spicula of the outer layer. Plate XVII. fig. 7. represents a portion of a section of one of the plates, viewed by transmitted light, with a power of 150 linear.

Beneath each of these plates or compartments there is a single large angulated canal, usually four-sided, which passes in a straight line towards the central axis of the sponge. The parietes of these canals are composed of interlacing triradiate spicula, two of the rays of each spiculum being disposed at right angles to the long axis of the canal, while the third projects into it in a diagonal direction towards the outer surface of the sponge. This arrangement presents one of the most delicate and beautiful interlacements of spicula that I have ever observed. Plate XVII. fig. 6. represents a view of four of the cells by the aid of a Lieberkuhn and a power of 100 linear.

The large angulated canals terminate on the inner surface of the sponge with open mouths, which are nearly circular and somewhat less in diameter than the cells, the diminution of the apertures being produced by a greater accumulation and a closer disposition of the triradiate spicula. Plate XVII. fig. 5. represents a view of a portion of the inner surface of the longer of the two specimens by the aid of a Lieberkuhn and a power of 100 linear, and figs. 8, 9, and 10. represent simple and triradiate spicula of the outer surface of the sponge by transmitted light and a power of 150 linear.

I could not detect the passages by which the incurrent streams of water pass. In most of the plates or compartments near the base of the outer surface of the smaller sponge there was a central depression, but I could find no perforations. The greater number of the plates in the larger specimen were convex to a considerable extent.

When a piece of the sponge was placed in dilute hydrochloric acid it effervesced and the spicula dissolved rapidly, leaving a small mass of animal matter, from which numerous portions of minute vessels projected.

Professor Phillips in his 'Figures and Descriptions of the Palæozoic Fossils of Cornwall, Devon and West Somerset,' describes and figures from Sir H. de la Beche's paper in the 'Transactions of the Geological Society,' vol. iii. pl. 20, a fossil, *Sphæronites tessellatus,* the outer surface of which has a tessellated structure very similar in appearance to *Dunstervillia elegans.* The Professor and other authors have evidently felt much doubt as to the nature of this apparently anomalous fossil, and under this feeling he concludes his observations by saying, "Meantime I wish to include it in the group to which it bears the most obvious external resemblance, and therefore propose to name it for provisional reference *Sphæronites tessellatus.*"

The great similarity which exists between this fossil and *Dunstervillia* struck me forcibly immediately I saw the latter. The external appearance of the plates or compartments in the fossil is precisely that of the recent sponge, and like it, they vary in having from four to six angles. In one specimen, which exhibits a very complete view of the interior of the fossil, and for the loan of which I am indebted to my friend Dr. Battersby of Torquay, the analogy is still further completed, and the distinction between it and any known crinoidal or echinodermal form is strongly portrayed. If it were a member of either of these two families, it would exhibit on their internal surfaces the same form and number of angles as they do at the external ones; but this is not the case with the fossil, the inner surface of which presents no appearance whatever of tessellated structure; but in place of it there is a series of raised lines or ridges running longitudinally, and corresponding in their width and direction with the lines of angular compartments on the exterior. The spaces formed by these parallel lines are again divided, most frequently at right angles, by a number of short raised lines, so that the interior surface is covered with numerous, oblong, square, or occasionally triangular sunken areas, presenting exactly the appearance that we should have, supposing that the series of fragile cells, equivalent to those in the recent *Dunstervillia*, to be broken away down to their bases, on the inner surface of the outer coat of the sponge.

The microscopical examination of both the outer and inner surfaces of the fossil also strongly favours the idea of its spongeous origin. While the surrounding matrix is solid and crystalline, the fossil is exceedingly porous. From the regularity of its structure and the character of its interspaces, it presents strong traces of the original organic arrangement of its parts, and like its recent type, the outer surface of the plates is very much more close and even in texture than they are immediately beneath; and these appearances are not peculiar to the specimen belonging to my friend Dr. Battersby, but they exist also in an equal degree in a second specimen presented to me by that gentleman.

EXPLANATION OF PLATE XVII.

DUNSTERVILLIA ELEGANS.

Figs. 1 & 2. The sponges of their natural size.

Fig. 3. The specimen represented by fig. 1. viewed by direct light with a power of 45 linear.

Fig. 4. A few of the quadrangular and pentangular plates of the same specimen as seen with a power of 94 linear.

Fig. 5. A view of the terminations of some of the large angulated canals at the inner surface of the sponge with a power of 100 linear.

Fig. 6. A portion of a section of the sponge at right angles to the natural surfaces, exhibiting the form and disposition of the angulated canals, seen with a Lieberkuhn and a power of 100 linear.

Fig. 7. A portion of a section of one of the plates seen by transmitted light with a power of 150 linear.

Figs. 8 & 9. Triradiate spicula magnified 150 linear.

Fig. 10. One of the simple-double-pointed spicula magnified 150 linear.

XLII.—*On the Structure of the Cocoon of a Leech.* By J. S. Bowerbank, F.R.S., L.S. &c.

[With a Plate.]

At the first view, I believed that the very curious body which is the subject of the present communication was one of the singular aberrant forms of that exceedingly variable tribe the *Spongiadæ*, and until I received a note from Professor Henslow, kindly intimating the probability that I had fallen into an error in thus designating it, I entertained not the slightest doubt of its being one of the numerous odd forms that abound among the sponge tribe, and especially so from the remarkably abundant and deceptive sponge-like tissue with which the body of the cocoon is enveloped.

The distinct coriaceous body with its mammillated terminations, so unlike the great mass of the *Spongiadæ*, would naturally have made it the type of a new genus, and as such I had described it. I am therefore the more anxious that this error should be repaired as completely as possible, and to prevent the chance of its recurrence, I have thought it advisable to describe the structure and peculiarities of this curious little body, although other cocoons somewhat similar have already been to a certain extent made known to the scientific world through the works of Dr. James Rawlins Johnson on the Medical Leech, and of Dr. Noble. The first of Dr. Johnson's memoirs was published in the year 1816, and the second in 1825, and that of Dr. Noble in the year 1822. In the latter treatise of Dr. Johnson we have engravings of the cocoon of the medicinal leech from drawings by Mr. Clift, and also from a cocoon sent to the author by Dr. Noble; and in a subsequent portion of the work we have the cocoons of *Hirudo vulgaris* figured and described; but in neither of these can we recognise the distinct and singular sponge-like fibrous envelopment of the species I am about to describe, and the cocoon of the latter species especially appears from the figures to be completely destitute of any such appendage. It is therefore probable that the subject of the present memoir is the cocoon of *Hirudo sanguisuga*, the common horse leech, an animal which differs very considerably both in structure and habit from the before-named species; or it is a species, the cocoon of which has not hitherto been described.

Dr. Noble designates the cocoon which was the subject of his observations as being of the size and figure of that of the silkworm, and as having the same appearance and density as a piece of fine sponge, but although the description in the latter respect agrees with the one I have to describe, the figure of it in Dr. Johnson's work is evidently that of a different species.

The one which I am about to describe was found in a large muddy ditch, which is on the left hand of the foot-path from Tenby to Pinally, South Wales. It is of an oval form, and rarely exceeds half an inch in length from one extremity of the fibre to the other, and the central case is about four lines long. The fibres are of a greenish amber colour, the case partaking of the same hue, but much deepened by its greater degree of density. Pl. XVIII. fig. 2. represents a specimen of rather more than the average size. When carefully denuded of the surrounding fibre, the case is found to be divided into numerous nearly equal-sized polygonal areas, which are most frequently five- or six-sided. These are produced by a raised network of fibrous structure, partly imbedded in the surface. From the angles of these reticulations the surrounding open fibrous structure springs, which preserves the same form of reticulation as that of the parent surface. Pl. XVIII. fig. 1. represents the same specimen as figure 2, but magnified ten diameters.

The case has frequently a deep sinus which extends entirely across it, causing it to assume very much the same form as a short, swollen grain of wheat, as represented by figure 4; and under these circumstances the mammæ are found opposed to each other in the direction of, what is then, the short axis of the case, and are situated just without the outer edge of the sinus. When there is no depression of this body, the mammæ are found opposed to each other at the ends of the cocoon, as represented by Pl. XVIII. fig. 3.

The sinus is produced by a partial state of collapse of the body of the cocoon, caused apparently by the gradual diminution of its gelatinous contents.

The cocoon in almost every specimen that I have opened was found to contain a dense opaline gelatinous matter. When removed it readily separates in water into flaky masses, which, when viewed by transmitted light with a power of 500 linear, appeared to be composed of exceedingly minute granules.

Upon carefully examining the gelatinous contents of several specimens which I opened, I found in two of them small vesicular bodies, which have every appearance of being the eggs or embryos of the animal. In the gelatinous matter of one specimen I found ten of these bodies, and in another six of them, apparently in different stages of development. They are usually pyriform, and have frequently a deposit of minute, dark, granulated matter towards the smaller end. In both cases in which these bodies occurred, they were found in greater quantities at one end of the cocoon than at the other. Pl. XVIII. fig. 7. represents one of the best-developed of these embryos by transmitted light and a power of 300 linear. The network which covers the outer surface of the body of the cocoon and bounds the deeply sunken areas of its interstices rises from its surface in the form of a sharp edge, and as the free fibres are given off at the angles where the imbedded fibres meet, they naturally at this point assume the form of a three-winged fibre, and this form they maintain throughout the whole of their length, as represented by Pl. XVIII. fig. 8. with a linear power of 94.

Every one is familiar with the horny cases surrounding the ova of certain fishes, and of the finely-spun horny threads with which they are fixed to the stems of Gorgonias and other bodies; but in these cases the fibre is simple and cylindrical, as might naturally be expected, while in the fibrous tissue of this singular cocoon it is three-winged, and anastomoses as regularly and as beautifully as the fibres of the horny sponges of commerce. How the animal produces this beautiful and complex structure, is a question which it will be exceedingly interesting hereafter to solve.

The coriaceous substance of the body is of about the thickness of a stout sheet of writing-paper, the centres of the areas being much thinner than the other parts. When a section of one of its thickest portions at right angles to its outer surface was examined by transmitted light with a power of 94 linear, it appeared to be composed of four or five layers of nearly equal thickness, as represented by Pl. XVIII. fig. 10. When the exterior surface was examined under similar circumstances with a power of 1000 linear, numerous cytoblastic vesicles were observed irregularly dispersed over its surface, but without the appearance of nuclei; but, on the contrary, when the inner surface was thus examined, it was seen to be nearly uniformly covered with well-defined nucleated cytoblasts, the nuclei in many cases being angular, as represented with a power of 1000 linear by Pl. XVIII. fig. 9. From the laminated structure exhibited in figure 10, it is probable that the production of tessellated cellular tissue is not continuous, but that it occurs at intervals, and is produced by a series of efforts, in a similar manner to that in which the successive layers of cartilaginous substance are produced by *Helix aspersa* when about to extend the lip of its shell in the spring of the year. But there is an essential difference in the circumstances of the two cases. In the shell the cytoblasts are developed and their peculiar office performed while in contact with the living body whence they emanate, while in the cocoon this cannot well be the case, as the animal immediately separates itself from it. Their presence and development therefore appear to indicate that vitality to a certain degree remains in the horny substance of the cocoon, and which vitality may probably continue in action until the proper office of the cocoon has been attained. Dr. Johnson, in treating of *Hirudo vulgaris,* describes the singular mode of the production of the cocoon of that species in this manner. When the animal is about to produce one of these bodies, it is observed to be greatly contracted both above and below the uterus, a distension then takes place between these constrictions, and a surrounding membranous structure is thrown off which becomes of a milky white colour; into this the animal forces with some effort the whole contents of the uterus. This done, it elongates the anterior portion of the body, and withdraws its head as from a collar. After the animal has firmly fixed it to some substance, it fashions it with its mouth until it presents an oval form.

This description enables us in some measure to account for the mammæform appendages of the horny case of the species under consideration, and which differs somewhat in the structure of these parts from all the cocoons described by Dr. Johnson, in which, instead of the protuberant mammæ, we find simply circular orifices; but it does not in any shape enlighten us upon the mode of the construction of the extraordinary and complex spongeous tissue which surrounds our species of cocoon.

The mammæform ends of the cocoon are of an oval form, and project in about an equal degree beyond the inner and outer surfaces previously to their becoming perforated, and the length of the oval is somewhat increased by a considerable thickening of the substance of the body immediately surrounding them. The communication between the inner and outer surfaces appears to be effected in a very singular manner. In one case where I made a section of one of these organs at right angles to the natural surfaces of the body, it appeared perfectly solid; in another a small cavity only existed near the inner surface of the case; but in a third specimen the appearance presented was of an exceedingly singular description. The outer end of this organ had a small irregular perforation which led into an ovoid cavity immediately beneath, and the long axis of which was in a diagonal direction as regards the axis of the body of the cocoon, and the inner surface of this cavity appeared to be furnished with three or four ribs, as represented by Pl. XVIII. fig. 5. with a power of 94 linear, and Pl. XVIII. fig. 6. with a power of 160 linear. Upon opening the cocoon I found that the opposite end of the mamma had disappeared, and in lieu of solid substance there was a large dome-shaped cavity, the top of which was separated from the inner end of the ovoid cavity in the external end by a very thin layer of horny structure; and indeed at one spot there were appearances as if a minute communication existed between them, but from the oblique position of the ovoid cavity I could not determine this with certainty. The other extremity of the cocoon did not exhibit precisely the same appearances; in this case the entrance to the ovoid cavity was much larger on the outer surface, while on the inner one the entrance to the large cavity was closed by an apparently stout membrane.

In other specimens which I examined, sometimes neither of the mammæ were perforated; at others one would be slightly open, while the opposite one was entirely closed. Whether the curious conformation of these parts is the result of accident occurring at the moment of the withdrawal of the leech from the young and tender cocoon, or whether it arises from a vital action inherent in this body and essential to the opening of this organ and the consequent liberation of the young contained within it, it is difficult to conjecture; but I am inclined to believe in the latter idea, and more especially so, as in by far the greater number that I have examined no perforation existed, although, from Dr. Johnson's account of other species, this is evidently the point at which the young effect their liberation.

XLIII.—*Description of three new species of* Rubus. By T. Bell Salter, M.D., F.L.S.

1. *Rubus tenuis.* Caule procumbente, tereti, subglauco aculeis æqualibus, foliis ternatis, rarius quinatis, supra subglabris, subtus pubescentibus; foliolis obovato-acuminatis, duplo serratis; lateralibus extrorsum lobatis; panicula decomposita, rarius cymosa; calycibus pubescentibus, lanceolatis acuminatis, fructui adpressis; fructu parvo, nigro, drupeolis paucis, magnis composito.

Var. β. *ferox,* aculeis crebris, uncinatis.

Syn. Rubus affinis δ. *W. et N. Rubi Germ.* p. 3. tab. 3 *b*. Rubi cæsii et R. corylifolii pars *auct. var.*

Hab. in variis locis in Britannia australi. *Var.* β. hab. ad "Apes Down" in Insula Vecte.

The habit of this bramble comes so near to that of *Rubus cæsius,* that there can be little doubt it may be often overlooked as being the ordinary dewberry; it is however readily distinguished from that species by the absence of glands generally, and by the absence of both glands and hairs from the growing shoot, and also by the berry being black instead of blue as in the true *R. cæsius*; the calyx embraces it precisely as in that species, but the sepals are rather more broadly lanceolate. The flavour of the fruit differs considerably, that of *R. tenuis,* though acid like that of *R. cæsius,* not having the peculiarly grateful lemon flavour of that species. *Rubus affinis* (W. et N.) is described in the 'Rubi Germanici' as having the calyx reflexed, yet one of the varieties is figured with the calyx embracing the fruit. As this is the principal character which distinguishes the present species from *R. affinis,* I can entertain no doubt that the variety (δ.) there figured is in fact the one now described as a distinct species. It holds a near affinity both with *R. cæsius* and *R. affinis,* but having closely observed it for many years, I am satisfied of its distinctness, and have no doubt that the characters now given will be found sufficient for it to be readily known. I have already found it in Dorsetshire, Wiltshire and Hampshire, including the Isle of Wight.

Var. β. is a somewhat stouter plant, and very much more prickly. It appears to be far less common, being hitherto only observed in the Isle of Wight, at Apes Down near the Farm.

2. *Rubus Borreri.* Caule procumbente, tereti, aculeato, pilis patentibus hirto; aculeis crebris, longis, tenuibus uncinatis; foliolis quinatis, obovato-cuneatis, supra subglabris, subtus hirtis concoloribus; panicula corymbosa, ramis inferioribus longis, decompositis, superioribus brevioribus, flore terminali subsessili; aculeis paniculæ paucis, pedunculis pubescenti-hirtis; bracteis lanceolatis, hirtis, inferioribus ternatis aut dentatis, superioribus simplicibus; calycibus ovato-lanceolatis, longe acuminatis, pubescenti-hirtis, fructum laxe amplectentibus; fructu nigro, hemisphærico, parvis nitidis drupeolis composito.

Hab. in Insula Vecte.

This species is one most readily distinguished from any other. It is a creeping plant of considerable length. Its nearest affinities are with the *R. villicaulis* and *R. sylvaticus* of Weihe and Nees, two forms very rightly considered as mere varieties of the same species by Mr. Babington *: the nature of the hairiness of the stem and the form of the thorns, together with a principal character of the leaves, which are hairy, yet deep green beneath, associate it very nearly with those forms; the stem however is both more thorny and more hairy, and the leaves more slender. The characters by which it is distinguished from all to which it is allied are to be found in the parts of inflorescence and fructification. The arrangement of the corymbose panicle as described above gives the plant a very remarkable appearance, and at first sight separates it widely from *R. villicaulis* and its varieties, the panicles of which are slender and tapering. The fruit and calyx present still better discriminating characters. The hemispherical form of the fruit and the clasping calyx distinguish it entirely from all the other species allied to it.

The fruit is of a remarkably bright jetty appearance when ripe, but prior to that it has a peculiar opake flesh tint; this last character was pointed out to me by my friend Mr. Borrer, who was with me on the third occasion of my observing this plant. In acknowledgement of his successful labours in this genus, and of his assistance in discriminating the present species, I have adopted for it his name.

* Manual of British Botany, p. 95.

Except in a few spots in the Isle of Wight, I have never yet noticed this species.

3. *Rubus Babingtonii.* Caule arcuato, tereti, sulcato, hispido ex aculeis, et aciculis crebris in setas incuntibus, sparsim glanduloso; foliis ternatis, rarius quinatis; foliolis supra glabris, subtus parce pubescentibus, rhomboido-cordatis, cuspidatis, duplo et inæqualiter mucronato- et crenato-serratis; stipulis linearibus, pubescentibus; panicula foliosa, multum ramosa, versus terram ut surculo induta, supra tomentosa, aculeata, setosa; foliis paniculæ ternatis vel simplicibus, inæqualiter mucronato-crenatis; bracteis foliaceis, late lanceolatis, pilosis glandulosis; calycibus lanceolatis cuspidatis, pilosis.

Hab. ad Selborne prope Week-hill.

This is one of the most remarkable of the genus which I have yet met with. It is a bramble of extraordinary size, and I regret not having measured a growing shoot, that I might give its dimensions; the panicle is more than 2 feet in length. It is a matter of difficulty to settle with which of our previous species it would most naturally be grouped. Its prickly inflorescence, accompanied with glands, would associate it with the *Koehleri* group, while the very tomentose clothing of this part would more nearly associate it with *R. leucostachys,* from which however the presence of glands at once separates it. The hispid shoot however is that which best marks its true affinity, which must, I conclude, be with the *Rudis* group, from all of which however it is distinguished by the leaves, though slightly pubescent, being green beneath, and ternate instead of quinate. The peculiar margin of the leaves, which are mucronato-crenate, or as Mr. Babington* more minutely specifies it, "serrato-apiculate towards the base, and higher up crenato-dentato-apiculate," at once distinguishes it, not only from the jagged-leaved species of the *Rudis* group, but from all other of our fruticose *Rubi,* while the existence of ternate leaves on a bramble of such dimensions adds to the peculiarity of its appearance. The shoot, though described above as sulcate, is not angular, the margins of the grooves being rounded. Notwithstanding the size of the panicle, the fruit itself is remarkably small.

I have named this species after my friend Mr. Charles C. Babington, the learned author of the 'Manual of British Botany,' in acknowledgement not only of his assistance in discriminating its characters, but of his successful labours, as well in this as in so many other difficult genera, and indeed in the whole British flora.

* In a letter to the author of these remarks.

XLIV.—*Additions to the Fauna of Ireland, including descriptions of some apparently new species of Invertebrata.* By William Thompson, Pres. Nat. Hist. and Phil. Society of Belfast.

[With a Plate.]

Species thus marked † before the names were indicated mostly by a generic name only, in my Report on the Invertebrate Fauna of Ireland, published in the Reports of the British Association for the Advancement of Science for 1843: those unmarked are subsequent additions.

Birds.

Vultur fulvus, Linn., *Gyps vulgaris*, Savigny.

Late in the autumn of 1843 Mr. Yarrell favoured me with the information that he had received a letter from Admiral Bowles, written from the south of Ireland, in which this gentleman mentioned having lately seen a living vulture at Castle Martyr, the seat of the Earl of Shannon, and which was said to have been captured in the county of Cork. The attention of Mr. R. Ball being called to the circumstance, he made inquiry of Lord Shannon, who replied, that the bird was purchased by his steward for 2*s.* 6*d.* from a peasant, who stated that he caught it on the sea-shore in that neighbourhood: its plumage was in good order. His lordship politely offered the bird to Mr. Ball for the collection in the Garden of the Zoological Society, Dublin, but before arrangements were completed for its transmission it died. The specimen was, by the directions of Lord Shannon, carefully preserved and stuffed and placed at the disposal of Mr. Ball, who has added it to the collection in Trinity College, Dublin. It is in adult plumage.

Although we cannot tell whether this bird may not have escaped from some vessel, still it need not excite surprise if the *Vultur fulvus* should wander to this island, inhabiting as it does (according to Temminck) the mountains of the north of Europe, the Alps? and Pyrenees. Another species of European vulture, the *Cathartes percnopterus*, was once shot in Somersetshire*.

Flat-billed Sandpiper, *Tringa platyrhyncha*, Temm.; Gould, Birds of Europe, "part 17"; Yarrell, Brit. Birds, vol. ii. p. 638.

Of this *Tringa* only one specimen is recorded as met with in

* *Pycnonotus chrysorrhœus*, Swainson.—At the meeting of the British Association held at Cork in 1843, I exhibited at the Natural History Section an example of this African species sent for inspection from the collection of native birds, or those killed in Ireland, belonging to Dr. Burkitt of Waterford. The following particulars respecting the bird, though mentioned at the meeting, have not been published. Dr. Burkitt "purchased it from a country-lad who brought it into Waterford in January 1838 with a number of blackbirds [*Turdus merula*] and snipes, and who thought it was a hen blackbird: he shot it at Mount Beresford, three and a half miles from Waterford." There can therefore be no doubt of the specimen having been killed in this country.

Great Britain. It was noticed by Mr. Hoy in the first volume of Charlesworth's 'Magazine of Natural History' as having been "shot on the 25th of May 1836, on the muddy flats of Breydon Broad, Norfolk, in company with some dunlins and ring plover." In a locality of a similar nature—the oozy banks of Belfast bay—a *Tringa platyrhyncha* was killed on the 4th of October 1844, at the same shot from a swivel-gun with eleven golden plover and seven or eight dunlins.

It is a male bird, and larger than the English specimen, but of about equal size with that described by Temminck. It is as follows *:—

	in.	lin.
Length (stuffed specimen)	7	0
——— of wing from carpus to end of quills	4	$3\frac{1}{2}$
——— of tarsus	0	11
——— of middle toe and nail	0	10
——— of hind toe and nail	0	3
——— of bill from forehead to point	1	$3\frac{3}{4}$
Breadth of bill at base (now dried up)	0	$2\frac{1}{2}$
Height of bill from base of upper to that of lower mandible...	0	4
Tibia bare of feathers for about	0	4

Temminck's descriptions (vol. ii. p. 616. 2nd edit.) of the plumage of the young bird before its first moult and of the nuptial garb show singularly little difference in a species belonging to this family, and Mr. Yarrell having both the old bird in its breeding plumage and the young bird of the year before him, remarks that "the young bird so closely resembles the parent in its plumage at this season that it is unnecessary to describe it." My specimen agrees with the descriptions of these authors, excepting in what the ornithologist will be prepared to expect of a bird killed in the month of October—that the rufous tints throughout the plumage (margining the feathers, &c.) have all but disappeared, and are replaced by white. The winter plumage I have not seen described, but fortunately the presence of a few winter feathers on the back and wings of the present specimen sufficiently indicate that a change from black to gray, analogous to the seasonal change which takes place in the dunlin, likewise occurs in this species. The hue of these feathers however resembles more the pretty gray colour of the phalarope than the pale brownish gray of the dunlin—or purre, as it has been termed in winter garb.

The broad bill and the peculiar marking of the head are the most obvious distinctive characters of this species. The dimensions of the bill have already been given: the plumage of the head may be thus described—from base of upper mandible to top of head a narrow blackish brown band, which broadens towards the hinder part of the head; on either side of this from the bill to the upper part of the eye, and continued over it is a white streak, bounded by a dark

* The taxidermist noted the specimen before being skinned to be in length $6\frac{7}{8}$ inches, breadth 13 inches; weight 1 oz. $4\frac{1}{2}$ drachms.

brown band, which reaches from the side of the bill to the eye; throat white.

This is a very interesting species to the ornithologist from the circumstance of its presenting the characters of different genera. Its general aspect—body plumage, delicate tarsi and feet—is that of a *Tringa*, but in the form of the head, breadth between the eyes and broad base of bill we are reminded of the genus *Scolopax*, or true snipes, as we likewise are in the brown and white banding of the head, in which latter respect it likewise resembles the whimbrel (*Numenius phæopus*). The very small rudimentary membrane between the base of the middle and outer toe, mentioned by Temminck as the chief character on which it has been raised to the rank of a genus by MM. Koch and Naumann, is a most trivial distinction, it being in the least degree only more developed than in the *Tringa variabilis* and *T. subarquata*. Except in the head and bill, the whole bird is in form and plumage an ordinary-looking *Tringa*.

In the continental countries south of our latitude in which this species has been met with, it is considered very rare, nor was it known to be otherwise in the north of Europe until Mr. Dann lately visited Norway and Lapland for the purpose of studying the birds which frequent those countries in the breeding season. In some places he found this *Tringa* to be by no means uncommon, and to Mr. Yarrell's beautiful work on 'British Birds' (vol. ii. p. 638) he contributed a full and admirable account of its habits, which were before unknown—the figure of the bird in this work is most characteristic. Temminck mentions specimens having been sent from Borneo, Sumatra and Timor.

American Wigeon, *Mareca Americana*, Wilson (sp.), Amer. Ornit. vol. iii. p. 109. pl. 69. Jardine's edit.; Yarrell, Brit. Birds, vol. iii. p. 196.

Towards the end of February 1844, Henry Bell, an intelligent man of middle age, who since he could carry a gun has been a wildfowl- (and more especially a wigeon-) shooter in Belfast bay, and for the last eight or nine winters has given up his whole time to the pursuit, earning by it his livelihood, visited Strangford lough "professionally" with his punt and swivel-gun. Hearing on a dark night the call of wigeon*, he fired towards the place whence the sound proceeded, and picked up a single bird, which differed in plumage from any he had ever seen. Its form at once marked this bird to his eye as a wigeon of some kind, but in a state of plumage unlike that of the common species of either sex at any age: of this he was a good judge from many hundreds having passed through his hands, and from his being very observant of the species of birds and the changes of plumage through which they pass. He described it as a *wigeon* in the plumage of a *teal*. The large markings

* According to Wilson's description of the call of the American wigeon, it is very like that of the European species.

on the lower part of the sides of the neck and on the breast were, instead of being roundish as in the teal, somewhat of a semicircular form, and varied in size from "one half to nearly the whole size of a man's finger-nail." Like the old male wigeon it was whitish, but of a purer colour, on the top of the head, and like it had the white marking on the wing, both characters denoting an old male bird of its species. On the figures of the American wigeon in the works of Wilson (Jardine's edit.) and Yarrell being shown to the shooter, he felt confident that his bird was of the same species, the former representing its plumage the better of the two, and the latter its form, as the neck was thicker than that of the common wigeon. Although he thus noted the bird particularly, and with another shooter who accompanied him to Strangford, held a kind of inquest on its species, it was unfortunately sold with his other wildfowl, as from having seen singular varieties of birds in the hands of bird-preservers, he thought this might be a remarkable state of plumage of the common wigeon:—of a second species he had not at that time heard. He is certain of having killed other birds of the same species in Belfast bay, but never any so far advanced towards adult male plumage. Placing entire reliance on the discrimination and accuracy of Bell, I have not hesitated to add this bird to our fauna, although other naturalists may not be inclined on such testimony to admit its claim to be so recorded.

To the same shooter we are indebted for the specimen of *Tringa platyrhyncha* just noticed; he at once perceived that it was distinct from the dunlins killed at the same time, and preserved it accordingly.

Fishes.

Ray's Sea Bream, *Brama Raii*, Cuv. and Val.

To Dr. R. J. Burkitt of Waterford we are indebted for the positive addition of this species to our fauna, this gentleman having lately contributed a native specimen to Mr. R. Ball for the Museum of Trinity College, Dublin. The fish (of which a large and correct drawing has been sent me) was taken at Tramore in the month of October 1843. It is the first certain instance known to me of its occurrence on our coast. Mr. Yarrell * gives it from M'Skimmin's 'List of the Fishes of Carrickfergus,' but as remarked in my Report on the Vertebrata of Ireland, "the propriety of the application of the name to this species is doubtful." All that is said of it by M'Skimmin is, "*Sparus Raii*; hen-fish, a choice fish; rare." The term hen-fish is applied by our fishermen to one or two other species of somewhat rare occurrence.

Mollusca.

Doris obvelata, Johnst., Annals of Nat. Hist. vol. i. p. 52. pl. 2. fig. 4—7 (not of Müller).

In July last Mr. Hyndman procured a specimen of this *Doris* on

* Brit. Fishes, vol. i. p. 134. 2nd edit.

Fuci at Skerries, Dublin coast. On its being submitted to the inspection of Mr. Alder, by whom the original specimen described by Dr. Johnston was discovered in Berwick bay, he remarked, that the species "appears to be pretty generally diffused, but nowhere common." He had obtained it last summer in Rothesay bay.

†*Doris Ulidiana,* Thompson.

On the 17th of February 1840, I procured three specimens of this *Doris* among oysters brought to Belfast market from the neighbouring coast of Down or Antrim, and after noting their general appearance, colour, &c., set them apart as species unknown at least to the British fauna. Mr. Alder having some time ago expressed a wish to see my collection of Nudibranchiate Mollusca, it was placed in his hands, and on this species coming under examination it was considered by him and Mr. Hancock to be new, and a description of it drawn up for their own use was kindly communicated to me. This is as follows;—within parentheses are my notes on the colour of the living *Doris*.

Doris Ulidiana.—"Length, from spirits, $\frac{1}{2}$ inch, breadth $\frac{1}{4}$ inch; ovate-oblong, rather straight at the sides, depressed [of a uniform pale yellow, the intestines appearing through the skin of a dark colour]. Cloak not extending much beyond the foot, rough with spicula, and covered with large, unequal, obtuse tubercles, the spicula collected in bundles in the tubercles and radiating at their base. Tentacula [long and whitish], lamellated, without sheaths; the edges of the apertures plain. Branchiæ consisting of eleven [beautifully white] pinnated plumes, set in a semicircle round the anus. Foot rather broad. Veil above the mouth semicircular."

On being put in diluted spirits of wine, the tentacula were entirely withdrawn, and the branchial processes lost their beauty by discoloration, which changed them to the same hue as that of the body.

On comparing these specimens at the time they were procured with the most nearly allied species in my possession, the *Doris muricata*, Müller (Zool. Dan.), they were noted down as being certainly distinct from it:—in being of a more elongate shape, in having the tubercles differently formed, and, in proportion to the dimensions of the body, their being not more than half the size of those of *D. muricata*. Messrs. Alder and Hancock made the following comparative observations: "Comparing your *D. muricata* [a species they had not seen before] with our *D. aspera* and your *D. Ulidiana*, we come to the conclusion, so far as we can judge from specimens in spirits, that these three are distinct, though nearly allied species. *D. Ulidiana* differs from *D. muricata* in its much larger size, and longer and more depressed form. The tubercles appear to be more depressed, and the branchial plumes larger. From *D. aspera* it differs also in size and shape; in having larger tubercles, the cloak narrower, and the foot broader."

Polycera punctilucens, D'Orbigny, Guérin, Mag. Zool. 1837, p. 7. pl. 106.

Professor Allman obtained this *Polycera* in a pool at Courtmasherry harbour, county Cork, in the month of August last. The species was originally described from specimens taken on the coast of France; it has not yet been procured on that of Great Britain. The specimen was submitted to the judgement of Messrs. Alder and Hancock, and will be fully noticed in their forthcoming work on the British Nudibranchiate Mollusca.

Eolis violacea, Alder and Hancock, Ann. Nat. Hist. vol. xiii. p. 166 (March 1844).

Mr. Hyndman, when dredging on the 26th of August last off Castle Chichester, Belfast bay, in 6 to 10 fathoms water, captured a specimen of this very beautiful *Eolis*. It was brought to me alive, and immediately afterwards despatched by post in a phial of sea-water to Newcastle for Mr. Alder's examination in a living state, but on reaching its destination was unfortunately dead. Mr. Alder remarked that it was a very fine example of his *E. violacea*, which was described from a Cullercoats specimen smaller and less perfect than this had been.

Aplysia nexa, Thompson. Plate XIX. fig. 8.

Animal elongate, deep carmine-red, mantle bordered with black.

Length 1 inch; much elongated; foot very narrow; two black eyes anterior to, but a little distant from the base of the dorsal tentacula.

Colour deep carmine-red, occasionally with a few minute white spots; mantle and anterior tentacula bordered with black, dorsal tentacula tipped with black.

Shell?

The specimen of this *Aplysia* was dredged on the 26th of August 1844, off Castle Chichester, Belfast bay, by Mr. Hyndman—depth 6 to 10 fathoms.

The characters which this beautiful little *Aplysia* has in common with *A. depilans* need not be given. Whether we consider it distinct from, or a mere variety of that species, it differs from it in being of a more elongate form, in colour, and in having the mantle, &c. bordered with black. From a single example only I should not venture to describe it as a distinct species, but on sending my specimen (its characters being first noted down) alive in sea-water to Newcastle-upon-Tyne for Mr. Alder's examination, he replied, that an *Aplysia* similar in form and colour had been taken by him at Torbay in Devonshire about two years before, but not having had much opportunity of studying the genus, he felt uncertain whether it should be considered a variety of an *A. depilans* or a distinct species. Neither do I feel certain on this point until an equally small *A. depilans* be had for comparison, but it seems to me better to describe and figure the form in question and leave the matter of species for future decision than to be altogether silent on the subject. A coloured drawing of Mr. Alder's specimen being kindly transmitted to me, it was found to represent mine exactly, except in the very trivial difference of having a few minute white spots on the sides instead of being of a uniform colour. Specimens of *A. depilans*, which I have often taken (but never of so small a size), differ in being occasionally spotted as well as plain. But I have never met with this species of the same form as *A. nexa*, of its fine deep-red colour, nor having any black border to the mantle, &c.; nor has Dr. J. L. Drummond ever done so, though great numbers came under his examination when dredging at Donaghadee, on the coast of Down, in the summer of 1843.

Hab. Torbay, England; Belfast bay, Ireland.

Acteon viridis, Mont. (sp.), Quatrefages, Ann. Sci. Nat., March 1844. *Aplysia viridis*, Mont., Linn. Trans. vol. vii.

With a letter, dated from Glandore House (county Cork), Aug. 23, 1844, Professor Allman sent me a small phial containing specimens of this *Acteon*, remarking that he had just taken it there in considerable numbers. He subsequently, at the meeting of the British Association at York, gave an admirable account of the anatomy of the species, illustrated by drawings of remarkable beauty, executed by his sister, Miss Allman. In consequence of the *Acteon* being thus brought forward, this brief note might be cancelled; but as the species had previously a place in my "Additions," it is retained with this explanation. About the same time the Rev. Mr. Landsborough informed me that he had taken this species on the coast of Arran, Frith of Clyde.

†*Bulla producta*, Brown, Illus. Conch. p. 57. pl. 19. figs. 15, 16; 2nd edit.—pl. 38. f. 15, 16; 1st edit.

Among shell-sand collected at Bundoran, on the western coast, by Mrs. W. J. Hancock in 1840, and sent to Mr. Hyndman, was a specimen of this *Bulla*. Capt. Brown notices it merely as "found at Dunbar by General Bingham."

Utriculus, genus, Brown, Illus. Conch. pp. 58, 59, pl. 19; 2nd edit.—pl. 38; 1st edit.

Having lately left with Mr. Alder a number of *Bullæ* (obtained with the last species at Bundoran) which he wished to examine critically, he reported on them as follows:—"On examining the fine suite of *Bulla hyalina*, I think I make out three of Brown's species of *Utriculus*: *U. candidus* being the full-grown shell; *U. pellucidus* the half-grown; and *U. minutus* the youngest state of *B. hyalina*. At least these answer very well to his figures and descriptions." The last two are noticed by Capt. Brown as from Dunbar only, where they were found by General Bingham, as was *U. candidus* also; but this is mentioned as having been subsequently procured at Holy Island, off the coast of Northumberland, by the author himself.

Volvaria subcylindrica, Brown, Illus. Conch. p. 3. pl. 19. figs. 19, 20; 2nd edit.—pl. 38. f. 19, 20; 1st edit.

Among the Bundoran shells was one on which Mr. Alder made the following remarks: "Capt. Brown's *Volv. subcylindrica* agrees with it in outline, but he describes the species as smooth, while this shell has both longitudinal ridges of growth and transverse striæ. The latter however are very faint, and in a worn shell neither of them might be visible. I am inclined therefore to consider them the same, but leave it to your own judgement to decide the question." To the better judgement of Mr. Alder I prefer to leave it; his knowledge too of the British marine Mollusca is very complete, whilst mine is very superficial, and must remain so, my eyes being now unable without injury to bear even the lowest magnifying powers. But that my friends kindly "lend me *their eyes*," I could not include the minute species. All that Capt. Brown says of the locality of this shell is—"discovered at Dunbar by General Bingham."

Rissoa costulata, Risso, Alder in Ann. Nat. Hist. vol. xiii. p. 324. pl. 8. figs. 8, 9, May and June (figures) 1844.

When looking over the collection of Mr. Alder in October last, he pointed out a specimen of this shell which had been given him by Dr. Farran of Dublin, who procured it at Roundstone on the Galway coast.

The specimens described in the 'Annals' were from Torbay, Devonshire.

Rissoa Warreni, Thompson. Plate XIX. fig. 4.

On my submitting this species and the following (which I could not find described) to Mr. Alder's opinion, he believed them to be new, and before returning the specimens, wrote descriptions and made drawings of them for his own guidance. Having offered to copy these for my use if desired, I gladly availed myself of the proffered kindness, feeling well-satisfied that the descriptions would be better than any drawn up by myself, and that the figures would be most faithful.

Rissoa Warreni.—"Shell slender, tapering, thin, transparent yellowish white, with six much rounded and deeply divided whorls terminating in a rather fine point, the nucleus sunk in the apex. Aperture oblong-oval: outer lip thin, without rib: inner lip not reflected, but having a deep umbilicus behind it. The shell is slightly wrinkled by the lines of growth, and is delicately striated spirally; the striæ can only be seen with a good magnifier, and are most distinctly observable at the base. There are also some faint indications of small obsolete ribs on the middle whorls. Length two-tenths of an inch; breadth one-twelfth."

Two specimens were found at Portmarnock (Dublin coast) by T. W. Warren, Esq.

†*Odostomia crassa*, Thompson. Plate XIX. fig. 5.

Of this shell a single specimen was sent me from Roundstone, Galway coast, in Oct. 1840, by Wm. M'Calla. Mr. Alder describes it :—

"Shell thick, conical, opake, of a dull dirtyish white, with five flat whorls, the last occupying about two-thirds of the shell. The apex is slightly oblique ; the upper whorls smooth, the last rugose, bulging and rather flattened in the middle, having strong coarse striæ crossed by indistinct lines of growth. Aperture ovate, white and polished internally : outer lip thick, acute at the edge : inner lip reflected on the pillar with a deep impression behind it, but no umbilicus. Tooth strong. Length $1\frac{1}{2}$ tenth of an inch ; breadth nearly 1 tenth."

†*Buccinum Zetlandicum,* Forbes, Loudon's Mag. of Nat. Hist. vol. viii. p. 593. fig. 62.

A *Buccinum* taken on a long line in deep water near Bunowen, county Galway, is considered by Professor Forbes to be his *B. Zetlandicum,* though differing in its being a thin shell, &c.—he does not now feel certain of this being more than a variety of *B. undatum.* The specimen is in the collection of Dr. Farran, who states that others were procured by similar means.

†*Pleurotoma Farrani,* Thompson. Plate XIX. fig. 3.

Shell fusiform, turreted, with nine volutions (well-marked), and ten prominent ribs (on body whorl) ; closely-set deep striæ extending spirally over the whole shell.

Length 7 lines ; breadth just above aperture 2 lines ; longitudinal ribs very prominent, "not continuous from whorl to whorl," and slightly angulated at summit ; aperture occupying nearly 3 lines in length, elongate ear-shaped, strong rib of body whorl appearing just outside it ; canal wide and long, turning a little obliquely to the left ; outer and pillar lip smooth.

Colour pale yellowish brown, with numerous darker brown narrow bands equal in breadth to the lighter coloured space between them, winding spirally round the shell, and giving it when magnified a very handsome appearance ; a single brown band of a much darker hue at the top of each volution. This species comes near *P. Smithii,* Forbes, 'Annals of Nat. Hist.' vol. v. p. 107. pl. 2. fig. 14.

Of this shell, handsome both in form and colour, two specimens were obtained by Dr. Farran on the Irish coast, he thinks at Portmarnock.

†*Pleurotoma Ulidiana,* Thompson. Plate XIX. fig. 2.

Shell fusiform, turreted, with eight volutions, eleven ribs (on body whorl) with coarse deep spiral striæ.

Length 7 lines ; breadth just above aperture $2\frac{1}{4}$ lines ; volutions very slightly ventricose, rather flattened at top, but less so than in *P. turricola* ; ribs strong and coarse, "not continuous from whorl to whorl ;" coarse cut striæ across ribs and furrows ; aperture crescentic ; outer lip thin and in form of a bow ; pillar-lip somewhat hollowed ; canal very short.

Colour uniform dirty brown.

This species—coarse in form and sculpture, and plain in colour—closely approximates *Pleur. brachystomum*, Philippi, Enum. Moll. Siciliæ, vol. ii. p. 169. pl. 26. f. 10, from which I could not regard it as distinct but for a single character possessed by that species in *raised* spiral striæ. These are apparent in the profile of the shell as figured by Philippi; they are much more numerous too than the *deep* striæ of *Pleur. Ulidiana.*

Three specimens of this shell were dredged from a depth of about 8 to 10 fathoms by Mr. Hyndman and myself in Oct. 1834 in Strangford lough, county Down.

†*Triton elegans*, Thompson. Plate XIX. fig. 1.

Shell turreted, somewhat ventricose, about eight volutions, numerous prominent ribs crossed by fine raised spiral striæ.

Length 7 lines; breadth just above the aperture $3\frac{1}{4}$ lines; ribs on each volution at regular distances from each other, except on the body whorl, where within three lines of the outer lip they cease, and substituted for them is one large varix equidistant between the lip and last rib; number of ribs on body whorl twelve, but this number may rather be individual than specific; ribs not continuous from whorl to whorl; aperture oval; canal oblique, widening gradually to base; outer lip with slightly grooved striæ within; pillar-lip smooth, except at top, where two ridges appear.

Colour greenish white with two double spiral lines of yellow, one series above the top of aperture, the other rather below it.

This species is more handsomely formed, sculptured and coloured than *Triton erinaceus*; its canal is much shorter.

I have seen only a single specimen, which was found alive at Portmarnock, on the Dublin coast, by Dr. Farran.

†*Cardium Lovëni*, Thompson. Plate XIX. fig. 7.

Shell of a somewhat rounded outline with about thirty ribs, set with small scales; height and length equal; colour pure white.

Length $3\frac{3}{4}$ lines; breadth $3\frac{3}{4}$; very thin and delicate; ribs rounded, about thirty in number and becoming beautifully fine towards the beak, covered with minute closely-set transverse scales throughout, but which are more numerous on the ribs at each side; furrows about the middle of the valve smooth and shining, narrower than at the sides, where towards the base they are crossed by transverse scales, and towards the apex punctate—near the beaks they appear in the form of a mere linear depression.

Colour pure white, with somewhat of a pearly lustre inside and outside.

Compared with the British species of *Cardium*, this comes nearest *C. edule*, but is more handsome in form, sculpture and colour. It is more rounded (less truncate at the anterior end), has the beaks terminating in a finer point, ribs more numerous and with the scales on them more closely set, but less elevated, the furrows narrower.

Cardium scabrum, Philippi, Enum. Moll. Siciliæ, vol. ii. p. 38. pl. 14. fig. 16, comes so near my shell, that future investigation may possibly show that they should be brought together: *C. scabrum* differs from it in having only twenty-six ribs, in the furrows being equal and punctate, and in its exhibiting two obscure violet rays, and having the beaks yellow; but as my specimens were not seen in a living state, stress need not be laid on the difference of colour.

This species was obtained in three localities* nearly about the same time. In October 1841 numbers of it, but mostly broken, were found by Dr. Farran in the stomachs of sole (*Solea vulgaris*) purchased in Dublin market, and taken off our eastern coast; in June 1842 Mr. Hyndman dredged a very few specimens from a depth of 50 fathoms, off the South Rock, coast of Down; and specimens which I have seen in Mr. Cuming's unequalled collection were sent him by Dr. Lovën in 1842 as a species unknown to him, and which had been obtained on the west coast of Sweden. It is named in honour of this distinguished naturalist.

†*Amphidesma intermedia,* Thompson. Plate XIX. fig. 6.

Shell oval-oblong, nearly equilateral, white with prismatic colours.

Length $2\frac{3}{4}$ lines; breadth 4; thickness $1\frac{1}{4}$; beaks almost central; shell nearly equilateral, rounded at each end, more particularly at the posterior; thin, semi-transparent, glossy, white with prismatic hues.

This species is intermediate in form or outline between *Amph. prismaticum* and *A. Boysii,* and also in general characters, but on the whole may perhaps be said to approximate the latter the more nearly; its form however at once marks it as distinct from *A. Boysii,* than which it has the beaks more central, is broader and more equilateral, has the apex rather more marked and pointed, and is beautifully iridescent inside and outside—the teeth do not present any marked differential characters.

* Should *C. scabrum* prove identical, in four localities—from Sweden to Sicily—this has been discovered subsequent to the publication of Philippi's first vol. in 1836, and is for the first time described in his second vol. which appeared in 1844.

†*Modiola vestita,* Philippi, Enum. Moll. Siciliæ, vol. ii. p. 51. tab. 15. fig. 12 (1844).

This *Modiola* is included in my Report on the Invertebrata of Ireland, but without any specific name being applied to it. A reference to the above work as soon as it appeared showed that the Irish shell is the *M. vestita,* known to Philippi only as found on the shore at Malta.

In a letter from Mr. Alder written on the 1st of April 1844, it was mentioned that among shells lately sent from the Mediterranean to Mr. King, Curator of the Newcastle Museum, were two specimens similar to the Irish shell: they "were imbedded in sponge, and one inch and one inch and a quarter respectively in length, and a little thicker from being older shells, but in all other respects the same." In May last I saw *Modiolæ* of this species from the Mediterranean in Mr. Cuming's unrivalled collection.

The only Irish specimen of this shell yet known was procured some years ago at Youghal by Miss M. Ball. It is described and figured in the second edition of Brown's 'Illustrations,' p. 132. pl. 37. fig. 36, under the name of *Modiola Ballii.*

Two examples of this species were dredged from a depth of about 6 fathoms in Strangford lough near Portaferry in August 1837 by Mr. Hyndman and myself; and two more were in like manner procured by us in July 1840 when with Mr. Edward Forbes and Mr. R. Ball dredging in Killery bay on the western coast—depth from 3 to 12 fathoms.

Crustacea*.

Polybius Henslowii, Leach, Malac. pl. 9. Desmarest, Consid. Crust. p. 100. pl. 7. fig. 1. (copied from Leach). Edwards, Hist. Crust. vol. i. p. 439.

A crab of this species was obtained at Crook Haven, county Cork, in August last by Professor Allman, who kindly sent it to me. It was remarked at the same time by its captor that the species appears to be "eminently natatory," and that "the one taken was swimming with great ease near the surface of the water among shoals of *Acalephæ*." It would appear, from the general work of Milne Edwards on the Crustacea, that this is the only species of its genus known. It was described by Leach from specimens taken on the coast of Devonshire, and is given by M. Edwards as one of the species of La Manche, these being the only localities noticed for it in the two works.

Nymphon Johnstoni, Goodsir, Edin. Phil. Journ. January 1842, p. 136. pl. 3. fig. 4.

The first specimen of this *Nymphon* which I have seen was taken by Dr. J. L. Drummond at Macedon point, Belfast bay, upwards of twenty years ago. From 1834 to the present time I have occasionally procured it on the north-east coast. From the "German Ocean" Mr. Goodsir's specimens were derived.

Nymphon spinosum, Goodsir, Edin. P. J. January 1842, p. 136. pl. 3. fig. 3.

Examples of this species have been taken in Belfast bay, &c. No locality is mentioned by Mr. Goodsir, but his specimens are probably from the Firth of Forth.

Pasithoe vesiculosa, Goodsir, Edin. P. J. Oct. 1842, p. 365. pl. 6. fig. 17.

My specimen of this rare form was dredged at Dalkey island, bay of Dublin, in August 1840: R. Ball, E. Forbes, W. T.: Mr. Goodsir's was procured in the Firth of Forth.

* *Irenæus splendidus*, Goodsir, Edin. Phil. Journ. Oct. 1843, p. 339. pl. 6. fig. 1—9.

Although this species is unknown to me as Irish, it seems desirable, from its being as yet recorded only as inhabiting a part of the eastern coast of Scotland, to mention, that it frequents the western coast of that country likewise, several specimens having been captured by Mr. Hyndman in a towing-net at the Kyles of Bute in the month of June last. Their green colour especially attracted attention.

My *Pasithoe,* together with the two species of *Nymphon* and the *Irenæus,* have been seen by Mr. Goodsir.

Udonella caligorum, Johnston, Loudon's Mag. Nat. Hist. vol. viii. p. 496. f. 45.

Numerous parasites of this species were attached to a *Caligus* on a gray gurnard (*Trigla Gurnardus*), captured on the coast of Down on the 22nd of June last by Mr. Hyndman.

Annelida.

†*Borlasia alba,* Thompson.

Dec. 18, 1843.—Two worms, apparently of the genus *Borlasia* (Johnston, Mag. Zool. and Bot. vol. i. p. 536) and of the same species, were found on the beach a short way northward of Carrickfergus by Mr. Hyndman and myself. They were lurking under stones between tide-marks. The species may be described as new, under the name of *Borlasia alba* :—of a whitish colour throughout, excepting behind the eyes on each side, where a reddish spot appears; eyes fourteen; the first four on each side near the margin of the body disposed in a line, and at equal distances from each other; considerably behind them are three at each side disposed in a triangular manner, the base towards the head of the worm: entire length 2 inches when stretched out so that its breadth is 1 line or $\frac{1}{12}$th of an inch.

The annexed outline shows the position of the eyes.

1. Reddish spots.

Planaria cornuta, Müll. Zool. Dan. vol. i. p. 37. tab. 32. f. 5—7; Johnst. Mag. Nat. Hist. vol. v. p. 344, with woodcuts.

Aug. 26, 1844.—Mr. Hyndman dredging today off Castle Chichester, just within the entrance of Belfast bay, and at a depth of from 6 to 10 fathoms, took three specimens on *Laminariæ.* Although the figures of this *Planaria* in the works cited differ a good deal, I agree with Dr. Johnston in believing them to represent the same species. The Irish specimens as observed at various times were more round in outline than Dr. Johnston's figures, and consequently quite different from those of Müller in that respect. The network of reddish "vein-like ramifications" on a cream-coloured ground renders this *Planaria* viewed as a whole very beautiful: the multitude of dot-like black eyes on a rich white ground too looked very elegant from the contrast of the white to the general reddish hue of the animal. Its progress, as Dr. Johnston remarks, "for a worm" is not slow: the tentacula were always reflected backwards so as not to be visible in a profile view. The species has been already so fully described that further observations are unnecessary. One which I left gliding about in sea-water apparently in perfect health, was when I looked at it again after eighteen hours not only dead, but almost wholly decomposed.

Planaria rosea, Müll. Zool. Dan. vol. ii. p. 31. tab. 64. figs. 1, 2.

At the same time with *Planaria cornuta* two specimens of *P. rosea* were taken. This species has not yet a place in the British fauna, but it was obtained on the coast of Anglesea last autumn by Mr. M'Andrew and Professor Edward Forbes when dredging there. Müller's specimens were from the coast of Norway.

Echinodermata.

Holothuria [*Cucumaria*] *inhærens,* Müll. Zool. Dan. vol. i. p. 35. tab. 31. f. 1—7.

An example of this species, about three inches in length, or as represented in the 'Zoologia Danica,' was found by Mrs. W. J. Hancock, cast on the beach at Balbriggan (county Dublin) after a storm in March 1843. This has not been noticed as a British species.

†*Chirodota digitata,* Mont. (sp.). *Holothuria digitata,* Mont. Linn. Trans. vol. xi. p. 22. pl. 4. f. 6; Forbes's Brit. Echinodermata, p. 239.

On the 18th of December 1843, an individual of this species, which had hitherto been obtained only by Montagu in Devonshire, was found lying on the sand between tide-marks near Carrickfergus Castle during a search for natural-history objects by Mr. Hyndman and myself.

Acalepha.

†*Velella subemarginata,* Thompson.

Membranous base oblong, slightly cut round the edge, in length 2 inches 10 lines, breadth 1 inch $7\frac{1}{2}$ lines: crest almost crescentic in form or obscurely pointed at highest part, thick in substance, with a minute vein-like ramification appearing throughout: body proper or skeleton, of a narrow oblong form, rounded at ends, in length 2 inches 4 lines, breadth 10 lines.

Colour when recent according to Professor Allman: "Disc, margin and tentacula fine sky-blue; sail light blue, nearly transparent, margined with delicate violet. Skeleton colourless and transparent."

This species differs from the ordinary *Velella* of the Irish coast in its greatly superior size, in the margin of the membranous base being slightly emarginate, in the crest being of a much stronger consistence and of a more rounded outline.

The specimen here described was given to me by Professor Allman, who saw great abundance of them on the shore of Courtmasherry harbour (county Cork) after a south-westerly gale late in the autumn of 1838 or 1839, but preserved only one.

This description of a *Velella* from spirits must necessarily be unsatisfactory, but it seems to me better that a species should, under such circumstances, be noticed than passed over altogether—*named* it perhaps should not be, but this has already been done in my Report on the Invertebrata of Ireland: the specific name there is given erroneously *marginata.*

ZOOPHYTA.

Cellepora Skenei, Ellis and Solander (sp.); Johnst. Brit. Zoop. p. 275. pl. 32. f. 6—8.

Among "corallines" taken in the trawl-nets in very deep water off the eastern coast of Ireland, and preserved in Miss Ball's collection, is a specimen of *C. Skenei* which was pointed out to me by that lady in May last. Dr. Johnston, in his 'British Zoophytes,' p. 276, remarks—"Notwithstanding the apparent dissimilarity in habit of the three preceding *Celleporæ* [*C. Skenei*, *C. ramulosa* and *C. pumicosa*], I cannot but suspect that they are merely different states of the same species, for in these productions the 'fronti nulla fides' receives many an apposite illustration." This specimen tends to bear out the correctness of the view that the three forms are not specifically different: the form *C. Skenei* is rare; *C. ramulosa* not common; *C. pumicosa* abundant: this last may perhaps be considered the base of both the others. With this one specimen of *C. Skenei*, a good deal of *C. ramulosa* was taken of small size adherent to *Sertularia argentea*.

Retepora cellulosa, Linn. (sp.); Johnston, Brit. Zoop. p. 297, vignette no. 46. p. 283.

Professor Allman informs me that he has in his possession a specimen of this *Retepora* attached to a *Pinna* obtained by the long-line fishermen in spring last at Cape Clear.

Iluanthos Scoticus, Forbes, Ann. Nat. Hist. vol. v. p. 183. pl. 3?

A number of specimens of an *Iluanthos* (and there is little doubt belonging to this species, though from their not having been seen in a living state a note of interrogation is added) were found by Mrs. W. J. Hancock on the beach at Balbriggan, after a storm in March 1843.

The only other specimens recorded were taken in four fathoms water at Loch Ryan, south-west of Scotland.

XLV.—*On the correct Nomenclature of the* Lastræa spinosa *and* L. multiflora *of Newman*. By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S. &c.*

Lastræa spinosa.—In Newman's 'History of British Ferns' this name is adopted for the plant usually known in England as *Aspidium spinulosum* (Sw.), on account of Roth having been the first botanist who, in Mr. Newman's opinion, properly distinguished this plant from the fern known in this country by the name of *A. dilatatum*, and called by Roth *Polysticum multiflorum*. That Roth deserves the credit of very carefully distinguishing the plants will be allowed by all who read his observations upon them,

* Read before the Botanical Society of Edinburgh, 10th April, 1845.

but I am not inclined to admit that he was the first who understood them.

All the older writers who have noticed this plant refer to Weiss, Crypt., who describes it most satisfactorily as *Polypodium filix-fœmina, γ. spinosa,* but states expressly that this and three other varieties are "unius solummodo speciei notabiliores varietates." His term *spinosa* therefore, being only employed to designate a variety, has no claim of priority over one used specifically, for it certainly is not imperative, although an excellent practice, to adopt that name for a plant as a species the term by which it was known as a variety. Weiss refers to Müller's 'Flora Fridrichsdalia' for a description and figure of his plant: that description is very short but satisfactory, and the figure (which only represents one pair of pinnæ) cannot be doubted.

If now we refer to the earliest writers who have used the term *spinulosum* as applicable to a species, we find Müller employing it* in the 'Flora Danica' in the year 1777, and Retz in his 'Flora Scandinaviæ' in 1795. The figure in the 'Fl. Dan.' is far from being satisfactory, as indeed is the case with many of the plates in that work, but it, and Müller's own figure in his 'Fl. Fridrich.,' which is certainly our plant, are quoted as belonging to *Asp. spinulosum* by all the best authorities. There cannot, I think, be any doubt that Müller, when applying the name of *Polyp. spinulosum* to the plate in 'Fl. Dan.,' supposed that the artist intended to represent the unnamed plant noticed by him in his 'Fl. Fridrich.' as *Polypodium* no. 841. This settles the point as to the priority of the names, for *spinosum* was not applied to a species until used by Roth in the year 1800.

Even if Müller had been unacquainted with the plant named *Polysticum multiflorum* by Roth, we should have had quite sufficient proof that his *Polyp. spinulosum* is identical with the *Polyst. spinosum* of Roth, and also that he well understood the species; but if we turn to the 'Fl. Fridrich.' we find upon the same plate the representation of another pair of pinnæ belonging to his unnamed plant *Polyp.* no. 845, and this is a very good figure of Roth's *Polyst. multiflorum,* being indeed referred by him to that species. Müller's short description also is satisfactory. It seems then that although Roth may have been the first who "properly" (that is I presume according to modern ideas) distinguished the species, yet that thirty-three years previously Müller had separated them specifically, and described and figured them according to the modes usually adopted at that date. Müller having

* The assertion that "*spinulosum*" here is a misprint for Weiss's term "*spinosum*" is surely unfounded. Müller's name was doubtless suggested by that of Weiss, and substituted, we may well suppose, as agreeing better with the character of the plant.

afterwards given a name to one of them (but still anterior to the publication of Roth's work) ought not to have his name superseded, because the artist employed on the 'Fl. Dan.' was not of a high order of merit, or because he was careless enough to admit the bad figure engraved on tab. 707. to be a representation of his previously unnamed species, and took that opportunity of conferring a náme upon it. That Müller did not confound his own plant (*Polyp.* no. 841, Fl. Fridrich.) with the *P. cristatum* (Linn.) will be seen by attending to an observation upon p. 195 of his 'Fl. Fridrich.' which is as follows: "Tria *Polypodia*, no. 841, 844, 845, nullo modo cum Linnæanis descriptionibus aut aliorum satis juste conciliare potui, hinc peritis descriptiones ac figuræ foliolorum traduntur." Of these plants no. 841. is *Polyp. spinulosum* (Müll.); no. 844. is *Athyrium ovatum* (Roth.), *A. dentatum* (Hoffm.), which seems to form part of the *A. molle* of Newman; no. 845. is *Polyst. multiflorum* (Roth). Thus it appears that Müller had endeavoured to refer his plants to a Linnæan species, but without success, and that succeeding botanists have confirmed their separation from the plants of Linnæus.

Having done my best to show that *spinulosum* is the earliest specific name belonging to *Polyst. spinosum* of Roth (who indeed quotes both the 'Fl. Fridrich.' and 'Fl. Dan.' in his 'Tent. Fl. Germ.,' but, apparently by accident, does not notice the specific name given in the latter, although he had previously quoted it in his 'Catalecta,' pt. 1.), it is not necessary to waste space upon an examination of later descriptions of plants so named, some of which describe the indusium as having a fringe of stalked glands, and therefore probably refer to the *Polyst. multiflorum* (Roth), and others expressly notice its absence. I find no reference to these glands in the original authorities for *Polyp. spinulosum*, and do not think that there is any *P. spinulosum* which possesses them, and at the same time is specifically distinct from *P. multiflorum* (Roth). I possess three continental specimens named *Asp. spinulosum*, in neither of which are there stalked glands to be found. Two of them are from Prussian Saxony, and the third is from Bitche in Lorraine. There does not seem to be the slightest reason to doubt these specimens being *Polyst. spinosum* (Roth) and *Polyp. spinulosum* (Müll.), and they tend to confirm the opinion that the true *Asp. spinulosum* of Germany is the same as our plant (*Lastræa spinosa*, Newm.), and that it has not the stalked glands on the edge of the indusium.

The synonyms seem to be as follows:—

Polypodium, no. 841, *Müll. Fl. Fridrich.* 193. *tab.* 2. *fig.* 2. (1767).
Polyp. filix-fœmina, γ. spinosa, *Weiss, Pl. Crypt. Fl. Gött.* 316. (1770).
Polyp. spinulosum, *Müll. Fl. Dan.* 707. (text and probably figure,)

(1777). *Retz, Fl. Scand. ed.* 2. 250. (1795). *Wither. Bot. Arr. ed.* 3. iii. 778. (1796). *Wahl. Fl. Upsal.* 345. (1820).
Polyp. multiflorum, β. spinosum, *Roth, Catalecta Bot.* i. 135. (1797).
Polysticum spinosum, *Roth, Tent. Fl. Germ.* iii. 91. (1800). *Catal. Bot.* ii. 149. (1800).
Aspidium dilatatum, β. spinulosum, *Wahl. Fl. Lapp.* 282. (1812).
Asp. spinulosum, α. *Wahl. Fl. Suec.* ii. 675. (1826).
Nephrodium spinulosum, *Kunth, Fl. Berol.* ii. 418. (1838).
Lastræa spinosa, *Newm. in Nat. Alm. for* 1844 ; *Hist. of Brit. Ferns,* 209. (1844).

Lastræa multiflora.—As to the supposed priority of Roth's name (*Polysticum multiflorum*), it may be remarked that Roth having continued to employ his own specific name, given in the 'Catalecta,' is no proof that he "claims for it priority," as he seems in other cases to prefer his own names to those previously used by Hoffmann without assigning any reason. In the present case he takes no further notice of Hoffmann's name (*Polyp. dilatatum*) than by quoting it as a synonym of his own *Polyst. multiflorum.* Roth's 'Catalecta Botanica,' part 1, appeared in the year 1797, whilst vol. ii. of Hoffmann's 'Deutschlands Flora' (which I have not seen) was published in "1795." It appears therefore that the claim of priority is in favour of *dilatatum,* which Roth (Tent. Fl. Germ.) gives as an undoubted synonym of his *multiflorum,* and also quotes Müller's figure in the 'Fl. Fridrich.,' to which I have already referred. There does not seem to be sufficient reason for any doubt being thrown upon the identity of Hoffmann's *Polyp. dilatatum* with Roth's *Polyst. multiflorum* ; and if they are identical, Roth's admirable description is surely not a sufficient reason for adopting a name which has not been used by any botanist (as far as my observation extends) except its author and Mr. Newman, and rejecting one of prior date, and at least as good, which has been correctly employed by many authors.

In the first part of his 'Catalecta' Roth did not distinguish this plant from the preceding, but included them both under the name of *Polypodium multiflorum.* In the second part he separated them, employing the name of *multiflorum* for the *var.* α, and *spinosum* for the *var.* β. of the former part. The 'Catalecta,' part 2, was printed after vol. iii. of the 'Tentamen Fl. Germ.,' which is quoted in it, and we must refer to the 'Tentamen' for the separation of the synonyms of the respective species, which are mixed together in the 'Catalecta,' part 1, but carefully referred to the species to which they belong in the 'Tentamen.'

It is unnecessary to go further into an examination of the synonymy of this species, as the whole question turns upon the above points.

In conclusion, it may be as well to add, for form's sake, that I now adopt the old names of *spinulosum* and *dilatatum* for these species, from conviction that they have the claim of priority.

St. John's Coll., Cambridge, March 1845.

XLVI.—*Characters of six new species of Nepalese Birds.* By Brian H. Hodgson, Esq., late British Resident at Nepal.

Parus jouchistos.—Back and wing-coverts gray, slightly tinged with olive; cheeks, breast, abdomen and tail-coverts rufous; top of the head shining black; a line from the base of culmen extending over the crown of the head to the nape rufous white; throat gray; quills and tail blackish brown, margined with gray, and the two outer tail-feathers with white.

Length $4\frac{1}{4}$ inches; bill from gape 4 lines; wings $2\frac{1}{4}$ inches; tarsi 9 lines.

Parus seriophrys.—Yellowish olive; coverts of wings, quills and tail-feathers blackish brown, the former with pale tips, the two latter margined with greenish yellow; under surface yellowish white; a spot of bright yellow over each eye.

Length 4 inches; bill from gape 4 lines; wings $2\frac{1}{2}$ inches; tarsi 8 lines.

Parus dichrous.—Cinereous; forehead, cheeks, and throat brownish white; breast and abdomen pale rufous; quills and tail-feathers brown, margined with cinereous.

Length $4\frac{1}{2}$ inches; bill from gape 5 lines; wings $2\frac{3}{4}$ inches; tarsi 9 lines.

Oreocincla rostrata.—Upper surface uniform ochraceous brown; beneath ochraceous white, the fore part of neck spotted with black, the feathers of the breast and abdomen margined with black; a line from the nostrils through each eye white; under tail-coverts white with dusky edges on the outer sides.

Length 11 inches; bill from gape $1\frac{1}{4}$ inch; wings $5\frac{1}{4}$ inches; tarsi $1\frac{1}{4}$ inch.

Ianthocincla (*Trochalopteron*) *subunicolor.*—Olivaceous, tinged with rufous on the lower part of the back, some of the feathers of the upper part of the back margined with black; quills black, basal part of outer webs bright yellow, the other part gray; tail with middle feathers olivaceous brown, the outer feathers black, tipped with white.

Length $8\frac{1}{4}$ inches; bill from gape 9 lines.

Leiothrix (*Proparus*) *chrysotis.*—Cinereous, tinged with olive on the uropygium; forehead blackish cinereous; throat silvery gray; breast and abdomen yellow; wing-coverts and quills black, the latter margined internally with white, and exteriorly with orange-yellow; tail blackish brown, margined exteriorly with yellow.

Length 4 inches; bill from gape 5 lines; wings 2 inches; tarsi 9 lines.

XLVII.—*Notice of some Rarities found on the West Coast of Scotland.* By the Rev. David Landsborough.

In this lazy world a person is often much indebted to the eyes and hands of others in helping him to observe and collect. How helpful might colliers and fishermen be, the former being so often in the bowels of the earth, and the latter by their lines and nets coming so often in contact with the depths of the sea! But they *canna' be fashed.* From one obliging fisherman in Milport, island of Cumbrae, who has not learned to say "I canna be fashed," I have got many curiosities. He has sent me at least half a dozen examples of *Halichondria infundibuliformis,* the funnel-sponge. One of them is figured in Dr. Johnston's interesting 'History of British Sponges.' The last, got a few months ago, is the variety which ranked for a time as a distinct species under the name of *H. ventilabra,* and is now in the well-stored and liberally-yielding cabinet of Mr. Bean of Scarborough.

From the same quarter I got this last summer a piece of ironstone, which brought up with it some curiosities from the deep sea. It was studded with *Crania personata,* so firmly cemented to the stone that only the upper valve could be detached. There was on the same stone a specimen of *Serpula vitrea* of rather rare occurrence. And winding over the surface of the stone, there was something like a flat sea-worm of a flesh-red colour, having at intervals the appearance of round puckered mouths. I thought I had seen its like before, but as I had mislaid the specimen with which I wished to compare it, I sent it to Mr. W. Thompson, Belfast, a kind resolver of doubts, who informed me that it was, as I had suspected, *Zoanthus Couchii.*

From the same obliging fisherman I got, this summer, *Psolus phantapus,* which was new to me; but respecting which I could have no doubt, from its corresponding so well with the figure and description given by Professor Forbes in his 'History of British Starfishes,' &c.

On the shore at Ardrossan I found this summer, among some sea-weeds, what was new to me, and I believe is rare, *Aplysia punctata.* Even *Aplysia depilans* is rare here.

Acteon viridis, Mont. (sp.).

In a little rocky pool of sea-water, about halfway betwixt Brodick and Corrie, on the Arran shore, I discovered in July 1844 an Alga which seemed new to me. I greedily laid hold of it, and found it no easy matter to detach it from the rock to which it firmly adhered. It turned out to be *Codium tomentosum*—not rare I believe either in England or Ireland, but so rare with us, that the only Scottish specimen I had ever seen, was one given me by my intelligent friend Dr. Curdie (now in the wilds of Australia), which he had got in the island of Gigha, off Cantyre*. On taking it out of the water I observed a greenish gelatinous animal on it; but being taken up with my rare plant, I cast the animal into the pool again. I afterwards saw on the *Codium* two more of the same species, but considerably smaller; and observing that they were beautifully mottled with azure spots, I deposited them in my vasculum among the branches of *Codium*. When, on reaching home, I put them into a tumbler of sea-water, I soon saw that I had got a rare and beautiful mollusk, *Aplysia*, now *Acteon viridis*, discovered by Col. Montagu on the Devonshire coast, and described by him in the 'Transactions' of the Linnæan Society. Allow me to refer to his description as quoted by my excellent friend Professor Fleming of Aberdeen in his 'British Animals,' a book which ought to be in the hands of every British naturalist.

As I kept it for nearly a week in the tumbler, where it seemed to browse with great satisfaction on the delicate woolly beard of the *Codium*, I had every opportunity of observing it, and I found that it was even more beautiful than from Montagu's excellent description I could have supposed. Its general colour is green, betwixt grass-green and bottle-green; but in certain lights it has a considerable shade of rich puce colour of the finest velvet. It is beautifully dotted with azure and with gold. The azure spots are small and numerous on all parts of the body and of the fins, and are precisely of the same brilliant azure as the lines on *Patella pellucida*. The golden spots were confined to the upper parts of the body; they were few in number, but considerably larger and less regular in form than the azure dots. Two of them for instance were oblong, and extended from the ear-like *tentacula* down to the eyes, which were placed on what we would call the *cuff* of the neck, as if to keep watch against the enemies from behind, while it was busy feeding on the rich pasture afforded by the *Codium*.

The membrane which acts as fins is of the same colour and substance as the body. When the fins are raised and meet above, they give it the appearance of being gibbous on the back. More generally however they are a little apart from each other, and in

* I have since learned from Mr. Thompson of Belfast, that he found several plants of it growing in the greatest perfection in a small rock-pool near Ballantrae (Ayrshire) in the month of August 1839.

swimming they extend horizontally from the body, and show, at the base of the neck, betwixt the upper part of the fins, a whitish protuberance bearing some resemblance to the shield on the back of *Aplysia depilans*.

At the base of each fin, and pretty close to the back, there could be seen, when the light was favourable, all along the inside, a line like the midrib of a leaf; and from this double midrib there proceeded at intervals, veins in a slanting direction to the upper margin of each fin; so that when the two fins were expanded, it was like a green-veined leaf. To this appearance it may at times owe its safety by deceiving the eye of prowlers.

The description of the mouths given by Montagu suited my specimens, except that in them the margin only of the *upper* lip was black. The lower lip and part of the throat were quite white, and were the only parts that had none of the azure or golden dots. I may mention in conclusion, that when the animal was held betwixt the eye and the light, the body and the fins seemed full of darkish granules.

On mentioning to Mrs. Griffiths (a name dear to naturalists) that I had fallen in with this green beauty, she informed me that it was frequently found in Devonshire on the *Codium tomentosum*, which seems to be its favourite pasture-ground; and on which, from similarity of colour, it may often escape detection.

Syrinx papillosus, Thomp.

In the month of March last, when my daughter Margaret was picking up some Algæ on the strand near to Stevenston Burnfoot, she observed on the shore a number of gelatinous creatures, blown up like little bags. Fortunately she brought one of them home with her; and unfortunately she brought but one; for it turned out to be the rare *Syrinx papillosus*. I kept it alive for some time and made some observations on it, which I sent, along with its poor remains, to Mr. Thompson. He is a person whom it is a pleasure and a privilege to consult in doubts and difficulties.

I shall add the substance of what I wrote to Mr. Thompson respecting *Syrinx papillosus*.

When found it was in the form of a soda-water bottle, about an inch and a half in length, and about $\frac{7}{8}$ths of an inch in diameter. On being put into sea-water, it assumed very much the appearance of the figure given by Forbes, being nearly 3 inches in length. The concentric striæ were rather faint; but the longitudinal ones looked like ribs, about fifteen in number, and were fully twice as distant from each other as the concentric ones which they crossed. It soon became flaccid, and contracted to less than half an inch in diameter; but it firmly adhered to the glass by the short papillæ with which its body was covered. Its colour was dirty white clouded with reddish brown. Next day it was blown up again, had become more lively, and twisted itself into various forms. It gave us no reason to think that it had a proboscis. It only once displayed its tentacula, about twelve in number, which were spread back and lay quite flat around the mouth in the form of a little star. While we waited for a more complete manifestation, it died in our hands, so that the figure was taken by my daughter Margaret in very unfavourable circumstances*. The tentacula were broader at the base than they are represented in the figure. When it put out only the tips of them, they appeared round, obtuse, and marked with reddish brown bands, somewhat like the single magnified tentaculum in the figure. When it died it shrunk into very small dimensions. The concentric corrugations, though still fainter than the ribs, were more evident than when it was alive. The reticulations assumed a beaded aspect, so as to give the body of the creature, in certain lights, a considerable resemblance to a small head of Indian corn.

But let me not forget to mention among the *memorabilia,* a Champagne bottle fished up last summer from the deep sea betwixt Bute and Cumbrae ! A bottle of Highland whisky could not have been more prized by my friend James McFee the fisherman, nor a bottle of old Falernian more valued by myself. It seemed quite a knowing, far-travelled, aristocratic bottle. Instead of a cork, it

> "Had fix'd a scallop on its *mouth* before."

Its sides were incrusted with *Serpula triquetra,* and its deep concavity below was inwrought with *Serpula tubularia.* But what did it contain ? Ay, there's the rub. It would take a wise man to answer that question. I never attempted it. It was full, however, of some white, soft, dense substance. Having by dint of assiduity extracted a little of it, I sent it by post to Dr. Stenhouse, a first-rate chemist in Glasgow, begging him to let me know what treasure of the deep this marine vial contained. Having done it all the honours of his laboratory, and having *secundum artem* analysed the precious contents, he returned for answer that "it was fat of some kind—probably tallow" ! ! !

> "Parturiunt montes, nascetur ridiculus mus."

Asterina gibbosa.

In August 1844 I had the pleasure of finding *Asterina gibbosa,* or the gibbous starlet, in pools of sea-water on the rocky shore of Arran, near to Lamlash. It has been found in several

* In consequence of this, the drawing has not been engraved.

places in England; and Mr. Thompson, Belfast, has found it all around the coast of Ireland; but the only habitat in Scotland mentioned by Prof. Edward Forbes is the gneiss shore of Ross-shire.

I may mention, that about five years ago, I found near the same locality at Clackland Point, a little starfish which was quite new to me, and for which afterwards I repeatedly looked in vain. I found two of them alive, adhering to *Halidrys siliquosa*, but they were lost by being deposited in a vasculum which had been so injured that it could not be kept closely shut. This *starlet* was not more than $\frac{5}{8}$ths of an inch in length, and little more than $\frac{3}{8}$ths in breadth; and as it had only four rays, and as the angles were not produced, it had quite the appearance of a miniature oblong shield. It was ash-coloured above. It is possible that it might be an abnormal variety of *Asterina gibbosa*, but this must remain *in dubia* till it is found by some person with a securer vasculum.

XLVIII.—*Notes on the Synonymy of the Genus* Apion, *with Descriptions of Six new Species, &c.* By John Walton, Esq., F.L.S.

[Continued from vol. xiii. p. 457.]

37. *Apion striatum*, Marsh., Kirb., Steph. Manual.
  — *Pisi*, Germ., Steph.
  — *atratulum*, Germ., Steph., Schönh.

This species may be distinguished from the following by having the head *rugose-punctate* between the eyes, and the vertex with a *smooth shining transverse band* adjoining the thorax; this is a constant character: the thorax has a distinct *dorsal channel*. The majority have the elytra obcuneiform and very convex; these may be regarded as of the normal form; but many individuals have a tendency to become much shorter, and these varieties have the elytra globose-ovate and subglobose; others are narrowed posteriorly and less convex, having the forms oblong-ovate and oblong-oval; hence the difficulty of identifying species from descriptions. Kirby and Stephens describe this species with the elytra globose; Germar and Schönherr as obcuneiform: when the extreme forms are contrasted by placing them in juxtaposition, it is difficult to believe that they belong to the same species; yet in a long series they are closely linked together by a regular transition from one form to another, and by the natural character of the sculpture. Small specimens are sometimes found less than half the magnitude of others, with intermediate sizes. The characters which commonly distinguish the sexes are not very obvious in this and the following species, and without some practical experience are rather difficult to determine.

I received four insects from Germar with the name *Ap. atratulum*; these are beyond all doubt the same species as *Ap. striatum* of Marsham and Kirby.

Very common almost everywhere on the furze (*Ulex europæus*) from February to November.

38. *A. immune*, Kirb., Steph., Schönh.
— *Betulæ* (Chevr. in Litt.), Schönh.

This species differs from the preceding in having the head *distinctly striated* between the eyes, the vertex *very coarsely punctured* adjacent to the thorax, the corresponding space in *Ap. striatum* being *smooth* and *shining*; the thorax with a large puncture near the base, before the scutellum, sometimes obsolete or wanting. The thorax has been described as somewhat globose and punctulated, whereas it is narrow and subcylindrical, laterally a little dilated at the middle, very coarsely and thickly punctured; the elytra, at the sides, posteriorly much enlarged and rounded, with the apex obtusely rounded, above very convex, and remarkably gibbous behind the middle. It is a smaller species than the foregoing, and also variable in form and size.

M. Chevrolat forwarded to me two insects under the name of *Ap. Betulæ* of Schönherr, which are very evidently small varieties of this species.

In my former notes on the species of this genus, I have erroneously referred the present insect to the preceding, as its male; the possession of an extensive series recently collected in the south of England has enabled me to correct this error, and to point out the specific distinctions of both species.

This insect appears to be confined to the south of England and is rather local; I found it plentifully on the broom (*Spartium Scoparium*) in Charlton sand-pits and in other localities in June and September.

39. *A. Sorbi*, Herbst, Kirb., Gyll., Germ., Steph., Schönh.
Curc. viridescens, Marsh.
A. carbonarium, Germ. (♂), Steph. Ill.

The male of this species is of smaller size than the female, the eyes are more prominent, the rostrum shorter and stouter, and the elytra black.

Gyllenhal first identified the male of this insect, which he communicated to Kirby; afterwards both authors described the female, and characterized the male; since which (1817) Germar described and figured an insect under the name of *Ap. carbonarium*, which he subsequently recorded as the male of *Ap. Sorbi**. Stephens in his 'Illustrations' described an insect under the name of *Ap.*

* Germ. Mag. iii. App. p. 39.

carbonarium of Germar, which he has sunk in his 'Manual' as a variety of *Ap. Sorbi,* but with a note of interrogation; and the error has not been corrected, as the name still stands in Curtis's 'Guide' and in Stephens's 'Nomenclature.'

Gyllenhal has erroneously referred the male to *Curc. aterrimus* of Linnæus: see notes on *Ap. marchicum.*

This fine species appears to be rare in the south of England. Mr. S. Stevens captured a few specimens of both sexes at Bury-hill near Arundel; Mr. Wollaston found the female abundantly amongst moss and dead leaves near Cambridge, and what is remarkable, without a single male occurring; I have also met with the female very plentifully under the same circumstances in woods and hedges near Knaresborough in Yorkshire in June, and both sexes in company in the same neighbourhood on the black thorn (*Prunus spinosa*) in September. According to my experience, the males of *Ap. subulatum* are very rarely found with the female, and when they occur together, the number of females is much greater in proportion than the males. It is difficult to assign a cause for these anomalies.

40. *A. Ervi,* Kirb., Gyll., Germ., Steph., Schönh.
— (♂) *Lathyri,* Kirb., Steph.

Mr. Kirby confounded the sexes of this insect, and recorded *Ap. Lathyri* as a distinct species; Gyllenhal afterwards defined the sexual characters, and cited *Ap. Lathyri* of Kirby as the male of *Ap. Ervi*; British writers have subsequently, upon the authority of the latter author, upheld the name; I have however published* evidence of their identity which I need not repeat here.

This is a common species, widely distributed, and occurs almost everywhere on the *Lathyrus pratensis* from June to October.

41. *A. punctigerum,* Germ., Gyll., Steph., Schönh.
— *sulcifrons,* Kirb., Steph., not Herbst.
— *punctiger,* Payk., Gyll. vol. iii.

I have seen a foreign specimen of *Ap. sulcifrons* of Herbst in the possession of Mr. Waterhouse, which is undoubtedly distinct from the present species, and has not yet been discovered in Britain.

I found this insect abundantly in the north, and also near Dover on *Vicia sepium,* in company with *Bruchus seminarius,* in June last.

42. *A. Spencii,* Kirb., Germ., Steph., Schönh.
— (var. β, γ.) *foveolatum,* Kirb., Steph.
— *intrusum,* Gyll., Steph.
— *columbinum,* Steph., not Germ.

The description of *Ap. foveolatum* by Kirby is taken from a

* Ent. Mag. v. p. 13.

Swedish insect sent to him by Gyllenhal, which is now in the possession of the Entomological Society: no doubt can exist as to the identity of this insect; it is pinned with a long fine pin and labelled with Mr. Kirby's number 27; subsequently Gyllenhal described the same species; and it is very remarkable, that the descriptions of the sculpture by these celebrated entomologists are very discrepant. The head between the eyes is described by Kirby as having an *impressed fovea*, by Gyllenhal as *flat, not impressed*; the thorax is defined by the former as *deeply punctured*, by the latter as *obsoletely punctate*. I have minutely examined the Swedish insect above-named; it has the head, between the eyes (when viewed in front), evidently *impressed*, and the thorax *distinctly* punctured. It has a very great resemblance in all its essential characters to *Ap. Spencii*, and as the latter species is extremely variable, I have hitherto regarded it as a male variety, but it appears to have the rostrum a little shorter and rather less bent; the antennæ with their articulations also appear to be rather shorter and a little stouter; these differences have caused me to hesitate in giving a decided opinion. The British insect variety *β*, cited by Kirby under the name of *Ap. foveolatum* with a note of interrogation, "an idem?" is beyond all doubt a male of *Ap. Spencii*; and variety *γ*. is decidedly a female variety of the same species. Gyllenhal has referred the first (*β*.) to his *Ap. intrusum*, and I have no doubt from his description it is synonymous with *Ap. Spencii*. Germar has cited both the above varieties of Kirby (*β*, *γ*.) under his *Ap. columbinum*, but with a note of interrogation. I possess a foreign example of the latter species from Germar; it has the habit of a female of *Ap. Spencii* with a narrow head, but appears to be distinct from that species; it differs in having the head longer and constricted behind the eyes, with a much deeper concavity between them, the concavity profoundly sulcate; the thorax somewhat cylindrical, deeply rugose-punctate; the elytra longer, less convex, and of an oblong-oval form: I have never seen a British specimen like it.

The typical examples of *Ap. Spencii* (27 ♀ ♂), now in the Kirbian collection, have the head with a distinct cavity or fovea between the eyes; it is very extraordinary that Mr. Kirby in his description should have omitted to notice this important character. The male has the rostrum rather shorter than that of the female, filiform, and covered with hairs to the apex; in the latter sex the rostrum is rather attenuated before the antennæ, and glabrous. Varieties of the female occur with very narrow heads; and the cavity between the eyes in both sexes is more or less deep; the foveæ on each side of the dorsal channel towards the base are sometimes obsolete or entirely wanting. When a long series of this species is closely examined, the characters will be found to be extremely variable.

I have found this insect very abundant near Low Harrowgate, Scarborough, and at other places in Yorkshire, invariably on *Vicia Cracca* in the month of August; and also at Lyndhurst. Taken by Mr. S. Stevens near Edgeware, and at Hampstead in July.

43. *A. virens*, Herbst, Kirb., Germ., Gyll., Steph., Schönh.
 — *marchicum*, Kirb. (♂), Germ., Steph.
 — *æneocephalum*, Gyll. vol. iii.

Mr. Kirby suspected that *Ap. marchicum* was but a sexual variety of *Ap. virens*; the male has the rostrum distinctly shorter and stouter, with the antennæ inserted at the middle; I have no doubt whatever that the former is the male of the latter.

It is rather a common species, and found in the north and south of England on hedge-banks and amongst grass in the spring and autumn.

44. *A. Astragali*, Payk., Kirb., Gyll., Germ., Steph., Schönh.

I am indebted to R. N. Greville, Esq., for specimens of this beautiful insect; they were taken by him near Northampton in June; it inhabits *Astragalus glycyphyllus*, and is found in June and July. I have frequently examined that plant in the north and south of England, but I never met with the insect; it appears to be extremely local and periodical in its appearance: Mr. Kirby sought for it year after year, *Astragalus glycyphyllus* being abundant near his residence, but never found it more than once.

45. *A. Loti*, Kirb., Germ., Steph.
 — *angustatum*, Kirb., Gyll., Schönh.
 — *modestum*, Germ.
 — (var.) *glabratum* (Spence MSS.), Germ., Steph.
 — (var.) *civicum*, Mus. Steph.

Ap. angustatum was described by Kirby from a Swedish insect which is certainly a narrow female variety of *Ap. Loti*; examples of the latter, which I sent to Schönherr, were named by that author *Ap. angustatum*; and specimens previously forwarded to Schönherr by Mr. Waterhouse were returned with the same name. I likewise sent specimens to Germar; his note relative to them is as follows: "*Ap. Loti* of Kirby (♂) and *Ap. angustatum* (♀) are no doubt the same species; until the present time I possessed only one injured specimen, presented to me by Mr. Spence; my *Ap. modestum* is identical with *Ap. angustatum*." It is upon Mr. Kirby's authority that I have cited *Ap. glabratum* as a synonym, from the following note in his manuscript book: "*glabratum* of Spence, var. *Apion Loti*, K." This I communicated to Germar in a note under *Ap. Loti*, but he made no observation upon it.

I have found this species rather abundant in Yorkshire, at

Birch Wood, Mickleham, and other places, always upon the *Lotus corniculatus*, in July.

46. *A. afer*, Schönh. (1833).
    — *validirostre*, Schönh.
    — *puncticolle* (Waterh. MSS.), Steph. Manual (1839).

I possess eight foreign examples of this species, sent to me by Schönherr, Germar and Chevrolat all under the first name; I have closely examined and compared these with a long series of eighty-three specimens of *Ap. puncticolle*, and no doubt exists in my mind that they are identically the same; M. Chevrolat and Mr. Waterhouse agree with me in this opinion. It is an insect that is subject to sexual and individual variation, and the varieties in a long series gradually pass one into another, so that no separation can be made.

According to Germar, *Ap. validirostre* of Schönherr is the male of this species.

I met with a great number of this insect the beginning of July amongst grass on hedge-sides near Turner's Wood, Hampstead.

47. *A. scutellare*, Kirb., Germ., Schönh., Steph.
    — *Kirbii* (Leach MSS.), Germ., Steph.

I sent specimens of this insect under the name of *Ap. Kirbii* to Schönherr, who referred them to *Ap. scutellare* of his work. Kirby originally characterized it with the latter name, and I regret that in strict accordance with the law of priority it cannot be changed. The late Dr. Leach placed in the national cabinet (at what period I have no means of determining) three insects under the name of *Ap. Kirbii*, which undoubtedly belong to *Ap. scutellare*. Germar has described* an insect with the name *Ap. Kirbii*, and added this note: "According to the description of *Ap. scutellare*, Mon. 78, we should distinguish this insect as being it, if Dr. Leach had not sent the same as a new species under the above name; but should this have been done through mistake, this description will at least serve as an addition to that of Kirby."

I have found this insect very plentiful on the furze (*Ulex europæus*) near Lyndhurst, and in Windsor Forest in June, and also at Shirley Common in October. On the furze, Ascot Heath, in great abundance in July and August, Mr. S. Stevens.

48. *A. obscurum*, Marsh., Kirb., Steph.

Two examples of this species were found amongst a parcel of insects given to Mr. Marsham by A. B. Lambert, Esq., one of

* Germ. Mag. iii. App. p. 50, 1818.

which is now in the collection of Mr. Kirby, and the other in that of Mr. Stephens; these are the only specimens known.

49. *A. flavipes,* Fab. (1781), Herbst, Kirb., Gyll., Germ., Steph., Schönh.

Common on the white or Dutch clover (*Trifolium repens*), Mr. Kirby.

50. *A. nigritarse,* Kirb., Germ., Steph., Schönh.
— *Waterhousei,* Schönh.

The typical example of the last-named insect being in the cabinet of Mr. Waterhouse, I have had ample opportunity of examining it; it is doubtless a female variety of the present species, having the tibiæ obscure testaceous.

Found rather abundantly on *various plants,* which renders its habitat uncertain.

51. *A. assimile,* Kirb., Germ., Gyll., Steph., Schönh.
— (var. *b.*) *flavipes,* Gyll. vol. iii.

Taken occasionally in profusion from April to October in red clover fields, pastures, meadows, and on hedge-banks, frequently in company with the two following species (*Ap. Fagi* and *Ap. Trifolii*).

52. *A. Fagi,* Linn., Kirb.
Curc. Fagi, Mus. Linn.
A. apricans, Herbst, Germ., Gyll., Steph., Schönh.
— *Fagi,* Mus. Kirb.
— *flavifemoratum,* Kirb., not Herbst.

The law of priority requires that the name given by the illustrious naturalist should be restored to this species.

Mr. Kirby has demonstrated* that the original specimens now preserved in the Linnæan museum are "beyond all question" the true *Curc. Fagi* of Linnæus. I have recently rigorously re-examined and compared these specimens with all the yellow-legged Apions that are liable to be confounded with them, and I can now affirm, without the least hesitation or doubt, that they are two immature males of *Ap. apricans* of Herbst: the form of the rostrum being nearly straight; the pale yellow basal joints of the antennæ, their shallow subremote punctures on the disc of the thorax, the pallid or pale yellow trochanters and femora, distinguish them from all the other allied species.

Ap. Fagi of Kirby is described by him from the above-named Linnæan examples. There is an insect in the Kirbian collection of Apions with the name "*Fagi*"; it is fastened upon a piece of paper with gum, and compressed to imitate the Linnæan speci-

* Linn. Trans. ix. p. 41.

mens; this I have many times examined, and always with the same result, which is, that it is an immature male of *Ap. apricans* of Herbst, synonymous with *Ap. flavifemoratum* of Kirby: the latter author therefore appears to have described the same species twice; but I think the circumstance of Linnæus having given the habitat in "*Fagi foliis*" has had a tendency to bias Mr. Kirby's judgement, in considering it distinct from his *Ap. flavifemoratum*: this (with many other species of the genus that I have examined) has ample wings, and the imago is not always found on the same plant that the larva feeds upon, but sometimes on trees—see notes on *Ap. Craccæ*; it is therefore very probable that *Ap. Fagi* of Linnæus was found on a beech-tree.

This and the preceding species, from their extreme resemblance to each other, are rather difficult to determine, but a knowledge of their sexual dissimilarities in the form of the rostrum will greatly assist in distinguishing them.

Ap. assimile may be known from *Ap. Fagi* by having the rostrum in both sexes distinctly more curved, and in the male attenuated in front; whereas the latter species has the rostrum of both sexes filiform, nearly straight, and evidently longest in the female. *Ap. assimile* has the basal joints of the antennæ dull piceous; the thorax closely punctulated, with the punctures confluent. *Ap. Fagi* has the basal joints of the antennæ testaceous; the thorax above more convex, with shallow subremote punctures on the disc; and it is a larger insect than *Ap. assimile.*

I have foreign specimens of *Ap. flavifemoratum* of Herbst from Germar, found in Saxony, which is a very distinct species and not hitherto discovered in this country. I have also foreign examples of *Ap. apricans* of Herbst from Schönherr.

I have frequently taken, in the spring and autumn, this and the preceding species together in profusion in red clover fields (*Trifolium pratense*) near Mickleham, at Birch Wood, and other localities, also in meadows and pastures where that plant grows.

53. *A. Trifolii,* Linn.
Curc. Trifolii, Mus. Linn. (Syst. Nat. iii. App. p. 224).
A. æstivum, Germ., Gyll., Steph., Schönh.
— (♂) *ruficrus,* Germ., Schönh.
— (var. β.) *flavifemoratum,* Kirb.
— (var.) *Leachii,* Steph.

I have the pleasure of reviving and re-establishing, by means of the Linnæan cabinet, the appropriate name of Linnæus to this species.

There is an insect preserved in the Linnæan collection (which it is very remarkable has been overlooked by Marsham and Kirby) that is well secured with gum upon a piece of paper, on which is inscribed "*Trifolii*" by Linnæus's own hand; the name being written on the same paper which bears the insect, effectually protects it against every casualty: this evidence is so strong and conclusive, that not a shadow of a doubt can now exist as to its identity. Moreover it agrees with his description in all its natural characters; but the body is covered beneath with whitish mould, which has been noted by the terms "abdomen niveum," when in fact the species has a black, naked body: this error, it is but fair to observe, may well be excused, since, according to Kirby, Linnæus rarely used a lens. *Curc. Trifolii*, described by Marsham (after Linnæus) as having a white abdomen, has long been immolated by Kirby. Schönherr has cited *Ap. Trifolii* of Linnæus as a mere synonym to *Ap. Viciæ*, because the latter species has a white abdomen; but Schönherr has injudiciously applied the name to a species with very different characters, namely *Ap. Trifolii* of Lintz. We are informed by Linnæus that his insect inhabits *Trifolium montanum*; in England it is found abundantly upon *Trifolium pratense*. I have many times inspected the type of *Curc. Trifolii* of Linnæus, and have not the slightest doubt of its being a female of *Ap. æstivum*. I sent examples (♂ ♀) of this species to Schönherr, who referred them to *Ap. æstivum* of his work. I likewise sent many specimens to Germar, who has recorded his opinion of them as follows: "*Ap. æstivum*: Kirby's *Ap. assimile* is identical*; the first joint of the antennæ is more or less red, and sometimes also the second;" "but *Ap. assimile* of Gyllenhal is unknown to me." I cannot concur with Dr. Germar that the British *Ap. æstivum* is identical with Kirby's *Ap. assimile*, because I think they are furnished with characters sufficiently evident to entitle them to rank as distinct species; certainly the British *Ap. æstivum* occurs with the basal joints of the antennæ more or less piceous, but they are generally black, except the first joint, which is red at its base. I must here observe, that specimens of *Ap. assimile* of Kirby, which I sent to Schönherr, were identified by him as *Ap. assimile* of Gyllenhal. I also forwarded to Germar examples of the same species.

I received an insect from Schönherr (symbolized ♂) with the name *Ap. ruficrus*, referred by him to his work (v. p. 407. 100, Germania). I wrote to Germar for specimens of *Ap. æstivum*; he sent me an example of "*Ap. ruficrus*, Germ." Schönherr now appears to regard *Ap. ruficrus* as distinct from *Ap. æstivum*, although he has previously cited the former name as a synonym to the latter†; Germar has recorded that "*Ap. ruficrus* may perhaps be only a variety of *Ap. æstivum* ‡."

I have very carefully examined the German examples of *Ap. ruficrus*, and have no doubt they are both males of *Ap. Trifolii*,

* Ent. Zeit., Stettin, no. 1. p. 4, 1842.

† Syn. Ins. i. p. 281. no. 70.

‡ Germ. Mag. iii. App. p. 39.

Linn., agreeing with my specimens of the latter in every *important* character; they differ however in having some parts of the legs more intensely coloured; their anterior coxæ and trochanters are totally black, and the four posterior femora more or less piceous and inclining to black. The insect received from Schönherr differs from Germar's in having the intermediate femora testaceous: the German specimens appear to have the colour of the legs inclining to black, the British incline more to rufous.

On examining a great number of this species, it will be found to have a peculiar tendency to vary extremely in the colour of the legs, and it is impossible to enumerate the shades of difference which arise; I shall therefore merely give a general description of the range of varieties. The anterior pair of legs have their coxæ and trochanters testaceous, with the apex of each, and sometimes the base and apex, more or less dusky testaceous, or piceous or black; the trochanters are not unfrequently wholly piceous or black; now and then the coxæ are black at the base and apex, obscure testaceous in front and piceous black behind, clearly indicating a propensity to become entirely black; the anterior tibiæ are frequently piceous, sometimes rufo-testaceous, sometimes black; occasionally the base and the lower half are black, and between the knees and the middle testaceous; the four posterior coxæ, their trochanters, the joints, the tibiæ, and all the tarsi, piceous black or black; all the femora beneath rufous or testaceous, now and then inclining to piceous above.

Ap. Trifolii may be distinguished from *Ap. assimile* and *Ap. Fagi* by having the anterior trochanters pitchy and the four posterior black, whereas the two latter species have all the trochanters constantly rufous*; *Ap. Trifolii* has the rostrum porrect and very little bent, a good character which will also distinguish it from *Ap. assimile*, the latter having the rostrum distinctly curved: these characters, independent of other less striking differences, are sufficient to discriminate this species from its congeners.

I met with this insect in considerable numbers with the two preceding in a field of red clover (*Trifolium pratense*) near Herne Bay in Kent, at the beginning of last June.

* Mr. Kirby has very judiciously introduced into his descriptions the colour of the coxæ and trochanters, and has been followed by Mr. Stephens. It is surprising that Gyllenhal, Germar and Schönherr should have disregarded the colour of these organs as a subsidiary specific character; nevertheless it is a valuable auxiliary, not only in determining species, but also the sexes: for example, the male of *Ap. rufirostre* has all the coxæ and trochanters yellow, the female has all the coxæ black and the trochanters rufous (first noticed by Mr. Spence); the male of *Ap. difforme* has all the trochanters rufous, the female has them deep black; the male of *Ap. flavipes* has the anterior coxæ rufous, in the female they are always black.

54. *A. Schoenherri* (Waterh. MSS.), Schönh.

Black, glabrous and shining. Head short and broad; the frons posteriorly convex and minutely punctured, between the eyes striated, the striæ more or less distinct; rostrum short and stout, attenuated in front and much thickened behind, a little bent, punctulated. Antennæ medial, about the length of the rostrum; the articulations short and robust, entirely black, except the first joint, which is red at its base, and sometimes piceous at its apex. Thorax narrow, oblong, subcylindrical, rather broader than the head, *very minutely punctured*, the punctures frequently very faintly impressed and indistinct, with a minute fovea before the base, intersected by a faint short line, sometimes scarcely perceptible. Elytra ovate, above very convex, arched, deeply punctate-striate, the striæ minutely punctured, the interstices rather broad, flat, and coriaceous. Legs black, with the anterior coxæ and trochanters testaceous, the base and apex of each or only the apex more or less piceous; occasionally the trochanters are entirely piceous; the anterior tibiæ testaceous or fuscous, sometimes testaceous in front and piceous behind; the four posterior coxæ black, their trochanters piceous; all the femora testaceous, now and then rufous. ♂. (Length $1\frac{1}{4}$ line.)

The female differs in having the head in some examples distinctly narrower; the rostrum longer, slender and filiform; the antennæ inserted behind the middle of the rostrum; the legs more strongly coloured, having the anterior coxæ, trochanters and tibiæ piceous.

This insect in the order of affinity ranks next to *Ap. Trifolii*; the female is very much like the same sex of that species, but distinguished chiefly by having the thorax very minutely punctured.

One male specimen of this new and very distinct species was first found by Mr. Waterhouse, and he has had the pleasure of naming it in honour of one of the most distinguished and celebrated entomologists in Europe; it was described in the work of M. Schönherr by Professor C. H. Boheman from the specimen above-named, and afterwards returned to Mr. Waterhouse; it appears to be unknown on the continent. I found the female near Scarborough in August 1837, since which a few specimens of both sexes were taken in the same month amongst short grass near Arundel by Mr. S. Stevens and myself. It appears to be not only very rare, but extremely local.

55. *A. varipes*, Germ., Gyll., Steph., Schönh.
— *flavifemoratum*, var. γ. Kirb.
— *flavipes*, var. *c*. Gyll. vol. iii.

This species is nearly related to the four preceding, but it may be readily known from them by its having the rostrum longer and much more curved, especially in the female; the legs longer and distinctly stouter; with the lower half of all the tibiæ black, the upper part rufous.

This insect is rather local and not frequently found; I met with it once rather plentifully in a red clover field near Birch Wood, the beginning of June.

56. *A. lævicolle*, Kirb., Germ., Steph., Schönh.

Mr. S. Stevens has found this species common in three localities near Arundel annually, in the month of August; also near Ryde, Isle of Wight. I met with many specimens on a sand-bank on Windmill Hill, Gravesend, in July: it appears to prefer sandy situations.

[To be continued.]

XLIX.—*Further Notice respecting* Cyanocitta superciliosa, *a supposed new species of Blue Jay.* By H. E. Strickland, M.A.

In the last Number of the 'Annals,' p. 260, I proposed to separate the *Blue Jays* of America from *Cyanocorax*, under the generic name of *Cyanocitta*, and I also pointed out a species of the latter group which had been hitherto confounded with the *C. ultramarina* of Mexico. When my paper went to press it happened that I had not then received the March Number of Mr. G. R. Gray's excellent work the 'Genera of Birds,' which contains a monographic summary of the subfamily *Garrulinæ*. He there follows preceding authors in retaining the *Blue Jays* and the *Blue Crows* under one genus, *Cyanocorax*, of which he enumerates in the whole twenty-one species. There can however be no doubt that these two groups are deserving of generic separation, as they not only differ in many points of structure and of colour, but also in their geographical distribution, *Cyanocorax* proper inhabiting the warm latitudes of South America, while *Cyanocitta* ranges from Mexico to the colder parts of the North American continent. The latter genus may be thus defined:—

Beak moderate, breadth at the base exceeding the height; upper mandible depressed at the base, slightly compressed towards the point; culmen straight for $\frac{4}{5}$ths of its length, then gradually curving down; commissure almost straight till near the apex, then curving downwards; emargination nearly obsolete, gonys curved upwards, height of each mandible nearly equal. Nostrils covered by recumbent bristly feathers. Frontal feathers not forming a rigid erect crest as in many species of *Cyanocorax*. Total length from 10 to 12 inches. Plumage more or less blue, especially on the wings and tail, which are frequently barred transversely with black. Structure of the feet, wings and tail as in *Cyanocorax*.

With respect to the species of *Cyanocitta* which I supposed to be new, and which I denominated *C. superciliosa,* the synonyms quoted in Mr. Gray's work under *C. ultramarina* have induced me to consult the 'Zoology of Capt. Beechey's Voyage,' and I there find the species in question figured and described by Mr. Vigors under the name of *Garrulus californicus.* The distinctions between it and *C. ultramarina* of Mexico (*Garrulus sordidus,* Swains.) are there correctly pointed out, although all subsequent authors have continued to unite these two species. My proposed specific name of *superciliosa* must therefore give way to Mr. Vigors's prior appellation of *californica,* and the extreme difficulty of obtaining ready access to every zoological work must be my apology for having added one more to the *ten* or *twelve thousand* superfluous specific synonyms which already exist in ornithology alone.

I may add that the "*Pica Sieberi*" of Wagler is certainly a synonym of *C. ultramarina,* not a distinct species as Mr. Gray makes it.

L.—*Note on* Mr. H. E. Strickland's *Paper on the genus* Cardinia (*Agassiz*). By Capt. Portlock, R.E.

Corfu, March 11, 1845.

The paper of Mr. Strickland* contains this passage: "Some authors have been disposed to extend the geological range of this genus, by including in it those species from the coal-measures which Sowerby and most other palæontologists have regarded as true *Unionidæ.* Whether Agassiz originally proposed this extension of the genus I am not aware, having never yet been able to meet with his translation of the 'Mineral Conchology,' in which the group is first defined; but in his last work on the subject, the 'Etudes critiques sur les Mollusques fossiles,' he seems to regard *Cardinia* as exclusively confined to the lias and lower oolite."

Having before me the German translation by Agassiz of the 'Mineral Conchology,' I am enabled to remove this doubt of Mr. Strickland, and to render his history of the new genus *Cardinia* complete.

To the generic description of the genus *Unio* (plate 33, Min. Conch.) Sowerby appended this remark: "Several species of this genus are abundant in the iron-stone bed of Derbyshire, called the mussel-band," &c.; and at this passage occurs Agassiz' first note upon the subject, the words of which are: "These bivalves from the stone-coal formation which have been classed by Sowerby in the genus *Unio* are very different from it, as I have satisfied my-

* Annals, vol. xiv. p. 100.

self by a careful comparison of the casts of several living species of the genus *Unio* with the fossil species of the stone-coal. The internal casts of the true *Uniones* have, like *Trigonia*, a strong anterior notch, and along the upper margin the impression of the hinge-teeth is distinctly visible. In the fossil casts from the stone-coal there are, on the contrary, two oblique furrows, the one anterior, the other posterior, which can only have originated from widely separated hinge-teeth. I think that they would be better placed in my genus *Cardinia*, which I have established from a liassic species of the same type."

Again, under *Unio acutus*, pl. 33. fig. 5, 6, 7, Sowerby states that he had satisfied himself of the identity of the fossil with the living genus *Unio*, by comparing a cast of the latter with several fossil casts; and the note of Agassiz upon this statement is as follows:—

"What Sowerby here states of the generic identity of the so-called *Uniones* from the stone-coal formation with the species now living in fresh water, merely proves that he recognised in the casts both the principal characteristics of all elongated bivalves provided with oblong hinge-teeth. But he has not thereby taken into account the great difference which the impression itself of these teeth on the casts shows." In referring to *Unio crassissimus*, *U. Listeri* and *U. hybridus*, the first of which is stated by Sowerby to possess peculiarities in the great thickness of its shell and the tile-like structure of its surface, which might perhaps be elevated into generic characters, Agassiz remarks, "These three species belong to my genus *Cardinia*; see the preceding note, and my 'Etudes critiques sur les Mollusques fossiles.'"

Unio crassiusculus, pl. 185, and *U. concinnus*, pl. 223, are also referred to *Cardinia*; but *U. Solandri*, pl. 517, and the several *Uniones* figured in pls. 594 and 595, are stated by Agassiz to belong principally to his new genus *Pleuromya*, for which he, as before, refers the reader to 'Etudes critiques sur les Mollusques fossiles.'

From these extracts then it is quite evident that Agassiz did extend his genus *Cardinia* to the species of the coal as well as to those of the lias, but whether he was correct in so doing can scarcely be determined from the notes in question, as the actual definition of the genus *Cardinia* is not given in them. This deficiency Mr. Strickland can doubtless supply, and by placing the characters of the several genera here alluded to in comparison with each other, determine whether the shells of the coal formation can be classed in the genus *Cardinia*, or should form the type of another new genus.

LI.—*Further Notice respecting the Ova of the Large Spotted Dog-fish* (Scyllium Catulus). By Capt. Portlock, R.E.

Corfu, March 11, 1845.

In my preceding note (p. 261) I have stated the general coincidence of the drawing given by Mr. W. Thompson with the specimens I had obtained and observed of what I also considered the ova of the large spotted dog-fish, but at that time I had been unable to procure the fish still having the ova in their last state of development prior to protrusion undisturbed within it. On the 17th of February I was more fortunate, as I obtained on that day from one of the fishermen a very fine specimen, exhibiting the ova in all states of development, the ovaries being loaded with ova of all sizes, from the most minute up to those of three-quarters of an inch in diameter, the latter being of course few in number, the former abundant. Of the greater, or those equalling and exceeding half an inch, there were at least eight, and it is probable more, as the fish had been opened and the ovaries slightly ruptured before I got it, so that some may have escaped, as they very readily did on my examination. These eggs were spherical, and of a greenish yellow colour: when put into turpentine (as I placed one), or left with the fish in a preservative mixture of corrosive sublimate, they became flattened without further injury, nearly to the thickness corresponding to the depth of the horny case, which explains how bodies of such a form and size should subsequently become invested with that covering. Risso draws a distinction in this respect between the *Scyllium Catulus* (his *S. stellaris*) and the *S. Caniculus*, stating the former to bear spherical eggs of various magnitudes of a pale yellow colour, and the latter the horny quadrangular eggs, as also *S. Artedi* (Risso), the black-mouthed dog-fish, and it is therefore probable he only saw the fish immediately after the protrusion of the horny cases from the oviducts. In my specimen they were still *in situ*, and without removing them I could measure their length and breadth and even depth. The length was in this instance almost exactly that of Mr. Thompson's specimens, viz. nearly $4\frac{1}{2}$ inches, measured to the extreme points, the breadth and depth the same as those I have before stated; the specimens appearing to vary in length, but to preserve nearly the same breadth and depth. There can now therefore be no doubt that Mr. Thompson has figured the ova of the great spotted dog-fish, although none of my specimens exhibit so rough a plaiting as his figure exhibits, and the colour when fresh is uniformly a horny yellow, though soon darkening when kept exposed. The last specimens I have obtained were fresh from the fish on the 27th of February.

P.S. Corfu, March 22.—A specimen of a female was brought to me this morning 21 inches long, in which the matured ova can be felt by pressure on the abdomen: I retain it therefore uninjured. This almost brings the time up to the period when I obtained the ova last year, so that it would appear that from January to May, rather than at two distinct periods, these fishes deposit their ova.

LII.—*Generic Characters of* Gasterochisma melampus, *a Fish which inhabits Port Nicholson, New Zealand.* By JOHN RICHARDSON, M.D., F.R.S. &c., Medical Inspector of Naval Hospitals at Haslar.

Piscis familiæ Scomberidarum.

Corpus valde compressum, clupeiforme. Cauda gracilis sine carinis. Venter acutus, alte diffissus et in vagina ejus pinnas ventrales thoracicas magnas recondens.

Linea lateralis inermis.

Pinnæ pectoris parvæ. Pinnæ dorsi contiguæ: prima spinis gracilibus membrana connexis instructa; secunda pinnaque ani pinnulis spuriis comitatæ. Pinna caudæ bifurca.

Anus parvus sub finem vaginæ ventralis latens.

Squamæ teneræ satis magnæ. Pectorale squameum nullum.

Dentes parvi setacei.

Radii membranæ branchiostegæ arctæ quinque.

Apertura branchialis ampla.

Obs. Species unica adhuc detecta *Gasterochisma melampus* in Museo Britannico hospitatur et a Domino Gray celeberrimo mihi benigne communicata. Nomen genericum fissuram ventris denotat.

BIBLIOGRAPHICAL NOTICES.

Recherches sur l'Embryogénie des Tubulaires, et l'Histoire naturelle des différens Genres de cette Famille qui habitent la côte d'Ostende. Par P.-J. Van Beneden, Professeur à l'Université catholique de Louvain. (From the Mémoires de l'Académie Royale de Bruxelles. 4to. Pp. 72. Six Plates.)

THIS interesting essay supports the well-earned reputation of its distinguished author. It begins with a lucid and candid review of what had been previously done by other naturalists towards a history of the family; a doubt of the correctness of some alleged fact being sometimes interposed, but more frequently the comment is made to reconcile observations which at first view are apparently contradictory and subversive of each other.

We can do little more than indicate the contents. The first chapter treats of the anatomy of the *Tubulariæ*. The tentacula are solid and composed of cells arranged somewhat after the pattern of the cellular tissue of vegetables. They are not organs of prehension as in the *Hydræ*, but are probably subservient to respiration. In the *Eudendrium* they are the only parts of the polyp which come into direct contact with the circumfluent water; and when this is at rest, all *Tubulariæ* spread wide their tentacular circle. But they are not the sole organs of this function, for we may safely suppose that the water, in penetrating into the common cavity of the polypidom, carries with it the necessary oxygen. In these animals in fact the functions of respiration and nutrition are so simple, and so intimately blended with the circulation, that we can scarcely use separate terms in defining them.

The stomach of every individual polyp communicates with the cavity common to all the polyps of the same polypidom, the line of separation being marked only by a sort of stricture; but in *Coryne* this is not the case, for the stomach of every individual is isolated and distinct.

The circulation of the granulous fluid in the common tube of the polyps, first described by Mr. Lister, Van Beneden is inclined to ascribe to the action of vibratile cilia, which, he admits, he could not detect. The irregularity or inconstancy of this circulation seems to us to be opposed to this explanation; nor do we perceive any fitting basis on which the cilia can be placed. A portion of the tube of a *Eudendrium*, some lines in length, being cut away, and consequently open at both ends, preserved its circulating power, the liquid moving in its normal course. Lister says that the current does not penetrate into the body or stomach of the polyp, but Van Beneden has plainly seen it do so. In *Coryne* and *Hydractinia* there is no circulation, because of the isolation of the stomach in these genera.

The second chapter, and principal part of the paper, describes the "embryogeny." The origin and development of the reproductive buds and eggs are traced with great minuteness, and illustrated with a series of admirably explanatory figures. There is no distinction of sex in the *Tubulariæ*; and nothing analogous to spermatozoa, notwithstanding what has been said to the contrary. The reproductive buds, which originate from the bases of the tentacula, are hollow in the centre in all the genera, and always communicate with the digestive cavity. What have been mistaken for females are young individuals, which often contain eggs at an early stage even of their development.

The *Tubulariæ* are reproduced (1.) by a bud continuous with the animal whence it pullulates; (2.) by a free or locomotive bud; (3.) by a simple egg; (4.) by a compound egg or vitellus; and (5.) by a free bud and eggs simultaneously. Every species may be reproduced by more than one or two of these modes, but it does not appear that any has been observed to reproduce itself by all of them.

The first or gemmiparous reproduction is the simplest. By it the embryo, after having become fixed in a proper site, evolves new individuals, and founds a colony where all are associated together.

2. The free bud originates near the tentacula. It appears at first as a simple tubercle which soon divides successively into several tubular branchlets, in which a circulation goes on as in the main stems. Within the swollen apex of each branchlet a distinct cell soon appears, indicating the commencement of the formation of a new being. This

cell may be considered as the analogue of the yolk or rather of the vesicle of Purkinje or of Wagner. It enlarges rapidly; and soon there is distinguishable underneath it a membrane which has its inferior surface in contact with the circulating fluid. This membrane is the source of the new polyp, the progress of which onwards from a little cone to the time when it has assumed the form of a *Beroë*, and is detached from its matrix and floats at freedom in the sea, is most interestingly told. Van Beneden has not seen this nomade *Beroë* refix itself, but he has seen it very soon afterwards; and its transition from the condition and shape of a medusa to that of its parent polyp appears as an uninterrupted sequence of development. He has never discovered cilia on the young embryo, nor any organs of sense.

3. The development from a simple egg is the most regular, and the process which approaches nearest to that of the superior animals.

4. The development from a compound or divided yolk is the most remarkable; but when it is remembered that, in these polyps, every portion of the body can give origin to a new individual, we need be the less surprised to find that the vitellus should have the same quality. At first the process in the primary cell agrees with the other developments, but a time comes when the surface of the vitelline mass assumes an embossed or granular appearance, and instead of a single vitellus there are as many as there are granules. In each of these there is the vesicle of Purkinje, or at least a transparent central vesicle. It seems that the embryos thus formed differ from the others not only in bulk but also in shape, for in *Campanularia* M. Lovén has seen them, covered with cilia, leave their cell, and move about like infusorial animalcules.

5. This is the union of two of the preceding modes; the formation at one and the same time of a free bud and of a compound vitellus organizing itself in the interior of this bud. It is the fact of these buds containing these vitelli that has made them be taken for pregnant females. The eggs here, according to Lovén, are covered with cilia; and when the embryo is born (for we should remember that the polyps are viviparous) it has the aspect of a *Planaria*,—the planule of Sir J. G. Dalzell.

Van Beneden next proceeds to prove, by a comparison of their common resemblances, that the *Campanulariæ* and *Tubulariæ* are so nearly related that they may almost be considered as members of the same family.

Lastly, he reviews the family zoologically, giving its character in detail, and the characters of the genera and species which he has observed. This view has been already given in the 'Annals.' We need only remark that his *Tubularia calamaris* is really not the *T. calamaris* of Pallas or *T. indivisa* of Linnæus; and his *T. Dumortierii* is a common British species. M. de Blainville is not the first of modern authors who recognised that the *Syncoryne* ought to be placed near the *Tubulariæ* (p. 51), as any one may see by referring to Loudon's 'Magazine of Nat. History,' vol. v. p. 632. We question the validity of the distinction between *Syncoryne pusilla* and *Listerii*; they are both British species, but the latter is the commonest. Van

Beneden's *Eudendrium ramosum* appears to us to be different from the species usually so designated, and a new species. The polyp on which Mr. Hassall founds his genus *Echinocorium* must, we think, be referred to Van Beneden's genus *Hydractinia*, and is perhaps the same as his *H. lactea*.

Such is our hurried notice of this valuable essay, which, it is to be regretted, cannot be procured in a separate form. But we look forward to the time—its object being better understood—when, by means of the Ray Society, essays of this high degree of excellence shall be diffused amongst us widely.

Mycologia Britannica, or Specimens of British Fungi.
By Ph. B. Ayres, M.D. W. Pamplin, 1844.

This is a welcome addition, especially to the admirers of Epiphyllous Fungi, to the various collections of Fungi which have been published in this and other countries. It is not at all probable that Mr. Berkeley's 'British Fungi' will be continued beyond the Fourth Fasciculus; we shall be rejoiced therefore if the present work should be encouraged sufficiently to ensure its continuance, so that it may take its place. The specimens are neatly prepared and correctly named, and we doubt not that in future numbers they will not be so much confined to a single division. *Æcidium Galiatum*, DeC., and *Æ. Scrophulariæ*, DeC., are new to our flora, and *Æ. pallidum*, a pretty species on *Galium Aparine*, has been hitherto unnoticed. The specimens, fifty in number, are so arranged that they can at pleasure be transferred to the herbarium.

PREPARING FOR PUBLICATION,

A work to be entitled, Fauna Antiqua Sivalensis, being the Fossil Zoology of the Sewalik Hills, in the North of India. By Hugh Falconer, M.D., F.R.S., F.L.S., F.G.S., and Proby T. Cautley, F.G.S.

The object of this publication is to make known, in a connected and complete series, the numerous fossil animals which have been discovered in the North of India, by the authors and other inquirers, during the last twelve years; and to develope the bearings of these discoveries on the physical and geological history of India during a great part of the tertiary period.

In order to secure to science the full advantage of the Sewalik fossil researches, in a suitable form of publication, Her Majesty's Government and the Honourable Court of Directors of the East India Company have been pleased to accord such an amount of aid *in limine* as will ensure the successful progress of the work.

The work will appear in about Twelve Parts, to be published at intervals of about four months, each containing from twelve to fifteen folio plates, or an equivalent number of a larger size where the nature of the subject may require it. The plates to be accompanied by royal octavo letter-press.

PROCEEDINGS OF LEARNED SOCIETIES.

BOTANICAL SOCIETY OF EDINBURGH.

Feb. 13, 1845.—Dr. Douglas Maclagan, President, in the Chair.

Dr. Herman Hoffmann, Giessen, was elected a Foreign Member of the Society.

Various donations to the Library and Museum were announced, and the following communications were read :—

1. Dr. Seller read a paper entitled "Examination of the Views adopted by Liebig on the Nutrition of Plants."

He contrasted Liebig's view of the mineral nature of the food of plants with that which represents their food as organic. He traced out the consequences deducible from this last hypothesis as affecting not merely the vegetable but the animal kingdom also, the latter being ultimately sustained solely by vegetable substances. He showed that, whereas the view adopted by Liebig nowise restricts the duration of the organized kingdoms, as long as they remain exempt from the influence of destructive agencies from without, the opposite view involves the conclusion, that the whole of organic nature is hastening rapidly to dissolution from inherent causes; and he affirmed, that were certain data somewhat more carefully considered, the period of the final extinction of plants and animals, in accordance with this hypothesis, might be pretty nearly determined. He regarded this question as one not merely of high interest in itself, but as bearing expressly on the solution of the problem, whether the food of plants be organic or mineral.

Dr. Seller calculates the annual conversion of the carbon of organic matter into inorganic carbonic acid at not less than 600 millions of tons; and infers, on the most favourable aspect of the amount of soil over the earth's surface, that such an annual loss could not be withstood beyond 6000 years; and, on a less exaggerated assumption of its amount, probably very near the truth, that the waste would absorb the whole of the existing organic matter of the soil in about 740 years.

Dr. Seller contends that the truth of these conclusions remains unaltered, even if it be conceded that much of the carbon of plants is drawn, not from the organic matter of the soil but from the inorganic carbonic acid of the atmosphere, unless some inorganic source of their hydrogen and oxygen be at the same time admitted. He therefore regards Liebig's view of the inorganic nature of the food of plants as supported not merely by many special facts—for example, by the increase of the organic matter of the soil, often observed during the growth of plants,—but also by the general view of the earth's surface just taken, because there is nothing in its aspect to warrant the idea that its means of maintaining the organic kingdoms are declining with the rapidity indicated in the statements just made.

Dr. Seller next examined Liebig's views of ammonia; 1st. as the sole source of the nitrogen of plants, and thereby of animals; 2nd, as having its exclusive origin from the interior of the earth, and never from the nitrogen of the atmosphere. In regard to these statements he made it appear, as there is no evidence of ammonia being thrown forth from the bowels of the earth at all times in quantity proportioned to the waste of it necessarily sustained at the surface by decomposition, as into uncombined hydrogen and nitrogen, that Liebig's view of ammonia infers the same limitation of the existence of the organic kingdoms to a few thousand years, as is deduced from the hypothesis of organic matter being the food of plants. Here therefore he dissented from Liebig, contending that ammonia must be produced from the nitrogen of the atmosphere*, and showing the probability of what is taught by Professor Johnson, namely, that the nitrogen of nitrates, formed from the atmosphere, is fixed by plants, as well as the nitrogen of ammonia.

In conclusion, he reviewed the evidence of potassa, the phosphates and the other saline matters of both organic kingdoms being derived originally from the crumbling of rocks, and dwelt on the retardation of vegetable physiology by the long scepticism of botanists on this head, owing, as he believed, to their distrust in the conclusions of chemistry, and went on to show that chemistry must be the groundwork of vegetable physiology in its present stage, and that the frequent changes in the aspect and nomenclature of chemistry did not materially affect the facts which it daily affords for the elucidation of the vegetable œconomy.

2. A paper by Mr. Ralfs, of Penzance, on the genus *Closterium* was read. This paper will shortly appear in the 'Annals and Magazine of Natural History.'

3. Mr. M'Nab read a continuation of his Journal of a Tour through part of the United States and the Canadas. The last portion read before the Society gave an account of the journey from Montreal to Kingston, and concluded with an account of a botanical excursion to the eastward of the latter place :—

The woods to the westward of Kingston appeared very dense, chiefly consisting of stately beeches, growing in rich vegetable soil. Several very remarkable plants were observed, and among others the *Monotropa uniflora* and *M. Hypopitys* : the former, which is abundant in shady beech woods throughout the country, and always growing from amongst leaves, is known to the inhabitants by the name of Indian pipe or bird's-nest ; the latter is not so plentiful, but found in similar situations. Here also *Corallorhiza multiflora* and *Orobanche virginica* were found, and at one place in a dense thicket the rare and curious *Pterospora Andromeda*.

Near the confines of the woods in drier situations the white and pink varieties of *Phryma leptostachya* occurred ; and on the dry limestone ridges, which prevail in this neighbourhood, large quantities of *Triosteum perfoliatum, Gnaphalium margaritaceum*, and *Botrychium obliquum* were found ; along the margin of Lake Ontario *Serpicola verticillata* was noticed, its delicate flowers floating on the surface.

* This has been clearly proved by the experiments of Prof. Mulder : see 'Chemical Gazette' for Jan. 1, 1845.—W. F.

The beech, sugar, maple and white pine, from their quantity and local situation, seem to have been the original inhabitants of this district; and mixed with them, but not so much in groups, were noble specimens of the oak, elm and walnut. The sugar-maples bore evident marks of having been often pierced for their juices. Fringing the edges of some meadow-land in this district, the stag's-horn sumach, *Rhus elegans*, presented a most magnificent appearance from the quantity of scarlet fruit.

He was agreeably surprised to see such a variety of native hawthorns, being convinced of their fitness for forming hedges, so very much wanted in that country, and for which many of the inhabitants expressed a great desire, instead of the unsightly snake fences which at present separate the fields. Apparently they never thought that the indigenous thorns would answer for this purpose, as they talked of importing haws and white-thorns from Britain. Mr. M'Nab gave instructions to those individuals with whom he had an opportunity of conversing upon the subject, so that they may raise thorns for themselves, as an abundant supply of seeds may be annually procured at no great distance from each settlement. As these instructions may be interesting to others, we here repeat them :—

"The fruit should be gathered about the end of October, care being taken to keep the seeds of the luxuriant growing sorts separate from those of the dwarfer kinds. A pit should be prepared about a foot and a half deep, into which the fruit is to be put with a mixture of earth or sand. It should be turned several times during the season, and if dry, a little water may be added; one or two inches of soil being a sufficient covering to ensure the decomposition of the pulp. During the following October a piece of good ground should be prepared, and the seed sown as it is taken from the pit, pretty thickly, in drills about a foot distant from each other, or in beds 3 feet wide. In the succeeding spring the plants will begin to appear; at which time, and throughout the season, they must be kept clear of weeds. If properly attended to, the seedlings will attain a height of from 6 to 12 inches the first year. The following spring the strongest plants may be either transplanted into drills, or placed where they are intended to remain as a permanent fence. The smaller ones should be left in the seed drills or beds for another year, when they may be treated in the same manner. In forming a live fence, the ground ought to be prepared as soon as the snow disappears, by making a trench about 2 feet broad and a spade in depth. Along the centre of this trench the young plants should be put about 6 or 8 inches apart, and afterwards well-watered and firmly trodden in. Care should be taken to protect the young plants from cattle and clear of weeds.

"The second year after planting, the thorns should be headed down to within six or ten inches of the ground, and each year afterwards switched up on both sides to a centre ridge, so as to produce the shape generally termed sow-backed; hedges trained in this form being less liable to be destroyed by snow resting upon them than when cut flat at the top."

If the method here recommended be properly attended to, Mr. M'Nab has not the least hesitation in saying that an excellent hedge of native thorns may be acquired in five or six years after planting. At several places he saw the indigenous thorns employed as a fence; at least they had been planted with that intention, and had attained a considerable height, but from want of proper attention to pruning and weeding, they were so slender that easy access might be obtained between each stem. From such instances of mismanagement, an erroneous opinion seems generally to prevail that hedges will not succeed in America. "But," he very properly remarked, "if newly-planted hedges in Britain were equally neglected, there can be no doubt that they would soon degenerate, and become no better than those which I observed in the United States and the Canadas."

March 13.—Dr. Seller, V.P., in the Chair.

Robert Balloch, Esq., Glasgow, was elected a Non-resident Fellow of the Society.

Numerous donations to the Library and Museum were announced, particularly from R. J. Shuttleworth, Esq., Berne, a collection of North American plants, and the 14th Fasciculus of Meisner's Plantarum Vascularum Genera; from the Imperial Academy, Naturæ Curiosorum of Breslau, the Supplement to vol. xix., and parts 1st and 2nd of vol. xx. of the 'Nova Acta'; from Professor Graham, plants collected in Jamaica by Dr. G. M'Nab; from H. C. Watson, Esq., his Botany of the Azores; from Mr. William Gardiner, jun., Dundee, Botanical Rambles in Braemar, &c. Dr. Parnell presented a copy of his beautiful work on the Grasses of Britain. The thanks of the Society were voted to the respective donors.

The following communications were read:—

1. "On the genus *Closterium* (continued)," by Mr. J. Ralfs, of Penzance.

2. "On *Encyonema prostratum* of Kützing," by the same. These papers will appear in the 'Annals of Natural History.'

3. Mr. M'Nab read a continuation of his Journal of a Tour through part of the United States and Canada. The last portion of this journal read before the Society chiefly related to the botanical aspect of the country immediately to the westward of Kingston; the indigenous thorns and their fitness for forming hedges being particularly described. From Kingston the party crossed Lake Ontario to Rochester, situated on the American side, a few miles above the mouth of the Genessee river. Considerable tracts of shallow water extend for some distance on either side of this river, in which the wild rice grew more luxuriantly than had been hitherto observed. Proceeding upwards the river becomes narrower but deep, having beautiful banks rising about 150 feet on either side, wooded chiefly with oak, elm, hiccory, beech and birch, interspersed with hemlock spruce, white pine and arbor vitæ of large size. On the north bank the black snake-root, *Actæa ramosa*, was abundant, its long spikes of white flowers having a singular effect beneath the shade of the trees. It

was not seen on the south bank, but in its place considerable quantities of *Gerardia flava* and *G. quercifolia* were noticed, all richly clothed with flowers: here also several extensive groups of buckthorn, *Hippophaë canadensis*, were observed; each plant formed a large silvery-looking bush, and when backed by the dark evergreen trees gave a picturesque effect to the landscape.

Crossing Lake Ontario again to Toronto, on the Canada side, a great difference in the vegetation was remarked; here, for the first time in Canada, healthy specimens of weeping willows, locust-trees, and Canadian and Lombardy poplars were met with; and for the first time in the country, a native forest of *Pinus resinosa*. The trees composing this forest were very tall, but none of the stems which were measured exceeded 2 feet in diameter. Many detached specimens of the black birch or mountain mahogany, *Betula lenta*, were also seen. It is described by Mr. M'Nab as a finely-shaped tree with a wide-spreading top, much resembling the beech-trees of Britain; the stems averaged about 2 feet in diameter. Here also *Monarda fistulosa* and *Spiranthes tortilis* were found; the latter very sparingly and for the first time.

They next directed their attention to the Peninsula of Toronto, lying about 2½ miles from the city, across an arm of the lake. The soil is poor and sandy, interspersed with marshes. Several species of trees of dwarfish growth were scattered about, the most remarkable being the rose or conegall willow, *Salix conifera*, of which many fine specimens were observed, the branches generally terminating in silvery, cone-like excrescences, supposed to be occasioned by insects; these, combined with the silvery whiteness of the foliage, gave the plants a remarkable appearance. Several other species of willows were noticed on the sandy plains, but none of them appeared to be infested with insects, although the appearance here described is not peculiar to the above species. The *Arbutus uva-ursi* covered considerable tracts: the Canadian plant is larger than the British, and even differs slightly from that found in the United States; it is called by the Indians *Sacacomis*; they smoke the leaves, and believe them to possess excellent medicinal properties. Few herbaceous plants were in bloom, with the exception of *Rudbeckia hirta*, which was in great abundance, although described by American authors as an inhabitant of the Southern States; and *Dracocephalum virginianum*, which is by no means an abundant plant in Canada, Niagara Falls being the station given in botanical books; but Mr. M'Nab failed to find it there; it principally inhabits the mountain meadows of Virginia and Carolina; *Linum virginianum*, *Cyperus flavescens* and *C. castaneus*; *Silene Antirrhina*, *Scutellaria parvula* and *Lathyrus palustris*; on dry loose sand, by the edge of the lake, *Euphorbia polygonifolia* was abundant, while in marshy places *Lobelia Kalmii* formed the greatest part of the vegetation, and was profusely covered with its rich blue flowers.

Specimens of the most remarkable plants were exhibited to the meeting.

ZOOLOGICAL SOCIETY.

August 13, 1844.—Professor Owen, V.P., in the Chair.

"Descriptions of new species of *Arca*, chiefly collected by H. Cuming, Esq. in the Philippine Islands," by Lovell Reeve, Esq.

Arca obtusa. *Arca testâ oblongâ, Modiolæformi, lateribus obtuso-rotundatis, margine ventrali bysso paululùm hiante; albâ, epidermide nigricante subsquamosâ partim indutâ; radiatim striatâ, striis elevatis; umbonibus depressiusculis, approximatis; ligamenti areâ parvâ, angustâ, profundè declivi.*

Conch. Icon. *Arca*, pl. 12. f. 77.

Hab. Coast of Japan (found under stones); Dr. Siebald.

Very like a *Modiola* in shape, but not the recent analogue of the fossil *A. Modiolæformis* of Deshayes.

Arca cunealis. *Arca testâ elongato-oblongâ, lateribus supernè angulatis, antico brevi, rotundato, postico elongato, angulato, carinâ ab umbone ad marginem decurrente, margine ventrali bysso hiante; pallidè fuscâ, epidermide molli lamellatâ indutâ; radiatim striatâ, striis elevatis, fortiter granulosis, areâ posticâ subindistinctè nigricostatâ; umbonibus subapproximatis, ligamenti areâ latiusculâ, concavâ, sulcis ligamentariis anticis posticisque, subdistantibus.*

Conch. Icon. *Arca*, pl. 13. f. 87.

Hab. Zanzibar (found under stones at low water); Thorn.

The sculpture of this species corresponds precisely to that of the *Arca mutabilis*; the form of the shell is more depressly elongated, the anterior side is shorter, and there are ligamentary grooves on the posterior part of the cardinal area as well as on the anterior.

Arca tenella. *Arca testâ subcylindraceo-oblongâ, Modiolæformi, tenui, subpellucidâ, lateribus obtuso-rotundatis, margine ventrali vix hiante; pallidè fuscescente, epidermide molli leviter indutâ; radiatim subtilissimè striatâ, striis granulosis; umbonibus obtusis, anticè incurvis; ligamenti areâ anticè latiusculâ, posticè lanceolato-acuminatâ.*

Conch. Icon. *Arca*, pl. 14. f. 91.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

A delicate light brown shell, beautifully striated, with a soft scattered epidermis.

Arca setigera. *Arca testâ subquadrato-oblongâ, lateribus rotundatis, postico latiore, margine ventrali bysso vix hiante; rubido-fuscâ, epidermide fuscâ setigerâ indutâ; radiatim subtilissimè striatâ, striis elevatis, granulosis; umbonibus subapproximatis, anticè adjectis; ligamenti areâ angustâ, declivi.*

Conch. Icon. *Arca*, pl. 14. f. 94.

Hab. Zanzibar (found under stones at low water); Thorn.

This species approaches very closely to *Arca lacerata*; it appears, however, to be of an uniform smaller size, the posterior side is less expanded, and the bristles are set in single rows.

Arca virescens. *Arca testâ elongatâ, lateribus rotundatis, postico leviter angulato, antico subattenuato; viridescente, epidermide tenui, ad aream posticam setosâ, indutâ; striis elevatis radiatâ; ligamenti areâ angustissimâ, umbonibus approximatis.*

Conch. Icon. *Arca*, pl. 15. f. 97.

Hab. Catbalonga, island of Samar, Philippines (found under stones at low water); Cuming.

A delicate greenish species, in which the epidermis lies on the posterior area in rows of fine bristles.

Arca fasciata. *Arca testâ oblongâ, tenui, compressâ, lateribus rotundatis, supernè attenuatis; albidâ, fasciis cinereo-purpurascentibus indistinctis concentricè tinctâ; epidermide tenui, posticè setosâ, indutâ; radiatim striatâ, striis elevatis, irregularibus, striis transversis subtilissimis fimbriato-decussatis; ligamenti areâ angustâ, profundè declivi; intus purpurascente.*

Conch. Icon. *Arca*, pl. 15. f. 99.

Hab. ——?

This is a remarkably flattened shell, banded and stained with reddish and ashy purple both inside and outside.

Arca lima. *Arca testâ elongato-ovatâ, lateribus supernè angulatis, antico infra rotundato, postico angulato-rotundato, subextenso; fuscescente, fusco tinctâ, posticè fusco maculatâ, epidermide tenui subtilissimè setosâ indutâ, radiatim liratâ, liris angustis, numerosis, confertis, granosis, perpaucis medianis duplicatis; lateraliter costatâ, costis rudibus, subdistantibus, crenato-nodosis; ligamenti areâ angustâ.*

Conch. Icon. *Arca*, pl. 15. f. 101.

Hab. Islands of Burias and Corregidor, Philippines (found under stones at low water); Cuming.

The sculpture of this shell is very similar to that of the *Arca bullata*; it is, however, of much finer character, although the shell is more elongated and altogether larger.

Arca ocellata. *Arca testâ elongato-quadratâ, lateribus supernè angulatis, latere antico brevissimo, infra rotundato, postico elongato, infra acuminato, margine ventrali bysso latissimè hiante; albidâ, epidermide tenui, subsetosâ, indutâ; radiatim striatâ, striis subtilissimè crenulatis; umbonibus remotis; ligamenti areâ latissimâ, rhombo ligamentario peculiariter ocellato.*

Conch. Icon. *Arca*, pl. 15. f. 102.

Hab. Singapore (found in sandy mud at the depth of seven fathoms); Cuming.

This interesting little species exhibits a character which is quite peculiar to the species. The dark ligamentary space between the umbones is marked with a pair of oblique white oval spots, one on each valve.

Arca Donaciformis. *Arca testâ sub-Donaciformi, medio leviter coarctatâ, latere antico brevissimo, truncato, postico elongato, subacuminato; albidâ, epidermide vix nullâ, striis transversis et lon-*

gitudinalibus elevatis fimbriato-decussatâ; ligamenti areâ anticè latiusculâ, posticè acuminatâ; ligamento brevi, ad posticam areæ partem solum adjuncto.

Conch. Icon. *Arca*, pl. 16. f. 104.

Hab. Mozambique Channel (found imbedded in madrepore); Hankey.

The ligament and ligamentary area of this species present exactly the same peculiar structure as those of the *Arca pusilla* (*Byssoarca pusilla*, Sowerby, Proc. Zool. Soc. 1833); the shell is, however, altogether larger, more acuminated posteriorly, and the sculpture is of a smaller pattern.

Arca tenebrica. *Arca testâ oblongo-ovatâ, lateribus angulato-rotundatis; fuscâ, epidermide tenui indutâ; radiatim striatâ, striis elevatis, numerosis, confertis; umbonibus albidis, approximatis, anticè adjectis; ligamenti areâ angustâ, posticè lanceolato-acuminatâ.*

Conch. Icon. *Arca*, pl. 16. f. 105.

Hab. Basey, island of Samar, Philippines (found under stones at low water); Cuming.

The umbones in this species are very anteriorly situated.

Arca bullata. *Arca testâ ovato-quadratâ, planiusculo-compressâ, lateribus supernè angulatis, antico infra rotundato, postico angulato-extenso; fuscescente, epidermide tenui, subsetosâ, setis in liris longitudinalibus adjectis, indutâ; radiatim costatâ, costis nodosis, costis lateralibus grandibus, distantibus, crenato-nodosis; ligamenti areâ angustâ, elongatâ, declivi.*

Conch. Icon. *Arca*, pl. 16. f. 107.

Hab. ——?

The nodules of the radiating ribs are arranged in longitudinal rows with so much regularity, that the shell has all the appearance of being cancellated, the effect of which is increased by the bristles of the epidermis being deposited only between the nodules.

Arca volucris. *Arca testâ subquadratâ, gibbosâ, naviculari, lateribus supernè angulatis, antico infra rotundato, postico angulato, carinâ acutâ ab umbone ad marginem decurrente; albidâ, fusco sparsim tinctâ; striis elevatis longitudinalibus et transversis decussatâ, areâ posticali costatâ, costis latiusculis, crenatis; umbonibus mucronatis, incurvatis; ligamenti areâ latissimâ, nigro unimaculatâ.*

Conch. Icon. *Arca*, pl. 16. f. 109.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

This species belongs to that division of the genus of which the *Arca Noæ* is the type, and is nearest allied to the *Arca imbricata*.

Arca cœlata. *Arca testâ ovato-quadratâ, subcompressâ, latere antico brevissimo, rotundato, postico angulato, margine ventrali bysso hiante; albâ; radiatim costatâ, costis liris angustis elevatis eleganter clathratis, interstitiis profundè excavatis, costis medianis duplicatis, lateralibus confertim nodulosis; umbonibus anticè adjectis; ligamenti areâ angustâ, profundè declivi.*

Conch. Icon. *Arca*, pl. 16. f. 110.

Hab. —— ?

The sculpture of this shell is of the most exquisite description, and reminds one forcibly of the delicate embossed carving of the Chinese.

Arca cometa. *Arca testâ elongatâ, latere antico brevissimo, attenuato, rotundato, postico longissimo, plano-angulato; albidâ; radiatim striatâ, striis elevatis, posticis latioribus, prominentibus, distantioribus, subsquamosis; umbonibus anticè adjectis; ligamenti areâ angustâ.*

Conch. Icon. *Arca*, pl. 16. f. 111.

Hab. Sorsogon, island of Luzon, Philippines; Cuming.

The posterior striæ acquire almost the importance of ribs.

Arca olivacea. *Arca testâ ovato-quadratâ, tenuiculâ, subæquilaterali, lateribus rotundatis; albidâ, epidermide olivaceo-fuscâ tenui corneâ indutâ; subtilissimè radiatim striatâ, striis numerosis, confertis; ligamenti areâ mediocri, umbonibus subcentralibus.*

Conch. Icon. *Arca*, pl. 16. f. 113.

Hab. San Nicolas, island of Zebu (found in sandy mud at the depth of four fathoms); Cuming.

This shell is not much unlike the *Arca lactea* in general appearance; it will be found, however, on examination to be a much thinner and more delicate shell, whilst the umbones are sharper and more closely approximated.

Arca minuta. *Arca testâ orbiculari-ovatâ, subæquivalvi, lateribus supernè angulatis, infra rotundatis; albidâ, subpellucidâ, epidermide tenui molli indutâ; radiatim striatâ; ligamenti areâ latiusculâ, ligamento parvo, centrali.*

Conch. Icon. *Arca*, pl. 17. f. 112.

Hab. Philippine Islands (found in coarse sand at the depth of six fathoms); Cuming.

A very minute species, which cannot be referred to any hitherto described.

Arca navicella. *Arca testâ quadrato-elongatâ, subcompressâ, lateribus supernè angulatis, antico infra rotundato, postico angulato, carinâ ab umbone ad marginem decurrente; radiatim striatâ; albidâ, fusco posticè sparsim strigatâ; ligamenti areâ elongatâ.*

Conch. Icon. *Arca*, pl. 17. f. 114.

Hab. Calapan, island of Mindoro, Philippines (found in coarse sand at the depth of ten fathoms); Cuming.

This is a little species of the *Arca Noæ* or naviform group.

Arca lateralis. *Arca testâ obliquè trapeziformi, lateribus supernè angulatis, antico brevissimo, postico latissimo, oblique expanso; radiatim costatâ, costis numerosis, angustis, crenatis, epidermide subpilosâ indutâ; ligamenti areâ parvâ.*

Conch. Icon. *Arca*, pl. 17. f. 115.

Hab. Philippine Islands; Cuming.

The peculiarly oblique growth of this species renders it extremely interesting. The posterior side of the shell is radiated with lines of fine dark hair rising from between the crenulations of about every third rib.

Arca symmetrica. *Arca testâ subquadratâ, gibbosâ, lateribus supernè acutè angulatis, antico infra rotundato, postico angulato; viridescente; striis longitudinalibus et radiantibus crenulato-decussatâ; ligamenti areâ latiusculâ, ligamento parvo, centrali.*

Conch. Icon. *Arca*, pl. 17. f. 117.

Hab. Philippine Islands, bay of Manila; Singapore (found under stones at low water); Cuming.

The ligament of this species occupies only a very small diamond-shaped space between the umbones.

Arca sculptilis. *Arca testâ oblongo-quadratâ, lateribus supernè angulatis, infra obtuso-rotundatis; albâ; striis longitudinalibus et radiantibus elevatis subtilissimè clathratâ; ligamenti areâ latiusculâ.*

Conch. Icon. *Arca*, pl. 17. f. 118.

Hab. Baclayon, island of Bohol, Philippines (found in sandy mud at the depth of seventeen fathoms); Cuming.

The engraved sculpture of this shell is of a more prominent character than that of the preceding species.

Arca zebuensis. *Arca testâ subquadratâ, gibbosâ, lateribus supernè angulatis, infra obliquè rotundatis; fuscescente, epidermide molli indutâ; radiatim subtilissimè striatâ; ligamenti areâ latiusculâ, ligamento parvo, centrali.*

Conch. Icon. *Arca*, pl. 17. f. 120.

Hab. Island of Zebu, Philippines (found under stones at low water); Cuming.

The ligament, as in the *Arca symmetrica*, occupies merely a small diamond-shaped space between the umbones.

Arca striata. *Arca testâ subquadrato-oblongâ, lateribus obtusè rotundatis; fuscescente, epidermide molli indutâ; radiatim striatâ, striis elevatis, confertis, posticis distantioribus; ligamenti areâ latiusculâ, declivi.*

Conch. Icon. *Arca*, pl. 17. f. 121.

Hab. —— ?

This shell approaches very nearly to the *Arca lactea*, but it is yet distinct; the posterior side is longer, it is a more compressed shell, and the posterior striæ are more widely spread.

Arca pulchella. *Arca testâ ovatâ, gibbosâ, lateribus supernè attenuatis, antico brevissimo; albâ; laminis longitudinalibus prominentibus, pulcherrimè fimbriatis, ornatâ; ligamenti areâ anticè latiusculâ; umbonibus anticis.*

Conch. Icon. *Arca*, pl. 17. f. 122.

Hab. Algeria.

This species is well distinguished from any yet described by the very beautifully fimbriated longitudinal laminæ.

August 27.—Richard C. Griffith, Esq., in the Chair.

Mr. Fraser read a description of a new species of Crowned Pigeon from New Guinea, now in the Gardens of the Society. In honour of Her Most Gracious Majesty, the Patroness of the Society, he proposed the name of

Lophyrus Victoria*. *L. ptilose saturatè cæruleo-grisea; singulis plumis cristæ upice barbato cæruleo, albo marginato; pectore castaneo; tectricibus alarum majoribus cinereo-cæruleis, castaneo marginatis.*

The general colour of this species is an intense blue-grey, becoming lighter on the head; the chest is deep chestnut; the larger wing-coverts are light blue-grey, tipped with dark chestnut; the head is surmounted with a crest, each feather of which is of a similar construction as that of *Columbus coronatus*, but spreading into a spatulate form at the extremities, of a blue colour, bordered with white; there is also a dark mark passing through the eye; irides vermilion.

In size it is somewhat larger than *C. coronatus*.

Hab. New Guinea.

This lovely species is closely allied to *C. coronatus*, but differs from that bird in having terminal points to the crest-feathers, in the darker colouring, in having chestnut on the breast instead of the back and shoulders, and in having the larger wing-coverts pale blue-grey, terminated with chestnut, in the place of white, tipped with chestnut.

"Description of new species of *Ranella*," by Lovell Reeve, Esq.

Ranella albivaricosa. *Ran. testâ oblongo-ovatâ, depressiusculâ, varicibus tuberculis subspinosis prominentibus armatis; anfractibus leviter angulatis, tuberculis subspinosis infra angulum biseriatim armatis, transversim elevato-striatis, infernè liratis, striis lirisque leviter undulatis, subtilissimè granulatis; albâ, rufescente-fusco tinctâ, varicibus niveis; aperturâ oblongo-ovali, utrinque canaliculatâ, fauce pallidè purpurascente; labro dentato et sulcato.*

Conch. Icon., *Ranella*, pl. 1. f. 2.

Murex rana, Linnæus; Martini, Conch., vol. iv. pl. 133. f. 1270–71.

Hab. Ceylon.

How comes it to pass that this common and peculiarly characteristic species has escaped the notice of so many good discriminating conchologists who have written on the genus?

Ranella pustulosa. *Ran. testâ ovatâ, subdepressâ, ponderosâ, castaneâ; anfractibus pustularum grandium seriebus duabus tribusve livido-castaneis cingulatis; varicibus granuloso-liratis; columellâ granuloso-rugosâ, rugis albidis; labro planissimè fimbriato, supernè sinuato, fusco, radiatim albisulcato.*

Conch. Icon., *Ranella*, pl. 3. f. 11.

Hab. Ascension Island.

This shell approximates so closely to the *Ranella cælata* in the

* "*Lophyrus*, Vieill. (1816); *Goura*, Steph. (1819); *Megapelia*, Kaup (1836); *Ptilophyrus*, Swains. (1837)." G. R. Gray's 'Genera of Birds.'

style and character of its sculpture, that a specimen or two of different ages seem all that is necessary to exhibit a complete specific connection between them; it has however been demonstrated by the researches of two gentlemen of perhaps the greatest practical experience, Mr. Cuming and Mr. Hinds, that no species of shell common to the western coast of South America has ever been discovered on the coast of Africa.

Ranella ponderosa. *Ran. testâ acuminato-ovatâ, crassâ, ponderosâ, varicibus valdè prominentibus; anfractibus supernè leviter angulatis, granulorum seriebus cingulatis, alternis granulis grandibus, bipartitis; rubido-fuscâ, lutescente; columellâ granulatâ et rugosâ; canali brevi, subrecurvo; labro plano-incrassato, granulato, supernè sinuato.*

Conch. Icon., *Ranella*, pl. 3. f. 14.

Hab. —— ?

The sculpture of this shell approaches very nearly to that of the *Ranella cælata*; it only requires however a slight examination of the specimens before me in different stages of growth, to see that they are specifically distinct.

Ranella nobilis. *Ran. testâ oblongo-ovatâ, depressâ, crassiusculâ; spirâ acuminatâ, varicibus angustis, radiatim stellatis; anfractibus granuloso-liratis, præcipuè super varices, in medio tuberculatis, anfractu ultimo tuberculorum seriebus duabus armato; albidâ, fuscescente subtiliter maculosâ; columellâ fortiter rugosâ; aperturâ oblongâ, utrinque canaliculatâ, fauce albâ; labro fortiter rugoso.*

Conch. Icon., *Ranella*, pl. 4. f. 16.

Hab. —— ?

The form of this noble species is somewhat intermediate between that of the *Ranella pulchra*, or "Finned Frog," and the ordinary type of the genus, the varices exhibiting an indication of that peculiar star-like radiation common to the former, whilst the aperture is of an oblong canaliculated form, with the wrinkled lip and columella of the latter. The sculpture most resembles that of the *Ranella foliata*.

Ranella coriacea. *Ran. testâ oblongo-ovatâ, depressiusculâ, spirâ subobtusâ, varicibus rotundatis; anfractibus undique creberrimè granulatis, transversim costatis, costis latis, interdum subobsoletis, irregulariter tumido-nodosis; aurantio-fuscescente; columellâ sparsim rugosâ; aperturâ ovatâ, utrinque leviter sinuatâ; labro intus radiatim denticulato.*

Conch. Icon., *Ranella*, pl. 6. f. 26.

Hab. —— ?

This interesting species, which Mr. Cuming possesses in different stages of growth, is the shell figured by Mr. G. B. Sowerby, jun., in the 'Conchological Illustrations' as a variety of his *Ranella scrobiculator* (*Triton scrobiculator*, Lamarck and others); I think, however, with M. Deshayes, that it is "*une coquille qui me paraît toujours différente; j'en ai vu plusieurs exemplaires et plusieurs figures,* *et j'ai observé des différences spécifiques constantes. Cette soi-disant variété a plutôt les caractères des Ranelles que le* Scrobiculator *proprement dit, et c'est sans doute ce qui explique pourquoi un certain nombre de conchyliologues veulent que le* Scrobiculator *soit une Ranelle. Pour nous, qui en avons vu l'animal, c'est un Triton.*" Note in new edition of Lamarck's Anim. sans vert., vol. ix. p. 626.

Ranella lívida. *Ran. testâ ovato-turritâ, spirâ acuminatâ; anfractibus supernè depressis, ad suturam granulatis, infra lævibus, transversim noduloso-liratis, in medio tuberculorum seriebus duabus compressis armatis; lividâ, fuscescente variâ; columellâ subtiliter rugosâ; aperturâ ovatâ, utrinque sinuatâ; labro denticulato.*

Conch. Icon., *Ranella*, pl. 6. f. 28.

Ranella granifera, Kiener (not of Lamarck).

Hab. Island of Annaa, Pacific Ocean (found on the coral reefs); Cuming.

I do not see how M. Kiener can identify this tuberculated shell with Lamarck's description of *Ranella granifera.*

Ranella plicata. *Ran. testâ oblongâ, sub-Muriciformi; anfractibus rotundatis, scabris, longitudinaliter plicatis, in medio nodulosis; livido-olivaceâ, zonâ albidâ in medio cinctâ; columellâ lævi, canali longiusculo.*

Conch. Icon., *Ranella*, pl. 7. f. 33.

Hab. ——?

The plicated growth of this shell is developed with the neatest regularity from the apex to the margin.

Ranella venustula. *Ran. testâ ovatâ, crassiusculâ, varicibus valdè obliquis; anfractibus transversim costatis, granulatis et punctatis, supernè angulatis, prope suturam corrugatis, ad angulum fortiter tuberculatis; columellâ excavatâ, nigricante-purpureâ, albigranulosâ; aperturâ rotundâ, utrinque canaliculatâ, fauce roseo-purpureâ; labro incrassato, nigro-purpureo.*

Conch. Icon., *Ranella*, pl. 7. f. 37.

Hab. ——?

This species is remarkably characterized by its rich dark purple columella granulated with white.

Ranella siphonata. *Ran. testâ ovatâ, crassiusculâ, varicibus perspicuè canaliculatis; anfractibus transversim rudè costatis et tuberculatis, undique granulatis et punctatis, prope suturam corrugatis; luteolâ; columellâ vix rugosâ, roseo-purpurascente; aperturâ rotundâ, fauce roseo-purpurascente, utrinque canaliculatâ, canali supero valdè elato-siphonato.*

Var. β. *Testâ albâ aut luteolâ, nigro-cærulescente fasciatâ et punctatâ; columellâ albâ, aperturæ fauce albâ.*

Conch. Icon., *Ranella*, pl. 7. f. 38.

Hab. Philippine Islands; Cuming.

I take this shell to be quite distinct from the dark variety of the *Ranella bufonia* to which it is allied.

Ranella tuberosissima. *Ran. testâ ovatâ, varicibus perspicuè canaliculatis; anfractibus transversim rudè costatis, dorsim tube-*

rosissimis, undique granulatis et punctatis, prope suturam corrugatis; albidâ, nigro-cærulescente punctatâ; columellâ lævi, croceâ; aperturâ rotundâ, vividè croceâ, utrinque canaliculatâ; canali supero elato-siphonato, supernè intus nigricante tincto; labro fortiter dentato.

Conch. Icon., *Ranella*, pl. 7. f. 39.

Hab. Philippine Islands; Cuming.

An extraordinary humped shell with a yellow mouth.

Ranella triquetra. *Ran. testâ elongato-Muriciformi, varicibus supernè mucronatis; anfractibus angulatis, ad angulum tuberculatis, supra lævibus, infra obsoletè liratis; livido-olivaceâ; columellâ lævi; canali longiusculo; aperturâ parvâ; labro vix denticulato.*

Conch. Icon., *Ranella*, pl. 7. f. 41.

Hab. San Diego, California; Nuttall.

Quite distinct in my opinion from the *R. Muriciformis*, which is a flat pinnated shell.

Ranella hastula. *Ran. testâ parvulâ, sublanceolatâ, depressâ, ancipiti; anfractibus transversim granoso-striatis, lamellis elevatis indistinctè diadematis; castaneo-fuscâ; columellâ lævi; canali brevi, recurvo; aperturâ parvâ.*

Conch. Icon., *Ranella*, pl. 8. f. 42.

Hab. ——?

This little dark granulated shell, though less pyramidal, is of similar structure to the *Ranella anceps.*

Ranella rosea. *Ran. testâ pyramidali-ovatâ, varicibus subobliquis; anfractibus supernè leviter angulatis, transversim striatis, undique seriatim tuberculato-nodulosis, nodulis ad angulum bipartitis; vividè coccineo-roseâ, nodulis luteis; canali breviter recurvo, aperturâ parvâ.*

Conch. Icon., *Ranella*, pl. 8. f. 46.

Hab. Island of Ticao, Philippines; Cuming.

This pretty little species exhibits a very agreeable contrast of colour, namely, yellow nodules upon a bright scarlet-rose ground.

Ranella cuspidata. *Ran. testâ acuminato-ovatâ, crassiusculâ, solidâ, varicibus obliquis; anfractibus transversim noduloso-liratis, tuberculis duobus obtusis inter varices ornatis; albidâ, luteo-aurantio plus minusve tinctâ; columellâ lævi; canali breviusculo, recurvo; aperturâ parvâ, ovato-rotundatâ.*

Conch. Icon., *Ranella*, pl. 8. f. 48.

Hab. Islands of Capul and Ticao, Philippines; Cuming.

This shell has somewhat the form and general character of the *Ranella bitubercularis*, though it is of more solid growth and of a peculiar orange-yellow colour.

"A continuation of a paper by Sylvanus Hanley, Esq., on new species of the genus *Tellina*, chiefly collected by Hugh Cuming, Esq. in the Philippine Islands and Central America":—

Tellina Rodon. *Tel. testâ oblongâ, tenuissimâ, compressiusculâ, lævi, nitidissimâ, roseâ, pellucidâ, valdè inæquilaterali, utrinque ro-*

tundatâ; margine ventrali convexiusculo; dorsali anticè vix declivi et convexiusculo, posticè subdeclivi; latere postico brevi, subattenuato; flexurâ obsoletâ; dente laterali approximato, antico. Long. 0·38; lat. 0·83 poll.

Hab. —— ? Mus. Cuming.

Allied to *coccinea*, but more elongated and glossy.

Tellina lux. *Tel. testâ subovali, tenui, pellucidâ, compressâ, nitidâ, aurantiâ, sublævigatâ, inæquilaterali; margine ventrali convexiusculo; dorsali utrinque subdeclivi, anticè convexiusculo, posticè brevi et incurvato; latere postico breviore obtusissimè biangulato; extremitate anticâ obtusè rotundatâ; flexurâ nullâ; dente laterali antico, approximato, distincto.* Long. 0·55; lat. 0·80 poll.

Hab. Philippines. Mus. Hanley.

Two specimens of this rare shell, which possesses the general appearance of *T. psammotella*, were selected by me from a large number of *T. Philippinarum*.

Tellina hilaris. *Tel. testâ oblongo-cuneiformi, tenui, compressiusculâ, inæquilaterali, nitidâ, lævi, roseâ, albo biradiatâ; radiis latis, submediis; margine ventrali convexiusculo; dorsali anticè declivi, posticè subrecto et valdè declivi; extremitate lateris antici longioris rotundatâ; extremitate posticâ brevi, cuneiformi; flexurâ obsoletâ; dente laterali unico, parvo, subapproximato.* Long. 0·37; lat. 0·62 poll.

Hab. —— ? Mus. Cuming.

Possessing the general contour of *T. tenera*, but more elongated and wedge-shaped. The colouring is rich and peculiar, being deep rose-colour, adorned with two broad white rays, one leaning forwards and the other with a posterior inclination. I suspect it comes to us from the Philippine Islands.

Tellina juvenilis. *Tel. testâ ovato-subtrigonâ, tenui, pellucidâ, nitidâ, compressiusculâ, rubro-aurantiâ, lævigatâ, inæquilaterali; margine ventrali convexo aut convexiusculo; dorsali anticè subrecto declivi, posticè convexo et valdè declivi; latere antico longiore, subattenuato, rotundato; postico brevi et obtusè subcuneiformi; costâ umbonali et flexurâ subobsoletis; dente laterali parvo, antico.* Long. 0·45; lat. 0·60 poll.

Hab. Philippines.

Closely resembling the Mediterranean variety of *T. tenuis*.

Tellina vestalis. *Tel. testâ oblongo-angustâ, tenuissimâ, convexiusculâ, nitidâ, lævi, intus extusque niveâ, inæquilaterali; margine ventrali subrecto, paululùm convexiusculo; dorsali anticè minimè declivi et paululùm convexiusculo, posticè prope ligamentum excavato, deinde declivi; extremitate lateris antici longioris rotundatâ; extremitate posticâ subemarginatâ, subattenuatâ, obtusè biangulatâ; flexurâ obsoletâ; dente laterali antico, approximato.* Long. 0·60; lat. 1·13 poll.

Hab. Isle of Negros; in coral sand, at seven fathoms: isle of Luzon; in sandy mud, at six fathoms.

Closely allied to the *Tellinides truncatulus* of Sowerby.

Tellina vernalis. *Tel. testâ subovali, tenuissimâ, compressiusculâ, pellucidâ, lævi, nitidissimâ, albido-roseâ, valdè inæquilaterali, utrinque rotundatâ; margine ventrali convexiusculo; dorsali utrinque paululùm convexiusculo, posticè declivi, anticè vix minimè declivi; latere antico producto, postico brevi; flexurâ obsoletâ; dente laterali minimo, antico, subapproximato.* Long. 0·40; lat. 0·63 poll.

Hab. Singapore; soft sandy mud, at seven fathoms.

The outline is somewhat similar to *T. lux*, and both the texture and colouring are most delicate.

Tellina spectabilis. *Tel. testâ ovato-trapeziformi, subtenui, ventricosâ, maximè inæquilaterali, impolitâ, intus extusque albidâ, concentricè striatâ; striis rugosis, elevatis, tenuibus; margine ventrali paululùm convexo; dorsali anticè convexo et declivi, posticè recto aut subincurvato et maximè declivi; extremitate lateris antici longioris obtusâ; extremitate posticâ truncato-cuneiformi, obtusè biangulatâ; costâ umbonali et flexurâ conspicuis; ligamento magno, haud prominente; dentibus primariis minimis, lateralibus nullis.* Long. 2·15; lat. 2·75 poll.

Hab. Bay of Manila and island of Siquijor; on coral sand, at low water. Mus. Cuming, Hanley.

Allied to the *ephippium* of Spengler, but easily distinguished by the extreme disparity of its sides.

Tellina grandis. *Tel. testâ ovali, subtrigonâ, solidâ, convexâ, subinæquivalvi, lævi, subimpolitâ, intus extusque albidâ, anticè rotundatâ; margine ventrali convexiusculo; dorsali utrinque declivi, posticè recto aut subrecto, anticè vix convexiusculo; extremitate lateris antici brevioris obtusâ; flexurâ costâque umbonali subobsoletis; ligamento magno; dentibus lateralibus nullis.* Long. 2·40; lat. 3·30 poll.

Hab. Tumbez, Peru.

A large species, which assumes the appearance of a *Lutraria*. An extremely thin greenish ashy epidermis is perceptible near the lower margin.

Tellina Bruguieri. *Tel. testâ rotundato-trigonâ, solidâ, subæquilaterali, convexâ, impolitâ, intus extusque albidâ, sublævigatâ, anticè obtusâ, posticè rotundatâ; margine ventrali convexo aut subarcuato; dorsali posticè elevatiore, valdè declivi et paululùm convexo, anticè arcuato et declivi; natibus prominentibus, anticè incumbentibus; flexurâ costâque umbonali obsoletis; ligamento infosso; lunulâ parvâ; dentibus primariis maximis, lateralibus nullis.* Long. 1·50; lat. 1·80 poll.

Hab. Ilo-Ilo, isle of Panhay; hard sand.

This species is evidently represented at plate 231. figure 2. of the 'Encyclopédie Méthodique,' but as no name accompanies the delineation, I have assigned to it its present one, in honour of the illustrious author of the letter-press to that work.

Tellina gubernaculum. *Tel. testâ subovatâ, subinæquivalvi, tenui, compressiusculâ, lævi, extus intusque albidâ, valdè inæqui-*

laterali; margine ventrali convexiusculo, anticè sursum acclinante; dorsali, anticè magis minusve convexo et declivi, posticè recto brevi, et subito declivi; extremitate lateris antici longioris attenuato-rotundatâ; extremitate posticâ brevissimâ, truncato-cuneiformi; flexurâ costâque umbonali obsoletis; ligamento infosso; dentibus primariis parvis, lateralibus nullis. Long. 1·45; lat. 1·90 poll.

Hab. Real Llejos, Central America; in sandy mud, seven fathoms.

Closely allied to the *truncata* of Jonas, but that species is much thicker and its shorter extremity simply wedge-shaped.

Tellina formosa. *Tel. testâ obovatâ, convexiusculâ, valdè inæquilaterali, albidâ, radiis interruptis roseis, striisque minutis confertis obliquis, undique ornatâ; margine ventrali convexo; dorsali utrinque convexiusculo, anticè subdeclivi, posticè valdè declivi; extremitate lateris antici producti rotundatâ, postici brevissimi obtusissimè angulatâ; flexurâ subobsoletâ; dentibus lateralibus nullis.* Long. 0·43; lat. 0·55 poll.

Hab. Daleguete, Zebu; sandy mud at ten fathoms.

The absence of lateral teeth, the general shape, the brilliant colouring and minute oblique striæ, unite in rendering this unique shell easily distinguishable from any species of this genus.

Tellina Sol. *Tel. testâ oblongo-ellipticâ, solidiusculâ, compressâ, nitidâ, rubro-aurantiâ, alterâ in valvulâ concentricè substriatâ, alterâ sublævigatâ; margine ventrali convexo, posticè sursum acclinante; dorsali utrinque subdeclivi, convexiusculo; latere antico longiore, ad extremitatem rotundato; extremitate posticâ in junioribus subacuminatâ, in adultis obtusè angulatâ; natibus planulatis; ligamento infosso; dente laterali unico, antico, distincto.* Long. 2·40; lat. 4·25 poll.

Hab. —— ? Mus. Cuming, Metcalfe.

This truly magnificent shell unites the aspect of the *acuta* of Wood to the brilliant hues of *T. foliacea*. The concentric striæ are extremely fine and regular, but become stronger and more decided towards the lower margin, where obsolete radiating lines are likewise perceptible. The smoother valve of Mr. Cuming's superb specimen is rayed with paler streaks, but this is not the case in the few other specimens I have ever beheld of this gorgeous species. The apex is colourless and not rosy as in *acuta*.

Tellina virgo. *Tel. testâ ovato-oblongâ, tenuissimâ, planulatâ, nitidissimâ, niveâ, pellucidâ, striis obliquis flexuosis subremotis in valvulâ utrâque ornatâ; margine ventrali convexiusculo; dorsali antico magis minusve declivi, convexo; latere postico breviore, subcuneiformi; flexurâ costâque umbonali obsoletis; ligamento satis prominente; dente laterali antico, parvo, subapproximato.* Long. 0·55; lat. 0·92 poll.

Hab. —— ? Mus. Cuming.

Allied to the *Iris* of Say, but much larger. The remote oblique striæ entirely cease before arriving at the hinder extremity. It is the most pellucid and glassy-looking bivalve I am acquainted with.

Tellina imbellis. *Tel. testâ ellipticâ, inæquivalvi, solidiusculâ,* *extus intusque albidâ, nitidâ, valdè inæquilaterali; alterâ valvulâ lævi, complanatâ; alterâ convexâ et lineis concentricis elevatis, posticè striatâ; margine ventrali convexo; dorsali antico convexiusculo et paululùm declivi; extremitate lateris antici longioris rotundatâ; extremitate posticâ obtusè angulatâ; ligamento prominente; flexurâ nullâ; dente laterali antico, minimo, approximato.* Long. 0·90; lat. 1·50 poll.

Hab. —— ?

Closely resembling a *Psammobia*, the minute lateral tooth being scarcely visible.

Tellina Valtonis. *Tel. testâ ovato-oblongâ, fragili, complanatâ, subinæquilaterali, nitidissimâ, pellucidâ, roseâ, radiis geminis albidis posticè ornatâ, lineisque minutis concentricè substriatâ; margine ventrali convexiusculo; dorsali antico subdeclivi, convexo; extremitate posticâ paululùm breviore, vix rotundato-angulatâ; flexurâ, costâque umbonali, obsoletis; dente laterali antico, parvo, subapproximato.* Long. 0·53; lat. 0·72 poll.

Hab. —— ? Mus. Metcalfe.

I have named this shell in honour of W. Walton, Esq., whose rich collection has proved of great service to me in my investigation of the very numerous species of this beautiful genus. It differs from *exilis* by the absence of regular suboblique striulæ and by the hinder extremity not being decidedly wedge-shaped.

Tellina frigida. *Tel. testâ ovali, solidiusculâ, convexâ, inæquilaterali, nitidâ, albidâ (intus candidâ), lævigatâ, utrinque rotundatâ; margine ventrali convexo; dorsali antico, subdeclivi, convexo; latere postico planè breviore; natibus inconspicuis; flexurâ, costâque umbonali, obsoletis; dentibus primariis minimis, lateralibus nullis.* Long. 0·70; lat. 1 poll.

Hab. Kamtschatka. Mus. Petit, Hanley.

I am indebted to M. Petit de la Saussaye for the possession of this rare species. It is closely allied to the *edentula* of Sowerby, but the beaks are more prominent in that species, and its posterior termination more angular.

Tellina elongata. *Tel. testâ oblongo-angustâ, subtenui, subventricosâ, intus extusque albâ, lævigatâ, valdè inæquilaterali, anticè rotundatâ; margine ventrali medio subretuso, anticè sursum acclinante; dorsali anticè convexiusculo et vix paululùm declivi, posticè producto, recto aut subretuso satisque declivi; latere postico brevi, truncato-acuminato hiante; ligamento subinfosso; flexurâ subobsoletâ; dentibus lateralibus nullis.* Long. 1·12; lat. 2·20 poll.

Hab. Chiquiqui, West Columbia; in sand at three fathoms.

The extremely narrow shape, and the peculiarity of its upper and lower edges being almost parallel, separate it from the majority of its section; it is however closely allied to the succeeding species.

Tellina assimilis. *Tel. testâ* T. elongatæ *simillimâ, sed magis ventricosâ, et extremitate posticâ contortâ, subrostratâ.* Long. 0·45; lat. 0·95 poll.

Hab. Isle of Luzon; in sandy mud, six fathoms.

Tellina inornata. *Tel. testâ ovato-oblongâ, subtenui, subventricosâ, impolitâ, subæquilaterali, sordidè albidâ, epidermide tenui et cinereâ indutâ, lævigatâ; marginis ventralis parte mediâ rectâ aut subretusâ; dorsalis parte anticâ convexiusculâ et paululùm declivi, parte posticâ subdeclivi; extremitate anticâ rotundatâ, posticâ attenuato-rotundatâ; flexurâ, costâque umbonali, obsoletis; dentibus lateralibus nullis.* Long. 0·82; lat. 1·30.

Hab. Conception, Chili; soft mud, six fathoms.

A fossil-like shell, which is devoid of striking characteristics, and much resembles an elongated *Edentula.*

Tellina cygnus. *Tel. testâ ovatâ aut ovato-oblongâ, solidiusculâ, subæquilaterali, convexâ, extus nitidâ, intusque candidâ, concentricè substriatâ; margine ventrali convexiusculo; dorsali anticè subrecto et paululùm declivi, posticè recto et valdè declivi; extremitate anticâ rotundato-obtusâ, posticâ cuneiformi, subrostratâ; flexurâ ventrali distinctâ; ligamento infosso; superficie internâ submargaritaceâ; dentibus lateralibus nullis.* Long. 0·40; lat. 0·63 poll.

Hab. Bias, isle of Negros; coral sand, seven fathoms.

Closely resembling *corbuloides* in shape, but narrower, possessing distinct concentric striæ, and devoid of lateral teeth.

Tellina Dombei. *Tel. testâ obovatâ, inæquilaterali, solidâ aut solidiusculâ, convexâ aut subventricosâ, impolitâ, lævigatâ, albidâ, natibus roseo tinctis; margine ventrali subrecto; dorsali anticè subdeclivi et convexo, posticè subrecto satisque declivi; extremitate anticâ rotundatâ, posticâ brevi, subangulatâ; ligamento infosso; costâ umbonali et flexurâ distinctis; disco interno aurantio-roseo; dentibus lateralibus nullis.* Long. 1·60; lat. 2 poll.

Hab. Panama; twelve fathoms, sandy mud.

Allied to the *umbonella* of Lamarck, but with the fold and flexure more distinctly marked.

Sept. 10.—William Horton Lloyd, Esq., in the Chair.

Continuation of a paper on the new species of the genus *Tellina,* by Sylvanus Hanley, Esq.:—

Tellina miles. *Tel. testâ* T. cuspidi *affini, sed oblongâ, rostratâ, et magis compressâ; margine antico dorsali vix paululùm declivi; ventrali convexo; valvulâ alterâ lineis elevatis concentricis undique striatâ.* Long. 0·90; lat. 1·88 poll.

Hab. ——? Mus. Metcalfe.

A beautiful shell, which reminds one slightly of the *rosea* of Spengler, and closely resembles a produced and flattened specimen of *Tellina cuspis.*

Tellina Lilium. *Tel. testâ ovato-oblongâ, tenuiusculâ, subventricosâ, extus intusque albâ, concentricè substriatâ; striis supra costam umbonalem elevatis; margine ventrali subrecto; dorsali anticè subrecto paululùmque declivi; latere antico producto, infernè* *ad extremitatem obliquè rotundato; latere postico, brevi, cuneiformi; dentibus lateralibus nullis.* Long. 0·50; lat. 0·80 poll.

Hab. Isle of Burias, sandy mud, low water; and isle of Negros, coral sand, seven fathoms: Cuming.

One of the many species which are destitute of any striking characteristics.

Tellina plebeia. *Tel. testá subovatá, convexá, lævigatá, intus extusque albidâ, umbonibus hyalinis et rubro-aurantiis; margine ventrali convexo aut subarcuato; dorsali, anticè prope nates recto et paululùm declivi, posticè recto satisque declivi; latere antico longiore, rotundato; extremitate posticá obtusè angulatá; ligamento infosso; dentibus lateralibus nullis.* Long. 1·15; lat. 1·70 poll.

Hab. Real Llejos, Central America; sandy mud, seven fathoms.

Very closely allied to the *umbonella* of Lamarck.

Tellina Aurora. *Tel. testá* T. Psammotellæ *simillimá, convexiore autem, et umbonibus rubro-aurantiis; ligamento infosso; dentibus lateralibus nullis.* Long. 0·75; lat. 1·23 poll.

Hab. Panama; soft sandy mud, ten fathoms: Cuming.

Both this and the succeeding species are not unlike Chemnitz's figure of *T. oblonga*, but the description by no means accords.

Tellina lucerna. *Tel. testá oblongá, subventricosá, lævigatá, albidá, umbonibus aurantiis, anticè longiore et rotundatá, posticè obtusè cuneiformi; margine ventrali subrecto; dorsali, anticè paululùm et posticè satis declivi, utrinque subrecto; ligamento subinfosso; disco interno aurantio; dentibus lateralibus nullis.* Long. 0·90; lat. 1·42 poll.

Hab. Isle of Negros and Isle of Misamis; sandy mud, low water: Isle of Panay, hard sand: Cuming.

Tellina scalpellum. *Tel. testá oblongá, tenuissimá, compressá, nitidissimá, valdè inæquilaterali, roseá, pellucidá, sublævigatá; margine ventrali subrecto; dorsali antico paululùm declivi et subrecto; latere postico brevi et obtusè subcuneiformi; extremitate anticá rotundatá; ligamento parvo, prominulo; dentibus lateralibus nullis.* Long. 0·25; lat. 0·50 poll.

Hab. Isle of Zebu; sandy mud, low water: Cuming.

More produced than in the majority of the smaller species, and of a peculiarly deep rose-colour.

Tellina Diana. *T. testá* T. Galatheæ *simillimá, subovatá autem, punctisque nullis; margine dorsali etiam utrinque magis declivi, ventrali convexiore, et extremitate posticá magis obtusá.* Long. 1·05; lat. 1·50 poll.

Hab. Java? Mus. Hanley, &c.

Tellina ancilla. *Tel. testá oblongo-elongatá, convexiusculá, nitidissimá, candidá, concentricè substriatá, lineisque obsoletis radiantibus ornatá; striolis supra costam umbonalem subobsoletam, remotioribus, distinctis, subimbricatis; margine ventrali subrecto; dorsali, anticè subdeclivi et convexiusculo, posticè subrecto et de-*

clivi; latere antico producto; postico obtusè cuneiformi; dentibus lateralibus nullis. Long. 0·45; lat. 1 poll.

Hab. Lord Hood's Island, on fine coral-sand: Cuming.

Tellina Hiberna. *Tel. testâ oblongâ, solidâ, compressiusculâ, valdè inæquilaterali, subnitidâ, candidâ, lævigatâ; margine ventrali subrecto; dorsali anticè convexiusculo et paululùm declivi, posticè primùm convexo deinde subincurvato; latere antico producto; postico brevi, cuneiformi; ligamento prominulo; dente laterali antico magno, approximato.* Long. 0·45; lat. 0·75 poll.

Hab. Panama and Bay of Guayaquil; six to eleven fathoms, in sandy mud: Cuming.

Closely allied to *T. polita.*

Tellina Deshayesii. *Tel. testâ* T. Spengleri *simillimâ, sed albido-roseâ, et lamellis subremotis concentricè ornatâ; margine etiam ventrali magis convexo.* Long. 0·60; lat. 1·55 poll.

Hab. Red Sea? Mus. Cuming, Deshayes.

However closely resembling *T. Spengleri,* it is nevertheless with facility to be distinguished by its regular (and not oblique) concentric lamellæ.

Tellina tulipa. *Tel. testâ* T. Donacinæ *simillimâ, sed subæquilaterali, et margine dorsali rosei coloris experte.* Long. 0·50; lat. 0·95 poll.

Hab. ——? Mus. Cuming, Walton.

Extremely like *T. Donacina,* but almost equilateral, and devoid of the short vertical ray at the beaks and the rosy dorsal edges which are characteristic of that species.

Tellina Pharaonis. *Tel. testâ* T. rostratæ *simillimâ, sed solidâ, lineisque elevatis concentricè striatâ; umbonibus aurantio-roseis; sinu postico distincto.* Long. 1·20; lat. 3·20 poll.

Hab. Red Sea. Mus. Metcalfe.

This magnificent shell is one of the first fruits of the recent systematic investigation of the fauna of the Red Sea.

Tellina spinosa. *Tel. testâ ovatâ, solidiusculâ, impolitâ, inæquilaterali, convexiusculâ, extus intusque albidâ, striis minutis confertissimis elevatis, concentricè asperatâ; margine ventrali arcuato, posticè sursum acclinante; dorsali posticè elevatiore convexo et declivi, anticè prope nates acutas subincurvato deinde subrecto et subdeclivi; latere postico brevi; extremitate anticâ rotundatâ; posticâ seriebus duabus vel tribus radiantibus spinarum serratâ; lunulâ parvâ, distinctâ; ligamento infosso; dente laterali antico subapproximato, postico remoto.* Long. 0·60; lat. 0·80 poll.

Hab. Isle of Ticao, six fathoms.

Mr. Cuming's unique specimen of this curious shell possesses characters which cannot readily be confounded with any other species. It is to *Gargadia,* however, that it is most allied.

Tellina fimbriata. *Tel. testâ obovato-rotundatâ, solidâ, convexâ, candidâ, striis concentricis confertissimis lamellosis fimbriatis, et* *lineis radiantibus confertis, decussatâ; margine ventrali arcuato, posticè sursum acclinante; dorsali utrinque convexiusculo, anticè subdeclivi, posticè valdè declivi; latere antico longiore, rotundato; extremitate posticâ brevi, angulatâ; costâ umbonali valdè conspicuâ; ligamento infosso; lunulâ distinctâ; dentibus lateralibus subremotis, subæquidistantibus.* Long. 1·25; lat. 1·42 poll.

Hab. ——? Mus. Cuming.

In sculpture not unlike *T. decussata*; in form more akin to *T. ostracea.*

Tellina subtruncata. *Tel. testâ obovatâ, valdè inæquilaterali, albidâ, striis lamellosis fimbriatis confertissimè ornatâ; margine ventrali anticè arcuato, posticè subrecto et sursum acclinante; dorsali utrinque magis minusve convexo, anticè declivi, posticè maximè declivi; extremitate anticâ rotundatâ; latere postico brevissimo, subtruncato, angulato; ligamento infosso; dentibus lateralibus subæquidistantibus.* Long. 0·60; lat. 0·75 poll.

Hab. Isle of Bohol; on the reefs, low water.

I had almost regarded the first specimen of this rare shell in Mr. Cuming's collection as a monstrosity, but the examination of another specimen in Sir Edward Belcher's cabinet has satisfied me that the seemingly diseased and stunted appearance is characteristic and not accidental.

Tellina perplexa. *Tel. testâ* T. ostraceæ *affinis, subovatâ autem, striisque ejus concentricis, magis confertis et supernè haud lamellosis; margine dorsali antico paululùm declivi.* Long. 1·20; lat. 1·65 poll.

Hab. Bay of Manila; sandy mud, six fathoms: Cuming.

Rather a solid shell, which is apparently closely allied to the *lintea* of Conrad; but the curvature of the ligamental margin, as represented in the figure of that shell, by no means agrees with its direction in *perplexa.*

MISCELLANEOUS.

ABUNDANT OCCURRENCE OF RARE INFUSORIA IN THE SCALLOP.

To the Editors of the Annals of Natural History.

Gentlemen,—The discovery some time since of the siliceous shells and cases of animalcules in the stomach of recent *Lepades*, belonging to many of the genera and some of the species which constitute a large proportion of the miocene tertiary strata of Virginia, was announced in Dr. Mantell's recent work the 'Medals of Creation.' (See vol. i. p. 586.) This fact, so highly interesting in a geological point of view, has since been fully established by many observers; and among others by the Rev. J. B. Reade, who has communicated the result of his examination of the oyster to the Microscopic Society. Having subsequently extended my investigations to the contents of the digestive sac of other mollusks, it may interest your readers to be informed that the common scallop (*Pecten maximus*) now in season, and therefore easily obtained, contains a richer assemblage of the most beautiful siliceous carapaces of animalcules than any other of the mollusca hitherto noticed.

So abundant and diversified are these forms in the scallop, that a few grains of the undigested contents of the stomach, properly prepared and mounted on a glass slide, exhibits many of the species usually found in the Richmond earth, and indeed could not be readily distinguished from a similar preparation of the fossil forms.

Another remarkable fact, also noticed in the 'Medals' (see p. 233), that of the occurrence of the mineralized bodies of Polythalamia, is fully confirmed; and when the eye of the observer becomes accustomed to the appearances presented by remains of this kind, they will be found abundantly in most chalk flints. I discovered one species in an atom of flint, in which the entire body of a *Rotalia*, except that part of it which occupied the outer cell, is as beautifully preserved as that of an insect in amber.

I am, Gentlemen, yours obediently,

Hamlin Lee.

Chester Square, Pimlico, April 21, 1845.

HÆMATOCOCCUS SANGUINEUS, AG.

In a valuable packet of Algæ lately received from Prof. Kützing, I was rejoiced to find a portion of an authentic specimen of the Alga published under the above name in the 'Icones Algarum.' It belongs to the genus *Microcystis* of Meneghini, and may vie with any of the curious forms published in his monograph. It proves identical with the Tobermorey plant of Mr. Harvey's 'Manual.' The Appin plant has quite a different structure, and will be illustrated in Mr. Hassall's work, which will we hope shortly be published.—M. J. Berkeley.

Observations on the Formation of Capillaries. By E. A. Platner.

As is well known, Schwann brought forward the view, that the capillaries were developed from cells, the star-shaped appendages of which became elongated. This view was adopted by Schwann from observations on the tails of young tadpoles, in which he found star-shaped cells between the capillaries, and from which he thought that they united to form capillaries. Schwann however never observed the actual formation of capillaries from these cells, nor did it occur to him that these cells are found in tadpoles of all ages, whilst, had his view been correct, they would have been rare or entirely absent in the older ones. During the past summer I have given my attention to this subject, and can now assert most positively, that capillaries are never formed from the stellar cells. From the examinations which I made not only on young tadpoles, but also on young tritons 1—1½ centimetre long, capillaries do not appear to be formed independently of the already existing vessels, but each new capillary is a continuation of those already formed, as I subsequently found out had been observed by Prevost and Lebert. If the tails of young tritons are observed, capillaries are readily met with, which terminate suddenly and bluntly like a bag. The termination of the vessel is completely closed, and no trace of a continuation can be detected. At this spot in several, a very thin long projection may be observed, which imperceptibly disappears, and in others, as if two such projections had united into a common arch; it may likewise be seen how this arch gradually increases in diameter. This arch is undoubtedly a new loop of capillaries. It is at first much too narrow to allow of the passage of blood-corpuscles. A fine granular matter appears moreover to close it, and even to prevent the passage of the *liquor sanguinis*. The double contour of a separate wall may very soon be perceived in it, especially at the point of its origin, but we never perceive any cells or their nuclei. The nuclei, so distinctly seen in the perfectly developed capillaries, which sometimes project inside, sometimes outside, must consequently belong to a later period; they cannot be the nuclei of cells from which the capillaries had formed by fusion.

Although I have convinced myself of this, I am at the same time in doubt, whether the nuclei which occur in the muscular fasciculi and the bundles of cellular tissue, from which, according to Henle, the so-called nucleolal fibres are developed, have not belonged to previously existing cells, and whether these nuclei do not owe their origin rather to a subsequent new production. This subject therefore deserves further observation.—*From Müller's Archiv*, 1844, Part 5.—J. W. G.

REPRODUCTION OF LOST PARTS IN THE ARTICULATA.

Amongst the subjects of physiological interest exhibited at our meetings, I may notice an instance of Gynandromorphism in *Arctia Caja*, by Mr. Evans; specimens of *Cossonus*, found in abundance in a recently opened barrow in Lancashire, by the Rev. W. Sibson; the parasitism of *Cœlyoxys conica* on *Saropoda furcata*, by myself; and the abnormal development and deficiency of joints in both antennæ of *Otiorhynchus picipes*, by Mr. Walton. But that which has appeared to me to be of the greatest interest is a subject that has often been before this Society,—the reproduction of lost parts in the Articulata. At a meeting of this Society in March last, Mr. Westwood exhibited a specimen of *Crœsus septentrionalis* "which had one of the hind legs much smaller than the other, and which he regarded as an instance of *arrested development*," in accordance with some very decided opinions formerly expressed by him. He also exhibited a large apterous *Phasma*, which had one of the hind legs smaller than the other; and this he regarded as an instance of *reproduction*. Both these examples were precisely analogous to the instance of reproduction in *Phasma* described in Mr. Fortnum's letter, and mentioned in my Address last year. On exhibiting these specimens Mr. Westwood expressed an opinion that the reproduction of lost parts can take place only in those insects which undergo an incomplete metamorphosis, and have active larvæ and pupæ, similar to the imago. He also announced his belief that those insects which undergo a complete metamorphosis,—as, for instance, the Lepidoptera,—are incapable of reproducing lost parts. To this very imperfect and partial view of a most important subject,—a view so little in accordance with the simple, uniform, and beautiful laws by which nature invariably works,—I could not, as your President, afford my assent; but expressed my decided belief that a reproduction of lost parts may take place in every Order of Insects, and throughout the whole of the Articulata. Unwilling, however, that either opinion should go forth to the world as that of the Entomological Society of London, or of its President, or of its Secretary, unsupported by facts, I availed myself of the earliest opportunity during the past summer of putting these opinions to the test of actual experiment. Several series of experiments were made on *Vanessa Urticæ* and *Vanessa Iö* with complete success, and the results of these experiments, the perfect insects, with their diminutive and newly-formed limbs, were exhibited to the Society at our last October meeting. Some of these specimens are now deposited in the cabinets of the British Museum, and others in the Hunterian Museum of the Royal College of Surgeons; and the details of the inquiries have been published elsewhere; so that this physiological question may now be regarded as completely settled. Experiments similar to my own were also made about the same time by one of our best physiologists, H. D. S. Goodsir, Esq., on the Crustacea. An interesting account of them was given by Mr. Goodsir to this Society when my own specimens of Lepidoptera were exhibited; and it was gratifying to find, that although some of the details of experiments on these two Classes of Articulata differed slightly, the great principles in both were precisely the same.—*From the Anniversary Address delivered at the Entomological Society, Feb.* 10, 1845, *by the President, G. Newport, F.R.C.S.*

Description of a new species of Solarium. By R. B. Hinds, Esq., R.N.

Solarium fuliginosum. *Sol. testâ orbiculato-conicâ, lævigatâ, fuligineo-fusco ornatâ; anfractibus inferioribus lævibus, subtumidis, superioribus longitrorsum plicatis, areâ medianâ pallidâ, strigis latis obliquis fuscis pictâ; ad peripheriam carinatâ, suprà areâ angustâ planulatâ maculis fuscis quadratis articulatâ; ad basin paulisper tumidâ, pallidâ, lævigatâ; aperturâ quadratâ; umbilico patulo, crenis rectis fuscis armato.* Diam. 21; umbilic. $5\frac{1}{2}$ lin.

Hab. —— ? Mus. Cuming.

The only specimen which is known to us is about the size of *S. formosum*, and is therefore materially smaller than the finer specimens of *S. perspectivum* or *S. trochleare*. The character of its ornation is however so very distinct from either of these, that it would mislead to push the comparison further. The species is perhaps rather thinner and lighter than usual, the inferior whorls and base are somewhat more tumid, and at the same time smooth; but the larger whorls are peculiarly decorated on their middle area with broad dark-brown flames, and are oblique as they proceed from the inferior portion upwards and forwards towards the left. The crenules are solid, straight, and of a dark-brown colour.—*Proc. Zool. Soc.* October 8, 1844.

METEOROLOGICAL OBSERVATIONS FOR MARCH 1845.

Chiswick.—March 1. Dry haze. 2. Fine: cloudy. 3. Rain. 4. Sharp frost: cloudy: clear and frosty. 5. Snowing: cloudy and cold: severe frost. 6. Severe frost: cloudy and cold: frosty. 7. Cloudy and cold: frosty. 8. Cloudy and cold: clear and frosty. 9. Cold and dry. 10. Overcast. 11. Fine, with clouds: clear and frosty. 12. Overcast: cloudy: sharp frost. 13. Frosty: cold and dry: severe frost at night. 14. Clear, with severe frost: cloudless, cold and dry. 15. Frosty: clear: cloudy: frosty. 16. Frosty: snowing. 17. Clear and frosty: bright sun: clear and frosty. 18. Clear and frosty: fine: overcast. 19. Overcast: fine. 20. Clear, cold and dry. 21. Clear: fine: overcast. 22. Overcast: slight rain. 23. Rain. 24. Cloudy: clear and fine. 25, 26. Cloudy and fine. 27. Overcast: boisterous. 28. Rain: boisterous. 29. Clear. 30. Clear: overcast: showery. 31. Cloudless and fine.—Mean temperature of the month 6° below the average; the coldest March since 1807.

Boston.—March 1. Fine. 2. Cloudy: snow early A.M. 3. Snow: large fall of snow. 4. Cloudy. 5. Snow. 6, 7. Fine. 8. Cloudy. 9. Fine. 10. Cloudy. 11, 12. Fine: snow P.M. 13. Windy. 14, 15. Fine. 16. Windy: large fall of snow. 17. Cloudy. 18. Cloudy: snow A.M. 19. Fine: snow P.M. 20, 21. Fine. 22. Rain: rain early A.M.: rain A.M. 23. Cloudy: rain P.M. 24. Fine: rain early A.M. 25. Cloudy: rain P.M. 26, 27. Fine. 28. Stormy: stormy all day. 29. Windy. 30. Fine. 31. Windy.—Not near so cold a March since March 1837.

Sandwick Manse, Orkney.—March 1. Cloudy: rain. 2. Cloudy: rain: clear. 3. Frost: showers. 4. Bright: frost: aurora. 5. Bright: frost: clear. 6—8. Cloudy. 9. Showers. 10. Showers: snow-showers. 11—14. Snow-showers. 15. Snow, deep: snow: clear. 16. Snow: cloudy: thaw. 17. Thaw: clear: frost: clear. 18. Thaw: bright: snow-showers. 19. Snow-drift. 20. Snow: bright: snow: cloudy. 21. Thaw: cloudy: drops. 22. Cloudy: rain. 23. Rain: clear. 24. Clear: aurora. 25. Cloudy: clear. 26. Bright: clear. 27. Bright: rain. 28. Rain: clear. 29. Clear. 30. Cloudy: rain. 31. Bright: cloudy.

Applegarth Manse, Dumfries-shire.—March 1. Showers of snow. 2. Clear: frost. 3. Dull. 4. Snow-showers. 5. Snow-showers: frost A.M. 6. Frost A.M.: slight snow. 7, 8. Slight frost. 9. No frost. 10. Rain P.M. 11. Clear: frost A.M. 12. Frost A.M. 13. Frost. 14, 15. Frost: snow-showers. 16, 17. Frost. 18. Frost: shower: snow. 19. Frost. 20. Frost: clear. 21. Frost A.M.: thaw: rain P.M. 22. Heavy rain. 23. Fine spring day. 24. Fine. 25. Rain: mild: growing. 26—28. Rain, and wind high. 29. Clear and bracing day. 30. Heavy rain and high wind. 31. Fair and fine.

Mean temperature of the month	36°·3
Mean temperature of March 1844	38 ·8
Mean temperature of March for twenty-three years	39 ·0
Mean temperature of spring-water	43 ·7

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. March.	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.	29·929	29·904	29·81	29·79	29·75	29·79	29·82	42	28	30	36	30½	38	37	e.	sw.	e.	sse.	.....	.....	.....	.....
2.	29·858	29·853	29·60	29·78	29·70	29·82	29·72	42	33	33	46	30	43	38	n.	calm	ne.	wsw.	·10	.....	.....	·10
3.	29·841	29·545	29·36	29·65	29·85	29·88	29·90	44	25	31	41	37	39	37½	e.	se.	ne.	.....	·28	.....	.....	·25
4.	29·908	29·900	29·65	29·80	29·85	29·97	30·05	45	19	29	35	30	39	31	ne.	calm	e.	se.	.....	.....	.....	·06
5.	30·075	29·949	29·73	29·95	30·10	30·15	30·32	34	13	27	35½	22½	35	30	ne.	e.	ne.	se.	.....	.....	.....	.....
6.	30·229	30·205	30·00	30·22	30·23	30·38	30·41	31	23	27·5	36	22½	37	38½	ne.	calm	ne.	.....	.....	.....	.....	.....
7.	30·232	30·210	30·02	30·24	30·22	30·42	30·38	39	26	23	42½	31½	42½	41	ne.	calm	e.	nw.	.....	.....	.....	.....
● 8.	30·161	30·102	29·82	30·19	30·25	30·38	30·40	41	30	36	47	34½	40	41	e.	e.	ne.	nw.	.....	.....	0·30	·10
9.	30·162	30·144	29·98	30·30	30·26	30·40	30·35	45	32	36	46	35	45	44½	ne.	calm	ne.	nw.	.....	.....	.....	.....
10.	30·129	30·058	29·83	30·19	30·02	30·26	30·24	45	32	38	48½	38	40	31	ne.	calm	n.	nne.	·02	·54	.....	·12
11.	29·973	29·936	29·65	30·00	29·90	30·14	30·07	40	24	34	40½	30	30	31	n.	nw.	n.	n.	.....	.....	.....	·14
12.	29·815	29·781	29·55	29·83	29·78	29·98	29·95	43	21	30·5	39	27	35	26	n.	calm	n.	se.	.....	.....	.....	·07
13.	29·793	29·740	29·63	29·75	29·64	29·84	29·81	25	13	25	36	22	30	25	e.	se.	se.	nnw.	.....	.....	.....	·11
14.	29·681	29·644	29·48	29·60	29·70	29·90	29·93	36	18	21·5	36	23	28½	27	e.	calm	e.	ne.	.....	.....	.....	.....
15.	29·745	29·705	29·50	29·78	29·85	30·06	30·12	36	29	31	34	21½	26½	19½	e.	se.	ene.	se.	.....	.....	.....	·25
☽ 16.	29·572	29·500	29·52	29·80	29·71	30·03	29·82	34	19	30	34½	21	35	35½	ne.	e.	ene.	w.	.....	.....	0·02	.....
17.	29·770	29·746	29·46	29·65	29·62	29·74	29·70	42	16	28	40½	25½	39	35½	nw.	calm	n.	calm	·03	.....	.....	·17
18.	29·726	29·674	29·45	29·60	29·57	29·58	29·71	43	27	32	43½	24½	37½	31	n.	calm	w.	nnw.	.....	.....	.....	.....
19.	29·858	29·691	29·38	29·65	29·82	29·82	29·87	44	25	33·5	38½	25½	29	30	n.	w.	s.	nw.	.....	·33	.....	·05
20.	30·274	30·081	29·76	29·97	30·15	30·06	30·10	40	16	27	41½	23	34	32	ne.	calm	s.	n.	.....	.....	.....	·12
21.	30·495	30·479	30·10	30·13	29·98	29·85	29·60	49	31	33·5	43½	23	39	43	w.	calm	sw.	s.	·08	.....	.....	.....
22.	30·381	30·308	29·90	29·95	29·84	29·83	29·47	51	43	42·5	49	40½	46½	46	sw.	calm	nw.	ese.	·08	·23	.....	.....
○ 23.	30·197	29·957	29·68	29·88	29·88	29·50	29·83	51	42	51	55	45	45	42	sw.	calm	sw.	w.	·60	·14	.....	·48
24.	30·121	30·022	29·54	29·97	29·95	29·92	29·92	58	29	45	52	36½	44	40½	nw.	w.	w.	w.	.....	·64	0·50	.....
25.	30·032	29·908	29·60	29·76	29·66	29·65	29·54	58	43	41	44	30½	43	36	s.	calm	w.	ssw.	·03	.....	.....	.....
26.	29·899	29·803	29·38	29·58	29·27	29·44	29·05	58	42	45	49½	32½	44	40	nw.	calm	w.	sw.	.....	·10	.....	.....
27.	29·874	29·803	29·25	29·45	29·30	29·25	29·09	60	47	51	52	44	44	40	w.	w.	wnw.	w.	.....	.....	.....	·37
28.	29·813	29·672	29·05	29·06	29·50	28·60	29·33	58	37	50	49½	45½	43	41	w.	w.	w.	nw.	·01	.....	.....	·39
29.	30·270	30·035	29·50	29·90	30·11	29·90	30·11	58	27	47·5	52½	40	43½	40	nw.	w.	nw.	nnw.	.....	.....	.....	·29
☾ 30.	30·273	29·997	29·88	30·00	29·43	30·00	29·72	56	36	46	45½	34½	43½	40	sw.	calm	e&sw.	ese.	·02	.....	0·76	.....
31.	30·227	30·151	29·69	30·00	30·08	29·96	30·00	63	30	48·5	55	40½	42	44	nw.	w.	ssw.	sw.	.....	.....	.....	·10
Mean.	30·010	29·919	29·63	29·852	29·837	29·887	29·881	45·51	28·26	35·6	40·1	31·2	48·40	35·95					1·25	1·98	1·58	3·17

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 100. JUNE 1845.

LIII.—*Descriptions of some Gigantic Forms of Invertebrate Animals from the Coast of Scotland.* By Harry D. S. Goodsir, M.W.S.

[With a Plate.]

Serpentaria. Pl. XX. fig. 1, 2.

Gen. Char.—Anterior extremity of the body pointed, with the proboscidean orifice obscure and imperfectly developed; the male generative apertures on each side; cloaca on the abdominal surface immediately behind. Body depressed. The power of division very great.

Description.—The power which this animal possesses of so easily casting off the various segments of its body renders it difficult, in fact impossible, to state its exact length. The longest portion of three specimens which have at various times come into my possession was about one yard in length, and when fully extended about $\frac{7}{8}$ths of an inch in breadth. The whole body was of a bright slate-blue colour, with the exception of the proboscis, which was yellow, and a narrow strip of the same colour down each edge, which gradually became narrower on approaching the posterior extremity. The anterior third of the body was much larger and broader than the remaining portion, from which it gradually tapered towards the distal extremity. The anterior extremity tapered very suddenly to a point (*rostrum*), which was generally curved upwards.

As the animal has no true proboscis, the proboscidean orifice is very small or imperfectly formed, which renders it difficult to be seen. On each side of the rostrum there is to be seen a longitudinal narrow slit, generally closed, and communicating with the male generative system.

Immediately behind these, and on the abdominal surface, is another larger orifice, which the animal has the power of opening and shutting at pleasure. When open it is of an ovoid shape. The edges are serrated. This leads into a large longitudinal cavity which runs through the whole length of the body, but for a considerable extent anteriorly is continuous and very much dilated; in the remainder of its extent it is more confined and interrupted by the ovaries which lie on each side of it. All that portion of the body in which the common cavity is continuous and dilated consists of one annulus, but the succeeding or terminal is composed of a great many, each about the eighth of an inch in length. Each of these separated annuli contains all the elements of the perfect or original animal, viz. a male and female generative apparatus, the cavity common to the generative, digestive and respiratory functions, and a small dorsal vessel analogous to the intestinal canal of *Nemertes*. *Serpentaria* therefore is a composite animal, each perfect individual consisting of numerous and apparently still unformed or imperfectly formed individuals. That we are justified in looking upon this animal as composite will be acknowledged from what will be stated still further when referring to the physiological phænomena it presents to us.

When swimming this animal is very active, and advances with considerable rapidity by means of an undulatory serpentine motion. When handled it throws itself into various contortions, and instantly casts off numerous annuli from the posterior part of its body, each of which, immediately upon its separation from the original, begins to move in a similar manner. The consistence of the body when alive is soft and gelatinous, and is covered with a thick tenacious slime.

Nemertes. Pl. XX. fig. 3.

Gen. Char.—Anterior extremity of the body rounded, somewhat quadrilobate, with the proboscidean orifice in the centre. Male generative apertures on each side. Cloaca or abdominal surface immediately behind. Body cylindrical. The power of division not great.

Description.—The whole body of a dark umber colour with the exception of a few narrow longitudinal white lines. The anterior portion of the body is corrugated transversely. It is almost half an inch in breadth, and tapers from this very gradually to the terminal extremity. The anterior extremity is slightly quadrilobate, and in the centre there is a small foramen through which a long, narrow, extensile, trumpet-shaped proboscis can be protruded at the will of the animal. On each side of this are two narrow longitudinal slits similar to those in *Serpentaria*. The edges however are more rounded, and consequently not so closely applied to one another. These, as already mentioned, are apertures to the male generative apparatus, which consists of two long, narrow cellular tubes, running down each side of the body.

The cloaca on the abdominal surface of the body is small and rounded, and opens into an oblong cavity similar to that of *Serpentaria.* The anterior extremities of the ovaries, or all that lies in the continuous portion of the common cavity, are very slightly attached; that again which belongs to the interrupted portion of the cavity is more firmly bound down.

In the most perfect specimen I could obtain the posterior extremity was bifurcated, but the opening in it was so large that it appeared to be only in process of filling up after the last separation, and therefore in all probability was not perfect.

The leading features in the structure of both of these animals will be seen from the above descriptions to be similar. Owing to the assistance derived from the comparison of the two, I think I have been enabled to make out more satisfactorily than has been hitherto done, the true structure of *Nemertes* and its congeners.

To begin with the large common cavity of the body, in both species it would appear to be common to the respiratory, digestive, and at the same time to the generative systems. The water in which the animal lives is transmitted through this cavity, and thus acts as a means of respiration. In *Serpentaria* it acts I would say almost altogether as an organ of digestion, and for this purpose its construction is slightly different from that of *Nemertes,* in which animal the structure approaches more to that of the true *Planaria,* in so far as it is endowed with an extensile trumpet-shaped proboscis, which is continuous with a large puckered-up tube running along the upper and central part of the common cavity, and which, contrary to the supposition of Rathke and other naturalists, is, according to the opinion already expressed by Ehrenberg, the intestinal canal. It is tied down at intervals by a strong fibrous or muscular band—mesentery, which, when unwound, allows the intestine to escape from its attachments. The ovaries which run down on each side of the body have no means of throwing off the ova except into the common cavity. It appears to me therefore that Ehrenberg is correct in supposing that cavity to be an egg-passage, and in *Serpentaria* this is more fully shown than in *Nemertes.* In the former the ova are apparently developed throughout the whole length of the ovaries, so that they have no way of escaping except by means of the common cavity; in the latter the ova are only being fully developed at the posterior extremity of the ovaries.

Quatrefages and others suppose that the slender filaments which run along each side of the body belong to the nervous system, but from all the observations I have made, there cannot be a doubt that they are the testicles of the animal; besides, we are bound by analogy to infer that none of the animals belonging to this order are so highly organized as to have a nervous system, at least so complicated. However this may be, the microscopic structure of these filaments sufficiently proves that they are not nervous, and at the same time points out their true characters as already mentioned. With regard to the bundle of nervous fibres seen by Rathke proceeding from the cerebral ganglion to the narrow furrows on each side of the rostrum, that can easily be accounted for from the furrows in question being the orifices of the seminal tubes, so that consequently the tubes must be continuous with them. I could not perceive the slightest vestige of filaments proceeding from the so-called ganglion to the anterior part of the body, and in the specimens which came under my own observation neither eyes nor ocellated points could be seen.

Forbesia. Pl. XX. fig. 4.

The animal to which I have given the above name, and which is now to be briefly described, is peculiar and very interesting on account of its gigantic size; gigantic, inasmuch as all the heretofore known similar forms have been microscopic. When the first specimen was brought to me, and from the cursory observation which I then made, it appeared to belong to *Vorticella*. Having been made acquainted by Professor Edward Forbes, the godfather of the present species, with Sars's paper on *Pedicellina*, I was thus also enabled to compare it with that eminent naturalist's description of those animals*. After a very cursory examination, however, it was found to differ very widely from both of the above forms.

It is about six inches in length, the pedicel being five and the body one inch long; the body is about half an inch, and the pedicel about $\frac{1}{8}$th of an inch in diameter. The oral extremity of the body is concave, with an oblong transverse aperture in the centre. The lips which surround this aperture are thick and fleshy, deeply serrated, and armed on their internal edges with a double row of fleshy cirrhi. Numerous spines of a clavate form and horny structure are thinly scattered over the lower part of the peduncle. A considerable number of fleshy papillæ also arise from a small portion of the body, forming a zone. The papillæ from one portion of this zone are more numerous and more regularly arranged than in the other part.

Until this animal has been more carefully examined, I am not prepared to specify any characters, either generic or specific. The opinion expressed by Professor Edward Forbes, that the polype here described is only one torn from a polypidom common to many, appears to be correct; but until we are satisfied of this from

* I am indebted to Mr. Halket of Edinburgh for the translation of this paper.

actual observation, it would be useless to characterize it. With the view of assisting in the proper illustration of the animal, I herewith append M. Sars's description of *Pedicellina*.

The external appearance as well as the peculiar course of the intestinal canal seem to bring this species near to the *Vorticella*; but it is distinguished from these by its distinctly developed tentacles, which give it a greater resemblance to the Polypi. In fact, it seems to be the link which connects the Infusoria just named with the Polypi.

The *Pedicellina* exhibits itself in the form of several stalked polypi of a sort of gelatinous substance, shooting straight up from a round creeping (?) root. The stem terminates at the top in an oblong, somewhat compressed knob, on the upper end of which, in a hollow, the mouth is found. The hollowed upper surface of this knob forms a sort of edge (or rim) round it, which does not always preserve the same form, inasmuch as it sometimes distends itself to a size greatly exceeding the ordinary thickness of the knob, and sometimes contracts itself very considerably. From this cause proceeds the variety of form which the knob assumes, being sometimes egg-shaped and sometimes cup-shaped. But it is the stem which chiefly exhibits the movements of life. When irritated it moves easily and actively in all directions. Round the upper end or edge of the knob is a single row of cylindrical tentacles, the inner side of which is furnished with numerous fine and short filaments (cirrhi), which are in almost constant motion, somewhat like the swimming-filaments of the *Ribbemanæterne* (*Acalepha Ctenophoræ*, Eschs.), by which motion a current is produced in the water, and a crowd of the Infusoria which serve it for food are drawn into its mouth or are caught by the tentacles. These last are sometimes thrust out, sometimes drawn in or laid back; they can also be moved in a variety of ways.

One of the most singular phænomena about the *Pedicellina* is the course of the intestinal canal. It is observed in the interior of the knob proceeding from the mouth downwards along one of the small sides, then expanding at the bottom of the knob into an oval-shaped stomach, and thence turning upwards along the opposite small side and running back towards the region of the mouth. The mouth and the anus are thus close to each other in the before-mentioned hollow. This formation is interesting and totally different from the Polypi, with the exception of the *Flustræ* and the Corallines which are related to them; unless indeed we agree with Rapp in excluding these from the Polyps.

We find in the *Pedicellina* a striking analogy with *Vorticella*, according to Ehrenberg's representation of their digestive organs; but I have never observed a plurality of stomachs. As regards the propagation of the *Pedicellina*, it is accomplished by shoots which come straight from the root, which seems also to be the case with the *Zoanthi*: I have never observed amongst them any other mode of propagation.

1st spec. *Pedicellina echinata.*—The long cylindrical stem is everywhere equally thick, and provided all round with numerous thin, pointed prickles. In some of them a few similar prickles are observed on the knob. The knob itself is oval and compressed. One of the small sides where the gut ascends is more convex than the opposite one. The upper edge is furnished with a circle of 24 tentacles, which number however varies in individuals from 20—22—24. These tentacles are about half the length of the knob. Within are seen a longitudinal row of numerous transparent globules. The ascending gut I have often seen filled with dark brown excrement which had gathered itself into oval particles. In the food-canal are sometimes seen a large number of little grains in constant motion, which doubtless were infusoria which they had swallowed. When the tentacles or any other part of the animal is touched, it shrinks from the irritating object, turning the stem to a side, bringing the tentacles together, or drawing them in and shutting its mouth. These contractions however are performed slowly, while on the other hand the stem moves quickly with the slightest touch. The whole length of the animal is about $\frac{1}{6}''$, the knob $\frac{1}{16}''$ long and $\frac{1}{8}''$ broad. The colour is whitish and transparent. This sort is found attached to various bodies, as *Cochylia, Serpula, Sertularia*, in the Fiord of Bergen.

2nd spec. *Pedicellina gracilis.*—The stem of this kind is quite smooth and free from prickles; it is also thinner and proportionably longer than the preceding one. The whole animal however is smaller, about $1'''$ long, and the stem of the thickness of the finest hair. The knob is less oblong than the preceding one, and on the end is furnished with about 20 tentacles. The stem below is a little thinner than above, but expands at the lowest end into a short thick cylinder. The stem as a whole is of a more firm consistence, except the knob and the lower thick part which are softer. It appears therefore to bend only at these two places. When irritated, therefore, either the upper part of the stem with the knob moves, which gives the animal a nodding appearance, or the whole stem bends, at the base, to the side or downwards. This sort, like the former, were found on a conglomerate of *Serpula*, a large number together. It doubtless also has similar creeping roots, but I was not fortunate enough to find any of them torn up; nor could they be distinctly seen, in consequence of the minute dimensions of the animal. Sometimes however a small continuation of the stem could be seen, probably a part of the root.

H.M. Ship Erebus, Woolwich.

EXPLANATION OF PLATE XX.

Fig. 1. *Serpentaria fragilis* reduced to one-half its natural size.
Fig. 2. Abdominal surface of the anterior part of the body, showing the cloaca.
Fig. 3. *Nemertes gracilis*, reduced to one-half nat. size.
Fig. 4. *Forbesia formosa*, natural size.
Fig. 5. *Pedicellina echinata*, nat. size, and magnified after Sars.

LIV.—*A Century of new Genera and Species of* Orchidaceous *Plants.* Characterized by Professor Lindley.

[Continued from p. 257.]

Decades 5 and 6.

41. Lycaste *barbifrons*; foliis oblongis in petiolum longum angustatis plicatis, bractea suprema angusta ovario paulo longiore, sepalis petalisque subconformibus lanceolatis falcatis lateralibus in mentum longum productis, labello oblongo basi concavo 5-lineato appendice lata emarginata adnata; lamina oblonga plana basi fimbriata apice rotundata laciniis lateralibus rotundatis, columna antice villosissima auriculis apice falcatis.

Peru (Hartweg).

Very near *L. lanipes*, but twice as large, and with long-stalked leaves. It is also different in the form of the lip and in the shaggy column.

42. Maxillaria *lepidota*; acaulis, foliis solitariis ligulatis acutissimis in petiolum angustatis, pedunculis unifloris acute vaginatis erectis dimidium folii æquantibus, sepalis elongatis linearibus acuminatis, petalis setaceo-acuminatis duplo brevioribus, labello carnoso obovato trilobo apice carinato et utrinque lepidoto lacinia intermedia ovata lateraliumque margine anteriore crenatis, tuberculo angusto vix medium labelli attingente.

Popayan (Hartweg).

43. Maxillaria *procurrens*; caulescens, pseudobulbis obovatis compressis diphyllis, foliis ligulatis subsessilibus, pedunculis solitariis squamoso-imbricatis pseudobulbis longioribus, sepalis petalisque ovatis acutis, labello oblongo obtuso indiviso juxta basin callo oblongo aucto.

Popayan (Hartweg).

Very like *M. platypetala*.

44. Oncidium *pentadactylon*; pseudobulbis ovatis compressis diphyllis, foliis lanceolatis tenuibus scapo longissimo paniculato multo bre-

vioribus, floribus plurimis abortientibus, sepalis lineari-lanceolatis liberis, petalis lanceolatis, labello oblongo emarginato pandurato lobis basilaribus intermedio subæqualibus, crista verrucosa processubus 5 digitiformibus circumdata, columnæ alis maximis obtuse lobatis.

Quito (Hartweg).

This is near *O. Wentworthianum* in the colour and structure of the flowers. Occasionally the principal part of them abortive, as in *O. heteranthum.* The panicle is occasionally 3 feet long or even more.

45. Oncidium *pyramidale*; pseudobulbis ovatis ancipitibus 2–3-phyllis, foliis oblongis tenuibus basi angustatis scapo erecto rigido paniculato pyramidali multo brevioribus, sepalis obtusis liberis dorsali ovali lateralibus linearibus, petalis duplo latioribus ovatis obtusis, labelli lobis lateralibus amplexicaulibus intermedio bilobo latioribus, crista antice excavata processubus 7 (?) linearibus anticis longioribus, columna nana alis verticalibus lineari-cuneatis sublobatis, rostello subulato.

Pasto (Hartweg).

Near *O. excavatum,* but with the rostellum of *O. ornithorhynchum.* Scape a foot and a half high.

46. Oncidium *trifurcatum*; . . . . . . , sepalis lateralibus unguiculatis spathulato-obovatis planis dorsali unguiculato rotundato crispo duplo breviori, petalis oblongis crispis dorsali minoribus, labello unguiculato tripartito laciniis linearibus truncatis lateralibus canaliculatis, crista trilamellata, columna tetraptera alis superioribus linearibus carnosis apice abrupte recurvis inferioribus rotundatis tenuioribus, clinandrii dorso in dente antherifero producto, rostello membranaceo bifido.

Peru (Hartweg).

I have only seen three flowers of this. They are 3 inches in diameter; the lateral sepals are whole-coloured, the dorsal, and the petals are bordered with yellow (?). It stands near *O. serratum,* Lindl.

47. Oncidium *cultratum* (II. †† * ‡‡ ¶¶ ☞☞); pseudobulbis ovalibus compressis, foliis solitariis lanceolatis basi canaliculatis scapo humili æqualibus, panicula cernua simplici floribus quibusdam abortientibus, sepalis petalisque oblongis subæqualibus reflexis, labello bilobo, crista parva tuberculata, columnæ alis maximis cultratis obtusis integris.

Popayan (Hartweg).

As far as I can judge of *O. olivaceum,* which I have never been able to see, it must be near this, which is a dwarf species with not more than ten flowers in the panicle. The flowers appear to be olive-brown with a yellow lip.

+ 48. Pleurothallis *Cassidis*; caule anguloso medio vaginato folio ovato-oblongo amplexicauli obtuso duplo longiore, spatha magna coriacea, spicis plurimis rigidis erectis multifloris folio longioribus, sepalis acutis supremo galeato lateralibus semiconnatis, petalis blongis obtusissimis dimidio brevioribus, labello nano oblongo emarginato utrinque intra marginem bicalloso, columna minima.

Popayan (Hartweg).

Like *P. macrophylla* and its allies; but it must be placed in the artificial arrangement among the species with "elongated spikes."

49. Stelis *parvilabris*; cæspitosa, caulibus tetragonis, folio coriaceo petiolato acuto tridentato racemis subgeminis longiore, bracteis cucullatis ovatis perfoliatis acutis floribus brevioribus, calyce triangulari bilabiato: labio altero ovato acuto altero angustiore et breviore emarginato, petalis subrotundis membranaceis, labello minimo carinato rotundato tuberculo crenato in medio.

Popayan (Hartweg).

50. Dienia *crispata*; caule diphyllo, foliis ovato-oblongis obtusis pedunculo brevioribus, spica densa cylindracea, sepalis oblongis obtusis, petalis linearibus, labello ovato indiviso, capsulæ angulis crispato-laceris.

Mexico (Hartweg).

Stem and spike, taken together, about a foot high.

51. Altensteinia *virescens*; foliis radicalibus obovato-oblongis, vaginis caulis 2—3 inflatis herbaceis, spica densa cylindracea, bracteis concavis glabris, rachi sepalisque pubescentibus, petalis linearibus obtusis ciliatis, labello oblongo concavo denticulato basi pubescente, columnæ facie villosa.

Quito (Hartweg).

Flowers greenish yellow. In habit like *A. fimbriata*.

52. Ponthieva *rostrata*; foliis oblongis acutis planis scapoque basi glabris, inflorescentia tomentosa, petalis levissime ciliatis, labello cochleato unguiculato in apicem rostratum producto.

Quito and *Bogota* (Hartweg).

Of this there are two varieties; viz. α. *spicata* with the flowers nearly sessile, and β. *racemosa* with the flowers distinctly stalked. The former is from Quito, the latter from shady places near Bogota.

53. Ponthieva *maculata*; glanduloso-villosissima, foliis ovalibus utrinque acutis, racemo laxo multifloro, bracteis ovatis acuminatis pedicellis æqualibus, sepalis lateralibus maculatis dorsali latioribus, labello oblongo canaliculato indiviso basi tuberculis duobus procurrentibus munito.

Bogota (Hartweg).

Flowering scape as much as a foot and a half high.

54. Cranichis *gibbosa*; foliis radicalibus oblongo-lanceolatis petiolis alatis longioribus, scapo basi folio uno alterove vaginisque quibusdam distantibus apice patulis acutis aucto, spica secunda laxa elongata, floribus glabriusculis, labello ovato cucullato basi saccato, petalis calvis.

Quito (Hartweg).

55. Prescottia *orchioides*; foliis lanceolatis in caulem ascendentibus sensim in bracteas acutissimas ciliatas floribus æquales mutatis, spica elongata multiflora, petalis basi ciliatis sepaloque dorsali adhærentibus, lateralibus revolutis, labello erecto antico (!) oblongo concavo unguiculato margine carnoso venis radiantibus parum elevatis.

Mexico (Hartweg).

Stem taken with the spike, which is a span long, about a foot and a half high. The plant looks like some *Platanthera*.

56. Stenorhynchus *cernuus*; glaber, foliis radicalibus longe petiolatis ovatis acutis 5-nerviis, vaginis scapi 3 acuminatis laxis, spica brevi densa cernua, bracteis lineari-lanceolatis floribus brevioribus, labello lineari-lanceolato unguiculato biauri ante stigma ventricoso apice convoluto serrulato.

Quito (Hartweg).

57. Acræa *triloba*; foliis radicalibus lanceolatis glabris, scapo erecto pubescente, spica oblonga villosa, sepalis lineari-lanceolatis villosis, labello cucullato trilobo: laciniis lateralibus runcinatis glabris intermedia multo minore ovata reflexa tomentosa.

Peru (Hartweg).

58. Habenaria *pyramidalis*; foliis oblongis obtusis imbricatis reticulatis ad spicam pyramidatim ascendentibus, racemo longo denso cylindraceo, bracteis foliaceis ovarii longitudine, sepalo dorsali subrotundo lateralibus reflexis, petalis subrotundo-ovatis, labello ensiformi basi utrinque unidentato, calcare subfalcato ovario longiore.

Mexico (Hartweg).

A showy plant with a spike a span long. Near *H. petalodes*.

59. Appendicula *micrantha*; foliis distichis ovato-oblongis obtusis, spicis axillaribus solitariis nutantibus folio brevioribus, bracteis subulatis reflexis, labello ovato acuto.

Philippines (Cuming).

This has the smallest flowers of any that I have examined. It is near Blume's *App. reflexa*, which is said to have an obtuse mucronate lip.

60. Trichoglottis *philippinensis*; foliis subrotundo-ovatis emarginatis mucrone interjecto, sepalis oblongo-lanceolatis patulis, petalis reflexis linearibus brevioribus, labello esaccato pubescente secus axin villoso oblongo convexo apice hastato-trilobo dentibus baseos brevibus rotundatis.

Philippines (Cuming).

A plant with the habit of a *Vanda*, but with very short, roundish, leathery, somewhat imbricated leaves. The flowers are solitary in the axils, an inch and a half from the point of the dorsal sepal to that of the labellum. The species differs from Blume's figure and descriptions in not having a very short spur or sac at the base of the lip, but in nothing else that seems essential.

LV.—*On a Monstrosity of* Gentiana campestris. By G. Dickie, M.D., Lecturer on Botany in the University and King's College of Aberdeen*.

In August 1844 there occurred in the vicinity of Aberdeen several remarkable monstrosities of *Gentiana campestris* which appear worthy to be recorded. The plants were growing near the sea in a soil of almost pure sand. In many of them all the flowers were fully double; in other cases the monstrous flowers, the structure and arrangement of which are now to be described, were growing on the same plant with those alluded to, but were as frequently associated with others presenting the usual structure.

The monstrous flowers may be briefly described as consisting of a calyx, presenting the number and arrangement of parts commonly found in *Gentiana campestris*; the corolla was mostly natural, but sometimes 5-cleft; stamens four, sometimes more, in most cases either partially or wholly petaloid, these three whorls presenting the usual relation to each other. The greatest deviation from the natural structure occurred in the central whorl. Instead of a pistil there were frequently flower-buds, in one case no fewer than eight, in another six, five of these forming a regular whorl round a central bud; and sometimes ovaries nearly natural were intermixed with flower-buds.

The accompanying Table will show at a glance the general arrangement in ten of these flowers.

No.	*Calyx.*	*Corolla.*	*Stamens.*	*Pistil.*
1.	Of usual structure.	4-cleft, irregular.	4, petaloid.	7 flower-buds.
2.	Irregular.	5 pieces, each 2-cleft.	5, petaloid.	Pedunculated flower-buds and ovaries.
3.	Of usual structure.	2 corollæ, each 4-cleft.	4 in each corolla, partially petaloid.	In each 1 ovary.
4.	Of usual structure.	4-cleft.	4, natural.	1 perfect ovary.
5.	Of usual structure.	4-cleft.	4, petaloid.	1 flower-bud, its ovary inclosing another flower-bud.
6.	Of usual structure.	4-cleft.	4, petaloid.	1 flower-bud, perianth single.
7.	Of usual structure.	5-cleft.	5, petaloid.	8 flower-buds.
8.	Of usual structure.	5-cleft.	5, petaloid.	4 ovaries and 2 flower-buds.
9.	Of usual structure.	4-cleft.	4, petaloid.	6 flower-buds.
10.	Of usual structure.	5-cleft.	None.	3 ovaries, 2 flower-buds.

* Read before the Botanical Society of Edinburgh, April 10, 1845.

In the first example mentioned in the Table the stamens were converted into petals, the central fasciculus of vessels in each bifurcating upwards, each branch losing itself in a small crested process. The buds occupying the centre of the flower are worthy of being described in detail.

No. 1. Calyx 4-cleft, very irregular, coloured blue; corolla 4-cleft; stamens 3, their connectives prolonged each into a small petaloid process; ovary cleft half way and inclosing another which was trifid at the apex, one of the pieces producing perfect pollen, in its interior six rows of ovules.

No. 2. Calyx very irregular; corolla 6-cleft; stamens 5, alternating with the divisions of the corolla; the place of the sixth stamen occupied by an ovary, open half way at the outer side, 5-cleft at the apex, and bearing ten rows of ovules.

No. 3. Calyx 4-cleft, irregular; corolla 4-cleft, regular; stamens four, petaloid; instead of an ovary a corolla 4-cleft, having five stamens and a small ovary bearing ovules.

No. 4. Calyx 4-cleft, very irregular and petaloid; corolla 4-cleft, with four alternating stamens, some wholly, others partially converted into petals; in place of an ovary a flower-bud with 4-cleft calyx, corolla 3-cleft, stamens four, and ovary of the usual structure.

No. 5. All the parts petaloid.

No. 6. Calyx very irregular, 6-cleft; corolla 2-cleft, with three imperfect stamens; ovary 3-cleft at apex, open half way down; ovules natural.

No. 7. Same as the preceding.

In flower No. 2. of the Table there were between the calyx and corolla numerous bodies, some green, others blue, of various forms mixed up with ovaries, bearing perfect ovules. The flower-buds and separate ovaries, occupying the place of the natural ovary, were pedunculated; the ovules were mostly imperfect, being composed each of a single tough cellular membrane, the cells with abundance of starch globules; others were converted each into a mass of lobed green cellular tissue. In one instance a flat spathulate leaf had its edges occupied by numerous ovules.

In flower No. 5. (see Table) the place of the pistil was occupied by a flower-bud, its *calyx* of two large lobes (opposite the two large divisions of the outer calyx), *corolla* of two divisions alternate with those of the calyx, one petaloid *stamen, ovary* partially petaloid, of two divisions alternate with those of the corolla, on its walls numerous ovules; it inclosed also a corolla of two divisions, with two stamens and a perfect ovary.

In flower No. 8. of the Table the centre was occupied by four ovaries and two flower-buds closely embracing another ovary. These four ovaries were nearly of the usual form, each supported on a peduncle; the smallest contained no ovules, another had only a few; one of the larger was open at the apex, which consisted of four petaloid processes; the other was bifid at the apex, one of the divisions leafy, the other of the usual structure; it contained numerous ovules; these were confined to its lower half. One of the flower-buds alluded to had its *calyx* 4-cleft of the usual structure; *corolla* 5-cleft; *stamens* five, some perfect, others petaloid; in its centre a solitary petal with one stamen and one ovary, these two confluent; on the walls of the ovary were numerous normal ovules mixed with others converted into leaf-like bodies, and some presenting the form of two green leaflets with an ovule in their axil (fig. 1). The ovary already mentioned as being embraced by the two flower-buds was half an inch in length, cleft half way on one side, all the way on the other (fig. 2); on its edges were

Fig. 1.

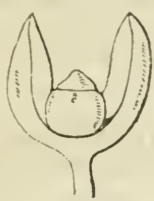
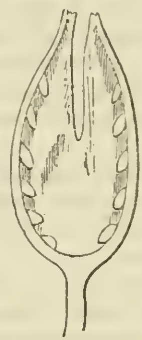


Fig. 2.



numerous ovules; in its interior and continuous with the axis there was present a corolla of two lobes, with one stamen and a pedunculated ovary, containing a few ovules. The buds occupying the centre of the flower in No. 9. of the Table are worthy of detailed description.

No. 1. *Calyx* none; *corolla* of ten petals; *stamens* ten, alternate with the petals; the place of the ovary was occupied by two flower-buds, each with single perianth, imperfect stamens, and one ovary in each.

No. 2. *Sepals* five; *petals* eight; *stamens* ten, in two whorls; *ovaries* two, almost natural.

No. 3. *Sepals* three; *petals* three; *stamens* three, alternate with the petals; *ovary* of three carpellary leaves with six rows of ovules.

No. 4. *Sepals* five, an ovary adhering to the outside of one; *petals* five; *stamens* five, alternate with the petals; *ovary* of five carpellary leaves with ten rows of ovules.

No. 5. *Sepals* three; *corollæ* two, each of three petals; *stamens* three; *ovary* single.

No. 6. The central flower: *calyx* none; *corolla* 5-cleft; *stamens* five, petaloid; *ovary* of three carpellary leaves, *ovules* in six rows.

In flower No. 10. (see Table) the centre was occupied by three ovaries and two small flower-buds. One of the ovaries was much compressed, of two carpellary leaves open half way, its ovules perfect; another of the same size and structure inclosed one like itself, the ovules imperfect; the other larger than any of the two former, of five carpellary leaves inclosing ripe seeds, beside it a small flower-bud with all the parts converted into leaves; the other flower-bud had calyx, corolla and stamens nearly regular, its ovary of two carpellary leaves, cleft half way; in the upper part of it were ripe seeds; it inclosed a flower with 3-cleft calyx, corolla of one petal, two stamens alternating with it, its ovary and ovules quite natural. In some instances the place of the ovary was occupied by a number of small green leaves. In some the calyx and corolla had the same colour and structure; in one instance imperfect flower-buds and separate carpels were developed in the axils of the sepals; the stamens in some were partially, in others wholly petaloid; the conversion of the ovary into a leaf and of the ovules into buds was evident in several cases. Many of the deviations from the usual structure here described have been already recorded by different observers and require no comment.

I would, however, particularly allude to the changes which the ovarium and ovules present, and the inferences which may be drawn from these.

A simple ovarium is considered to be a modified leaf folded upon itself, the margins united, and these alone in most cases constituting the placenta (necessarily double) and producing ovules. It was at the same time supposed that the stigma was a mere prolongation of the midrib of the carpellary leaf, and therefore single and terminal. The "greatest botanist of this or any age" has satisfactorily demonstrated (Annals of Nat. Hist. vol. xi. p. 35) that each simple pistillum or carpel has necessarily two stigmata, which are to be regarded, not as terminal, but lateral; the style where present being only a mere attenuation, in many cases very gradual, of the whole body of the ovarium. Most *Gramineæ*, many *Euphorbiaceæ*, several *Irideæ*, &c. are stated as illustrating this point. The ovaria, in some of the monstrous flowers already described, appeared to afford proof of the same; and many carpels in the earlier stages of their development yield ample evidence that the opinion alluded to is in strict accordance with nature.

Ovules have been compared to buds formed upon the margins of some true leaves, and declared to be analogous to them in structure. Professor Henslow has recorded instances in the mignonette of the ovules being transformed into leaves, either solitary or rolled round an axis, of which the nucleus is the termination. Others have maintained that in certain families the ovules are parts of the carpellary leaves themselves. In confirmation of this, M. Ad. Brongniart has published an account of a monstrosity of *Delphinium elatum*. On the borders of the carpels were observed all states of transition from lateral trifid lobes of the leaf to true ovules. The lateral teeth of these lobules became atrophied; the middle part was hollowed and curved upwards and inwards in the form of a hood, so as to constitute the primine. The nucleus was described as originating from a cellular excrescence or papilla situated on the upper surface, upon the median nerve of each lobe a little below its summit. M. Brongniart considers it a new production, a cellular papilla, developed on the superior face of the middle lobe of the leaflet, and in the cavity which the latter had formed. Some of the ovules observed in the gentian appeared at first to confirm this opinion. In examining its merits, however, it appears necessary to take into account two circumstances, the order of development of the ovules, and that of their individual parts. From careful examinations made some years ago, I have been convinced that in some carpels whose ovules are numerous, the order of development is from the base to the apex. In very early stages of the carpel, the ovules are confined to the lower part alone, there being no trace of them toward the upper portion of the placenta. At a more advanced stage they occur through the greater part of its extent, but still there is a very evident difference (previous to impregnation) between the progress made by ovules from the base of a placenta, and those nearer to its apex; this is obvious to the unassisted eye in regard to the development of the membranes, but actual measurement removes all doubt. The *Viola canina* may be mentioned as an example within the reach of those who choose to investigate this matter. In regard to the second point, viz. the order of development of the individual parts (reference is here made to the three outer membranes only), it is unnecessary to say much. In the young capsules of the violet already alluded to, it will be found that each ovule first appears toward the lower part of the placenta as a cellular papilla, the nucleus; the secundine soon makes its appearance as a cellular ring around the base of the former; and lastly, another ring, the rudiment of the primine, appears on the outside of the secundine; the outer membrane, however, becomes rapidly developed, inclosing and concealing the other two. It may be also worthy of notice, that the ovules make their appearance while the carpel is still entirely cellular, there being no trace of any vascular tissue till a more advanced period. The nucleus therefore is not an organ necessarily dependent (at least in its earlier stages) on the membranes which surround it, nor developed subsequently to them, as would seem to be implied in the account given of M. Brongniart's opinion, translated from the 'Comptes Rendus' (March 1844), and published in a late Number of the 'Annals and Magazine of Natural History.'

LVI.—*Notes on the Synonymy of the Genus* Apion, *with Descriptions of Six new Species, &c.* By John Walton, Esq., F.L.S.

[Continued from p. 342.]

57. *A. difforme,* Germ., Curt., Steph., Schönh.
— *compressicorne,* Dej. Cat.

The anomalous structure of the antennæ and the parts of the legs, which eminently distinguishes the male of this species, is entirely sexual. The female differs in having the rostrum slender and longer; the antennæ simple, inserted behind the middle of the rostrum, entirely black; the legs slender; the basal joint of the anterior tarsi short and not produced at the apex, the posterior tibiæ and tarsi much less dilated at their apices; all the trochanters, the tibiæ and tarsi of a deep black; the epigastrium simple. The male was originally described by Germar from a specimen sent to him by the late Mr. Haworth; subsequently Mr. Curtis figured and also described the male; I succeeded in capturing a great number of both sexes in October 1837, which gave me an opportunity to identify distinctly the female. The female has frequently been mistaken for *Ap. Trifolii* of Linnæus (*Ap. æstivum* of Germar), but it is instantly distinguished from that species by having, independently of other characters, the anterior coxæ and trochanters always densely black.

This curious species was formerly considered to be very rare, yet of late years it has been found in abundance in many localities in the south of England, but not in the north to my knowledge; I found a great number of both sexes near Mickleham in Surrey the 1st of October 1837, and again at Hastings in September on the *Polygonum Hydropiper* abundantly. "Common near Brighton, Arundel, Birch Wood, and other places in the autumn," Mr. S. Stevens.

58. *A. dissimile,* Germ., Schönh.

Black and shining. Head very broad, the frons posteriorly flat, rugose or rugose-punctate, between the eyes more or less deeply excavated, the excavation with one or more irregular curved ridge or ridges; eyes very prominent; rostrum moderately long, curved, rather stout, dilated on each side at the insertion of the antennæ, and gibbous beneath. Antennæ medial, black, the basal joint fulvous, longest, considerably dilated at the apex, forming a pyriform club, the second oval, minute, three following exceedingly minute, sixth and seventh very long, eighth stout, long-obconic, the remainder forming an elongate club distinctly articulated, the twelfth being minute, conic. Thorax subglobose, dilated and rounded at the sides, above very convex, thickly and deeply punctured, the punctures confluent, with a deep dorsal channel. Elytra ovate, shining blue-black, very convex, punctate-striate, the interstices broad, flat and coriaceous. The mucro of the epigastrium elevated and dilated, armed on each side with an acute tooth. Legs fulvous, robust, with the four posterior coxæ, the lower half of all the tibiæ and the tarsi black; the anterior tarsi have the basal joint short and stout, armed at the apex within with an acute tooth, the second joint at the base within also armed with an acute tooth, which is parallel to the first; the four posterior tibiæ are distinctly stouter than the anterior pair, bent, and each gradually thickened from the base to the apex; the two first joints of all the tarsi dilated; the basal joint of the posterior pair parallelogramical; the three first joints of all the tarsi, especially the posterior pair, concavo-convex, and clothed beneath with a pulvillus. ♂. (Length $1\frac{1}{4}$ line.)

The female differs in having the head generally narrower, striated between the eyes, the frons posteriorly closely punctulated; the rostrum longer, slender and filiform; the antennæ placed behind the middle of the rostrum, the basal joint black or piceous, slender, a little dilated at the apex, the second long-ovate, the six following nearly of equal length, long-obconic; the legs comparatively slender; the four posterior tibiæ as long as the anterior, of equal thickness and nearly straight; the two first joints of all the tarsi slightly dilated; the anterior tarsi and the mucro of the epigastrium simple.

This new and extraordinary species offers another example of anomalous form peculiar to the male in the joints of the antennæ and in the construction of the legs. I first received a single example with the collection of the late Mr. Millard of Bristol, which I sent to Germar as a new species, and he returned it labelled "*dissimile* ♀." Specimens of both sexes were afterwards found near Arundel in August, and rather plentifully amongst grass in a field adjacent to Birch Wood in September, by Mr. S. Stevens and myself.

59. *A. filirostre*, Kirb., Steph.
— *morio*, Germ., Schönh.

The female of this species has sometimes a broad testaceous ring at the apex of the anterior femora.

Hitherto this insect has occurred but very sparingly, and may be regarded as somewhat rare; Mr. S. Stevens found it in the autumn amongst grass in Arundel Park; also at Charlton, Dorking, and Birch Wood, but rarely; I cannot recollect having taken it more than once, and then but a few specimens, at Mickleham in Surrey, the beginning of October: it appears to be confined to chalky and sandy districts.

60. *A. ebeninum* (Gyll. in Litt.), Kirb., Gyll., Germ., Steph., Schönh.
— *Kunzei*, Schönh.

I forwarded to Schönherr four specimens of this insect, and he reported of them as follows:—"*Ap. ebeninum*, Kirby (i. p. 288. n. 89.) non idem Ghl.—*Kunzei Schh.* v. p. 419. n. 128. idem species." "Patria Lipsiæ A. Dom. Kunze." From this opinion I was induced to think that we had two closely allied species, namely *Ap. ebeninum* of Gyllenhal and *Ap. Kunzei* of Schönherr, and that I had mistaken *Ap. ebeninum* of Kirby, or that the latter author had described a Swedish species which was unknown as British, and had erroneously placed two indigenous specimens in his collection as identical therewith. It appears from a catalogue of Swedish insects, dated the 6th of September 1805, in the handwriting of Major Gyllenhal, now in the possession of the Entomological Society, that Mr. Kirby originally received from him an insect with the manuscript name of *Ap. ebeninum*, which he described under that name, and refers to "Mus. Dom. Gyllenhal," giving the habitat in "Suecia. Anglia," and records the capture of British examples near Great Blakenham in the middle of July 1806, after which he adds an observation, "The male has the rostrum shorter and more robust." The Swedish typical specimen in Mr. Kirby's collection, indicated by having number 34 fixed to the pin, is unfortunately mutilated; the head and thorax are wanting; it is therefore useless for the purposes of comparison and elucidation, but it corroborates the evidence that Mr. Kirby's description of *Ap. ebeninum* was drawn from this insect; there are two Kirbian specimens with the above-named type, one of which has a male symbol fixed to the pin, which is doubtless the specimen characterized above. Gyllenhal subsequently described this species before he had seen Kirby's description; but their descriptions of the sculpture do not agree: the part of the head between the eyes is described by Kirby as not being very conspicuously *striated*, with some of the striæ punctulated; by Gyllenhal, the frons between the eyes as being very minutely *punctured*: the thorax is described by the former as *distinctly punctured* with a deep *furrow* before the scutellum, which in some is very much broader and deeper; by the latter author, as sparingly and very finely punctured, with a small round *fovea* before the scutellum. I forwarded to Germar seven examples of *Ap. ebeninum* of *Kirby*, and at the same time I solicited him to send me specimens of *Ap. Kunzei*, as he had recorded in his 'Monograph' that he possessed examples of *Ap. ebeninum* from Kunze of Leipsic. I received from him two insects named "*Ap. ebeninum* of Germar" with the following note: "*Ap. Kunzei*, Schönh., is unknown to me;" the specimens which I forwarded to Germar were taken promiscuously from the same series as those I had previously sent to Schönherr, and were collected in the same locality; Germar, in prefacing his observations upon the British species of *Curculionides*, presented to him by me for examination, observes, that "all the species in which we concur are omitted," and *Ap. ebeninum* is one of that number. I have now in my possession two insects which were sent to M. Schönherr by Mr. Waterhouse, and returned in October 1837, named *Ap. ebeninum*.

I have been induced to re-examine the insects in Mr. Kirby's collection with the name of *Ap. ebeninum*, to examine carefully the specimens of Mr. Waterhouse, and the two insects from Dr. Germar, together with a long series of seventy specimens of my own, found partly in the same locality as those I sent to M. Schönherr; and after a tedious and minute examination of so many insects, I feel perfectly satisfied they all belong to the same species.

This remarkable insect has very little affinity to any other species, except its being of the same genus, and may be distinguished at first sight by its singular form and peculiar sculpture; nevertheless the sculpture, particularly on the thorax, will be found, when critically examined, to vary in many specimens, yet they are so intimately linked together in a long series, that it is impossible to regard them otherwise than as varieties. The majority have the head with three impunctate striæ between the eyes, the central stria frequently deeply cut, sometimes faintly marked, occasionally abbreviated, rarely entirely absent, with one or two rows of minute punctures on each side, which are occasionally confluent, the vertex smooth; the greater part have the thorax very minutely punctured, the punctures more or less scattered, sometimes distinct, at other times obsolete, uniformly with a fovea near the base before the scutellum, which is invariably intersected either by a dorsal furrow or an impressed line, always commencing at the base, and more or less abbreviated in front, rarely continued to the apex; some have the furrows broad and deep, extending nearly to the apex, almost obliterating the foveæ; these varieties agree with the descriptions of *Ap. ebeninum* by Kirby, and of *Ap. Kunzei* of Schönherr: other specimens have a faintly impressed line terminating just before the fovea, with the latter very distinct; these agree typically with *Ap. ebeninum* of Gyllenhal; the elytra are black and shining, the furrows very deep, the interstices narrow and convex, finely coriaceous or nearly smooth, with a tendency in some individuals to become rather broader and less convex.

I have no doubt this insect inhabits *Lotus major*, having many times taken it plentifully from that plant in June and July, in several places in the north and south of England.

61. *A. Viciæ*, Payk., Kirb., Gyll., Germ., Steph., Schönh.
— *Griesbachii*, Steph.

Gyllenhal furnished Paykull and Kirby with specimens of this very distinct insect; the characters which distinguish the sexes are analogous to those of *Ap. Ervi*. *Ap. Griesbachii*, described by Stephens in his 'Illustrations,' appears to have been sunk in his 'Manual,' on my authority, but with a note of interrogation; specimens were submitted by Mr. Waterhouse to the inspection of Schönherr, who remarked that they were scarcely sufficiently distinct from *Ap. Viciæ*; I think there cannot be any doubt of its being a variety of that species.

I found this elegant insect very common in Yorkshire on the *Vicia Cracca*; but it appears to be rather local in the south; I once found it extremely abundant on the 19th of June at Birch Wood, on the same plant, but never upon any other.

62. *A. Ononis*, Kirb., Steph.
— *mecops*, Schönh.

This species has a considerable affinity in form and sculpture to *Ap. pavidum*, but it differs in being more thickly clothed with hair, and in having the head distinctly *longer*; the vertex punctulated; the rostrum thickly covered with hairs to the apex; the antennæ inserted before the middle of the rostrum, the basal joints *black* or *piceous*, the clava *ovate*; the thorax *subcylindrical*; and the elytra *black* (never blue, obscure green or greenish black). The female differs in having the rostrum sparingly *covered* with *hairs to the tip*, and the antennæ inserted nearer the middle of the rostrum.

Specimens of this insect were sent by Mr. Waterhouse and myself to M. Schönherr, which were named *Ap. mecops* by that author.

This species is very abundant in the south of England, and is found upon the rest-harrow (*Ononis arvensis*) from June to October. It is extremely local in Yorkshire, but very plentiful when found.

63. *A. pavidum* ♂, Germ., Schönh.
— *Ononis*, Germ.? non Kirb.
— *cinerascens*, Germ.*
— *plumbeum*, Schönh.

Black, rather broad, thickly clothed with cinereous hairs. Head short, subquadrate, the vertex, adjoining the thorax, smooth and shining, the frons flat, posteriorly punctulated, anteriorly distinctly striated, the central striæ extending to the vertex; rostrum short, about twice the length of the head, porrect, a little bent, filiform, the apex smooth and shining; eyes ciliated beneath. Antennæ inserted a little behind the middle of the rostrum, the first and second joint and sometimes the third dull rufous, the clava oblong, acuminated, black and pilose. Thorax as broad as long, subglobose, laterally dilated and rounded, convex above, closely and deeply punctured with a distinct dorsal channel more or less abbreviated in front. Elytra obovate, very convex, profoundly punctato-sulcate, the interstices rather broad and flat, transversely rugulose, blue, obscure green or greenish black. Legs very long, black. ♂. (Length $1\frac{1}{3}$ line.)

Mr. Waterhouse forwarded a British insect to M. Schönherr, which was returned with the name of *Ap. pavidum* of Germar. I possess a foreign specimen from M. Schönherr which is labelled "*Ap. pavidum*, G. e Saxon. Schupp," and I have another specimen of *Ap. pavidum* from Dr. Germar. Mr. Curtis has likewise a foreign example of *Ap. pavidum* from M. Sturm. It is very satisfactory to find four eminent entomologists all concurring in one opinion as to the identity of this species; but it is a curious fact, that the four insects in question are decidedly all males. M. Chevrolat not having a duplicate specimen of *Ap. plumbeum* of Schönherr, very liberally sent to me the type of that species for my inspection; this I find is also a male of *Ap. pavidum* of Germar. Dr. Germar has sent me four insects with the name of *Ap. Ononis*, which I have carefully examined: the male agrees in every character with the male of *Ap. pavidum*; the female differs in having the rostrum longer, before the antennæ slightly attenuated, glabrous and shining, the antennæ placed behind the middle of the rostrum; these are only sexual dissimilarities, and are common to many other species; in other characters the males and females agree. The four insects under consideration have the sculpture very similar, and approximate rather closely in form to *Ap. Ononis* of Kirby, but they are sufficiently distinct from that species. See notes on *Ap. Ononis*.

The only British example of this species that I have seen is in

* Germ. Mag. iii. App. p. 38.

the collection of Mr. Waterhouse; he has no distinct recollection where he found it.

64. *A. Waltoni,* Steph., Curt. MSS., Schönh. in Litt.
— *Curtisii,* Schönh.

This insect approaches very closely to the preceding, but differs chiefly in having the vertex of the head adjacent to the thorax thickly *punctulated,* the punctures frequently confluent, the frons minutely punctured, the punctures arranged in rows, sometimes confluent, rarely rugulose-punctate, and in having one fine impunctate stria in the centre, occasionally indistinct; the basal joints of the antennæ black or inclining to piceous, the clava *ovate*; the thorax subcylindrical, slightly rounded at the sides and rather convex above, with a short dorsal line or a large puncture at the base; the legs *distinctly shorter.*

Professor C. H. Boheman, in the celebrated work of Schönherr, has described a species under the name of *Ap. Curtisii* of Stephens, taken from specimens forwarded by Mr. Waterhouse, and returned to him; these have been placed in my hands for examination, and it is very much to be regretted that they are not the true *Ap. Curtisii* of Kirby's MSS., but are undoubtedly the species described by Mr. Stephens under the name of *Ap. Waltoni.* I sent specimens of this insect to M. Schönherr named *Ap. pavidum* of Germar, citing *Ap. Curtisii* of Stephens nec Kirby as a synonym, which elicited the following observation: "*Ap. Waltoni,* Schh., nova spec. forte—*Apioni plumbeo* proximum —*non pavidum, Germ.* (vix *Curtisii,* v. p. 430. n. 163, mihi non ad manum.") I likewise sent specimens to Dr. Germar; his opinion of them is as follows: "*Ap. Waltoni,* Steph., a new species for my collection."

I found this insect rather plentifully on the chalky downs near Brighton in the autumn. Taken by Mr. S. Stevens near Brighton, Arundel, Bury-hill and Dorking, from June to October; it appears to be confined to a chalky soil.

65. *A. vorax,* Herbst, Kirb., Gyll., Germ., Steph., Schönh.
Curc. villosulus ♀, Marsh.
—— *fuscicornis* ♂, Marsh.
A. pavidum, Mus. Steph.

The male differs from the female in being more pubescent, and in having the rostrum shorter, filiform, and covered with hairs; the antennæ and their articulations longer and distinctly stouter, the four or five basal joints rufous; the mesostethium armed where it terminates between the posterior coxæ with an acute tooth; the anterior tibiæ longer, compressed internally and externally at the base, and in front and behind at the middle; and the basal joint of all the tarsi longer.

Kirby and Stephens appear to have described the female, and to have ascribed the remarkable subflexuose appearance in the form of the anterior tibiæ to that sex, but it is a character peculiar to the male. It is a very active insect and runs with great rapidity. Small varieties of the female occur which have a great resemblance to the same sex of *Ap. pavidum.*

Plentiful near Knaresborough in Yorkshire, in woods and hedges upon various plants, in June and July; it also occurs not uncommonly in the south, I believe generally in woods.

66. *A. Pisi,* Megerle, Fab., Germ., Schönh., Steph. Manual.
— *punctifrons,* Kirb., Germ., Steph.
— *æratum,* Steph.

Frequently taken in many localities in the north and south of England, and found abundantly in the chalky districts of Kent and Surrey upon *Trifolium procumbens* and *Hedysarum Onobrychis* in June.

67. *A. Æthiops,* Herbst, Germ., Gyll., Schönh.
— *subsulcatum,* Marsh., Kirb., Germ., Steph.
— *Marchicum,* Gyll. vol. iii.
— *subcæruleum,* Steph.

The sculpture of this very distinct species is subject to variation. Kirby and Stephens describe the head *rugulose* between the eyes; the thorax *deeply punctured,* with a very *obsolete dorsal channel*; the elytra subsulcate: Gyllenhal describes the frons as *obsoletely striated*; the thorax closely but *obsoletely punctured,* with a small *obsolete fovea* before the scutellum; the elytra deeply punctate-striate.

Kirby has cited the following as varieties:—

Var. β. the elytra sulcate with the interstices convex.

Var. γ. the thorax without a fossulet or a line.

Var. δ. the head with three sulci between the eyes.

" *Var. β.* may be distinct, but it differs in nothing but the convexity of the interstices of the elytra.

" I took δ. upon the bean; it may be distinct, but it differs in scarcely any point except the furrows between the eyes."

In my series of seventy specimens, the principal part have between the eyes three or four very distinct sulci; some of them are faintly or less deeply carved than in others, but with a lens of a quarter of an inch focus, all have them more or less distinct; the thorax rather closely and deeply punctured, the punctures varying in magnitude and depth, but always very distinct, with a striolet or a large puncture before the scutellum, sometimes obsolete or wanting; the elytra elegantly engraved, very deeply and distinctly punctate-sulcate, the sulci catenulate-punctate, the interstices broad, flat and coriaceous: varieties occur with the interstices more or less convex and transversely rugulose.

Specimens of *Ap. subsulcatum* of Marsham and Kirby sent to Schönherr and Germar were determined by them to be *Ap. Æthiops* of Herbst. Gyllenhal and Schönherr's having adopted the latter name upon the authority of Germar, has induced me to follow them.

Occasionally found in plenty in many parts of England; near Dover upon *Vicia Sepium* in June.

68. *A. livescerum* ♂, Schönh.
— *translaticium* ♀, Schönh.
— *Hedysari*, Walt. MSS.

Plumbeous black, glossy, sparingly clothed with fine cinereous hairs. Head subquadrate, the vertex adjoining the thorax smooth, the frons posteriorly slightly convex, closely punctured, between the eyes commonly flat, sometimes depressed, longitudinally rugose-punctate, with one to two impunctate striæ more or less distinct; eyes prominent; rostrum moderately stout, nearly as long as the head and thorax together, curved, a little attenuated in front, rather thickly punctulated throughout, black and slightly glossy. Antennæ medial, rather longer than the rostrum, totally black. Thorax very little longer than broad, subcylindrical, broader behind than before, the anterior margin elevated, laterally scarcely dilated, convex above, coarsely and thickly punctured, posteriorly with a deep dorsal channel more or less abbreviated in front, plumbeous black and shining. Scutellum triangular, black. Elytra long-obovate, the shoulders nearly rectangular, the humeral callus elevated, convex above, deeply punctate-sulcate, the interstices flat, transversely rugulose, sometimes coriaceous, greenish blue, rarely blue or blue-black. Legs moderately long, black. ♂. (Length $1\frac{1}{2}$—$1\frac{2}{3}$ line.)

The female differs in having the head narrower; the rostrum longer, slender, filiform and shining; the antennæ inserted behind the middle of the rostrum.

Dr. Germar sent me six insects (♂ ♀) with the name of *Ap. translaticium* of Schönh., remarking that he had received this species from M. Schuppel under that name, and from M. Aubé for *Ap. livescerum* of Schönh.; and that *Ap. Hedysari* of Walton likewise agreed with them. I received a typical specimen of *Ap. livescerum* of Schönh. from M. Chevrolat, who informed me that *Ap. translaticium* was synonymous. I have closely examined the above-named foreign specimens, and I am convinced they are identical with the British species *Ap. Hedysari*.

Found in abundance in the chalk counties on the common saintfoin (*Hedysarum Onobrychis*) from June to October.

69. *A. Gyllenhali*, Kirb. ♀, Gyll., Germ., Steph., Schönh.
— *unicolor*, Kirb. ♂, Germ., Steph., Schönh.
— *Æthiops*, Gyll. vol. iii.

This insect appears to be extremely rare in the south, and very local in the north of England. I once found it abundantly, in company with *Ap. Spencii*, in a valley just beyond the White Nab, on the sea-coast south of Scarborough in Yorkshire, upon *Vicia Cracca*, the beginning of August 1837, which gave me an opportunity of identifying the sexes of both species beyond all doubt, and the pleasure of supplying many cabinets with specimens, since which I have never met with it, nor have I heard of its capture in the south of England.

70. *A. Meliloti*, Kirb., Germ., Steph., Schönh.
— *bifoveolatum*, Steph.

Few cabinets contained this species until I had the pleasure of supplying them. I met with it near Knaresborough in Yorkshire in profusion upon the melilot trefoil (*Trifolium officinale*) in September; it occurs very sparingly in the south; I have occasionally found a few specimens in Charlton sand-pits upon the same plant, and it is the only locality that I am acquainted with in the vicinity of London. Mr. S. Stevens has taken it at Bury-hill near Arundel in August, and also at Charlton in June.

I have a foreign specimen of *Ap. aciculare* from Germar, who informs me that it is found in Germany upon *Cistus Helianthemum*, but very rarely; it has been recorded as British, yet I have never seen an indigenous example.

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

[With a Plate.]

Scenedesmus, *Meyen* (Arthrodesmus, *Ehr.*).

Fronds composed of few (two to ten), cylindrical, fusiform or oblong cells, arranged in one or two rows.

The cells are always entire and mostly fusiform or oblong, although in some species the outer ones are lunulate. They are few in number, varying from two to ten, and are placed side by side in one or two rows and united by a hyaline mucus.

In this genus the specific characters depend on the number, position and form of the cells. It however seems probable that

* Read before the Botanical Society of Edinburgh, June 13, 1844.

some writers, by placing too much reliance on the arrangement of the cells, have raised varieties to the rank of species*.

Scenedesmus differs from the preceding genera in the very different form of its cells, but *Pediastrum* forms a connecting link between them. As in that genus, the frond in *Scenedesmus* is composed of several cells, but differently arranged; and the division into two segments, which, although modified, is still met with in the outer cells of *Pediastrum,* is entirely absent in *Scenedesmus.*

The endochrome is in general very pale, and starch granules are much less conspicuous than in the other *Desmidieæ.*

1. *S. quadricaudatus,* Breb. Cells generally four, oblong, rounded at their ends, disposed in a single row; each extremity of the two external ones terminated by a bristle. Breb. Alg. Fal. p. 66; Menegh. Syn. Desmid. in Linnæa 1840, p. 206. *Arthrodesmus quadricaudatus,* Ehr. Infus. p. 150. tab. 10. fig. 16; Pritch. Infus. p. 189.

β. External cells with a bristle at each extremity, and one at the centre of the outer margin.

γ. *ecornis,* Ehr. All the cells similar and without bristles. *Scenedesmus Leibleini,* Kutz. Synop. Desmid. in Linnæa 1833, p. 607. fig. 98; Menegh. *l. c.* p. 207. *Scenedesmus bijugatus, trijugatus* and *minor,* Kutz. *l. c.* p. 607. figs. 97 and 99.

In pools not uncommon. Storrington Common and Eastbourn, Sussex, and Shoreham, Kent, *Mr. Jenner*; Cheshunt, *Mr. Hassall*; Dolgelley.

β. Dolgelley.

γ. Weston Bogs near Southampton, *Mr. Jenner*; Bristol, *Mr. Thwaites*; Dolgelley and Penzance.

Fronds composed of from four to eight oblong cells, which are generally larger than in any other species of this genus; they are about three times as long as broad and rounded at their ends; the external ones are usually more turgid, and the bristles at their extremities are directed outwards.

The colouring matter is pale with minute scattered granules.

In β. the cells are smaller, and the external ones, besides the usual terminal bristles, have another from the centre of the outer margin.

The variety γ. is described by several authors as a distinct species, but I agree with Ehrenberg in considering it a state of this

* "Distributio cellularum constantissima et characteristica, forma in speciminibus bene evolutis pro unaquaque specie semper eadem."

"Forma cellularum extremarum, a cæteris plerumque diversa, fines frondis indicat, et errores a portiusculis earundem, frequenter oculis occursantibus, vitat."—Meneg. Synop. Desmid. p. 206.

species, from which it only differs in the absence of bristles on the outer cells.

Plate XII. fig. 4. *Scenedesmus quadricaudatus*: *b*, variety *β*; *c*, variety *γ*. *ecornis*.

2. *S. dimorphus*, Ktz. Cells acute, four to eight, placed evenly in a single row; the inner cells fusiform, the outer externally lunate. Ktz. *l. c.* p. 608; Menegh. *l. c.* p. 208. *Arthrodesmus pectinatus*, Ehr. Infus. p. 150. tab. 10. fig. 17. *Achnanthes dimorpha*, Turp. (1820).

Dolgelley, *J. R.*; near Bristol, *Mr. Thwaites*.

Fronds very minute, consisting of four to eight cells placed evenly side by side in a single row; the inner cells straight, fusiform, attenuated and acute at each end, the outer ones externally lunate.

The endochrome is pale bluish green.

Plate XII. fig. 5. *Scenedesmus dimorphus*.

3. *S. acutus*, Meyen. "Cells two to six, fusiform, acute at both ends, unequally ventricose, arranged in a double, irregularly alternating series." Menegh. *l. c.* p. 207; Kutz. *l. c.* p. 609. fig. 96. *Arthrodesmus acutus*, Ehr. Infus. p. 150. tab. 10. fig. 19. *c*, *d*.

I notice this species because the Rev. M. J. Berkeley has gathered it near King's Cliffe, and I have occasionally met with specimens at Dolgelley which agree with Ehrenberg's figures, but as I omitted to draw up a description at the time, I have borrowed the specific character from Meneghini.

The cells are fusiform, somewhat ventricose in the middle and acute at the ends; they project more or less alternately on each margin, and thus form two irregular series. When there is but little irregularity and the cells are nearly in a single series, this species has some resemblance to *S. dimorphus*, but in the latter the cells are not ventricose in the middle and are arranged quite evenly side by side.

Plate XII. fig. 6. *Scenedesmus acutus*.

4. *S. triseriatus*, Mgh. Cells elliptico-fusiform, eight arranged in two oblique series, in each of which the cells are in close apposition; but the outermost one, which is lunate, is not in contact with any cell of the other series. Menegh. *l. c.* p. 208. *Arthrodesmus acutus*, Ehr. Infus. tab. 10. fig. 19. *a*, *b*, *e* (according to Meneghini).

King's Cliffe, *Rev. M. J. Berkeley*; in a cave near Bristol, *Mr. Thwaites*.

In the perfect frond the cells are eight in number, arranged obliquely in two distinct series. Each series has three cells which are fusiform, equal, somewhat ventricose in the middle, acute at the free extremity, and subacute or rounded at the inner one. As the cells are not placed evenly, but each projects beyond its neighbour, each row is oblique; their position with respect to each other is such that the inner ends of two cells of the lower lie between those of the upper row, whilst that of the third is outside the end of the highest in the upper. Of the two remaining cells, which are lunulate, one is placed beyond the outer cell in each series, and is therefore not in contact with any cell in the other. They however take the same direction as the other cells in the series to which they respectively belong.

Meneghini, under his *Scenedesmus triseriatus,* refers to the figures *a, b, e* of the *Arthrodesmus acutus* of Ehrenberg. Mr. Berkeley is convinced that our plant is represented in fig. *b.* In this opinion I fully concur; but I have great doubt whether it be distinct from the *Scenedesmus obliquus,* Kutz., and by Ehrenberg both are considered as states of *S. acutus.* It however seems distinct from the *S. acutus,* as it has all the cells in a series closely united; but in all these plants their form is nearly the same, and I have not sufficient experience to decide whether any intermediate arrangements of them may be found.

If distinct from *S. obliquus,* it must be distinguished by the outer cells being lunulate and the extremities of all more acute, for in Turpin's figure of the *obliquus* the cells are arranged in the same manner as in our plant. I strongly suspect that a better acquaintance with them will prove the necessity of uniting these forms. I subjoin the descriptions of both from Meneghini.

"*S. triseriatus,* Mgh., cellulis fusiformibus exilibus octo, apicibus acutis, duobus medianis rectis, cæteris extrorsum lunulatis in seriem triplicem alternantibus, quarum mediana a duabus extimis formata."

"*S. obliquus,* Kutz., cellulis elliptico-fusiformibus octonis, extremitatibus rotundatis, in seriem duplicem obliquam dispositis. *Kutz. l. c.* p. 81; *Achnanthes obliqua,* Turp." *Menegh. l. c.* p. 208.

Plate XII. fig. 7. *Scenedesmus triseriatus.*

5. *S. obtusus,* Meyen. Cells three to eight, ovate or oblong, with rounded ends and arranged alternately in two rows. Menegh. *l. c.* p. 208. *Scenedesmus quadralternus,* Kutz. *l. c.* p. 608. fig. 94. *Scenedesmus octalternus,* Kutz. *l. c.* p. 609. fig. 95. *Arthrodesmus acutus,* Bailey, American Bacil. fig. 18?

In boggy pools, Dolgelley.

Fronds minute, composed of from three to eight ovate or ovato-oblong cells, arranged alternately in two rows. The endochrome is very pale green.

The specimens I have examined did not agree in every respect with the description and figures of this species, but they probably belonged to it. The cells were ovate, the broad ends of the rows placed alternately, the smaller ends being in different directions;

sometimes the cells seemed only held together by the hyaline matrix, in which state they appear to connect the *Desmidieæ*, through *Gonidium*, Ehr., and *Trochiscia*, Kutz., with the *Ulvaceæ*.

The cells of one row are separated by the interposition of the broader ends of the other.

PLATE XII. fig. 8. *Scenedesmus obtusus.*

DESMIDIUM*, *Ag.* (*Kutz.*)

Filaments elongated, triangular or quadrangular, regularly twisted, fragile; the joints bidentate at the angles.

In my former paper on *Desmidium* I removed from that genus all Ehrenberg's species which do not form a filament, and retained in it only those *Desmidieæ* which have elongated jointed filaments. Since its publication, Kutzing, in his 'Phycologia Generalis,' has restricted the genus to the species with triangular filaments, and as this arrangement meets with the approbation of Mr. Berkeley, I am induced, in deference to their joint opinion, to follow it in the present article, with a slight alteration of the character which will enable me to include the plant described below.

The transverse view is triangular or quadrangular, and the endochrome has in one case three and in the other case four rays; these are frequently cloven.

1. *D. Swartzii*, Ag. Filaments triangular, equal, with a single longitudinal, waved, dark line formed by the third angle; end view triangular with the endochrome three-rayed. Kutz. Phycol. Generalis, p. 165; Menegh. Synop. Desmid. in Linnæa 1840, p. 203; Ralfs in Annals of Nat. Hist. vol. xi. p. 375. pl. 8. fig. 3.

I have only to add to my former notice of this plant, that it has since been gathered near Cheshunt by Mr. Hassall, and in many stations in Sussex by Mr. Jenner, also in Caragh Lake, Kerry, by Mr. Andrews.

2. *D. quadrangulatum.* Filaments quadrangular, varying in breadth from the twisting of the filament, and having two longitudinal, waved, dark lines; the end view is quadrangular, with the endochrome four-rayed.

In a boggy pool at Bologas near Penzance.

Mr. Berkeley and Mr. Borrer regard this plant as a variety of *D. Swartzii*, nor can I find any distinctive mark except those which depend upon the filament being quadrangular in one case and triangular in the other; but Mr. Jenner informs me that the

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

teeth in *D. Swartzii* have two angles, whereas they are rounded in the present plant.

As there are three sides in one plant and four in the other, whilst the sides in both are equal, the filament of *D. quadrangulatum* is stouter; for the same reason, instead of one dark longitudinal line it has two lines running from side to side and crossing each other: the additional line of course depends on the additional angle. When these lines approach the opposite margins of the filament only one side is presented to the eye, and the filament is then of the same breadth as in *D. Swartzii*, but as it is regularly twisted its apparent breadth varies, being greatest where the two dark lines cross each other in the middle. The end view also has one more angle, and therefore the endochrome exhibits four instead of three rays.

I must confess that I am inclined to agree with Mr. Berkeley and Mr. Borrer, and to regard it as a variety of *Desmidium Swartzii*; but as I have gathered it for two succeeding years quite unmixed with that species, and as Mr. Berkeley well observes (in a letter), that "whether considered as a species or variety it is a remarkable plant and well-deserving of notice," I have preferred to describe it as distinct.

Plate XII. fig. 9. *Desmidium quadrangulatum.*

[The following paragraphs, which should have been inserted in the description of *Xanthidium furcatum* at p. 466 of the previous volume, were omitted by accident.]

Near the centre of each segment there is a curious projection on each surface. In the front view, and especially before the escape of the endochrome, these projections are liable to be overlooked, and even in the empty fronds some attention is requisite for their discovery.

The best method of detecting them is to adjust the microscope for a view of the frond, and then gradually to raise the lens; as soon as the frond becomes slightly indistinct, the projections will be rendered visible. In this aspect they are circular with marginal teeth, somewhat resembling the peristome of a moss. In a lateral view the processes are more distinct, rather broader than high, and dentate at the end.

LVIII.—*Note on* Mr. Bowerbank's *Paper on the genus* Dunstervillia (*Bowerbank*), *with Remarks on the* Ischadites Königii, *the* Tentaculites *and the* Conularia. By Thomas Austin, Esq., F.G.S.

When reading in the 'Annals' for the present month Mr. Bowerbank's very interesting observations on a new genus of calcareous sponge (*Dunstervillia*), discovered on the coast of Southern Africa by Mr. G. Dunsterville, I was at once struck with the resemblance this minute sponge bears to the *Sphæronites*, even before I had arrived at that part of Mr. Bowerbank's communication in which he states his conviction that the fossil known as *Sphæronites tessellatus* owes its origin to an allied genus of Zoophytes. And I also came to the conclusion that this minute sponge would throw considerable light on those hitherto puzzling fossils, the *Ischadites* of the Silurian system.

On referring to the illustrations in the 'Annals,' and comparing them with Mr. Bowerbank's very clear description, there can be no room to doubt the correctness of his opinion that the *Sphæronites tessellatus* is the calcareous skeleton of a spongiform body. And if it is admitted that *S. tessellatus* is the remains of an extinct species of sponge, there can be but little difficulty in proving the *Ischadites* to be of similar origin, and not belonging to the family of *Ascidiæ*, as Mr. König imagined. In alluding to this fossil in Murchison's 'Silurian System,' Mr. König says, "they seem to form a group of globular, coriaceous, and it may be added, pedicled bodies, for in one of them a cicatrix for the insertion of the pedicle distinctly appears." This cicatrix is probably the point where the zoophyte had been attached.

The manner in which the *Ischadites* are found associated together, and are compared in Murchison's 'Silurian System' to compressed figs, serves to show that the zoophytes were affixed in groups to extraneous bodies, and that they lived and died on the spots where their remains are now imbedded. The flattened form in which they sometimes occur may be accounted for by the fact that the internal supports (spicula) are either wholly wanting, or, if present, but little adapted to sustain the sponge in its original form after the destruction of its vitality, so that the calcareous framework which still held together would become collapsed and leave the remains in the shape we now find them.

The *Sphæronites* have been heretofore frequently considered as allied to the *Crinoidea*, but Mr. Bowerbank has, I conceive, clearly removed the difficulty relative to this fossil, and which will henceforth take its proper position in all future scientific arrangements of organic remains.

I will now venture an opinion relative to two other fossils which have caused considerable diversity of ideas respecting their nature and origin, namely, the *Tentaculites* and *Conularia*.

On a careful examination of numerous specimens, I am of opinion that the *Tentaculite* is the shell of a Pteropodous mollusk allied to the recent *Creseis*, as the *Conularia* is that of an animal allied to the *Cleodoræ*.

Bristol, May 14, 1845.

LIX.—*On the Formation of Aërial Tubers in* Sedum amplexicaule, *DeC.* By L. C. Treviranus*.

If we assume, what can scarcely be denied, that individuals exist even in the vegetable kingdom, it may be asserted that each of them flowers only once. When a plant appears to do this more frequently, it is accurately speaking no longer the same individual, but a different one, which has applied itself to or engrafted itself upon the first, or by whatever other name the connexion which has become established between the two may be designated. It is very distinctly evident that the flowering plant is a new one when the old one dies off after flowering, but previous to this forms the basis of a new one in the form of a bud, that is, a crude deposit of organic matter which remains connected with the mother-plant for a period, at the same time putting forth separate organs of nutrition, with the aid of which it becomes a distinct independent individual, which flowers and propagates as the parent one. Of several families of plants in which this circle of propagation and flowering is perceptible in a striking manner is that of the house-leeks (*Crassulaceæ*, DeCand.). In those species of *Sempervivum* which constitute in Koch the subgenus *Jovisbarba*, we often observe buds shoot out on thread-like petioles frequently an inch in length from the angles of the leaves converging to form the rosette. At first globular, and only of the size of a grain of millet, they soon become larger, and separate, when they have attained the size of a cherry-stone or of a hazel-nut, from the mother-plant, themselves sending down root-fibres, with the aid of which they absorb nutriment and become developed. If a section of such a body be made, it is seen to consist of a ground-work of compact cellular tissue, from which numerous fleshy leaves take their origin. As soon as the mother-plant has acquired the requisite size and development, it flowers and dies; the same fate likewise attends the newly-formed plant.

In those species of *Sedum* which are herbaceous and perennial, such as *S. reflexum, sexangulare, album*, &c., some short branches densely clothed with leaves shoot out of the main body of the plant during and after the flowering period; they continue in organic connexion with it by means of cellular tissue and vessels until their turn comes to extend and to flower. But this formation of new shoots takes place in a more remarkable manner in *Sedum amplexicaule*, DeC., a species occurring in the south of France, in Lower Italy, in Spain and in Greece, which bears our winters very well if they are not too severe, even in the open ground. It was named *Sedum rostratum* by Tenore, but ranged

* From the Botanische Zeitung for April 18th, 1845.

under *Sempervivum* by Sibthorp and Lagasca from its generally having eight pistils, and designated by the former as *Semp. tenuifolium*, and by the latter as *Semp. anomalum*. A. P. DeCandolle has given a very good figure of it in the second of his 'Mémoires p. serv. à l'Hist. du Règne Végét.,' in plate 7. In this plant the new shoots destined for the reproduction are very much thickened at their apex for about an inch in length, and at the same time the leaves in this place are very close together, while those on the lower portion of the shoot are very few and widely separate. About the time of the solstice, when the plant has finished flowering and formed its fruit, a complete arrest occurs in the growth of the plant. Not only the main body which had flowered dies away, but likewise the shorter or longer lateral branches, the thickened apices of which constitute the newly-formed living shoots. If one of these shoots be examined at this time, we find, wholly inclosed by the dried sheath-like lower portions of the leaves, a cylindrical mass of cellular tissue, the cells of which contain numerous starch-granules. Its axis is occupied by a small circle of fibres and vessels. At the apex is observed a bud consisting of several incipient leaves, and on the surface some impressions in regular order which the dried leaves have left behind where they fell off. In fact, it is a true tuber which has formed above the ground by the growing together of the lower parts of numerous densely-crowded leaves.

In this state of rest and of apparent want of life the plant remains until the middle of August, at which time new leaves are developed from the apex of the shoot; and one, or several rootlets from the lower extremity, which soon become long and much ramified. The new leaves which clothe the stem of the future year, which terminates in a flower, are cylindrical, or rather semicylindrical, with a slightly acute termination, and provided at the base with a small appendage as in *Sedum reflexum, acre*, and other species; they do not possess the sheath-like inferior portion which characterizes those by which the new tubers are enveloped; these latter are therefore formed only in the early part of the summer, and no longer in the later like the others. Consequently, what renders the formation of new shoots for the vegetation of the succeeding year remarkable, is, on the one hand, that they assume the shape of tubers which are formed within peculiar sheath-like leaves, which soon dry but never fall off like the others, and serve as a case for the tuber during its period of rest; on the other hand, that the vital connexion of this tuber with the mother-plant ceases as soon as it has become developed.

The various authors who have described the *Sedum amplexicaule* have noticed this kind of reproduction only briefly and with few words. Sibthorp (Prodr. Fl. Græc. i. 355) and Lagasca (Elench.

Plant. n. 223) state that the plant has "propagines cylindricæ;" but Tenore, observing more accurately, ascribes to it "surculi tuberiformes, in quibus folia basi in membranam dilatata, quæ in caule florifero basi soluta." (Syll. 288.)

DeCandolle (*op. cit.*) likewise mentions this difference in the leaves, which is also exhibited in the above-mentioned figure, and he states with reference to it, that "on est conduit à penser que le petit appendice qu'on observe à la base des feuilles est une espèce de rudiment de la gaine des feuilles." (*Loc. cit.* p. 35.) However, this formation of aërial tubers, if we may so express ourselves, seemed to deserve closer attention, for no similar formation has hitherto occurred to me, or been observed to my knowledge, at least in Dicotyledons.

I will lastly observe, that *Sedum amplexicaule* differs from the other species of this genus, not only in the number of pistils and in the mode of reproduction, but likewise by the structure of its calyx, each sepal being externally considerably excavated, while a prominent angle reaches from each sinus to the base, giving the calyx a septangular or octangular appearance. These characters deserve to be recommended to some manufacturer of genera for the creation of a new genus.

LX.—*Anatomical and Organogenical Researches on* Lathræa clandestina. By M. Duchartre *.

The complete history of a plant from its origin at the period of germination to the moment when, after having given birth to new seed, it has accomplished all the phases of its existence, is still wanting in botany; for the type studied minutely in all its details, in an anatomical and physiological point of view, which man furnishes to zoology, does not exist in the vegetable kingdom; numerous materials, it is true, have been brought together for the history of some plants, but there are none in which some gap does not remain which it is essential to supply.

The description of most plants is limited to that of their external forms with respect to the organs of vegetation, and the organs of reproduction have alone been examined generally with more detail. Among the phanerogamous plants, the madder is perhaps the only one which has been the object of an investigation of this nature, profound and almost complete, due to M. Decaisne.

It would however be desirable, both for the interest of vegetable anatomy in general and for the application of anatomical

* Abstract of a Report laid before the French Academy by MM. de Mirbel, Richard, and Ad. Brongniart, April 28, 1845.

characters to natural classification, that all the essential organs of a certain number of the principal types of the vegetable kingdom should be examined with care. Many facts considered as general would lose this universality, and the greater or less frequency of the exceptions would soon establish the value of characters and the importance of such or such a point of organization.

The memoir of M. Duchartre on *Lathræa clandestina* is an excellent example of this kind of investigation, in which many points are treated in a very complete and satisfactory manner, and in which only a small number of gaps would remain to be noticed.

But this memoir acquires an additional interest from the nature of the plant which is the subject of it. The mode of existence of parasitical plants is always an interesting problem to solve, and the anatomical examination of their organs must serve as a starting-point for physiological researches.

Several of these vegetables have already been the object of minute research, among which must be cited in the first rank that of Mr. R. Brown on *Rafflesia*, then those of M. Unger on parasitical plants in general, of M. Goeppert on the *Balanophoræ*, and lastly, the researches of Mr. Bowman on another species of the same genus *Lathræa*, viz. *L. squamaria*. But, if we except the first of these memoirs, the other treatises have almost had for their sole object the mode of implantation of the parasites on the plants from which they draw their nourishment, or some peculiar points of their organization. M. Duchartre, on the contrary, has proposed to study successively all the organs of the curious plant which forms the subject of his researches; he presents an anatomical monography of it, and this step has led him to discover several important facts in the structure of this species.

We shall follow him in the examination of the various organs of vegetation and reproduction, noticing rapidly the points by which the organization of this plant appears to differ from that of the vegetables which have already been studied by other anatomists; and we may observe, that we have been able to verify the majority of the facts advanced by M. Duchartre, and represented in the numerous drawings which accompany his memoir, by means of fresh specimens, or specimens preserved in alcohol.

The structure of the stem is first studied by M. Duchartre; he finds in it, as in all the stems of Dicotyledons, the pith, the ligneous system and the cortical system formed of the liber and of the cellular envelope; but he notices two characters which appear to remove this plant from the usual structure of these vegetables. The first consists in the absence of a medullary sheath, that is to say, of a first interior zone of vessels of a different nature to those of the ligneous zone, and comprised between the pith and this ligneous zone. It is these vessels which in the ordinary Dicotyledons belong to the form designated by the name of true spiral vessels or of unrollable spiral vessels, and it is in this position alone that these vessels are found in the stem. Here nothing similar occurs; the vessels nearest to the pith consist of finely reticulated vessels, similar, although finer, to those which exist in the rest of the ligneous layer. There are no tracheæ with a continuous free and unrollable spiral fibre.

This character, however, although forming an exception to the most usual organization of dicotyledonous plants, is met with in other vegetables of this class, and particularly in most parasitical plants, although the unprecise manner in which authors apply the word *spiral vessels* may sometimes leave a doubt on this point.

A second remarkable character of the ligneous body of this plant consists in the complete absence of medullary rays. This fact is well established by M. Duchartre, and is placed beyond all doubt. The ligneous zone is entirely formed of cells elongated in the longitudinal direction of the stem and consequently parallel to the pith, intermixed with more or less finely reticulated vessels, and thus appearing most frequently radiated or punctated; it is not interrupted at any point by those lines of cells in a radiating direction, which, extending from the pith toward the bark, constitute the medullary rays.

An analogous structure had been already noticed by M. Brongniart in a family very far removed from the *Lathrææ*, in the *Crassulaceæ* *, in which the ligneous zone is equally unfurnished with medullary rays, and is only constituted of tissues elongated in the direction of the axis and perfectly continuous.

Having desired to ascertain whether, in the family to which the *Lathræa clandestina* belongs, this character was found in any other plant, we found that the *Melampyrum sylvaticum* presented the same continuity in the elongated tissues of the ligneous zone, and that there was also a complete absence of medullary rays.

We thus find in several Dicotyledons an organization of the stem which we were far from suspecting some years ago, and which deserves the attention of physiologists.

The bark presents, in its elongated internal tissue forming the liber, the same continuity, in consequence of the absence of the medullary rays which ordinarily extend from the wood into the bark. The tissue which constitutes this internal cortical layer has the greatest analogy with that which forms the non-vascular part of the ligneous zone; only it is more opake and more solid

* See "Observations on the Internal Structure of the *Sigillaria elegans*," &c., by M. Ad. Brongniart. (Archives du Muséum, tome i. p. 437.)

towards the exterior, more delicate, and at the sides thinner in the internal part in contact with the exterior of the wood.

In no part has M. Duchartre been able to detect proper or laticiferous vessels.

But if the zone of elongated ligneous tissue forming the wood and the liber constitutes a continuous cylinder around the pith, and not a series of distinct fascicles separated by the medullary rays, as is usually the case, it is not less true that the vessels there form separate fascicles and of a definite number. This is shown by the researches of M. Duchartre on the successive development of the stem and the tissues which constitute it. The vessels form at first four quite distinct fascicles; they then divide into a greater number, and we count eight, ten, twelve, and even more; lastly, the vessels appear dispersed with irregularity in the whole of that zone, which itself, on old stumps of at least two years, acquires a much greater thickness, and is often formed of two distinct concentric layers.

Thus, notwithstanding these two essential points, by which the stem of the *Lathræa clandestina* differs from the ordinary structure of Dicotyledons, the absence of spiral vessels and of the medullary rays, its growth is effected according to the mode proper to the totality of these vegetables.

The root, in its principal parts and even in its fibrils, presents the same structure as the stem, modified, as is generally the case, by the absence of the pith; but the parasitism of the plant gave a peculiar interest to the investigation of the extremities of the radical fibrils by which it is fixed on the roots of trees, and most frequently on those of the poplar.

This point however, which has been already examined carefully by Mr. Bowman, in *Lathræa squamaria,* could present fewer new facts; indeed the differences between these two species in this respect are very slight, and M. Duchartre has only been able to add some details and to point out some secondary differences between these two plants.

The *L. clandestina* attaches itself to the roots of trees by numerous suckers terminating in radicles, or growing laterally along these fibrils and representing spongioles. These suckers, nearly hemispherical, are larger than those of *Lathræa squamaria;* their surface of adherence is plane or slightly concave, formed of a cellular tissue of a peculiar form, elongated and directed perpendicularly on the external surface. The small tubercle which the sucker itself forms is essentially cellular, but traversed, especially toward its centre, by numerous moniliform vessels with reticulated sides, which however do not extend as far as the surface by which the sucker is applied on the foreign root; an arrangement which would thus differ from that stated by Mr. Bowman in *Lathræa squamaria*.

The majority of the plants parasitical on roots are destitute of true leaves, these organs being reduced to short scales which seem to correspond only at the base of the petioles; this is seen in the *Orobanchæ*, *Monotropa*, and several exotic plants which present the same mode of growth, and these reduced and abortive leaves appear, as well as the stems, generally destitute of those epidermal pores designated by the name of stomata.

The appendicular organs of the *Lathræa* present a very different form and structure, although short and imbricated like scales; they are narrowed at their base into a sort of petiole, and present a true cordiform fleshy limb, analogous to that of the leaves of certain succulent plants. Mr. Bowman had already indicated the large regular gaps which traverse the interior of these kinds of leaves, but he believed these organs to be destitute of stomata, and it was not till within a few years that Dr. Schleiden noticed the existence of these pores on the leaves of *Lathræa squamaria*. M. Duchartre had discovered these organs, not only on the cuticle of the leaves, but on that of the stems of the *L. clandestina*, and at a period when he could not know of the observation of Dr. Schleiden, and had insisted on this exception to a character considered as general among the plants parasitical on roots.

His memoir contains, moreover, a very complete anatomical description of these rudimentary but complicated leaves, of their nerves, of their parenchyma and of the empty spaces which regularly occur in them, and of the papillæ which clothe them; finally, the mode of evolution of these organs is carefully followed out, and it is one of the most complete chapters of the history of this remarkable plant.

With respect to the organs of reproduction, the plant which was the object of the examination of M. Duchartre did not present any singularity which might lead us to presume anything very peculiar in their structure; but, as we have said at the commencement of this Report, a complete anatomical description of the different organs of a vegetable is still a thing so rare as to offer considerable utility to science by the means of comparison which it permits of our establishing at a later period.

In this point of view, the anatomical investigation of almost all the parts of the flower of *L. clandestina*, such as M. Duchartre has given, deserves great praise; but the author has moreover directed his attention in a special manner to the mode of development of the different floral verticils. Thus the mode of appearance of the calyx, the corolla, the stamina and the pistil, the changes which take place in the anthers and the ovary have been carefully traced, and some of the theories propounded on this subject have been discussed on this occasion; but we do not think it necessary to consider them here, as the *L. clandestina* does not offer anything peculiar in this respect.

It is also to be regretted that M. Duchartre has not been able to follow out the mode of formation of the embryo and its subsequent germination.

Notwithstanding these slight omissions, the investigation of M. Duchartre is not less one of the most complete on the anatomy and organogeny of a particular vegetable; it has appeared to us very exact in all the points which we have been able to verify, the author is quite conversant with the modern labours relative to the different subjects which he has treated, and we are of opinion that it would be desirable for the progress of botany that the science should possess several anatomical monographs made with the same care. For these reasons, we propose to the Academy to give its approbation to the memoir of M. Duchartre, and to insert it in the 'Mémoires des Savants Etrangers.'

LXI.—*On the Growth of the Stem of Palms, and on the Decurrence of the Leaves.* By M. von Martius*.

Permit me to present to you some pages of the Bulletin of our Academy, in which I have stated the results of my researches on the growth of the stem of Palms, and on the decurrence of the fibres. These results may be reduced to the following points:—

1. The stem of Palms does not contain more fibres than are destined to enter sooner or later into the leaves.

2. The fibres originate on the summit of the stem, *in nucleo gemmæ, vel in phyllophoro Mirbelii,* between the new and plastic parenchyma which there forms a peculiar conical layer, covering, like a funnel, the more aged parts. They are always external with relation to the others, which are already formed, and a little higher.

3. The points of origin of the fibres are organically predisposed; we find, in these points, the fibres situated obliquely, and converging at their upper ends. They are elongated from the two ends, that is to say, *they grow from below upwards and from above downwards.*

4. The upper extremity of these fibres is directed towards the base of the young leaf; the latter originates in the form of a cellular fold (*plica, crista*) in the centre of the bud, and is conducted toward the periphery on becoming enlarged.

* Being an extract of a letter to M. Flourens, Comptes Rendus for April 7, 1845.

5. The lower extremity is obliquely prolonged below, and terminates, in the form of an extremely slender and exclusively parenchymatous filament, on a peripherical layer. This layer is wholly different from the liber of the Dicotyledons with relation to the history of its development; it may however be compared to that organic system as regards its constituent elements.

6. The spot where the upper extremity of the filament enters into the leaf, is either on the same side of the stem by which it makes its decurrence, or on the side diametrically opposite. In this second case the fibre passes throughout the stem.

7. There are necessarily decussations for each filament. Some decussate the others in the central part of the stem; others by bending suddenly to enter a leaf on the side of their origin.

8. The growth is effected in an organic solidarity between the formation of the elementary organs and the laws of the position of the leaves. It is especially this *position* and the *succession* of the systems of phyllotaxis (which generally increase by specific complications in each species of palm), that we must regard as the conditions of the modifications in the decurrence of the fibres and the formation of the wood*.

9. The oldest part of the filaments is not found at either their upper or lower extremity; they have their most complete development in the middle part of their decurrence. Below they consist only of parenchymatous cells; at their upper extremity they are divided into several finer vessels which enter the leaves.

10. The lower extremity does not extend to the roots; it does not go beyond the *collum,* where is the organic separation of the *descensus* and the *ascensus*.

11. The stem becomes more ligneous and harder by the growth of the fibres which ascend and which make their decussations, and likewise the parenchyma between the fibres becomes thicker and harder. The hardening is effected in a direct ratio to the age of the tree; and as the organic elements first formed and homologous are grouped at the periphery, the stem is harder in its circumference.

You see that these results are not in contradiction with the ideas propounded by MM. de Mirbel and Mohl; they however differ in some less essential points. M. Mohl does not mention in his memoir (De Structura Palmarum in Mart. Palm. Brasil.) the passage of the filaments from one side of the stem to the other; nor has he explicitly declared that they grow in two directions, *sursum* and *deorsum*. With respect to the ideas of your illustrious academician, M. de Mirbel, I quite agree with all that

* I have demonstrated in what manner the four forms of the stem of the Palms, defined by M. Mohl, owe their different organization to the condition of the phyllotaxis, to the number and length of the internodes, &c.

he has stated on the structure of the fibres; but I am not of his opinion with regard to the first degree of the development of the leaf, seeing that at the beginning it does not appear to me to have the form of a hood, but rather that of a small crest (*crista* or *plica*) with a vertical direction.

My observations have been especially made on the *Chamædorea elatior*, the subterraneous *caudices* of which are ramified, and present in their buds all the conditions necessary for the examination of the origin both of the elementary organs and of the leaves, branches and *régimes*. These observations have also convinced me that the bicarinated leaf, which often commences the formation of the leaves in the branches of the Monocotyledons, and which is repeated in the morphology of the spathelles of the *Gramineæ*, is not formed by the coalescence of two leaves. It is only a solitary leaf, furnished with an extremely thin lamina, and which soon disappears. You are aware that the nature of these leaves has long been a subject of discussion by MM. Turpin and Robert Brown, and recently by M. Röper, whose results agree with mine.

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

[Continued from p. 185.]

No. III. Aranjuez, 8th of July 1844.

On the 18th of June I left Valencia, which had detained me within its walls longer than I wished. Immediately on leaving the charming Huerta, you enter a wood of olive and St. John's bread trees (*Ceratonia Siliqua*) with *Kentrophyllum lanatum*, DeC., growing in great plenty beneath them, which accompanied us from here almost to Madrid. So long as we were in the kingdom of Valencia, the country was very fertile, well-cultivated, and clothed with timber; the broad valley of Incar filled with rice-fields, the view of the romantic Sierra de Cullera, and the environs of the friendly town St. Felipe, were in particular among the fairest regions I had hitherto seen in Spain. As soon, however, as you have traversed the Pass of Almansa, you come into a desert, treeless, thinly-peopled, elevated plain in the province of Albacete, belonging to the kingdom of Murcia; low, uniform hills of chalk alternating with wheat-fields and waste sterile plains clothed with solitary specimens of an umbelliferous plant which appeared to me to be *Elæoselinum fœtidum*, Boiss., and with *Retama sphærocarpa*, Boiss. Still more desert and equally devoid of trees is the country beyond Albacete, at the entrance into the poor province of La Mancha, the villages of which lie so scattered that they resemble heaps of stones and ruins more than human abodes. All this ren-

* Translated from the Botanische Zeitung, Nov. 8, 1844, and communicated by A. Henfrey, F.L.S.

ders more striking a pretty widely-spread wood of slender trees of *Pinus Pinea*, L., lying between La Minaya and El Provencio, near the Venta del Pinal. Generally speaking, the country is somewhat better from hence, as the land is elevated in low hills, between which occur here and there little isolated woods of *Quercus Ilex*, L., and dwarf plantations of olives. Beyond Ocaña the soil is dreadfully sterile, but on ascending an eminence, you suddenly discover the broad green valley where flows the Tagus, filled with a forest of trees, with the domes and towers of the palace of Aranjuez rising from among them. I was prevented by want of time from halting then in this paradise, and an hour later I found myself already on the arid shores of the nearly waterless Manzanares, glad to have crossed the comfortless upland plain of New Castile.

Interesting as the neighbourhood of the capital may be in spring in a botanical point of view, it offers little in the summer months, and I had not time to visit the Sierra de Guadarrama, though lying quite near, and rich in plants. I confined myself therefore during my fortnight's stay in Madrid to making myself acquainted with the scientific institutions of the Spanish capital, where the many recommendations I had obtained to the most distinguished men in all branches of natural science gave me the best opportunities. Now that I dare permit myself to give an opinion on the present condition of natural science in Spain, I can, alas! only say, that the Spaniards, notwithstanding the numerous splendid collections of all kinds, in every branch of natural science, the practical parts of medicine included, are still very far behind the other civilized nations of Europe. This is not merely owing to the small assistance rendered by the government, but to the exceeding indifference of Spaniards to all that relates to science in general. This unhappy country has come to such a pass, through the incessant civil wars, that no one will interest himself in anything but politics.

With regard to botany, I devoted my attention particularly to the botanical garden, which was open to me at all times, through the kindness of the director, Prof. D. José Demeiro Rodriguez. This extensive and well-kept garden, situated on the magnificent promenade of the Prado, was the first real botanical garden I saw in Spain. It has existed in this place and in this condition since the reign of Charles the Third, the king to whom Spain owes all her scientific and artistic institutions; it was established here in the year 1781. The first director of it was, if I mistake not, D. Casimir Gomez Ortega, who was followed by D. Antonio José Cavanilles, from whom the garden came into the charge of his pupils, D. Mariano Lagasca and the present director Rodriguez, a man whose well-known name is a guarantee that it is in no unworthy hands. The plants, the number of which is unknown to me, as no catalogue exists, are arranged according to the Linnæan system and provided with elegant labels, on which are inscribed both the Latin and Castilian names. The garden, which is remarkably large, and is open daily to the public at the time of the promenade, possesses many well-arranged plant-houses, and an orchis-house has lately been built. Very few ferns are cultivated, but on the other hand there is a very rich collection of *Cacti* and succulent plants, especially from the West Indies, Mexico and South America. The botanical museum is in the garden, and the lower part of this contains a spacious, very elegant theatre for the lectures on botany and agriculture ; in the upper story are the botanical library with the herbaria, as well as a room for a collection of models and instruments of husbandry, woods and the like, which is yet but insignificant, but for the enlargement of which the present Professor of Agriculture, D. Pascual Asensio, labours with great zeal. The richly-bound botanical library contains but few new works ; however, the herbaria of Cavanilles, Ruiz, Pavon and others are here, the first of which I studied particularly. From deficiency of funds, the Madrid garden is in correspondence with no foreign gardens except those of Paris and Montpellier. During my sojourn in Madrid, I made a day and a half's excursion to the famous Escurial, situated at the foot of the Sierra de Guadarrama, less for the sake of botanizing than to see this palace so remarkable in historical associations. From this excursion however to the richly watered, in part well-wooded, granitic Sierra, next to the Sierra Nevada and the Pyrenees the highest mountain of Spain, some parts being at that time covered with snow, I am persuaded that it would well repay a longer sojourn. In a single half-hour's excursion which I made in the immediate vicinity of the Escurial, I found many interesting plants, of which I may mention *Ranunculus Carpetanus*, Reut., *Dianthus laricifolius*, Reut., *Sedum gypsicolum*, R., and *Jasione sessiliflora*, R.

On the 6th of July I left Madrid and betook myself to Aranjuez, from whence I think of setting out this evening towards Granada. Well would it recompense a longer stay, since both the very luxuriant vegetation of the neighbouring shores of the Tagus and the surrounding gypsum hills promise a rich harvest. Aranjuez is particularly remarkable for its woods. Giant planes, innumerable elms, limes, beeches, oaks and other dicotyledonous trees, clothe for leagues the shores of the stream, on which occur, among other plants, *Helminthia echioides* and *Chlora perfoliata*, L. *Kentrophyllum lanatum*, DeC., *Picnomon Acarna*, DeC., *Centaurea Calcitrapa*, L., *Carlina corymbosa*, L., are extremely frequent, in company with *Heliotropium europæum*, L., and *Tribulus terrestris*, L., on waste places, while the neighbouring gypsum hills are clothed with *Frankenia pulverulenta*, Mill., *Machrochloa tenacissima*, Kth., many *Resedaceæ* and *Labiatæ*.

BIBLIOGRAPHICAL NOTICES.

Contributions towards a Fauna and Flora of the County of Cork. London, 1845. 8vo.

The appearance of the first local fauna and flora of a part of Ireland gives us great satisfaction, since we trust that it will soon be followed by similar accounts of other parts of the island, and that thus we shall attain that knowledge of its native productions of which we are still so deficient. The volume before us is published by the Cuvierian Society of Cork, and forms "part of a series of communications on the local history of the county of Cork, which have from time to time been communicated" to that Society, and were also furnished to the British Association at its Cork meeting. They are now published "in consequence of a wish which was expressed by several Members of the Natural History Section of the Association."

The contents of the volume are—

1. The Fauna, Div. *Vertebrata*, by Dr. J. R. Harvey, recording—Mammalia 24, Birds 167, Reptiles 1, Amphibia 1, Fishes 95—total 288. *Vultur fulvus*, new to Britain, was taken in Cork harbour and kept alive for some time in Lord Shannon's park: the specimen is now in the museum of Trinity College, Dublin. *Turdus Whitei*, *Glareola pratincola* and *Naucrates ductor* are new to the Irish fauna. The *Black Rat* (*Mus rattus*) is marked as "rare," and the *Brown Rat* (*M. decumanus*) is omitted. Can it be that the latter has not found its way to Cork?

2. The Fauna, Div. *Invertebrata*, Classes *Mollusca*, *Crustacea* and *Echinodermata*, by J. D. Humphreys, Librarian of the Royal Cork Institution. It contains, of freshwater Mollusca, Gasteropoda 54, Conchifera 5; of marine Mollusca, Gasteropoda 68, Acephala 106, Annelida 9; of Crustacea 59; of Echinodermata 26.

3. The Flora, under the title of 'The Botanist's Guide for the County of Cork,' is written by Dr. Thomas Power, and records 885 Phænogamic and 936 Cryptogamic plants, forming a total of 1821.

We have thus a very rich flora, compared with the whole flora of Ireland as shown in the 'Fl. Hibernica,' where the number of species is, Phænog. 994, Crypt. 992—total 1986. We have not space to enter minutely into the examination of this list, which is so highly creditable to the industry of the botanists of Cork. It is probable that the *Cuscuta europœa* found "on flax," and the *C. epilinum* are identical. *Orobanche minor* "on ivy" is doubtless *O. barbata*. *Primula elatior*: is this the plant of Smith or Jacquin? *Polygonum maritimum*: all the Irish specimens so called which we have seen belong to *P. Raii*; may not this also be the case on the coast of Cork? *Abies excelsa* is introduced upon the authority of the following quotation from the works of the late Dr. C. Smith: "*Abies mas, Theophrasti*: this grows wild in the rocky mountains which divide this county from Kerry." That is a district well deserving of a careful examination, and should the botanical explorer indeed find the *spruce* in a wild state, he will be gloriously repaid for his trouble. *Trichomanes speciosum*: we understand that the locality given on the authority of Mr. Babington is not correct, and that he did not find the plant in the county of Cork.

In conclusion, we would recommend the work to those naturalists who may purpose visiting the south of Ireland, and also to all who are interested in the geographical distribution of our native animals and plants.

Musée Botanique de M. Benjamin Delessert. Par A. Lasègue: Paris, 1845. 8vo.

This highly interesting volume of nearly 600 pages is devoted to the description of the herbarium and botanical library of the justly celebrated Delessert, and the plan which has been adopted by its author is such as to make it a most valuable addition to the library of every botanist.

The herbarium and library of M. B. Delessert was commenced by his brother, and has been so much enlarged since his death, as to form one of the most extensive and valuable collections of specimens and botanical works in existence, the whole of which is opened to botanists with the greatest liberality.

In the earlier part of the volume will be found a very interesting chapter upon the statistics of vegetation. From this we learn that in 1546 Lonicer was acquainted with only 879 plants; in 1570 Lobel knew 2191; in 1587 Dalechamp recorded 2731. The interest of these numbers is however less than that of the table of increase of species since the reformation of botany by Linnæus. We copy this table.

Authors.	Years.	Number of species. Phanerog.	Cryptog.	Total.
Linnæus......	1753	5,323	615	5,938
Persoon	1807	19,949	6,000	25,949
Steudel	18.4	39,684	10,965	50,619
Steudel	1841	78,000	13,000	91,000
Steudel	1844	80,000	15,000	95,000

It is remarkable that the single order *Compositæ* is now known to contain more species (8523, DeCand. Prod.) than the whole number of plants known to Linnæus, and also that the relative proportion of that order to the whole vegetable kingdom has continued nearly unchanged to the present day, it being about one-tenth of the whole. Tables are then given of the increase of the number of recorded genera and of natural orders. Also a series of calculations of the probable number of species inhabiting the globe, which M. Lasègue is led to estimate at from 130,000 to 150,000.

An account is next given of the mode of preservation and arrangement adopted in M. Delessert's herbarium, which contains about 86,000 species and 250,000 specimens, besides a large collection of fruits. It is peculiarly rich in the authentic specimens of botanical authors.

By far the larger portion of the work is occupied by a very full account of the voyages and travels which have been undertaken with a view to the collection of specimens of plants. This we look upon as peculiarly valuable information, since much of it was formerly scattered through very numerous works, and was indeed unattainable without much labour and research.

A short account is given of the principal herbaria of Europe.

The account of M. Delessert's library is merely in general terms, from which we learn that it contains 4350 botanical works. It is greatly to be hoped that an arranged and descriptive catalogue of this library will be prepared and given to the public. We know of few works which would be of greater service to botanists.

A copious index concludes the volume. The whole evinces in every part the hand of a master, and does its author the greatest credit. It only requires to be known to find its way into the hands of all botanists.

Classification der Säugethiere und Vögel. Von J. J. Kaup. Pp. 144. 8vo. Darmstadt, 1844.

In this work the author endeavours to arrange the Mammalia and Birds, and elaborates them into a quinary system, resembling in structure but differing in detail from the quinary systems which flourished for a time in this country. Like the British quinarians, Dr. Kaup insists on a uniformity and constancy in the analogies between corresponding groups, while he follows Oken in extending these analogies to the anatomical systems of organization which are more or less developed in each animal according as it represents one set of organs or another. Thus he makes his first subkingdom to consist of—1. Mollusca, or *generation-animals*; 2. Fish, or *muscle-animals*; 3. Amphibia, or *bone-animals*; 4. Birds, or *lung-animals*; 5. Mammalia, or *sense-animals*. He then proceeds to ring the changes on these anatomical structures, maintaining that the same set of analogies pervade all the minor groups: that the *Rasores* are *generation-birds*; the *Natatores, muscle-birds*; the *Grallatores, bone-birds*; the *Insessores, lung-birds*; the *Scansores, sense-birds*, and so on. It is needless to follow the author further in these far-fetched and visionary analogies, which are so much more congenial to the German than to the British mind, and which are still better adapted to the astrologers and alchymists of the middle ages, who compiled learned volumes on the mutual analogies and influences between the *seven* metals, the *seven* planets, the *seven* ages of man's life, &c. &c.

The appendix of Dr. Kaup's work is in our opinion the most valuable part of it. Laying aside his mysticism, he gives us some practical and useful remarks on several subjects connected with zoology. In one of these essays he criticises the *natural-history artists* of different countries, pointing out the defects and mannerisms so prominent in the French school, and the merits of Naumann among German, and of Landseer, Bewick and Gould among British artists. We do not however quite agree with Dr. Kaup in his preference of etching (*Radirung*) over lithography for zoological subjects.

Our author next gives directions for preparing plaster-casts of the heads of Mammalia, and especially of the *Quadrumana*. As these animals lose so much of their essential characters by the ordinary mode of preparation, a set of casts taken from them in a recent state would be a valuable addition to our museums. He also recommends naturalists when collecting in foreign countries to use various kinds of traps and nets, as being far more efficacious than the gun, for procuring mammals and birds, especially such species as are wild and shy in their habits.

Another suggestion which seems likely to be of value to the practical zoologist, is that of a solution of arsenic, which Dr. Kaup states to be effectual in preserving mammals and birds from the attacks of every kind of insect. This preparation is made by dissolving in alcohol, of the specific gravity 0·86, as much white arsenic (arsenious acid) as it will take up. The fur of mammals and the plumage of birds (whether mounted or in skins) is to be thoroughly soaked with this solution and then dried. To prevent the plumage from being disarranged by this operation, Dr. Kaup recommends that the specimen should be wrapped in linen cloths, and then wetted with the solution. We are inclined however to think that the mixture might be more easily applied by a flat camel's-hair varnishing brush, the softness of which could do no injury to the specimen. Dr. Kaup assures us that when every part of a specimen has been effectually wetted with this solution, it is guaranteed for ever from the ravages of insects, and that no further precaution against them is necessary. Mr. Waterton some years ago recommended a similar solution of corrosive sublimate in spirit of wine, but we have not found this preparation to be in all cases efficacious, and we are disposed to think that the arsenical solution proposed by Dr. Kaup is far more potent.

Our author further recommends a method of preparing specimens of birds, which would be very advantageous in certain cases. The only parts to be removed are the pectoral and crural muscles, the intestines and the eyes; the whole interior is then to be well-sprinkled with powdered alum and arsenic, and the cavities filled with cotton. When dry, the plumage is to be saturated with the arsenical solution above-mentioned and again thoroughly dried. This method, though somewhat rude, has the advantage of being easily performed by unskilful persons, as well as by the practised naturalist when the saving of time is an object; it retains the proportions and true position of the neck, wings and legs far better than the ordinary mode of preparing skins, and what is of the utmost importance to science, it supplies us with perfect *skeletons* of rare foreign species, which may be easily separated from their integuments if necessary, and placed in the osteological cabinet. We should rejoice therefore to see this method introduced as an adjunct to the usual process of preparing ornithological specimens.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

February 4, 1845.—R. Brown, Esq., V.P., in the Chair.

Read the commencement of a paper "On the Nervures of the Wings in Lepidopterous Insects; and on the genus *Argynnis* of the 'Encyclopédie Méthodique.'" By Edward Doubleday, Esq., F.L.S. &c. &c.

Read also "Observations on the immediate causes of the Ascent of the Sap in Spring." By Arthur Henfrey, Esq., F.L.S. &c. &c.

Mr. Henfrey thinks that none of the causes generally stated, viz. 1. Endosmosis; 2. Capillary Attraction; and 3. Evaporation, are sufficient to determine the first start of the sap. He objects to attributing to the two first-named causes (endosmosis and capillary attraction) a primary part in the production of this phænomenon, that they cannot act where there is no outlet above, and where consequently no current can take place. As regards evaporation, he is inclined to believe that it does not come into operation until a certain quantity of the sap has been absorbed and assimilated to the new tissues. He refers to the precaution taken in the autumn to cover up those portions of the plant which are exposed to the atmosphere so as to protect them from its action, and to the fact that buds burst forth, not from evaporation, but on the contrary, from being gorged with moisture, as proofs that evaporation cannot be regarded as giving the primary impulse to the current of the sap. The true cause of the ascent of the sap must, he thinks, be looked for in the chemical changes which take place in the materials stored up in the cells during the autumn. The insoluble grains of starch are converted into soluble substances (dextrine and sugar) which are dissolved by the water always present in the tissues. A current is thus produced by two concurrent circumstances, viz. the *exhaust* arising from the syrup occupying less space than the materials from which it was derived, and the *endosmosis* resulting from the increased density of the fluid contents of the cells. This chemical change Mr. Henfrey believes to be brought about by the increase of temperature, but whether it is immediately effected through the action of *diastase* or other substances he is not at present prepared to give an opinion.

February 18.—W. H. Lloyd, Esq., in the Chair.

Read a memoir "On *Agaricus crinitus*, L., and some allied species." By the Rev. M. J. Berkeley, M.A., F.L.S. &c. &c.

Mr. Berkeley refers to the *Fungi* of the Linnean herbarium as few in number but in good condition, and comprising some remarkable forms. Among these not the least interesting is the *Agaricus crinitus*, which, together with a few allied species, it is the object of the paper to illustrate.

1. *Lentinus crinitus*, pileo latè infundibuliformi repando badio-rufo fibris innatis apice liberis vix fasciculatis regulariter striato margine reflexo, stipite æquali pallidè sericeo-farinoso, lamellis acutis integris rigidiusculis subdistantibus glandulosis decurrentibus posticè anastomosantibus.

Agaricus crinitus, *L. Sp. Plant. ed.* 2. p. 1644.

Hab. in ligno in Americâ Australi, *Rolander in Herb. Linn.*

The *Agaricus crinitus* of Swartz and Fries (figured and described under the same name by Mr. Berkeley in the 'Annals of Natural History') is very distinct, and has since been named by Mr. Berkeley *Lentinus Swartzii*.

2. *Lent. tener*, pileo tenui regulari latè infundibuliformi repando cervino fibris fasciculatis subcrispis vestito subtùs sericeo-striato margine subsulcato, stipite gracili æquali pallido granulato-furfuraceo, lamellis subdistantibus pallido-ligneis opacis lato-denticulatis glandulosis decurrentibus posticè vix anastomosantibus.

Lent. tener, *Klotzsch*; *Fries Syn. Lent.* p. 6, *Epicr.* p. 389; *Berk. in Hook. Lond. Journ. of Bot.* ii. p. 362.

Hab. in ligno, in Mont. Organ, *Gardner*; ad *Novam Aureliam*, Klotzsch.

3. *Lent. Schomburgkii*, pileo tenui latè infundibuliformi repando cervino floccis mollibus fasciculatis leviter crispatis vestito demùm medio subglabrescente sericeo-striato, stipite æquali sublurido parcè furfuraceo apice sericeo, lamellis confertis tenuibus decurrentibus posticè anastomosantibus pallidè cervinis eglandulosis acie denticulatis.

Hab. in ligno sicco, in Guianâ Britannicâ, *Schomburgk*.

4. *Lent. nigripes*, Fries.

On the synonymy of this species, as well as of the two preceding, Mr. Berkeley makes some observations.

5. *Lent. Leveillei*, pileo tenui latè infundibuliformi repando explanato rigidiusculo floccis crispatis subfasciculatis rarioribus vestito, stipite æquali nigro-furfuraceo, lamellis confertis fuscatis decurrentibus glandulosis ochraceis acie granulato-dentatis posticè vix anastomosantibus.

Hab. ad Surinam.

March 4.—R. Brown, Esq., V.P., in the Chair.

Read the commencement of "An Enumeration of the Plants of the Galapagos Islands." By J. D. Hooker, Esq., M.D., F.L.S. &c.

Read also some Additions and Corrections to his "Monograph of the *Myriapoda Chilopoda*" read during the last Session. By George Newport, Esq. Communicated by the Secretary.

These additions have reference chiefly to the characters and habits of the family *Lithobiidæ*, and to the genus *Scolopendrella* of M. Gervais. This genus Mr. Newport had in his *Synopsis Generum* (Ann. Nat. Hist. vol. xiv. p. 50) proposed to refer as a subfamily to *Geophilidæ*; but on a closer examination of its characters, he finds that they indicate a much higher type of development and approximate it very nearly to *Lithobiidæ*. He proposes therefore to establish *Scolopendrellidæ* as a separate family, and to place them next after *Lithobiidæ*.

BOTANICAL SOCIETY OF EDINBURGH.

April 10, 1845.—Dr. Seller, V.P., in the Chair.

A valuable donation of South American plants, from Robert Brown, Esq., was announced, for which the special thanks of the Society were returned.

The following communications were read:—

1. "On a monstrous variety of *Gentiana campestris*," by Dr. Dickie of Aberdeen. (See Annals, present Number, p. 387.)

2. "On the correct nomenclature of the *Lastræa spinosa* and *L. multiflora* of Newman," by Mr. Babington. (See p. 322.)

3. "Account of a Botanical Excursion to the Mull of Cantyre and Island of Islay in August 1844," by Prof. Balfour of Glasgow.

In this tour Dr. Balfour was accompanied by Mr. Babington, Dr. Parnell and several other botanists. They left Glasgow on the 10th of August for Campbelton in Argyleshire, from which place they walked by the eastern shore of Cantyre to the lighthouse at the Mull, and returned to Campbelton by the western coast, the bay of Machrihanish and a strath in which coal is worked. No plants of great rarity were observed; those most worthy of notice were *Œnanthe Lachenalii, Sinapis monensis, Dryas octopetala* on rocks not far from the point of the Mull, growing with *Saxifraga oppositifolia* and *S. aizoides*, and *Spergula subulata*.

On the 14th they returned to the west coast and followed it to Tayinloan and Porthullion at the outlet of W. Loch Tarbert, from whence they embarked for Islay. *Cuscuta epilinum* was found in great abundance in all the flax-fields in company with *Camelina sativa*. On the sands of Lenanmore, *Catabrosa aquatica*, var. *littoralis* (see Parnell's Brit. Grasses, tab. 102) covered a great extent of surface. *Thalictrum minus, Convolvulus Soldanella, Scirpus Savii, Crambe maritima, Steenhammera maritima, Apium graveolens, Equisetum Telmateia, Lolium temulentum, Pinguicula lusitanica, Radiola millegrana* and *Carum verticillatum* were amongst the most interesting plants observed.

The total number of species noticed in Cantyre was—Phanerogamous plants 425, Ferns 19—total 444.

The excursion in Islay commenced on the 16th of August, and they were enabled, through the kindness of T. G. Chiene, Esq. (Campbell of Islay's factor), to examine the greater part of the island. Near Kilchoman and Ardnave, *Draba incana* was found growing plentifully upon sand-hills nearly at the level of the sea, in company with *Gentiana amarella, Convolvulus Soldanella, Equisetum Telmateia* and *Mentha rubra* (Sm.). In ditches near Loch Gruinart, *Rumex hydrolapathum* (a very rare plant in Scotland) was gathered, and on a limestone stratum near Islay House, *Anthemis nobilis*. Ergot occurred upon several grasses, especially upon *Anthoxanthum odoratum* and *Phalaris arundinacea*. *Cuscuta epilinum* was by no means so abundant as in Cantyre. On rocks at the O'e, *Beta maritima* was found associated with *Ligusticum scoticum* and *Pyrethrum maritimum*. On the mountainous parts of the island, *Arbutus uva-ursi* and *Carex rigida* occurred.

The total number of Phanerogamous species seen was 451, of Ferns 23—total 474.

Dr. Balfour accompanied his paper with a sketch of the geology of Cantyre and Islay, and gave an account of some of the antiquities noticed by the party, which returned to Glasgow on the 24th of August, after a very interesting tour in districts almost unknown to the botanist.

ZOOLOGICAL SOCIETY.

October 8, 1844.—Richard C. Griffith, Esq., in the Chair.

Various Skins of Mammalia from Chile were laid before the Meeting, and Mr. Waterhouse read some notes relating to them with which he had been favoured, in a letter from Mr. Thomas Bridges, Corr. Memb., who had formed the collection.

"The specimens," Mr. Waterhouse observed, "contained two species of foxes, both of which were quite distinct from the *Canis fulvipes* from Chiloe. The one approaches most nearly to the *Canis Magellanicus*, and might possibly be a variety of that animal, differing in having a more slender appearance; but this arises perhaps entirely from its fur being shorter, a difference which would probably arise from dissimilarity of climate, the *C. Magellanicus* being from a colder, and humid part of South America. The Chile animal, in having a more slender appearance, approaches considerably to the *Canis Azaræ*; from this however it may be distinguished by the absence of the black on the chin, in having the ears of a deeper and richer rust-colour, and there is the same difference observable in the colouring of the legs. The hind-legs want the black patch, which is situated considerably above the heel, and is very conspicuous in *C. Azaræ*. The tail is longer and of a brilliant rust-colour beneath; in *C. Azaræ* it is pale in the same part. This, according to Mr. Bridges, is the *Culpeo* of the natives, and is no doubt the animal so called by Molina.

"The second species of fox of the collection Mr. Waterhouse regards as the *Canis Azaræ*. It is smaller, Mr. Bridges observes, than the Culpeo, and less common and mischievous; more shy in its manners, and, according to his observations, confines itself more to the lower parts of the country, inhabiting the provinces of Valparaiso, Aconcagua, and Colchagua, where it is abundant. It is well known to the natives under the name of 'Chilla.'

"The following species of Rodents were also contained in the collection, viz. *Myopotamus coypus, Poephagomys ater, Octodon Cumingii, Mus Darwinii, Mus megalonyx* (a new species, the characters of which Mr. Waterhouse pointed out), and the Mountain Viscacha (*Lagotis Cuvieri*, Bennett). Several specimens of this last-mentioned animal were procured by Mr. Bridges on the Chile side of the Andes, and upon comparison they prove to be specifically identical with an individual formerly sent by the same gentleman and which was found in the vicinity of Mendoza. The Viscacha, Mr. Bridges' notes state, 'confines itself to the elevated parts of the Andes, always inhabiting rugged and precipitous mountains where there are natural caves or immense stones rolled in confusion, amongst which it makes its abode.' It has a very extended range, he having found it in Bolivia in south lat. 20° to 22°, whilst the specimens laid before the Meeting were from the province of Aconcagua, near 'Los ojos de Agua.' Mr. Bridges further remarks that it seldom leaves its abode during the daytime, but comes out to feed upon the herbage either before sunrise or late in the evening.

"Several specimens of *Didelphis elegans* were also sent home by Mr. Bridges, who states that they were procured for him by the natives in the province of Aconcagua, where they were caught in traps baited with meat, and which were placed for that purpose in the vicinity of old hedges and vineyards. Mr. Bridges also calls attention in his letter to the differences observed in the sexes of this animal, the female being considerably smaller than the male, and remarkable for having the tail very thick and fleshy. It is known to the natives by the names 'Comadrejo' and 'Llaca.'"

The following is Mr. Waterhouse's description of the new species of *Mus* (which he places in the section *Hesperomys)* contained in the collection :—

Hesperomys megalonyx. *Hesp. suprà cinerascenti-fuscus, subtùs cinereo-albus; auribus mediocribus; pedibus anticis unguibus magnis armatis; caudâ brevi, pilis minutis obsitâ.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin	4	4
——— *caudæ*	1	6
——— *auribus*	0	$3\frac{1}{2}$
——— *tarsi digitorumque*	0	$11\frac{1}{3}$
——— ab apice rostri ad basin auris	1	$2\frac{1}{2}$

Hab. Chile.

This little mouse evidently belongs to the genus *Hesperomys*, but it differs from any species hitherto described in having stronger forefeet, and these furnished with long claws, exceeding the toes in length. The inner toe or thumb is furnished with a distinct pointed claw. The fur is very soft, and in the upper parts of the body nearly of a uniform grey-brown tint, though the hairs of the ordinary fur are annulated with pale brown; at the base these hairs are of a deep slate-grey colour. The under parts of the body are grey-white, but the hairs are deepish grey at the root, and on the chest there is a brownish mark. The chin is white; the feet are pale brown, but the hairs on the toes are dirty white. The tail is clothed with short brown hairs. The ears, which are rather small, are well-clothed with moderately long hairs, and these are variegated with pale brown and dusky; they are much hidden by the long fur of the head.

From Mr. Bridges' notes I learn that this little animal was found near the margin of the Lake of Quintero.

Mr. Waterhouse also characterized a new species of *Octodon* contained in a former collection sent home by Mr. Bridges :—

Octodon Bridgesii. *Oct. corpore suprà flavescenti-fusco nigroque penicillato; subtùs flavescente; pedibus albis; auribus magnis posticè emarginatis; caudâ, quoad longitudinem, corpus ferè æquante, nigrâ, subtùs sordidè albâ, dimidio apicali pilis longis vestitâ.*

	unc.	lin.		unc.	lin.
Longitudo ab apice rostri ad caudæ basin ..	8	0	vel	8	6
——— *caudæ*	5	6	,,	5	8
——— *tarsi digitorumque*	1	$6\frac{1}{2}$	,,	1	$6\frac{3}{4}$
——— *auris*	0	$6\frac{1}{2}$	,,	0	$6\frac{3}{4}$

Hab. Chile.

The general hue of this animal is brownish, a tint produced by the admixture of brownish ochre and black: the hairs of the fur are deep slate-grey next the skin, and on the back black externally, but most of them broadly annulated with deep ochre towards the point;

the last-mentioned colour prevails on the sides of the body, where numerous long interspersed white hairs are observable, as well as on the rump. The under parts of the body are of a cream-yellow. The ears are rather large, deeply emarginated behind, and clothed internally with small pale hairs, excepting towards the margin, where they assume a dusky hue; externally the ears are furnished with minute dusky hairs, but at the base they are white. The head, in the region of the ear, is very pale; the throat, inner side of the legs ana the tarsi are white; the tail is about equal to the body in length; the basal half is tolerably well clothed with short hairs, which are black on the upper surface and dirty white on the under; on the apical half the hairs are longer (averaging rather more than a quarter of an inch in length) and almost entirely black. The fur is long and moderately soft.

The *Octodon Bridgesii* differs from the *O. Cumingii* (or *O. Degus*, as it should be called) in being considerably larger, of a less bright colour, and in having the tail longer and less distinctly tufted at the apex; the feet moreover are white, or very nearly so.

The dimensions given are taken from two specimens, one in the British Museum collection and the other in that of the Zoological Society, which were brought to this country by Thomas Bridges, Esq., a very zealous collector and good observer, after whom I have named the species. The skulls of these two specimens agree with each other, and differ considerably from those of the *O. Cumingii*. In the first place they are about one-third larger, less arched above; the nasal bones are narrower in proportion, the frontal bones smaller and more contracted in front, and the palate is also more contracted in front. The molar teeth of the upper jaw have the inner fold of enamel deeper. In the lower jaw the molar teeth have the lateral angles more produced, and their transverse diameter is consequently greater in proportion. The coronoid process is distinctly larger in proportion. Other differences of size and proportion will be perceived upon comparing the following dimensions :—

	O. Cumingii.		*O. Bridgesii.*	
	in.	lin.	in.	lin.
Total length of cranium	1	$6\frac{3}{4}$	1	$9\frac{1}{2}$
Greatest width	0	$10\frac{1}{2}$	1	$0\frac{1}{2}$
Length of nasal bones	0	7	0	$8\frac{1}{2}$
Length of frontal bones	0	$6\frac{1}{4}$	0	$6\frac{2}{3}$
Width of interorbital space	0	5	0	$4\frac{1}{2}$
Total length of zygomatic arch	0	$8\frac{1}{2}$	0	11
Length from front of superior incisors to the molar teeth	0	$5\frac{1}{4}$	0	$6\frac{1}{4}$
Length of the four molar teeth taken together	0	$4\frac{1}{3}$	0	$5\frac{1}{4}$
Width of incisor teeth of upper jaw	0	$1\frac{3}{5}$	0	$1\frac{3}{4}$
Width of palate between foremost molars	0	$1\frac{1}{4}$	0	$1\frac{1}{5}$
Width of palate between hinder molars	0	2	0	$2\frac{2}{3}$
Length of ramus of lower jaw	0	$11\frac{1}{3}$	1	$1\frac{3}{4}$
Height of ditto in a vertical line, dropped from the condyle	0	$5\frac{2}{3}$	0	7

Mr. Waterhouse observed, that the skull in the genera *Octodon* and *Schizodon* differs from that of the nearly allied genera of *Abrocoma* and *Poephagomys*, as well as the *Echymys* group, in having a small vertical plate of bone which rises from the upper surface of the anterior root of the zygomatic arch, and which serves to protect, externally, the infra-orbital nerve. The superior incisor tooth enters the superior maxillary bone, and passes beyond the intermaxillary suture by about one-sixth of the whole length of the tooth; whilst in *Abrocoma* the incisor is shorter, terminating at the suture mentioned, and thus approaches the genus *Lagotis*, as well as in several other characters which he had before noticed. *Poephagomys* is remarkable for having the superior incisor tooth extended backwards and outwards, covered by a thin fold of bone, and terminating on the outer surface of the palatal portion of the skull, close to the third molar tooth.

Notwithstanding the great superficial resemblance which exists between these animals and the *Muridæ*, it will be evident upon examination that they belong to a different section of the Rodent order, a section the species of which is readily distinguished, as he had elsewhere pointed out, by the structure of the skull and lower jaw; it is not, however, in these parts alone that differences exist between the *Octodontidæ* and the *Muridæ*, for there is a dissimilarity in the form of the muzzle, which he should take an early opportunity of showing by means of drawings and descriptions, made either from the living animals or from specimens preserved in spirit, and that not only the *Octodontidæ*, but the whole of the great section *Hystricina*, established by himself chiefly upon characters furnished by the crania, possess peculiarities which will serve to distinguish them from other groups of Rodents. In this great section, moreover, we find the tibia and fibula invariably distinct, and not echylosed, as in the *Muridæ*, which should, I now think, embrace the *Myoxidæ*, but not the genus *Anomalurus*, which Prof. Wagner is inclined to place in the last-mentioned section, that genus having the tibia and fibula distinct, as in the Sciurine and Hystricine groups.

Mr. Fraser brought before the Meeting the following species of Chilian Birds, not included in the former collection. (See Ann. Nat. Hist. vol. xiii. p. 498.)

Milvago megalopterus, Meyen; *Synallaxis flavogularis*, Gould; *Sturnella militaris*, Vieill.; *Attagis Gayi*, Less.; *Aphriza Townsendii*, Aud.; *Calidris arenaria*, Ill.; *Cyanopterus fretensis*, Eyton; *Dafila pyrogaster*, Eyton; *Dafila urophasianus*, Eyton; *Phalacrocorax albigula*, Brandt.

To the last-mentioned bird the following note was attached:—"Guanayre of the natives. A very scarce bird; found along the shores of Chile in rocky places. T. B."

Mr. Fraser also described a new bird from Chile, for which he proposed the name of *Leptopus Mitchellii**.

* If the name *Leptopus* proves to have been previously used, I would propose *Leptodactylus* in its stead.

LEPTOPUS.

Rostrum longum, tenue, rectum; nares basales; alæ mediocres; primariæ tres ferè æquales, secunda longissima; cauda subrotundata; tarsi mediocres; digiti longi et tenues; nullus digitus posterior; ptilosis junioris seniori dissimilis.

The bill of this bird is of the same formation as that of *Totanus chloropygius*, Vieill., while the feet resemble those of *Hiaticula tricollaris*.

LEPTOPUS MITCHELLII. *Lep. capite fuscescente lineâ albâ circa verticem; collo ferrugineo; corpore supernè cinereo-fusco purpureis metallicis coloribus ornato; fasciâ albâ apud pectus; subtùs fasciis parvis albis et nigris alternis; rostro saturatè viridi; tarsis flavis.*

Tot. long. 7; alæ, $4\frac{1}{2}$; cauda, $2\frac{1}{4}$; rostrum, 1; tarsi, $\frac{7}{8}$; digito medio, 1 poll.

Hab. Chile.

Another specimen, which I take to be the young of the above, has an undefined white line passing from eye to eye round the back of the head, the whole upper surface barred and mottled irregularly with ferruginous and blackish brown; cheeks and throat mottled with soot-colour, barred on the breast in a similar manner to the adult, which barring is almost lost on the belly; vent and thighs white.

October 22.—Professor Owen, V.P., in the Chair.

A paper by Sylvanus Hanley, Esq., was read, containing descriptions of new species of *Cyrena*, *Venus*, and *Amphidesma*.

CYRENA RADIATA. *Cyr. testâ rotundato-cordatâ, crassâ, solidâ, inæquilaterali, tumidâ, subnitidâ, concentricè et subimbricatim sulcatâ; epidermide olivaceo-fuscescente, et marginem convexum aut subarcuatum versus, luteo-virescente radiisque nigrescentibus ornatâ; margine dorsali postico declivi, convexiusculo; lunulâ nullâ; natibus acutis, incurvatis, integris; ligamento parum prominente; superficie internâ purpureâ; dentibus lateralibus distinctis, brevibus, minutissimè rugulosis (haud crenatis autem), antico approximato.*

Long. 1·50; lat. 1·70 poll.

Hab. Central America. Mus. Hanley, Cuming, Sowerby.

This and the *variegata* of D'Orbigny are remarkable for being the only radiated *Cyrenæ* at present known to us. The latter species is decidedly depressed, whilst the *radiata* is peculiarly swollen.

CYRENA SORDIDA. *Cyr. testâ suborbiculari, crassâ, subinæquilaterali, ventricosâ aut tumidâ; epidermide olivaceo-fuscescente et marginem ventralem convexum versus, luteo-virescente, concentricè rugulosâ; margine dorsali postico, convexiusculo, declivi; natibus erosis, satis prominentibus; ligamento subinfosso; lunulâ nullâ; superficie internâ albidâ; dentibus lateralibus brevibus obtusis, antico magis approximato.*

Index Test. Sup. t. 14. f. 51. Long. 1·50; lat. 1·60 poll.

Hab. North America. Mus. Hanley.

The link between *Carolinensis* and *radiata*, uniting the interior and membranaceous wrinkles of the former to the general outline of the latter.

Cyrena Philippinarum. *Cyr. testâ maximâ, compressâ, obovatâ, valdè inæquilaterali, ponderosâ, anticè plicato-sulcatâ, epidermide olivaceo-fuscescente, indutâ; margine ventrali convexiusculo; ligamentali subdeclivi, et angulum obtusum cum margine postico formante; natibus integris, approximatis, incumbentibus; ligamento pergrandi, valdè prominente; superficie internâ posticè et infernè purpureâ, supernè albido-cærulescente; dentibus cardinalibus crassissimis; lateralibus supra crenatis aut denticulatis, antico valdè approximato.*

Index Test. Sup. t. 14. f. 60. Long. 4; lat. 4·75 poll.

Hab. Philippines. Mus. Cuming, Hanley.

There are a few narrow diverging folds on the posterior slope, but this character is by no means peculiar to the species, being equally possessed by *Keraudreni*, *obesa* and *rotundata*. The ligament is dull yellowish, variegated with rich green. The young are of a uniform bright grass-green, and exhibit more decidedly than the adult the vestiges of an incipient lanceolate lunule.

Cyrena placens. *Cyr. testâ suborbiculari, subventricosâ, inæquilaterali, nitidâ, concentricè sulcato-striatâ, epidermide virido-flavescente indutâ; margine ventrali convexo; dorsali, utrinque declivi et convexiusculo; natibus erosis; ligamento fulvo, depresso, angusto; lunulâ nullâ; superficie internâ purpureâ; dentibus lateralibus minutissimè rugulosis haud autem crenatis, antico brevi et subapproximato.*

Index Test. Sup. t. 14. f. 52. Long. 1·50; lat. 1·75 poll.

Hab. —— ? Mus. Hanley.

A beautiful and rare species, of which I have never seen but my own specimen and that in the Jardin des Plantes at Paris. The sulci are close and regular, and the outline of the shell, although not very unlike that of *radiata*, is convex in front of the beaks, thus rendering the front extremity broad and somewhat obtuse.

Venus subnodulosa. *Ven. testâ ovatâ, crassiusculâ, subæquilaterali, satis convexâ, concentricè costatâ; costis confertis, anticè medioque obtusis, posticè in breves lamellas conversis, undique a sulcis radiantibus decussatis; margine ventrali convexo aut subarcuato; dorsali, utrinque subdeclivi; pube et lunulâ oblongo-cordatâ, prominentibus; ligamento infosso, angustissimo; margine interno undique crenulato; superficie internâ purpureo pictâ.*

Var. α. *Testâ albidâ, livido-brunneo variegatâ.*

Var. β. *Testâ fulvo-fuscescente, natibus albidis; sulcis subremotis.*

Index Test. Sup. t. 16. f. 19. Long. 0·58; lat. 0·75 poll.

Hab. San Nicholas, Philippines. Mus. Cuming, Hanley.

This species bears some resemblance in sculpture to *V. Marica*, but the shape is quite different. The concentric ribs are rendered subnodulous by the radiating grooves. Only a few specimens of this rare shell were procured by Mr. Cuming in the Philippine Islands.

Venus Chemnitzii. *Ven. testâ rhombeo-cordatâ, crassâ, ventricosâ, valdè inæquilaterali, albidâ, brunneo subradiatim maculatâ et strigatâ, radiatim costellatâ, concentricè lamelliferâ; lamellis numerosis, brevissimis, undique crispis; costellis angustis confertissimis; margine ventrali convexo intusque crenulato; dorsali postico subrecto et minimè declivi; latere postico supernè angulato; antico brevi, attenuato, rotundato; lunulâ fuscâ, cordatâ; ligamento angusto, infosso; superficie internâ albidâ, immaculatâ.*

Index Test. Sup. t. 16. f. 20. Long. 1·75; lat. 2·50 poll.

Hab. San. Nicholas, Philippines (Cuming). Mus. Cuming, Hanley.

This beautiful species bears a strong resemblance to the shell delineated in the sixth volume of the 'Conchylien Cabinet,' fig. 384, which is commonly quoted for the *reticulata* of Linnæus equally with the two preceding figures; although Chemnitz, without separating it from that species, specifies the absence of the orange tinge upon the teeth, the peculiar characteristic of that well-known shell. There is a slight shade of orange beneath the umbones internally, and the teeth are similar to those of *puerpera*.

Venus lacerata. *Ven. testâ* V. puerperæ *affini, minus autem ventricosâ et margine ventrali posticoque magis arcuatis; margine ligamentali subrecto et minimè declivi; lamellis concentricis confertioribus, et posticè asperrimis; superficie externâ albidâ, lineis ferrugineis aut brunneis angulatim strigatâ; extremitate posticâ intus extusque immaculatâ.*

Index Test. Sup. t. 16. f. 23. Long. 2·50; lat. 2·50 poll.

Hab. Moluccas? Mus. Hanley.

The fringed lamellæ become so crowded at the hinder extremity of this rare and beautiful shell as to form a kind of raised reticulation. It is a much rounder species than the *V. Listeri*, to which it also bears a considerable resemblance.

Venus scabra. *Ven. testâ ovato-cordatâ, inæquilaterali, subventricosâ, pallidè brunneâ, radiatim costellatâ; costellis confertis et concentricè squamiferis; margine ventrali valdè arcuato; dorsali utrinque convexiusculo et anticè brevi; natibus acutis et anticè incumbentibus; lunulâ subinconspicuâ; pube haud excavatâ; superficie internâ, lividâ et posticè saturatius tinctâ; margine interno crenato.*

Index Test. Sup. t. 16. f. 24. Long. 0·50; lat. 0·70 poll.

Hab. Catbalonga, Philippines. Mus. Cuming, Hanley.

A rare species, which is somewhat allied to *decorata* and *ovata*, but distinguishable from either by the greater convexity of its lower margin. The radiating ribs are peculiarly strong upon the umbones, from whence they separate into two or three smaller ones, which become more densely armed with the concentric rows of scales as they approach the lower margin.

Venus roborata. *Ven. testâ cordato-trigonâ, solidâ, validè inæquilaterali, magis minusve ventricosâ, albidâ (intus purpureo posticè infectâ), concentricè cingulatâ; cingulis multis, lævibus, obtusis; interstitiis lævibus; margine ventrali arcuato (intus leviter* *crenulato); dorsali postico convexo et valdè declivi; lunulâ profundâ, cordatâ; pube lævi, excavatâ; sulco radiante obtusissimo, lunulam alteram, ad extremitatem anticam simulante.*

Index Test. Sup. t. 16. f. 25. Long. 1; lat. 1 poll.

Hab. Van Diemen's Land. Mus. Hanley, Metcalfe.

Not at all unlike the *dysera* of Chemnitz, but the concentric ribs are in that species distant and membranaceous, whilst in ours they are thick, obtuse, and rather crowded.

Venus Lyra. *Ven. testâ rotundato-cordatâ, ventricosâ, valdè inæquilaterali, albidâ, lineis maculisque brunneis angulatim variegatâ, concentricè costellatâ; costellis confertissimis lævibus, medio subimbricatis, anticè et posticè membranaceis; interstitiis glabris; margine ventrali arcuato, intusque crenato; lunulâ cordatâ, brunneâ, profundè impressâ; pube excavatâ; superficie internâ albidâ.*

Index Test. Sup. t. 16. f. 21. Long. 1·20; lat. 1·40 poll.

Hab. Gulf of Guinea (Rang). Mus. Hanley, Cuming.

In contour, colouring and general sculpture this rare shell approaches the *cincta* of Chemnitz (f. 387), but whilst that species is girt with but a few broad belts, ours is adorned with at least forty. It is sometimes called *V. cingulata* of Lamarck, but not only is the expression "annulis crenatis" utterly at variance with its characteristics, but an examination also of the typical specimens of the Jardin des Plantes has proved to me its complete distinctness from that species. Its teeth are those of the section *Dosina*.

Venus decipiens. *Ven. testâ parvâ, rotundato-subtrigonâ, compressâ, inæquilaterali, solidâ, pallidè fulvâ, radiis latis rufobrunneis variegatâ, concentricè costatâ; costis glabris, subremotis, depressis, posticè sublamellosis, et supra pubem impressam porrectis; interstitiis subconcavis, lævibus; margine ventrali subarcuato, intusque subcrenato; dorsali, utrinque declivi, posticè convexo, anticè brevi, subrecto; lunulâ lanceolatâ; ligamento angustissimo, infosso.*

Index Test. Sup. t. 16. f. 22. Long. 0·75; lat. 0·90.

Hab. Australia? Mus. Hanley, Cuming.

So extremely like the young of *fasciata* as with difficulty to be distinguished. Its form, however, is proportionably broader between the lateral extremities, the valves are much more compressed, and the interstitial spaces decidedly broader. The hinder terminations of the lamellar ribs, which project beyond the escutcheon in compressed tubercles, do not appear to become obsolete by age, as in *fasciata*.

Amphidesma carnicolor. *Amph. testâ suborbiculari, convexâ aut subventricosâ, subtenui, subæquilaterali, albido-roseâ aut carneâ, undique concentricè lamellatâ; lamellis multis, membranaceis, ad margines earum serratis; interstitiis rugis radiantibus minutis, confertissimè ornatâ; margine ventrali rotundato, intusque integro; dorsali, utrinque brevi, subrecto et subæqualiter declivi; pube impressâ; superficie internâ aurantiâ.*

Index Test. Sup. t. 12. f. 28. Long. 1; lat. 1 poll.

Hab. Philippines. Mus. Cuming, Hanley.

Exquisitely sculptured, but so minutely as to baffle the unassisted eye.

November 12.—Professor Owen, Vice-President, in the Chair.

Extract of a letter from the President, the Right Hon. the Earl of Derby, to the Secretary:—

"Knowsley, Oct. 17.—A circumstance has just occurred here which I cannot help flattering myself will tend to throw light upon a matter in the history of the *Macropodidæ* which has been often disputed. I allude to the manner in which the young animal after birth attains its lodgement in the mother's pouch.

"My superintendent tells me that one of our female Bettongias was seen to part with a young one. She was observed to place herself erect in one of the angles of the place where she was confined, backing as it were into the corner, and in this situation produced the young one, which after its birth she took up in her fore-paws and deposited in the pouch. This latter process the superintendent witnessed himself.

"She had received the male so lately as the 19th of September, and the parturition took place on the 16th of October. We will take particular notice when the young quits the pouch.

"Of course this is not a decisive proof that all of the tribe adopt the same process, yet I think we may fairly conclude from analogy that they do."

"Oct. 19.—It may be observed that the period of utero-gestation is a very short one, even under a month. Something peculiar in the manner of the animal placing herself in the corner was observed by the person who fed her, he stopped and watched her, and thus witnessed the birth, immediately after which she turned round to the young one, and getting it up in her fore-paws, applied them to the mouth of the pouch, opened it with them, and as soon as the little one was deposited she put her head in after it; when her nose reappeared it was rather stained with blood. In five minutes she was jumping about the place as if nothing had happened."

Mr. Weaver, of Birmingham, exhibited and presented to the Society specimens of the following insects:—*Hipparchia Melampus**, *Leucaria littoralis, Sperantia sylvaria, Cleodora* —— ?

November 26.—William Horton Lloyd, Esq., in the Chair.

Conclusion of a paper by Sylvanus Hanley, on the new species in the genus *Tellina*:—

TELLINA VIRGULATA. *Tel. testâ* T. Donacinæ *simillimâ, sed paululum angustiore, striisque exilioribus ornatâ; extus intusque al-*

* Taken on the mountains of Perthshire, about 3000 feet above the level of the sea.

bidâ roseo pereleganter radiatâ; radiis latis, haud interruptis; margine dorsali albido. Long. 0·30; lat. 0·70 poll.

Hab. ——? (Cuming.)

Tellina Owenii. *Tel. testâ ovato-oblongâ, solidiusculâ, subimpolitâ, compressâ, æquilaterali, albidâ, concentricè et confertissimè striatâ; margine ventrali valdè arcuato; dorsali utrinque subdeclivi, anticè subrecto, posticè incurvato et lamellis subdentato; extremitate anticâ rotundatâ; latere postico acuminato, subrostrato; costâ umbonali conspicuâ; natibus acutis; ligamento infosso; disco interno, aurantio; dentibus lateralibus subæquidistantibus.* Long. 1·25; lat. 2 poll.

Hab. Africa. Mus. Zool. Soc., Brit. Mus.

A very rare and beautiful shell, whose contour is that of *squalida* and sculpture that of *Pharaonis*. I have named it in honour of its discoverer, Captain Owen.

Tellina semen. *Tel. testâ ovatâ aut ovali, crassâ, inæquilaterali, subventricosâ, nitidâ, albidâ (intus submargaritaceâ), anticè rotundatâ, posticè obtusâ, concentricè striatâ; striis anticè subimbricatis confertissimisque, posticè remotioribus et elevatis; margine ventrali convexo; dorsali utrinque magis minusve convexo, posticè declivi, anticè declivi aut subdeclivi; latere antico multo longiore; ligamento minimo, prominulo; flexurâ subobsoletâ; dentibus lateralibus conspicuis, postico magis approximato.* Long. 0·25; lat. 0·50 poll.

Hab. Corregidor; sandy mud, twelve fathoms. (Cuming.)

Almost a *Donax*, but possessing a slight flexuosity which is not to be met with in that genus.

Tellina nobilis. *Tel. testâ ovali, solidiusculâ, convexâ, inæquilaterali, nitidissimâ, lævigatâ, intus extusque roseâ; margine ventrali convexiusculo, medio plerumque subrecto; dorsali, anticè vix declivi et convexiusculo, posticè subdeclivi et subrecto aut convexiusculo; latere antico longiore, ad extremitatem obtusè rotundato; postico obtusè angulato; natibus obtusis; flexurâ costâque umbonali subobsoletis; ligamento prominulo; dentibus cardinalibus parvis, lateralibus nullis.* Long. 1; lat. 1·50 poll.

Hab. Orion, province of Bataan, isle of Luzon; fine black sand, at low water. Mus. Cuming, Hanley.

The extreme link between *Tellina* and *Psammobia*, and not readily confounded with any of its division, owing to the general absence of colour in those Tellens which are destitute of lateral teeth.

Tellina puella. *Tel. testâ obovatâ, inæquilaterali, tenui, ventricosâ, lævi, nitidiusculâ, extus intusque albido-roseâ; margine ventrali anticè arcuato, posticè sursum acclinante; dorsali, anticè convexo, paululumque declivi, posticè convexiusculo et valdè declivi; latere antico longiore, rotundato; postico brevi, angustato, angulato; costâ umbonali subobsoletâ; flexurâ ventrali, satis conspicuâ; natibus obtusis; ligamento prominulo; dentibus parvis; lateralibus remotis, subæquidistantibus.* Long. 0·5; lat. 0·6 poll.

Hab. Senegal. Cuming, Metcalfe.

Not very unlike a thin *Solidula*, but provided with lateral teeth.

Tellina chinensis. *Tel. testâ ovali, solidiusculâ, convexâ, subinæquilaterali, impolitâ, intus extusque candidâ, lævigatâ; margine ventrali subrecto; dorsali, anticè convexiusculo et paululum declivi, posticè subrecto satisque declivi; extremitate posticâ obtusâ; latere antico longiore, rotundato; ligamento —?; costâ umbonali obsoletâ; dentibus lateralibus nullis.* Long. 0·62; lat. 1 poll.

Hab. China. Mus. Britannicum.

Tellina ala. *Tel. testâ ovatâ, solidiusculâ, subinæquivalvi, subæquilaterali, nitidâ, convexiusculâ, extus intusque albidâ (radio brevi pallidè aurantio in adultis ornatâ), concentricè substriatâ; margine ventrali magis minusve convexo; dorsali anticè convexo et subdeclivi, posticè declivi et prope nates subretuso; latere antico, rotundato, longiore; postico angulato, subrostrato; flexurâ costâque umbonali conspicuis; ligamento subinfosso; cardine, dentibus primariis parvis, et nonnunquam dente laterali antico rudimentali, instructo.*

Var. *Testâ ovato-trigonâ, solidâ, convexâ, lævi aut sublævigatâ, nequaquam subrostratâ; flexurâ costâque umbonali subinconspicuis.* Long. 1·20; lat. 1·75 poll. Var. long. 1·20; lat. 1·50 poll.

Hab. Ceylon? Mus. Metcalfe, Cuming, Hanley.

An extremely variable species, with somewhat the aspect of *Nymphalis*, but easily distinguished by its lesser convexity, and in general by the presence of a pale orange streak on either side of the umbones, or in the young by the slight rostrum and the possession of regular concentric striæ.

Tellina Irus. *Tel. testâ ovatâ aut obovatâ, crassâ (in adultis), subventricosâ, subæquilaterali, impolitâ, extus intusque albidâ, concentricè rugulosâ; rugis interruptis minimis, confertissimis, subelevatis; margine ventrali magis minusve arcuato; dorsali anticè convexo et subdeclivi, posticè convexiusculo, elongato et declivi; latere antico paululum breviore, rotundato; postico infernè angulato; lunulâ (in adultis) parvâ, profundâ; ligamento infosso; costâ umbonali subobsoletâ; dentibus satis magnis.* Long. 1·10; lat. 1·40 poll.

Hab. ——? Mus. Cuming, Walton.

Evidently a perforating species, and allied to the *Petricola ochroleuca* of Lamarck, the true *Tellina fragilis* of Linnæus's own collection.

ENTOMOLOGICAL SOCIETY.

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

Mr. W. W. Saunders exhibited a case of New Holland insects, some being of great rarity, including a new species of *Rhipicera* of large size.

Mr. F. Bond exhibited some specimens of *Pachyrhynchi* from the

Philippine Islands, which had become discoloured by grease, but which he had restored to brilliancy by immersing them in pure naphtha and then covering them over with powdered chalk for twenty-four hours. This plan was equally applicable to Lepidopterous insects similarly circumstanced.

The following memoirs were read :—

Descriptions of some new *Curculionidæ* from the Philippine Islands. By G. R. Waterhouse, Esq.

Continuation of a memoir on the *Geotrupidæ* and *Trogidæ*. By Mr. Westwood.

May 1st.—George Newport, Esq., President, in the Chair.

Mr. Marshall mentioned that in the United Service Museum he had observed an ant's nest, stated to be from abroad, precisely similar to one recently forwarded to the Society from Surrey as the construction of the wood-ant.

He likewise mentioned that the rare moth, *Ephyra pictaria*, had been taken in some plenty at Colchester in April 1842.

Mr. Evans exhibited some curious *Crustacea* recently received from China, and Mr. Westwood various new and interesting Indian insects of different orders, recently added to the collection of the Rev. F. W. Hope, including a fine *Gryllus*, like *G. Donovani*, a new subgenus allied to *Derbe*, some curious *Chalcididæ*, two species of *Celyphus*, &c., also a box of interesting *Coleoptera* and *Hymenoptera* which he had received from the Berlin museum.

Mr. S. Stevens exhibited a living specimen of an Indian *Harpalideous* insect resembling *Platynus angusticollis*, found in an importation of plants from Bombay. He also stated that a specimen of *Cermatia livida* had been found alive on board a ship recently arrived from Madeira.

Mr. Ingpen exhibited a fine specimen of the North American *Saturnia Cecropia*, reared from the chrysalis state by the Rev. Albert Badger.

The completion of Mr. Westwood's memoir on the *Geotrupidæ* and *Trogidæ* was read.

After noticing the views published by Macleay and Latreille as to the relations and classification of the *Geotrupidæ* and *Trogidæ*, the author proceeds to describe those genera which possess 10-jointed antennæ and exserted mandibles and labrum, and which respectively belong to the two families above mentioned as thus characterized.

	GEOTRUPIDÆ.	TROGIDÆ.
Antennarum clava	articulo basali infundibuliformi,	articulis liberis.
Maxillarum lobi	membranacei,	potius cornei, supero ciliato-dentato.
Labii lobi	plerumque porrecti,	plerumque retracti.

GEOTRUPIDÆ.

Antennæ 11-articulatæ .... Geotrupes, &c.
Antennæ 10-articulatæ.
  Prothorax haud canaliculatus.
    Tibiæ anticæ 3-dentatæ.
      Mandibulæ uncinatæ .... Hybosorus.
      Mandibulæ latiores.
        Ungues bifidi.
          Tibiæ posticæ in medio dentatæ .. Coilodes.
          Tibiæ posticæ in medio inermes .. Silphodes.
        Ungues simplices .... Chætodus.
    Tibiæ anticæ 2-dentatæ .... Apalonychus.
  Prothorax canaliculatus .... Anaides.

TROGIDÆ.

Antennæ 9-articulatæ.
  Corpus breve, latum..................... Ægialia.
  Corpus longum, parallelum.......... ..... Chiron.
Antennæ 10-articulatæ.
  Corpus supra planum, mentum profunde incisum.. Cryptogenius.
  Corpus plus minusve convexum, mentum haud profunde incisum.
    Caput sub pectus haud contractile, corpus haud globosum.
      Pedes mediocres, tarsis gracilibus.
        Prothorax maximus, anticè subbituberculatus .... Geobius.
        Prothorax mediocris haud anticè subbituberculatus.
          Prothorax anticè plus minusve retusus, maxillarum lobus internus denticulatus.
            Caput maris plerumque cornutum.
              Mandibulæ 4-dentatæ .... Orphnus.
              Mandibulæ 3-dentatæ .... Triodontus.
            Caput inerme, mandibulæ 2-dentatæ Ægidium.
          Prothorax et caput simplicia, maxillarum lobus internus in spinam acutam productus .... Ochodæus.
      Pedes abbreviati, tarsis crassis........... Trox and Phoberus.
    Caput sub pectus contractile, corpus globosum. Acanthocerus, and the subgenera separated by Germar in Zeitsch. f. d. Ent.

The following new species are described in this paper :—

Hybosorus orientalis, Hope MSS. *Niger, nitidus, clypeo punctatissimo, marginato, thorace tenuè punctato ; elytris striato-punctatis ; tibiis anticis 3-dentatis.* Long. corp. lin. 6.—Hab. India orientali.

Hybosorus thoracicus, Hope MSS. *Oblongo-ovalis, piceo-rufus; thorace rufo, nitido; capite thoraceque sub lente tenuè punctatis; elytris striato-punctatis; antennis luteis; tibiis anticis* 3-*dentatis*. Long. corp. lin. $3\frac{1}{2}$.—Hab. Senegallia.

Hybosorus pinguis, W. *Latior, piceo-niger, elytris nigris, clypeo punctato, thorace sublævi; elytris striato-punctatis; pedibus piceis, brunneo-setosis; antennis fulvis; tibiis anticis* 3-*dentatis*. Long. corp. lin. 3–4.—Hab. Sierra Leone.

Coilodes, W. Insecta Americana. Typus generis *Hybosorus gibbus*, Perty.

Coilodes chilensis, W. *Piceus, thorace ♂ rufo-piceo, excavatione magna antica, margineque antico in medio tuberculo prominenti instructo*. Long. corp. lin. $3\frac{1}{2}$.—Hab. Chili.

Coilodes castaneus, W. *Piceo-castaneus, nitidus; thorace maris parùm excavato; elytris vix geminato-striato-punctatis; pedibus brunneis*. Long. corp. lin. $2\frac{3}{4}$.—Hab. Columbia.

Chætodus, W. Genus novum. Insecta Americæ meridionalis incolæ.

Chætodus piceus, W. *Piceus, nitidus; capite thoraceque rudè punctatis; elytris regulariter striatis, luteo-setosis; pedibus valdè setosis; antennarum clava lutea*. Long. corp. lin. 3.—Hab. Brasilia.

Chætodus irregularis, W. *Piceus, nitidus; capite thoraceque grossè punctatis; elytris irregulariter striatis, antennarum clava obscuriori*. Long. corp. lin. $2\frac{1}{2}$.—Hab. Brasilia.

Chætodus? basalis, W. *Piceus, nitidus; elytris basi rufis, punctato-striatis; pedibus elongatis, gracilibus*. Long. corp. lin. 2.—Hab. Cayenne. (Caput deest.)

Silphodes, W. et Anaides, W. See Journal of Proceedings for September 1841 for an abstract of the characters of these two groups.

Apalonychus, W. Species unica ex insula Cuba.

Apalonychus Waterhousii, W. *Fulvo-castaneus, nitidus, lævis, antennarum clava lutea; elytris tenuè et irregulariter punctato-striatis, lateribus longè setosis*. Long. corp. lin. 4.—Hab. Insula Cuba.

Cryptogenius, W. See Journal of Proceedings, September 1841.

Triodontus, W. Species unica. *Orphnus nitidulus*, Guérin, texte de l'Iconographie. Ex insula Madagascar.

Ægidium (Dej. Cat. sine descr.). Insecta Americana.

Ægidium Columbianum, W. *Nigrum, capite thoraceque lævibus, nitidis; elytris subpiceis, carinatis, et punctis ovalibus obsitis; ♂ pronoto tuberculo frontali et excavatione magna dorsali, ♀ pronoto canaliculato*. Long. corp. ♂ lin. 9; ♀ lin. $7\frac{1}{2}$.—Hab. Columbia.

Ægidium parvulus, W. *Angustius, nigro-piceum obscurum, un-*

dique punctatum; elytris bicarinatis, pronoto canali dorsali subobsoleto. Long. corp. lin $5\frac{1}{2}$.—Hab. Insula Guadeloupe.

Ægidium Hædulus, Dej. Cat. *Nigrum, nitidissimum; pronoto ♂ in medio valdè depresso-punctato, lateribus angulato-elevatis, tuberculoque frontali in utroque sexu armato, ♀ impressione seu canali lato, minime profundo, frontali, elytris magis rotundatis et punctatis, punctis in strias irregulares dispositis.* Long. corp. lin. 5–4.—Hab. Brasilia.

Ægidium? Guianense, W. *Brevè convexum, castaneum, pronoto posticè parùm angustato; mandibulis extùs cornu obtuso armatis.* Long. corp. lin. $4\frac{1}{2}$.—Hab. Guiana.

Orphnus Mysoriensis, W. *Brunneus seu nigro-piceus, tuberculo elevato in medio marginis postici prothoracis; elytris irregulariter punctatis.* Long. corp. lin. 5–$4\frac{1}{3}$.—Hab. India orientali, Mysore.

Orphnus picinus, W. *Piceo-niger, nitidus; capite ♂ cornu erecto, prothoraceque excavatione magna media, margine postico marginato; elytris striis irregularibus, parùm impressis.* Long. corp. lin. $4\frac{1}{2}$–4.—Hab. India orientali, Bombay.

Orphnus impressus, W. *Piceus vel rufo-piceus, capite posticè in ♀ tuberculo parvo armato pronotoque anticè excavatione triangulari instructo.* Long. corp. lin. $3\frac{1}{2}$–4.—Hab. India orientali centrali.

Orphnus nanus, W. *Niger aut castaneus, nitidus, oblongus; capite ♂ cornu brevi, erecto, et pronoto semicirculariter excavato, excavatione haud ultra medium pronoti extensa, lateribusque vix elevatis et in tuberculo terminatis; capite pronotoque vagè punctatis, elytrisque irregulariter striatis, punctisque majoribus in strias rudes dispositis.* Long. corp. lin. $2\frac{3}{4}$.—Hab. India orientali centrali.

Orphnus Meleagris, Dej. Cat. (ined.) *Latus, castaneo-fulvus; elytris stria suturali punctisque irregularibus, capite cornu elevato, conico, frontali pronotoque valdè excavato, lateribus conico-elevatis, versus caput rotundatis.* Long. corp. lin. 5.—Hab. Senegallia.

June 4th.—George Newport, Esq., President, in the Chair.

Mr. S. Stevens exhibited specimens of the larvæ of *Leucania straminea* (*Nonagria Vectis*, Curt.), tolerably well figured by Freyer, which he had detected in the Hammersmith marshes feeding on the leaves of reeds, and which spin an external web in which they undergo their transformations; also a very large living British species of water-mite (*Hydrachna geographica*).

Mr. Evans exhibited a specimen of the rare *Agrotis puta*, captured on the evening of the meeting, in the Wandsworth road.

Captain F. Parry exhibited a box of *Coleoptera* from New Holland, Africa and India, including a new and very flat *Lamellicorn* insect belonging to the family *Cetoniidæ*, but having somewhat the form of *Platygenia*, with singular-shaped middle feet, from tropical Africa.

Mr. Saunders exhibited specimens of a species of *Polydesmus* and of *Iulus pulchellus*, which he had found extremely destructive at the roots of plants in gardens. The latter insect was stated by Mr.

Newport to have been formed by M. Gervais into the genus *Planiulus*, but with insufficient characters. He also stated, in reference to the question of the habits of these insects and the best modes of their destruction, that they deposit their eggs from March to May, after which there is an interval of a few months, a second period of oviposition being in July and August. Mr. Ingpen doubted whether these insects ever attack perfectly healthy plants, but Mr. Saunders mentioned various instances of an opposite character.

The following papers were read :—

Monograph of the Dipterous genus *Ceria*. By W. W. Saunders, Esq., F.L.S. (since published in the first part of the fourth volume of the Transactions of the Society).

A notice respecting the Prizes offered by the Rev. F. W. Hope.

Observations on the sexual distinctions and mode of copulation of an Indian species of *Mutilla*. By Captain Boys.

Mr. Westwood having suggested that one of the statements in Captain Boys's letter respecting the transporting of prey by a winged *Mutilla*, appeared to him to apply to a winged female *Scolia* rather than to a winged male *Mutilla*, as no male fossorial hymenopterous insect had been hitherto observed to possess such habits, Mr. Doubleday stated that he had captured many specimens of *Monedula* in the United States in the act of capturing gad-flies (*Tabani*), whence they are termed horse-guards, and that all his specimens proved to be males.

Mr. Westwood exhibited drawings of and made some observations upon the portable nests of the larvæ of different species of *Chlamys*.

MISCELLANEOUS.

On the Fossil Cycadeæ *in general, and especially on those which are found in Silesia.* By Prof. Gœppert*.

The author commences his memoir by observing that, notwithstanding the considerable increase of late in the number of species which compose the fossil *Cycadeæ*, the classification established in 1828 by M. Ad. Brongniart, in his 'Prodrome des Végétaux Fossiles,' still suffices, with a few modifications, for the wants of the new intercalations.

The great majority of the fossil *Cycadeæ* known up to the present time belong to the Jurassic formation; those which the author collected in Silesia are found in the deposits of argillaceous iron of Upper Silesia, deposits which form part of the above-mentioned formation. After passing in review the attempts which, since the publication of the 'Prodromus' of M. Ad. Brongniart, have been made to establish a new classification of the *Cycadeæ*, M. Gœppert enumerates the whole of these fossil vegetables, distributed according to

* Being an abstract drawn up by M. Tchihatcheff, and laid before the French Geological Society, Nov. 18, 1844.

the method of M. Brongniart, re-uniting however the two genera *Zamia* and *Zamites* into one genus, and adding the genus *Zamiostrobus* (Endlich.) to designate their fructifications.

Amongst the *Cycadeæ* hitherto known, and which M. Gœppert divides into the four following sections, *Cycadites*, *Zamites* (comprising the *Zamiostrobus*), *Pterophyllum* and *Nilsonia*, the following species have been discovered by the author :—

Zamiostrobus (fruit) ovatus.
—— crassus.
—— Sussexiensis.
Pterophyllum Ocynhausianum (av. fig.).
—— Carnallianum (av. fig.).
—— propinquum (av. fig.).
—— gonorrhachis (av. fig.).
—— Preslianum.
—— taxinum.
Pterophyllum Braunianum.
—— Dunkerianum.
—— Munsteri.
—— inconstans.
—— difforme.
—— lunularifolium.
Nilsonia compta.
—— Bergeri.
—— acuminata.
—— Kirchneriana.

The result of the enumeration made by the author is, that the total number of the different species of fossil *Cycadeæ* known up to the present time and designated by a specific name amounts to 78, amongst which are 9 stems or stipes, 65 fronds and 4 fructifications. The genera which compose this total are in the following proportions :—

		Stems.	Fronds.	Fructifications.
Cycadites	11	4	7	
Zamites	28	5	23	
Zamiostrobus	4	...	...	4
Pterophyllum	23	...	23	
Nilsonia	12	...	12	
Total number of species	78	9	65	4

The species are thus distributed in the different formations :—

Carboniferous formation	4	Jura	5
Red Sandstone	1	Weald Clay	5
Grès bigarré	2	Greensand	3
Keuper	2	Chalk	2
Lias	19	Lignite	3
Oolite	29	Unknown deposit	3

Making a large allowance for the inevitable reproductions of the same species under new names, as well as for the probability that many fronds and stipes, described as different species, are only in fact the integrant parts of the same individual, it is not less true that on comparing the species of the fossil with those of the existing *Cycadeæ*, the total number of which is generally estimated at 38, the numerical advantage will infallibly belong to the first, so that their number may always be placed at double that of the recent *Cycadeæ*; inasmuch as the influence of the causes which would tend to reduce that proportion is greatly counterbalanced by the discoveries which are continually going on of new fossil species.

The eleven species of *Cycadites* approach most in their stiff and uninervous leaves to the recent species of *Cycas*, the number of which is nearly equal to that of the fossil species ; a part of the genus *Zamites*, and especially the species (nearly to the number of fifteen) the pinnules of which present a certain contraction at their base, correspond to the genus *Encephalartos*, whilst the species (to the number of eight) the pinnules of which are articulated at their base, and are fixed to the frond in an oblique manner, might offer a pendant to the *Macrozamia*. Lastly, the genera *Zamiostrobus*, *Nilsonia* and *Pterophyllum*, composed of thirty-eight species, must be considered as extinct genera, and do not admit of any parallel with the *Zamia*, L., the pinnules of which are distinctly *articulated*, whilst those of the genera in question do not at all present that peculiarity.

The author concludes his important work with a comparative table of the geographical and geological distribution of the living and fossil *Cycadeæ*. We submit it to our readers, not only because it is of great interest, but also because it serves to render the extent of the laborious investigations of the celebrated savant of Breslau appreciated.

Present Flora.	*Fossil Flora.*
Cycas, L., composed of 10 species; tropical and subtropical Asia, New Holland.	*Cycadites*, composed of 11 species; Sweden, Isle of Portland, France, Bohemia, Saxe-Coburg and Hanover.
Macrozamia, Miq., 3 species; New Holland and the Cape.	*Zamites*, Brong. (incomplete analogy); France, England, Baireuth, Bamberg (Bavaria).
Encephalartos, Lehm., 15 species; the Cape, not far from the tropics.	Reappears 15° further north, that is to say, Isle of Portland, England, Bamberg.
Zamia, 10 species; tropical and subtropical America.	Wholly wanting.
Genus partly extinct.	*Zamites*, Gœpp.; Isle of Portland, England, France, Bamberg, Baireuth, East Indies.
Genus wholly extinct.	*Zamiostrobus*, England.
Genus wholly extinct.	*Pterophyllum*, Brong., 23 species; Switzerland, Wurtemburg, Austria, Bohemia, Bamberg, Baireuth, Saxony, Schaonmberg, Silesia.
Genus wholly extinct.	*Nilsonia*, Brong., 12 species; Sweden, England, Saxe-Coburg, Quedlinbourg, Bamberg, Baireuth.

Extract of a Note from J. E. GRAY, Esq., *relative to his paper on the Animal of* Spirula, p. 257.

To Richard Taylor, Esq.

MY DEAR SIR,—While in Holland, my friend M. Milne Edwards has sent me M. Laurent's 'Annales d'Anatomie et Physiologie,' containing a paper by M. de Blainville describing the body of *Spirula*, in which he shows that the animal is provided with a rudimentary fin on each side of the terminal gland, which had been rubbed off or otherwise destroyed, so that their base appears to form part of the gland itself in Mr. Cuming's specimen.

The paper above referred to, being published in a work chiefly devoted to anatomy and medicine, had escaped my knowledge.

I will shortly send you a copy of the figures, with some other particulars, for the purpose of completing the history of this interesting genus. Believe me, my dear Sir, yours very truly,

15th May, 1845. J. E. Gray.

[The observations of M. de Blainville were noticed by Mr. Owen in one of his Hunterian Lectures, published in 1843, of which the following is an extract:—

"The genus in which the shell most nearly resembles that of the tetrabranchiate Cephalopods, belongs to the *Spirula*. A few mutilated specimens which had reached this country during this present century had demonstrated it to be an internal shell, and the more perfect specimen dissected by M. de Blainville in 1839, proved it to have the characteristic organization of the Dibranchiate order, and to possess, as Péron had indicated, the eight short arms and the two long tentacula of the Decapodous tribe."—Ed.]

ON THE DEVELOPMENT OF DORIS. BY C. W. PEACH*.

[With a Plate.]

Goran Haven, Cornwall, April 1845.

Having in the early part of 1844 noticed white-spotted jelly-like films suspended from the rocks in the cove near my residence, my curiosity was excited to know what they were. On the 18th of January of that year, I observed that they were more plentiful than I ever before saw them, and on rocks *considerably nearer high water mark*. I also found a great number of a small kind of *Doris* on the same rock; not having seen them there before, I began to suspect that in all probability they had something to do with the above-mentioned films. I took several of them and placed them in a vessel containing sea-water; the next morning I found that a pair of them had fixed their ova to the side of the dish, *in every respect agreeing with those found on the rock*, thus confirming my suspicions. They shed their ova in pairs. I took also with the animal several pieces of their ova from the rock and kept them in a glass of sea-water, and on the 5th of February found that the young had come forth in thousands. I just mention, that no mistake might be made, that I always filtered the water I supplied the ova with through three or four folds of linen; and moreover, I saw the young moving about in the ova long before they came out, and also observed others there some time after their elder brethren had left. These young are contained in a Nautilus-like shell so small (indeed a mere speck), as not to be made out as such by the unassisted eye. The animal is furnished with two arms of a

* Read at the last Annual Meeting of the Royal Institution of Cornwall.

wheel-like shape, from which rise in a radiate form delicate cilia; these cilia move rapidly, and with them, after raising the shell on its edge, the animal runs round, and at times darts across with surprising swiftness; occasionally they lie on their side and then spin round on the shell with the mouth going backwards, occasioned by the position and rapid movements of the cilia. They frequently rest, and withdraw altogether into the shell. The adult animal is tubercled, about $1\frac{5}{8}$ths of an inch long, covered with dark brown and red blotches intermingled with spots of white; it is furnished with two horns, one on each side of the head; these are leaf-like on the hinder part. The branchiæ are placed in a semicircular manner near the tail, the two ends being turned in so as almost to touch the outside, the open part being towards the tail; on the outer part of the semicircle are eighteen feather-like branchiæ, with three on each of the parts which turn in. They left the rocks in February, and I have not *seen one since*; thus showing them to be inhabitants of deep water, and that they only came in shore for the purpose of shedding their ova. I succeeded in hatching the young from two different sets of ova several days between.

Up to March of the present year 1845, I have not seen a single animal of the above *Doris*, or any of the ova: this is probably owing to the severity of the weather. The first part of 1844 was much more genial, and thus tempted the *Doris* in-shore. I merely throw this out as a hint well worthy of notice.

EXPLANATION OF PLATE XIV.

Fig. 1. The embryo with its wheel-like arms displayed when raised on its edge.

Fig. 2. Ditto on its side.

Fig. 3. Empty shell:—all highly magnified..

ON THE NIDI OF BUCCINUM RETICULATUM. BY C. W. PEACH*.

In your valuable publication for March 1844, p. 203, you inserted an opinion of mine, that the nidus there described belonged to the *Buccinum reticulatum*; I have since continued to notice them, and all my observations completely confirm what I then stated. I succeeded in the spring, and again in August 1844, by keeping the nidi in sea-water in my house, in hatching the young; thus showing that, like the *Purpura lapillus*, they deposit their nidi all the year round. These young so much resemble those of the *Doris*, both in shell and animal, that the former description will do for this. It is a singular circumstance, that an animal which is naked at maturity should require a shelly covering when young, as well as one which always possesses a shell in all its stages of growth. It is one of those interesting circumstances which meet the naturalist at every step he takes; to me it proves design in providing a covering to shelter it when in a weak and helpless state. Both these young shells have myriads of enemies in the small infusoria, which may be noticed with a powerful microscope hovering round them, and ready

* Read at the last Annual Meeting of the Royal Institution of Cornwall.

to devour them the instant weakness or injury prevents their keeping in motion the cilia, which serve both for locomotion and defence. Let these cease to move, a regular attack is made, and the animal is soon devoured; and it is interesting to observe several of these scavengers sporting in the empty shell as if in derision at the havoc they have made. The shells are mere specks; what must be the size of the conquerors, when the speck-like shell will hold several of them! Thousands of both of the young animals perish early—in a few hours after coming into existence; this must be the case, for if all came to maturity that are hatched, our coast would be literally *covered* instead of being only *spotted*.

Obituary.—It is with much concern that we record the early loss of a very distinguished cultivator of botanical science:

Died at Malacca, on Sunday the 9th of February, after a short illness, William Griffith, Esq., of the Madras Medical Service, and late Acting Superintendent of the Honourable East India Company's Botanic Garden at Calcutta, after having been antecedently employed in the scientific missions sent into the Tenasserim provinces, to Assam, to Suddujow and Ava, Bootan, Affghanistan, Khorassan, &c. He was an active member of several scientific societies in Europe, and was in his thirty-fifth year.

METEOROLOGICAL OBSERVATIONS FOR APRIL 1845.

Chiswick.—April 1. Slight haze: clear. 2, 3. Foggy: fine: clear. 4. Foggy: cloudless. 5. Thick haze: fine. 6. Clear and fine: sharp frost. 7. Clear and frosty: very dry air: slight frost. 8. Densely overcast: cloudy: sharp frost. 9. Foggy: overcast. 10. Showery throughout. 11. Rain: dense clouds and cold: frosty at night. 12. Cloudy and fine: rain. 13. Showery: clear and fine. 14. Boisterous. 15. Boisterous, with slight rain. 16. Overcast: fine. 17. Fine. 18. Overcast: fine. 19. Overcast and cold: very fine. 20. Slight haze: very fine. 21, 22. Very fine. 23. Sultry. 24—26. Very fine. 27. Showery. 28. Overcast. 29. Very fine. 30. Overcast.—Mean temperature of the month 1° above the average.

Boston.—April 1. Cloudy. 2—5. Fine. 6. Fine: ice this morning. 7. Cloudy. 8. Cloudy: rain A.M. 9. Fine. 10. Windy: rain P.M. 11. Windy: rain A.M. 12. Cloudy. 13. Cloudy: rain P.M. 14. Windy: rain P.M. 15. Cloudy and stormy: rain early A.M. 16. Cloudy. 17. Fine. 18. Cloudy. 19—21. Fine. 22. Cloudy. 23—25. Fine. 26. Rain. 27. Cloudy. 28—30. Fine.

Sandwick Manse, Orkney.—April 1. Bright: damp. 2. Bright: clear. 3, 4. Clear: cloudy. 5. Clear. 6. Fog: clear. 7, 8. Bright: clear. 9. Rain: cloudy. 10, 11. Bright: cloudy. 12, 13. Cloudy: clear. 14. Rain: clear. 15. Clear. 16. Cloudy: drizzle. 17. Drizzle: fog. 18. Bright: fog. 19. Clear. 20, 21. Fine: clear: fine. 22. Fine. 23. Fine: fog. 24. Cloudy. 25. Bright: cloudy. 26. Rain: damp. 27. Bright: cloudy. 28. Showers. 29. Bright: clear. 30. Cloudy.

Applegarth Manse, Dumfries-shire.—April 1, 2. Fine: dry: hoar frost. 3. Remarkably fine. 4. Very droughty: raw frost. 5. Very droughty, but milder. 6. Hoar frost. 7. Slight frost. 8. Rain and hail. 9. Slight showers. 10. Frequent showers. 11. Clear: fair, but cold. 12. Cloudy: drops: rain. 13. Hail and rain. 14. Slight showers. 15. Dry and cold. 16. Fair: fine: slight frost. 17. Very fine. 18. Fine. 19—22. Fine: droughty. 23, 24. Fine. 25. A few drops: rain. 26. Heavy rain. 27. Heavy rain and flood. 28. Fair, but unsettled. 29. Shower P.M. 30. Heavy rain P.M.

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.	Dumfries-shire.		Orkney, Sandwick.		Chiswick.		Boston.	Dumfries-shire.		Orkney, Sandwick.		Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.
1845. April.	Max.	Min.	8½ a.m.	9 a.m.	9 p.m.	9¼ a.m.	8½ p.m.	Max.	Min.	8½ a.m.	Max.	Min.	9¼ a.m.	8½ p.m.								
1.	30·237	30·194	29·87	30·03	30·00	29·95	30·01	59	29	38	54½	33	45	48	e.	calm	ssw.	sw.	......	......	......	......
2.	30·086	30·061	29·74	29·95	29·94	30·10	30·06	60	33	46·5	62	36½	52	40	e.	calm	e.	se.	......	......	......	......
3.	29·968	29·882	29·62	29·90	29·80	30·02	30·02	69	30	49	63½	34½	44½	42	se.	calm	e.	e.	......	......	......	......
4.	30·053	29·886	29·53	29·89	29·98	30·04	30·08	69	35	50	51	35½	44½	40	e.	calm	ene.	se.	......	......	......	......
5.	30·041	29·992	29·61	29·99	29·95	30·10	30·06	58	32	43	58	38½	46	40	e.	calm	ene.	se.	......	......	......	......
● 6.	29·914	29·891	29·62	29·95	29·85	30·04	29·96	60	22	45	59½	31½	43	40	ne.	calm	w.	n.	......	......	......	......
7.	29·915	29·813	29·57	29·82	29·57	29·88	29·63	60	26	40	57	36	44	39½	ne.	calm	e.	se.	......	......	......	......
8.	29·606	29·416	29·18	29·39	29·20	29·26	29·20	57	23	41	51	40	45	40	w.	w.	ssw.	se.	·04	......	0·15	......
9.	29·068	28·972	28·76	29·02	28·99	29·19	29·26	47	35	44	52	34	40½	39	ne.	w.	ne.	ene.	·09	·06	......	·27
10.	29·118	29·020	28·60	29·04	29·28	29·42	29·64	48	34	42	46½	37	42	39½	w.	nw.	nne.	ne.	·19	......	......	......
11.	29·636	29·285	29·00	29·47	29·60	29·74	29·73	49	30	41	49	38½	42½	39½	ne.	ne.	n.	......	·16	·34	......	......
12.	29·770	29·607	29·37	29·60	29·56	29·62	29·54	54	34	42·5	51½	30	44	38½	w.	calm	ssw.	s.	·03	·04	......	......
13.	29·787	29·354	29·33	29·30	29·00	29·22	29·17	54	41	47	48	36½	45½	41	w.	w.	sw.	n.	·10	......	......	......
☽ 14.	29·558	29·401	28·90	29·22	29·61	29·50	29·97	55	39	48	52	38	44	42½	nw.	nw.	wnw.	nne.	·10	·25	......	·10
15.	30·126	29·694	29·42	30·00	30·25	30·30	30·40	49	40	43	51½	41	44	40	ne.	ne.	nne.	......	·02	·20	......	......
16.	30·275	30·265	29·97	30·35	30·35	30·32	30·40	54	39	43	54	34½	46	44	ne.	calm	nne.	sw.	......	......	0·78	......
17.	30·328	30·190	29·98	30·36	30·25	30·34	30·34	62	38	49	65½	37	47	47	ne.	ne.	sw.	w.	......	......	......	·05
18.	30·157	30·101	29·80	30·20	30·18	30·32	30·30	58	37	42	59	48	48	40	ne.	calm	ne.	......	......	......	......	......
19.	30·081	30·032	29·72	30·15	30·10	30·28	30·21	60	36	49	61	40½	50	44	ne.	ne.	ne.	sse.	......	......	......	......
20.	30·139	30·078	29·74	30·12	30·10	30·20	30·20	68	36	51	66	37½	55	48	e.	e.	e.	sse.	......	......	......	......
21.	30·108	30·014	29·60	30·10	30·00	30·19	30·14	66	38	53	68	38½	52½	48½	ne.	e.	se.	......	......	......	......	......
○ 22.	29·982	29·924	29·58	30·00	29·90	30·14	30·08	63	31	43	65½	43	56	46	ne.	calm	e.	ese.	......	......	......	......
23.	29·851	29·727	29·47	29·84	29·75	29·98	29·90	72	34	48	65	43½	48½	42	e.	calm	e.	ese.	......	......	......	......
24.	29·747	29·707	29·30	29·68	29·66	29·86	29·79	71	34	54	68	39	44½	43	sw.	calm	se.	ese.	......	......	0·00	......
25.	29·786	29·632	29·32	29·65	29·31	29·73	29·55	67	52	53	65	41	45	46	s.	calm	se.	ese.	·18	......	......	......
26.	29·583	29·414	28·83	29·05	29·11	29·30	29·25	63	47	55	58	50	50	45	sw.	sw.	s.	ese.	·01	·23	......	·20
27.	29·654	29·620	29·08	29·07	29·18	29·30	29·23	61	44	52	50½	46½	49	46	sw.	w.	se & s.	ese.	·02	......	......	......
☾ 28.	29·682	29·627	29·20	29·39	29·50	29·29	29·51	64	50	56	59	47½	49½	49	s.	calm	s.	sse.	......	......	......	·18
29.	29·982	29·875	29·35	29·67	29·72	29·64	29·73	66	49	57·5	59½	47½	56	48	w.	calm	s.	ese.	......	......	2·00	·14
30.	30·041	29·975	29·44	29·70	29·47	29·66	29·30	63	51	59	60½	48½	54	48	sw.	calm	s.	se.	·01	......	......	......
Mean.	29·875	29·754	29·41	29·746	29·692	29·831	29·822	60·20	36·63	47·4	57·7	39·4	47·24	43·13					0·95	1·12	2·93	0·94

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

SUPPLEMENT TO VOL. XV. JULY 1845.

LXIII.—*Notices of various Mammalia, with Descriptions of many new Species.* By Edward Blyth, Esq., Curator of the Asiatic Society's Museum, &c.*

Part I.—The *PRIMATES*, Linn.

Simiadæ.—When last I had occasion to treat of this group, I remarked (Journ. As. Soc. xii. 176), that at that time the only ascertained species known to inhabit the countries bordering on the Bay of Bengal to the eastward were the *Hylobates Lar*, which I suggested to be the most common species of gibbon found in the interior of the Tenasserim provinces, as alluded to by Dr. Helfer; and *H. syndactylus*, which according to that author extends as high as 15° N. lat., a statement which however it would be satisfactory to have confirmed. It now appears that the *H. Lar* is diffused so high as Arracan, where Captain Abbott, assistant to the commissioner of the province, and who is stationed in Ramree, is acquainted both with it and *H. Hoolock* as inhabitants of that island (?). In Arracan however the Hoolock is the prevalent species of gibbon, and extends thence over all the hill-ranges of Sylhet and Assam†; while the *Lar*, or white-handed species, is found southward to the Straits. The Society has lately received a pale specimen of the Hoolock from Captain Phayre (senior assistant to the commissioner of Arracan, and stationed at Sandoway), which closely approaches to that in the Zoological Society's museum, which was described as a distinct species by the name *H. choromandus*, being however a trifle darker, and considerably darker than the very pale example from Assam noticed in 'Journ. As. Soc.' x. 839. Another Hoolock in this museum is again much darker than the Arracan specimen, and we have retained a third of the usual intense black colour all over, with the exception of the constant white band across the forehead.

According to Mr. J. Owen, who resided upwards of two years among the savage Nagas and Abors who inhabit the wooded mountain-ranges to the eastward of Upper Assam, the Hoolock

* From the Journal of the Asiatic Society of Bengal, No. 66, New Series, for 1844.

† It is even found in some parts of Mymunseng. Buchanan Hamilton's MSS., upon the authority of Mr. Dick, formerly judge and magistrate of Sylhet.

abounds in those upland forests, associating in societies of 100 or 150 individuals, the combined noise of which may be heard to an immense distance. In general they keep to the tops of the highest Oolung and Mackoi trees (*Dipterocarpi*), to the fruit of which they are very partial; but on several occasions, when emerging from a footpath through the dense forest into the open ravines formed by the action of the mountain rapids, Mr. Owen mentions having come suddenly upon a party of them washing and frolicking in the current, who immediately took alarm and retreated into the jungle; but in one instance, as he was proceeding solitarily along a newly-made road through the forest, he found himself surrounded by a large body of them, impelled perhaps as much by curiosity at his European dress and appearance, as by resentment at the intrusion of a stranger upon their domain; the trees on either side were full of them, menacing with their gestures and uttering shrill cries; and as he passed on, several descended from the trees behind, and followed him along the road; and he feels sure that they would soon have attacked him had not his superior speed on the ground enabled him to escape. Having at first, relates Mr. Owen, to cross a number of felled logs, it was really no easy matter to get away; but the clear and open road once gained, he was not long in distancing his pursuers. Upon his return, after this threatened attack of the Hoolocks, Mr. Owen asked his Assamese interpreter (who had been brought up in the hills) whether it was usual for these apes to manifest so hostile a disposition; and he was informed that only a few days before, as a party of Nagas were proceeding along one of the tortuous jungle-paths, necessarily in Indian file, the foremost man, who was a little ahead of the rest, was actually attacked and severely bitten on the shoulder, and would probably have been killed by his assailants had not others of his party opportunely come to the rescue, upon which the Hoolocks immediately fled. Indeed I can testify to the capability of these animals to inflict serious injury, from having witnessed a tame female of the Sumatran *H. agilis* suddenly attack her keeper, by springing up at him, grasping his body with her four limbs, and biting at his chest, when it was fortunate for the man that her canines had been previously filed down, in consequence, as was said, of her having occasioned the death of a man at Macao*. According to Mr. Owen's account, the Hoolocks

* From what I have seen of the Gibbon tribe when brought up tame, no animals could be more gentle and good-tempered; but the lady in question had good reason for the utter hatred which she bore to her keeper, who used to make her display her wondrous activity a hundred times a day, in swinging from bough to bough of a large artificial tree by means of her fore-limbs only, by frequent application of the whip.

would also appear capable of destroying large snakes; for his attention was once arrested by the noise which a party of them were making on the tops of some lofty trees overhead, when after a while he was startled by the fall of a Python snake, of about six or seven feet in length, within a few paces. The reptile was nearly dead, or for that matter might have been disabled by the fall; but it had been severely bitten and lacerated, no doubt by the Hoolocks above, who were unquestionably the cause of its precipitation.

Of the Javanese species (*H. leuciscus*, F. Cuv.), the Society has lately obtained a fine female specimen, the colouring of which is somewhat remarkable, although nearly resembling that of a male described and figured in the unpublished MSS. and drawings of the late Dr. Buchanan Hamilton. General hue pale grayish brown, or rather brownish gray, darker on the nape, shoulders and limbs, and the inside of the thighs blackish anteriorly; the outside of the thighs, and the legs and feet above, are pale; the hands are washed with blackish; crown of the head black; a whitish ring encircles the face; the throat, sides of the throat, entire under-parts, and especially the lumbar region, are also whitish, but a dark brownish gray line extends down each side of the breast and belly, commencing from the armpits, and terminating in the blackish inner side of the thighs. As compared with the Hoolock, this species has the coat very much more close and woolly, the hair adhering in flakes, more particularly on the back. That of *H. Lar* (the only additional species we possess) is just intermediate*.

I also suggested, upon the same occasion, that the Tenasserim

* On the subject of Orang-utans, I took the opportunity before referred to, to offer a few remarks. Since then the Society has fortunately recovered a fine skull of the male *Mias Rambi*, presented by Major Gregory which had been missing from their museum, and was consequently unnoticed in my remarks on the genus. I have also lately received a letter from Mr. James Brooke (of the Borneo settlement), wherein that gentleman notices the dark colour of the *Rambi* as compared with the *Pappan* and *Kassar*. He remarks, "I concur in what you say regarding the *Wurmbii* and *Abelii* being referred to one class [species]. The *Kassar* in every specimen which I have seen is of the same colour as the *Wurmbii* or *Pappan*; but the *Rambi* is of a *dark brown* in the two I have seen,—one an adult female, the other a young but a large male. The *Rambi* is probably intermediate in size to the other two species. I am aware how little general importance is to be attached to colour, but among the very numerous specimens of the *Pappan* and *Kassar* I never found one of this dark colour, whereas the only two specimens of the *Rambi* which have fallen under my notice were both similar and both dark brown. A little further personal inquiry would settle the matter beyond dispute; and I hope soon to have the countries open to me, when I shall feel great pleasure in forwarding you specimens either of skeletons or skins."

Semnopithecus maurus of Helfer would probably prove to be the *S. obscurus*, Reid; and the Society has now received skins of the latter species from Captain Phayre, and some living young specimens from Captain Abbott; and the skull of this animal, compared with that of a skeleton prepared from a Tenasserim specimen sent in spirits by the late Dr. Helfer (Journ. As. Soc. vii. 669), leads me to refer the latter also to the same species, which, it may be remarked, is the only member of its genus as yet ascertained from Arracan southward to the Straits, where (in the vicinity of Singapore) specimens of it were obtained by Mr. Cuming.

The skins adverted to are those of full-grown animals, and they accord very well with the description of the species furnished by Mr. Martin; but two very conspicuous characteristics of the living animal might pass unnoticed in these skins, namely, the variegation of the face, which is of a leaden black, contrasting with pinkish flesh-colour on the mouth and lips, extending to the lining of the nostrils, besides which a large semicircular mark of a paler and more livid tint occupies the inner half of each orbit; and secondly, a longitudinally-disposed erect crest upon the vertex, rising abruptly from amid the rest of the hair of that part, and being analogous to that of the Sumatran *S. cristatus* (Raffles), with which I should not be surprised to find the present species identical. Raffles however says nothing of the variegation of the face, and he remarks that "the young *Chingkaus* are of a reddish fawn-colour, forming a singular contrast with the dark colour of the adults," whereas very young examples of the present animal agree in colour with full-grown ones; he also mentions that the under part of the body is merely "paler," while in the Arracan animal this is dull white, and purer white in the young. In adults, the whole hair of the crown is much elongated, the tuft still rising up among the rest; and that forming the whiskers stands far out on each side, forming lateral peaks in addition to the vertical one. Five examples before me (three of which are alive) exhibit scarcely any difference in shade of colour, all being of an ashy dusky black, darkest on the head and extremities, a good deal silvered on the back, white underneath or in front, and the tail more or less albescent either at base only, or for the basal half or two-thirds, or even the entire tail; there is little trace of beard, and the shortish scanty hairs growing upon the flesh-coloured lips are white. The young, besides a whining noise to express their wants, frequently emit a mewing cry that might be mistaken for the mew of a cat.

To the same group of *Semnopitheci* belongs my *S. pileatus* (Journ. As. Soc. xii. 174), a species which abounds on the skirts of the Tipperah hills, retiring far into the interior during the rains (as I am informed by F. Skipwith, Esq., judge and magistrate of Tipperah), and it would appear also to extend sparingly upon the Naga range eastward of Upper Assam. A fine specimen of an old male has just been presented to the Society by the Rev. J. Barbe, R. C. Missionary, which was shot by him during his recent visit to the wild Kookie tribes of the Chittagong hills; and the same gentleman had previously favoured us with a more than half-grown male killed in Tipperah. These two differ considerably in shade of colour from the young female formerly described, having the whiskers, throat, chest and front of the shoulder very deeply tinged with ferruginous; the rest of the under-parts, the legs all round (from the knee), and much of the humerus, less so; and the head and back of a more dingy ash-gray, being sullied with the prevalent rust-colour. The half-grown female before described has merely a faint tinge of ferruginous on its whitish under-parts, and the back and limbs are very delicate pure gray*. In the old male, the tail is of the colour of the back at base, becoming gradually black, which last occupies the terminal third or more; the fingers and toes are blackish, with an admixture of this on the back of the hands: the long black superciliary hairs spread into two lateral masses (in all three specimens) and are very copious, and between and above them, immediately over the *glabella* or inter-orbital space, the hairs of the forehead are conspicuously tinged with ferruginous; those on the crown are not elongated as in the preceding species, nor is there any trace of vertical crest; but they are a little lengthened beyond those of the occiput, sinciput and temples, which they accordingly impend, and thus is presented somewhat the appearance of a small flat cap laid on the top of the head, whence the specific name. The length of fore-arm and hand (of the adult male) to tip of longest finger is above a foot; knee to heel nine inches; foot about seven inches; and length of skull about five inches.

As a third continental species of this subgroup, I suspect must be brought together the *S. cephalopterus* (Zimmerman), from Ceylon, with which Mr. Martin identifies the *lion-tailed monkey β*, and the *purple-faced monkey* of Pennant, the *Guenon à face pourpre* of Buffon, *Simia dentata*, Shaw, *Cercopithecus latibarbatus* of Geoffroy, Kuhl and Desmarest, *C. leucoprymnus*, Otto, *Simia fulvo-grisea*, Desmarest, *Simia leucoprymna* and *S. cephaloptera*, Fischer, *S. Nestor*, Bennett, and *S. leucoprymnus* and *S. Nestor*, Lesson, and the *S. Johnii*, Fischer, from the Neilgherries, to which Mr. Martin only refers the *S. cucullatus*, Is. Geoffroy.

* A half-grown male just received from Mr. Skipwith is intermediate in its colouring.

From specimens now before me, I think there can be no doubt of the identity of all of these, and that the species both inhabits the Neilgherries and the mountains of Ceylon; but Mr. Martin erroneously identified one specimen in the Paris museum with the present species, as I have shown in 'Journ. As. Soc.' xii. 170, the animal in question being evidently my *S. hypoleucos* (Journ. As. Soc. x. 839). The name *cephalopterus* would have to be retained and the animal appears subject to considerable variation of shade; a half-grown female before me resembling Mr. Martin's figure referred to *S. cephalopterus,* except that the croup is pale gray as stated in the description, the hair there being shorter; and there is an admixture of this on the thighs, and slightly up the back; the whiskers, and hairs on the lips and chin are dull white, and those of the crown dull chestnut-brown, and lengthening on the occiput; the tail of this is whiter to the end. An old male, on the contrary, has dark dull chestnut-brown whiskers, concolorous with the hair of the crown, and some blackish hairs growing in front of them, and his tail is blacker to the end; the hair on the crown is all elongated, but increasing in length to the occiput, where some of the hairs exceed five inches in length, and tend to be albescent,—a sort of dingy isabella-colour prevailing, which is not easy to express in words. On the short hair of the croup and upon the thighs the same gray colour appears as in the young female specimen, but is mingled with black and considerably less albescent. The bodies and rest of the limbs of both are deep black, but picked out a little with grayish in the young female. I consider these two specimens to represent respectively the *S. cephalopterus* and *S. Johnii* of Mr. Martin's work, the latter (or old male) being certainly from the Neilgherries, and the other I purchased alive in Calcutta, and could not learn whence it had been brought; but I am quite satisfied of the specifical identity of the two, and have seen others variously intermediate. Upon these grounds I venture to bring the two alleged species together.

The other Indian *Semnopitheci* form a particular subgroup, well-characterized by their physiognomy; and all of them have a radiating centre of hair on the forehead, a little behind the superciliary ridge. They have been mostly confounded under *S. Entellus.*

The most different from the rest is *S. hypoleucos,* nobis (Journ. As. Soc. x. 839 and xii. 170), which is characterized by its comparatively small size, deep colouring, and black fore-arms and hands, feet and tail, the head being of a dirty pale straw-colour. Inhabits the Malabar range and Travancore.

Next, *S. Entellus* (verus), F. Cuv., is the representative of the group in Bengal and Assam, extending (as I have been informed) into Cuttack. It has constantly black hands and feet; the fore arm and leg externally, with the croup, are of a pale *chocolat au lait* colour, extending more or less over the back, humerus and thigh; and the rest is of a light straw-colour, or pale isabelline, with occasionally a tinge of ferruginous on the belly. It is figured by the late Mr. Bennett in the 'Gardens and Menagerie of the Zoological Society.'

Very different is the *S. Priamus,* Elliot, of the Coromandel coast, which has naught of the yellowish tinge, the whole back and outside of the limbs, with the crown of the head, being nearly of the *chocolat au lait* hue confined to parts of the former, but having more of the *lait* in it, and as usual being most intense about the croup; the hands and feet are *pale* and concolorous with the rest of the limbs; the whiskers and occiput whitish; and a strongly marked peculiarity consists in having an abruptly rising erect crest upon the vertex, analogous to that of *S. cristatus* (vel ? *obscurus*).

The *S. Anchises,* Elliot, represents the former in the Deccan and along the foot of the western ghauts. A skin presented to the Society by that gentleman, with three examples of *S. Priamus,* resembles the darkest specimens of *S. Entellus* in colour, but has the leg from the knee whitish (perhaps not a constant distinction), the hands mingled white and blackish, and the feet whitish, with dusky black above the base of the toes and on their terminal phalanges; but the coat generally is much longer than in *S. Entellus,* the hairs on the sides measuring four, five, and even six inches in length; and those which grow upon the toes, and in a less degree those of the fingers, which are very copious, are also remarkably elongated, extending considerably beyond the tips of the toes, which thus present a spaniel-like appearance. Mr. Elliot, to whom the merit is due of first distinguishing these species, and who is well-acquainted with both of them, will shortly describe their characters more minutely.

The same gentleman has also forwarded for my inspection an imperfect skin of a half-grown animal, received from the Coimbatore district or its vicinity, which presents the colouring of the true *Entellus,* and has the black hands and feet well-marked; but the coat is different in texture, the hairs of it being quite straight, and not exhibiting the waviness which is constantly observable in those of *S. Entellus* of every age, causing the light to fall irregularly on each hair of the latter species; while on those of the specimen in question, as in *S. Anchises,* the shine is uniform, and the same straightness of hair is observable in *S. Priamus*: this may appear a trivial distinction, but it is nevertheless a well-marked one, which at once characterizes *S. Entellus* apart from either of the others; and I incline to consider, for the present at least, the skin under consideration to be a doubtful variety of *S. Anchises*, the more especially as its coat is also longer than in specimens of *S. Entellus* of corresponding age.

Another allied species, of which the description does not tally with either of the foregoing, is the *S. schistaceus*, Hodgson (Journ. As. Soc. ix. 1212), "from the Tarai forest and lower hills, rarely the Kachar also," of Nepal, and which would seem to approach nearest to *S. Anchises*. It is described as "dark slaty above; below, and the entire head, pale yellow; mere hands and feet somewhat darkened or concolorous with the body above; tail also concolorous: hair on the crown short and radiated; on the cheeks long, directed back, and hiding the ears: piles or fur of one sort, neither harsh nor soft, more or less wavy; three to five and a half inches long upon the body, closer and shorter on the tapered tail, which is more or less tufted."

The Mussoorie Lungoors have been thus described to me by Capt. Thos. Hutton, from whom I hope shortly to receive some specimens. "I fell in," writes that observer (in a letter dated Dec. 30th,), "with a whole lot of monkeys this morning, and took a leisurely survey of them; they were dark grayish, with pale hands and feet, white head, dark face, white throat and breast, and white tip to the tail. This is, I think, the Nepal and Simla species. The *Macacus Rhesus* is found here also, but I do not remember it in the winter, though it may remain in some of the deep warm valleys*." Elsewhere he remarks, "I have long thought that the *Lungoor* of our parts must be distinct from the *S. Entellus* of Bengal, on account of the different locality in which it is found; for assuredly were the Entellus to occur here in summer, it would retire to the plains on the approach of winter. Our species, on the contrary, seems to care nothing for the cold; and after a fall of snow, a glen on my estate which opens to the north-west is crowded with them. In fact, I really believe they are more numerous during the cold than during the hot weather. On the Simla side I observed them also, leaping and playing about, while the fir-trees among which they sported were loaded with snow-wreaths. I have seen them at an elevation of little short of 11,000 feet even in the autumn, when hard frost occurred every night, and that was at Hattoo or Whartoo mountain, *three* marches in the interior from Simla. * * * It grows to a goodly size, and is rather a formidable-looking fellow." Captain Hutton's suggestion, that the Himalayan *Lungoor* must be different from the

* In Journ. As. Soc. vi. 935, Capt. Hutton states, of the *M. Rhesus*, "This species I saw repeatedly during the month of February, when the snow was five or six inches deep at Simla, roosting? in the trees at night, on the side of Jakú, and apparently regardless of the cold."—*Journal of a Trip to the Burenda Pass.*

Bengal *Hoonuman* because of the diversity of climate which they inhabit, is in part nullified by the fact that the *Macacus Rhesus* inhabits alike the Himalaya and the Bengal Soonderbuns; and it also remains to ascertain how high the *S. Entellus* may extend upon the northern mountains of Assam: moreover it is by no means clear, from the above description, that Capt. Hutton's Mussoorie *Lungoor* is identical with Mr. Hodgson's Nepalese species.

Returning now to the determination of the *Simiadæ* found eastward of the Bay of Bengal, Dr. Helfer mentions two species of *Macacus*, stating that "the *Cercopithecus cynosurus* [*cynomolgus* ?] inhabits chiefly the banks of rivers and the mangrove forests, being chiefly fond of shell-fish;" and that "another species of *Cercopithecus* belongs to the rarest of this genus, and is found chiefly in the northern parts upon isolated limestone rocks." There can be little or no doubt that the two following are the species referred to; and to Capt. Phayre is due the credit of first securing specimens of these animals for examination, the Society being already indebted to that gentleman for numerous other specimens of Arracanese mammalia, several of which are new, and for nearly 200 species of birds, besides specimens in other classes, to all of which he is continually fast adding.

Macacus nemestrinus (?).—A huge specimen of what I conceive to be merely the common *pig-tailed monkey* of authors, numerous in Sumatra, (where three *varieties* of it are alluded to by Raffles, who terms the species *Simia carpolegus*,) if not also in other parts of the Malayan archipelago and peninsula, differs from ordinary specimens of its race, such as are commonly seen in captivity, in the development of its coat of hair, especially on the fore-quarters, in having the crown merely infuscated, instead of black (or nearly so), and in the terminal tuft of its tail being bright ferruginous; besides which, there is a strong tinge of golden ferruginous about the shoulders. The coat is fine in texture, and upon the fore-quarters the hairs of it measure from four to five inches long; on the loins they scarcely exceed two inches, and on the under-parts are comparatively scanty; the general colour being that prevalent among the *Macaci*, or grizzled brown, the piles annulated with dusky and fulvous; crown darker, and the middle of the back posterior to the lengthened hair is also darker, becoming black along the upper surface of the tail, which has a bright ferruginous tuft as before noticed; but there is no trace of this upon a very young specimen also sent, which has likewise little appearance of annulation to its fur, and the colours generally are subdued and much paler. A live example (of undoubted *nemestrinus*) which I possess, about a third grown, begins to show the grizzling or annulation to the fur of its fore-quarters, but no sign as yet of the rufous tail-tip. Upon the whole, the very large fine specimen under consideration does not differ more from ordinary domesticated examples of the pig-tailed monkey, than does an unusually fine wild old male of the *M. Rhesus* which I procured some time ago in this vicinity, from such domesticated specimens of the latter as must be familiar to the observation of most naturalists who are conversant with the study of mammalia. Capt. Phayre obtained these animals in a mountainous and rocky situation, and it is doubtless Dr. Helfer's second species of (so-called) *Cercopithecus.* It belongs indeed (as does also *M. Rhesus*) to the division *Papio* of Mr. Ogilby, which comprehends all the short-tailed *Macaci* of Cuvier; but not, as I suspect, to the *Papio* of Prof. Owen*, which I have reason to believe applies to the long-tailed African Baboons, or the *Cynocephali,* Auctorum, exclusive of *C. Mormon* and *leucophæus,* or the mandrill and drill: whereas the long-tailed *Macaci,* such as the next species, together with *M. radiatus* and *M. sinicus* of S. India, are referred by Mr. Ogilby to *Cercopithecus.* But the truth is, that if we once commence dividing the group *Macacus,* as now generally recognised, nearly every species of it might be selected as a subgeneric type *per se,* presenting various peculiarities of its own (*e. g. M. niger, nemestrinus, Silenus, Rhesus, cynomolgus, radiatus* with *sinicus,* and perhaps others with which I am less familiar): and I certainly much prefer the currently adopted system of restricting *Cercopithecus* to the numerous African species which want the fifth tubercle to the last inferior molar, and follow Mr. Martin in appriating the name *Cercocebus* to those other long-tailed African species which are known as the *Mangabeys,* or white-eyelid monkeys, of which three have now been ascertained,—an arrangement which has the advantage of according with the geographical distribution of these animals, and by which, too, any of them may be classified at a glance at their exterior by those who are familiar with the subject†.

M. cynomolgus (?).—Though possessing living examples of both the *M. nemestrinus* and *M. cynomolgus,* I have found great difficulty in determining the skins sent by Capt. Phayre, which I refer to these species, in consequence of the mode of preparation of them, the skulls having been taken out and the faces irreparably injured; but after full consideration I feel confident that the present one is correctly assigned, if not the other also. A pair of skulls of this are sent, from which the following dimensions are taken. That of an adult male measures four inches and

* Mentioned in the Report on British Fossil Mammalia, published in the Report of the British Association for 1842, p. 55.

† If I mistake not, the tail is in *Cercopithecus* and *Cercocebus* of constant proportional length, being much longer than in any *Macacus.*

three-quarters in total length, inclusive of the protruding incisor teeth; greatest breadth (of *zygomata*) three inches; vertical height (including lower jaw) three inches and one-eighth; length of bony palate an inch and seven-eighths; breadth of ditto three-quarters of an inch. The corresponding measurements of a female skull are—four inches and three-quarters, two and seven-eighths, three inches, one and five-eighths, and nearly three-quarters of an inch. The upper canines of the male project nearly five-eighths of an inch from the bony socket. Capt. Phayre sent the following note respecting the habits of this animal:—"These monkeys frequent the banks of salt-water creeks, and devour shell-fish. In the cheek-pouch of the female were found the claws and body of a crab:" accordingly, there can be little hesitation in identifying it with the other species of Dr. Helfer, to which the same habits were assigned.

Of the species of this genus, one only appears to inhabit Bengal, the *M. Rhesus,* which is numerous in the Soonderbuns, where its habits, I suspect, pretty much resemble those of *M. cynomolgus*: it frequents thick jungly situations, particularly about the borders of narrow gullies, and to escape pursuit will sometimes plunge into the water from an overhanging tree, swim to some distance beneath the surface, and then land and make off on the opposite bank. The Hoonuman, on the contrary, would appear never to enter the water. The *M. Rhesus* also occurs, as we have seen, even on the Himalaya so far westward as Simla, and Mr. Hodgson has sent it from Nepal, where I cannot help suspecting that (in different phases) it constitutes both his *M. oinops* and *M. pelops* (Journ. As. Soc. ix. 1213); and it is included in Dr. Walker's list of the mammalia of Assam (Calc. Journ. Nat. Hist. ii. 265), together with another species discovered in that part by Dr. Mc Clelland, and described as *M. assamensis* in Proc. Zool. Soc. 1839, p. 148. Still further to the north-west, "monkeys" are stated by Elphinstone to be found only in the north-eastern part of Affghanistan: but no *Simiadæ* are included in an elaborate paper on the mammalia of that country, prepared for publication by Capt. Thos Hutton, nor have I seen any subsequent notice of their occurrence in that vicinity. In the Indian peninsula generally, the common species of *Macacus* is the *M. radiatus,* being the only one included in the catalogues of Messrs. Sykes and Elliot; but *M. sinicus* is likewise found in the southernmost part and in Ceylon, as is also the *M. Silenus.*

The following is a brief synopsis of the Indian species of *Simiadæ,* with those of Assam, Arracan, and the Tenasserim provinces, as far as they are at present ascertained:—

1. *Hylobates syndactylus; Simia syndactyla,* Raffles. Stated by Helfer to extend as high as 15° N. lat.

2. *H. Lar.* Common in the Tenasserim provinces, and extending northward into Arracan, and southward to the Straits.

3. *H. Hoolock.* Hill-ranges of Assam, Sylhet and Arracan.

4. *Semnopithecus Entellus,* F. Cuv. Bengal and Assam; Cuttack?

5. *S. Anchises,* Elliot. Central table-land of the Indian peninsula, and base of the western ghauts.

6. *S. schistaceus,* Hodgson. Nepal: the species of the western Himalaya perhaps different.

7. *S. Priamus,* Elliot. Coromandel coast.

8. *S. hypoleucos,* nobis. Travancore and Malabar range.

9. *S. pileatus,* nobis. Tipperah and Chittagong hills; Naga range.

10. *S. cephalopterus* (Zimmerman). Ceylon and Neilgherries.

11. *S. obscurus,* Reid (*C. cristatus*? Raffles). Arracan, Tenasserim, extending southward to the Straits, and probably Sumatra*.

12. *Macacus Silenus.* Ceylon, and neighbouring districts of the continent of India.

13. *M. nemestrinus* (?). Arracan, Tenasserim.

14. *M. Rhesus.* Bengal, Assam, Nepal, Simla.

15. *M. assamensis.* Assam.

16. *M. cynomolgus* (?). Arracan, Tenasserim.

17. *M. radiatus.* Peninsula of India.

18. *M. sinicus.* Southernmost part of India, and Ceylon†.

Although I have here followed the usual order of classifying these three groups, I am nevertheless of opinion that the division comprising the *Cynocephali, Macaci* and *Cercopitheci* (*i. e.* the genera with cheek-pouches) should precede that of the *Semnopitheci* and *Colobi* (or the genera with sacculated stomachs). The facial angle can no longer be considered as a guide to the relative elevation of these animals in the scale of being, now that the adult Orangs, for example, are known to present so very prominent a muzzle, while on the other hand, the lowest of all the *Simiadæ,* or the American Marmozets, have the same so inconsiderably developed; and it would seem that some trivial resemblance which the Semnotes bear to the Gibbons is now the chief inducement that occasions the former to be still placed next to the group of tailless Apes, and thus to precede the third great division of old-world Monkeys and Baboons, which is character-

* The *Semn.* (or *Presbytis*) *nobilis,* Gray, Ann. and Mag. Nat. Hist. 1842, vol. x. p. 256, I cannot but regard as requiring confirmation as an inhabitant of India proper.

† This is doubtless the species noticed by Mrs. Graham in Ceylon, where that lady mentions "swarms of red monkeys playing in the trees overhead." (Journal of a Residence in India, p. 104.) I have reason to conclude also that this, and not the Lungoor, is the *Rollewai* of the Singhalese.

ized by possessing cheek-pouches. But this third division unquestionably presents a nearer structural approach to the first than does the second; and, so far as I have observed, the intellect is also decidedly of a superior grade. I have next to describe an apparently new species of the African genus *Cercopithecus*.

Cercopithecus chrysurus, Nobis.—This belongs to the particular minor group exemplified by *C. sabæus*, and would seem to be nearly allied both to that species and to the *C. Tantalus*, Ogilby, P. Z. S. 1841, p. 33, the tail of which is stated in the Latin diagnosis to be yellow at tip, while in the more detailed vernacular description this is said to be "brown at the base, light gray at the tip." In the species now described, the terminal third of the tail is bright yellowish ferruginous, as I believe in *C. sabæus*. The specimen is a male, and measures about nineteen inches from forehead to base of tail, the tail about twenty-four inches; from elbow to tip of hand nine inches, knee to heel seven and a quarter, and foot five inches. Colour grizzled yellowish brown, the hair fine and soft at base, with the terminal half comparatively coarse and rigid, and broadly annulated first with black, then fulvous, and finally tipped with black; for the most part about two inches and a quarter long, but exceeding three inches on the sides towards the flanks: the whiskers, with the entire underparts and inside of the limbs, are dingy yellowish white: the fore-arm and leg grayer, or less yellowish than the parts above, and the hands and feet infuscated. Face almost naked, having only a few scattered hairs, but a narrow supercilium of long black hairs across the brow. The upper surface of the tail is rather darker than the back for the first two-thirds of its length, and then passes into bright yellowish ferruginous, which on the under surface of the tail is continued nearly to its base, weakening however in intensity; the extreme tip of the tail is wanting in the specimen. Length of the skull four inches and a half, and breadth across the *zygomata* two inches and three-quarters; vertical height two inches and five-eighths; length of bony palate an inch and a half, and breadth seven-eighths of an inch. Habitat unknown.

Lemuridæ.—The *Stenops gracilis* is usually assigned to Ceylon, and the *Nycticebus tardigradus* to Bengal. The latter however certainly does not occur in the lower part of Bengal, but may perhaps exist in the hilly regions. Dr. Walker includes it in his catalogue of Assamese mammalia; and upon referring to the late Dr. Buchanan Hamilton's MSS., I find what I consider to mean this species noticed as occurring in Chittagong, where it is said to be rare and solitary, inhabiting trees; in Rungpore also very scarce, and said to have been seen in the hilly countries to the south and east of the Boorhampooter by some natives, who recognised it by the Hindustanee name *Shiriminda Billi*, "bashful or shame-faced cat," a name which I have also heard applied to it. The unobtrusive, nocturnal habits of this animal would however always cause it to be little observed. I believe that it is "the little *Bradypus*" of Dr. Helfer's 'Note on the Animal Productions of the Tenasserim Provinces,' being commonly designated "Sloth" by Europeans; and the territories eastward of the bay constitute, I suspect, its chief habitat. A pair of the *Stenops gracilis* were offered to me in the Madras bazar at the low price of a rupee; but I have seen no notice of this species as an ascertained inhabitant of the peninsula*. Here in Calcutta, a dealer would ask at least ten rupees for a pair either of them or of the *Nycticebus*, and in all probability double as much†. They are, indeed, but seldom brought for sale in this emporium; and it is probable that the *Nycticebus*, if found at all in Bengal, occurs sparingly only a little within the confines of the province.

Vespertilionidæ.—The only bat contained among Dr. Helfer's Tenasserim specimens was *Pteropus javanicus*, which, with *Nycticebus Temminckii*, he stated to be "amongst the rarer species found in the provinces"; and he alludes vaguely to other species of *Pteropus*, *Phyllostomus* (meaning probably *Megaderma*), and *Nyctinomus* (or *Dysopes*). The Society has received *Pt. medius* (vel *Edwardsii*, Desm., apud Ogilby and others, though Edwards's specimen was from the Mauritius, and should therefore, I suspect, be the *Pt. edulis*‡,) from Arracan, Tipperah, and Assam, where I cannot help considering the *Pt. assamensis* described by Messrs. McClelland and Horsfield to present merely an individual variation. The same appears to be Dr. Walker's opinion, as *Pt. Edwardsii* alone is included in his list of Assamese mammalia. Mr. Hodgson has also sent it from Nepal as his *Pt. leucocephalus* (Journ. As. Soc. iv. 700), together with the *Cynopterus marginatus* as his *Pt. pyrivorus* (ibid.), which latter has likewise been received by the Society from Assam and Arracan, and both of these species appear to be common throughout India; the former also doubtless constituting the large "flying fox" so abundant in the Maldives and Laccadives. The third Indian species of frugivorous bat, *Pt. Dussumieri* (of which a description will be found in Journ. As. Soc. xii., 176), is still wanting to the Society's collection.

Of *Cynopterus marginatus*, I have been keeping three live

* It is included in Mr. Elliot's new catalogue of the mammalia of peninsular India.

† A pair of the *Stenops* said to have been brought from *Singapore*, have just been put up at auction at sixty rupees! The *Nycticebus* is common in Arracan.

‡ The Mauritius species is styled *Pt. vulgaris*, v. *rubricollis*, Geoff., in P. Z. S. 1831, p. 45.

females for several weeks. They are exclusively frugivorous, and take no notice of the buzz of an insect held to them; which I remark in reference to a statement of Mr. Gray, that the nearly allied little Kiodote is partly insectivorous: this I doubt very much. The *Cynopterus* is a very ravenous eater, and will devour more than its own weight at a meal, voiding its food but little changed as excrement, while still slowly munching away. Of guava it swallows the juice only (though a soft mellow fruit), opening and closing its jaws very leisurely in the act of mastication, and rejecting the residue. The flight of this bat is particularly light and buoyant, far different from the measured rowing, the direct and heavy flight of the large *Pteropus*; but the general manners and the voice of the two are very similar*.

The other Indian *Vespertilionidæ* fall into three principal groups; viz. *Rhinolophinæ,* comprising the genera *Megaderma, Rhinolophus* and *Hipposideros,* and *Nycteris* (which at least is a Malayan genus),—*Dysopodinæ,* including *Dysopes* (with its various subdivisions, as *Cheiromeles,* &c.), *Taphozous,* and *Rhinopoma,*—and *Vespertilioninæ,* or the ordinary Bats.

The *Megaderma Lyra* appears to be a common species throughout India, and I have described its habit of preying on smaller bats, first sucking their blood, in Journ. As. Soc. xi. 255. In reference to that paper, Mr. Frith informs me that a number of these bats were in the habit of resorting to the verandah of his residence in Mymunseng, and that every morning the ground under them was strewed with the hind-quarters of frogs, and the wings of large grasshoppers and crickets: on one occasion the remains of a small fish were observed; but frogs appeared to constitute their chief diet—never toads; and of a quiet evening these animals could be distinctly heard crunching the heads and smaller bones of their victims. Other species of bats were noticed to keep aloof from this retreat, but Mr. Frith had no opportunity of confirming my observation, that the *Megaderma* preys upon smaller animals of its tribe. The disproportion of the sexes in the assemblages of this species in their diurnal retreats is noticed in Journ. As. Soc. xi. 600; and indeed I think that the same pretty nearly holds throughout the family. In Mr. Elliot's catalogue the name *carnatica* is proposed, with a mark of doubt, for the *Megaderma* of S. India, which however is perfectly identical with that of Calcutta.

* After a while, the three caged females mentioned above attracted a male, who used to be continually hovering about their cage of an evening, and at length took up his diurnal residence hitching to a rafter above a dark staircase close by, where one of the females who escaped immediately joined him, and they continued to retreat there regularly for some days, when both were caught.

Rhinolophus, Geoff. and Cuv.—In preparing a notice of the Indian species of this difficult genus, so far as I am acquainted with them, I labour under the considerable disadvantage of not having M. Temminck's valuable monograph to refer to; but I will nevertheless endeavour to review the history of the group, so far as the means at my disposal will permit of. The first endeavour at collating the species would appear to be that of M. Geoffroy St. Hilaire, in the 'Annales du Muséum,' tom. xx. pp. 254 *et seq.* (1813). Four species are there noticed, in addition to the two common in Europe*; and among the former is a species from Timor, the *Rhinolophe cruménifère* of MM. Péron and Lesueur, which I conceive to be erroneously identified with the *Vespertilio speoris* of Schneider, described to inhabit India, as it differs from the latter in its considerably larger size and (it would seem) more rufous colouring.

In the second edition of Cuvier's 'Règne Animal' (dated 1829), these six species only are referred to; but Dr. Horsfield, in his 'Zoological Researches in Java' (dated 1824), had described seven (alleged) species as inhabitants of that island, two of which have since been brought together by Mr. Gray, after an examination of the original specimens collected by Dr. Horsfield, —*Rh. deformis*, Horsfield, being thus identified with *Rh. insignis*, Horsfield.

Then followed M. Temminck's Monograph of the genus, wherein (if I remember rightly) several species were added to those of his predecessors; of which, among perhaps others unnoticed in Mr. Gray's subsequent synopsis, I find mentioned by authors a *Rh. luctus*, Tem., from Java, an alleged rufous variety of which is described in the Zoology of the Voyage of La Favorite, from Manilla; also a *Rh. pusillus*, from India, which appellation is referred with a mark of doubt to a specimen in the Zoological Society's museum, in Mr. Waterhouse's catalogue of the mammalia preserved in that collection, where also is mentioned, but likewise with a mark of doubt, *Rh. insignis*, Horsf., from Ceylon.

Confining ourselves now to the describers of Asiatic species†, Col. Sykes, in the Proceedings of the Zoological Society for 1831, describes a *Rh. dukhunensis*, distinguishing this from the *Rhinolophe cruménifère* of Péron and Lesueur, which, it is added, is the *Rhin. marsupialis* of M. Geoffroy's lectures, and the *Rh. speöris* of M. Desmarest, by its much smaller size, &c.; but this

* A third European species, found towards the South (in Dalmatia, Sicily, &c.), also in the Levantine countries, and it would appear all Africa, is the *Rh. capensis*, Licht., *Rh. clivosus*, Rüpp., v. *Rh. Geoffroyi*, A. Smith.

† The form is peculiar to the old world, inclusive however of Australia (apud J. E. Gray).

smaller size corresponds with the original description of *Vesp. speoris* from India, the colour of which is however stated to be "pale yellowish ash-brown" (apud Shaw), which does not apply well to either, though better to that of India: and I have little doubt that Col. Sykes's species is the true *speoris*, to which *dukhunensis* would therefore be referred as a synonym, as likewise the subsequent names *apiculatus*, Gray, for the male, and *penicillatus*, Gray, for the female.

Mr. Hodgson, in the Society's Journal for 1835, next described a *Rh. armiger* and *Rh. tragatus* from Nepal; but the former of these appears to be identical with the Javanese *Rh. nobilis* of Horsfield. The same naturalist more recently obtained three other species from that province, and has described one of them by the name *perniger*, in Journ. As. Soc. xii. 414; but I suspect that this is identical with *Rh. luctus* of Temminck.

We now come to Mr. Gray's "Revision of the genera of Bats, and descriptions of some new genera and species," published in the 'Magazine of Zoology and Botany,' No. 12. In this paper the *Rh. vulgaris*, Horsf., is mentioned as inhabiting India; and besides the *Rh. apiculatus* and *Rh. penicillatus*, Gray, both of which I have referred to *speoris* verus v. *dukhunensis* of Sykes, two other species from India are described as new, from specimens procured by Walter Elliot, Esq., Madras C. S.; and these are also given in the latter gentleman's valuable "Catalogue of the Mammalia of the Southern Mahratta Country," published in the 'Madras Journal of Literature and Science,' No. 24. pp. 98–99, one of them however by a different and more appropriate name.

Such appears to be the amount of information hitherto published relative to the Indian *Rhinolophi*, which I shall now proceed to reduce and classify, and enrich by the addition of several new species.

The various Indian and Malayan members of this group fall into two marked divisions, corresponding to *Rhinolophus*, Gray, as restricted, (the *Noctilio*, apud Bechstein, according to Mr. Gray,) and the *Hipposideros*, Gray, v. *Phyllorhina*, Bonap., apud Gray.

The former is exemplified by the three European species, and by the Javanese *Rh. affinis* and *Rh. minor*, Horsf., in addition to which only two species are indicated by Mr. Gray, the *Rh. megaphyllus*, Gray (P. Z. S. 1834, p. 52), from Australia, and *Rh. griseus*, Meyer, habitat not ascertained. In this group, the facial crests are more prominently developed, and terminate in an angular peak above, within and anterior to which is a second leaf of membrane, in general also peaked, and attached behind by a vertical (*i. e.* longitudinally disposed) connecting membrane, which last is sometimes developed beyond the lesser transverse leaf, in front of it, and each undergoes considerable modification in the various species: the nasal apertures appear linear, from being partly overlapped by membrane, which lines and surrounds the centre of the facial depression, between the latter and the nostrils; outside of the nostrils the face is bordered by a layer of membrane surrounding it in front in shape of a horse-shoe. The ears in this group are large, ample, and apiculated, having the point directed outward, and (as Mr. Hodgson remarks of the *Rhinolophi* generally) are "tremblingly alive all over:" the conch is continued round in front to form an anti-helix, which is separated apart by an emargination, sometimes very deep, but should not be confounded (as it occasionally has been) with the *tragus* of various other bats. As many as six species inhabit India, all of which (unless *Rh. pusillus* be among them) seem different from those heretofore described.

The first is remarkable for having a conspicuous transverse leaflet with a septum behind and above it, situate upon the larger or posterior peaked membrane, and considerably above the lesser or anterior one; but this is only a modification and development of what is more or less observable in the others. The posterior peak reaches to between the ears and even beyond.

1. *Rh. mitratus*, nobis.—Length four inches, of which the tail measures an inch and a half; of another specimen three inches and one-eighth, the tail an inch and a quarter. Expanse (of the former) probably twelve inches; length of fore-arm respectively two and a quarter, and two and one-eighth; of longest finger three and one-eighth, and three inches; of tibia an inch; and tarse with claws half an inch. Ears large and ample, measuring an inch to point anteriorly; the anti-helix moderately developed, but separated apart by only a slight emargination. Fur of the upper parts a rich light brown, paler at base, excessively soft and delicate, and rather long; of the under parts shorter and much paler. Anterior nose-leaf subovate, or nearly rounded, contracted at base, and a conspicuous lappet of membrane is given off from each side of the centre of the facial depression, overhanging the nostrils, and forming a round mesial cup; vertical membrane posterior to the lesser nose-leaf little developed, and supporting its base only; the uppermost or hindmost peak triangular and acute at tip, reaching beyond the base of the ears between the two, and divided by a mesial septum, but little overlapped at the base by a second small transverse lamina which occurs also in most of the other species, and is placed beyond and above the vertical membrane which supports the inner or anterior nose-leaf. This fine species was procured by Capt. Tickell in the neighbourhood of Chyebassa, in Central India.

2. *Rh. perniger*, Hodgson, Journ. As. Soc. xii. 414*.—Distinguished by its large size, and delicately soft and long, curly blackish fur, having a slight ashy cast from the hairs being thus tipped. A fine specimen which I saw in Dr. Griffith's possession, from Cherra-Poonjee (Sylhet), and which has since been forwarded by him to the museum of the Honourable Company in London, measured five inches from muzzle to extremity of foot. The only example now before me is too much injured about the head to permit of a description being taken of the peculiarities of its facial membranes; and Mr. Hodgson's account, excepting as regards size and colouring, applies, for the most part, to the species generally of the present subgroup. The length of the fore-arm in the latter specimen (which was presented to the Society by Mr. Hodgson) is two inches and three-quarters, and of tibia an inch and three-eighths. Inhabits the central region of the sub-Himalayas.

3. *Rh. tragatus*†, Hodgson, Journ. As. Soc. iv. 699.—This species was so named in reference to the development of its anti-helix, as compared with the very slight indication of one traceable in *Hipposideros armiger* (v. *nobilis*?); but the appellation is far from being felicitous, as the anti-helix (not tragus, as indeed was duly pointed out by Mr. Hodgson) is less developed than is usual in the present subgroup. Mr. Hodgson described this bat to be "uniform deep brown, with the tips paler and rusty;" but two of three specimens sent by him are certainly of a light brown, and one of them more particularly has the upper parts tipped with dull maroon, which produces a general shade of this colour, as in several other species both of *Rhinolophus* and *Hipposideros*. The central nose-leaf is small and narrow, and a little expanded at the summit; the nasal orifices are fringed externally with a lappet of membrane; and the uppermost peak of the membrane above the nose-leaf is inconspicuous, being almost concealed by the fur of the forehead. Length of fore-arm two inches and a quarter, and of tibia an inch and one-sixteenth. Inhabits the central region of Nepal.

* Probably the *Rh. luctus*, Tem., of which I can get at no description though Mr. Gray alludes to it as stated to be black with an ashy tinge; vide 'Annals and Magazine of Natural History,' vol. x. p. 257, where Mr. Gray describes a *Rh. Morio* from Malacca, Singapore. "The front central lobe of the nose-leaf large, three-lobed; fur reddish brown. Very like *Rh. luctus* in general appearance, and perhaps the colour may have changed by the specimen having been taken from spirits." Why therefore impose a new name, or at any rate why not put a mark of doubt after the word *Morio*, and add *Rh. luctus*, Tem. var.? Most probably this is the *Rh. luctus*, Tem. var. *rufus*, from Manilla, of MM. Eydoux and Gervais, in the Zoology of the Voyage of La Favorite, *Rh. luctus* is described from Java.

† Misprinted *torquatus* in Mr. Gray's "Revision."

4. *Rh. macrotis,* Hodgson, MS.—This and the two succeeding species are of small size, and one of them may perhaps be the doubtfully cited *Rh. pusillus* of Mr. Waterhouse. In that now under consideration, the anterior nose-leaf approaches in form to that of *Rh. tragatus,* but is proportionally larger and wider, nearly twice as long as broad, and rounded without expanding at the summit, which is scarcely so high as the pointed tip of the posterior vertical membrane that connects the nose-leaf with the face; behind or above this again are three successive lappets of membrane, the first of them incomplete, and the last or hindmost peak is obtusely pointed: the nasal orifices are oblong, or rather kidney-shaped, with no lappet of membrane bordering their outer side, but the usual horse-shoe-shaped development overhangs the upper lip. Mr. Hodgson describes the species as follows:—" General structure typical? No pubic teats. Distinguished by the large size of the ears, which are longer than the head, broad, oval, with pointed recurved tips, and large obtusely-rounded second ears [anti-helix]. Colour sooty brown, much paler and dusky hoary below*. Snout to base of tail an inch and three-quarters; head three-quarters of an inch: ears from anteal base fifteen-sixteenths of an inch; interval of ears a quarter of an inch; tail three-quarters of an inch, completely enveloped in the square membrane: arm an inch; fore-arm an inch and a half; longest or second finger two inches and five-sixteenths: femur eleven-sixteenths; tibia the same; expanse nine and three-quarters; weight one-third of an ounce. Habitat Nepal." The following are the dimensions of one of the specimens presented to the Society by Mr. Hodgson: from muzzle to base of tail an inch and five-eighths, the tail exceeding five-eighths; ears anteally five-eighths; fore-arm an inch and five-eighths; longest finger two inches and a quarter; tibia exceeding five-eighths of an inch; and foot with claws three-eighths.

5. *Rh. subbadius,* Hodgson, MS.; mentioned as *Vespertilio subbadius,* H., in Journ. As. Soc. x. 908.—In this species, the anterior nose-leaf is very small, oblong, and rounded above, but the vertical membrane behind it is conspicuously developed, and pointed posteriorly; behind this again is a short and broad transverse membrane, divided into two lateral lobes, and as usual some long straight hairs grow from this part; and lastly, there is the hindmost angular peak, the sides of which are slightly emarginated towards the point: the nostrils are not externally fringed with membrane; and over the lip is the usual horse-shoe. Mr.

* This description does not apply, however, to the specimens with which Mr. Hodgson has favoured the Society, and which are of a light earthy olive-brown (one of them verging on isabelline), and paler below.

Hodgson thus describes the species:—"No pubic teats. Ears no longer than head, truncated at tip, [or rather, they are somewhat obtusely pointed,] ovoid. Nasal appendage quadrate, not salient, with a transverse bar nearly surmounting it towards the head. Colour a medial clear brown, paler below, and especially on the head and face. Snout to vent an inch and a half; tail an inch and a quarter; head five-eighths of an inch; ears the same; expanse seven and a half: fore-arm an inch and a quarter; longest finger two and a quarter; the foot and nails three-eighths of an inch. Habitat Nepal." The admeasurements of a specimen presented by Mr. Hodgson are—muzzle to vent an inch and a quarter; tail five-eighths of an inch; head the same; ears anteally half an inch; fore-arm an inch and three-eighths; longest finger one and seven-eighths; tibia nearly five-eighths of an inch; foot and nails five-sixteenths of an inch. Inhabits Nepal.

6. *Rh. lepidus*, nobis.—A good deal allied to the last, but distinguished by its much paler colour, longer fore-arm, and especially by the uppermost and hindmost peak of the facial membranes being much less evenly angular, having its sides so considerably emarginated towards the tip, that the latter appears as a narrow terminal prolongation, one-sixteenth of an inch in length; the vertical membrane posterior to and adjoining the anterior nose-leaf is also still more developed and obtusely angulated behind; and there is a slight fold of membrane exterior to the nostrils. Ears large, and of the usual form, measuring nearly five-eighths of an inch from anteal base to tip, and having a well-developed anti-helix. General hue pale isabella-brown, the fur of the upper parts tinged with dull maroon towards the tips, imparting a shade of that colour; under-parts still lighter, and the fur shorter: membranes apparently dark. Length an inch and three-quarters; of tail half an inch more; and extent about nine inches: fore-arm an inch and five-eighths; longest finger two and a quarter; and tibia above five-eighths of an inch. The specimen (in spirits), and an injured skin of apparently the same species, were both probably obtained in the vicinity of Calcutta.

Hipposideros, Gray.—This seems a perfectly distinct group, characterized by a totally different form of facial crest from that observable in the preceding series. The general form of this is quadrate, surmounted by a short and broad transverse membrane recurved along the edge, and over this in the males (I suspect always) is a round sinus or cavity with a transverse semicircular opening. "This cavity," remarks Mr. Elliot, "the animal can turn out at pleasure, like the finger of a glove; it is lined with a pencil of stiff hairs, and secretes a yellow substance like wax. When alarmed, the animal opens this cavity and blows it out, during which it is protruded and withdrawn at each breathing.

Temminck notices it under the name of a siphon, or purse, in *Rh. insignis* and *Rh. speoris*" (apud Geoffroy)*. The entire facial crest has been well compared by Mr. Hodgson to "a coat of arms with double field"; the superior and inferior fields separated by a trilobate fleshy ridge, below which are situate the nostrils in a deep cavity, surrounded by the membrane which forms the lower field, both within and exterior to which are, in some species, additional laminæ of membrane. The ears in this group are, in general, less apiculated, and sometimes rounded, and the conch is not continued round to form an anti-helix.

Some have a more complex membrane surrounding the nostrils, and three small lateral fringes of membrane exterior to the nose-leaf.

1. *H. armiger* (Hodgson), Journ. A. S. iv. 699.—Very closely allied to, if not identical with, *H. nobilis* (Horsfield). I cannot however perceive that "the hairs of the axilla, hypochondria, and scapular marks are nearly white," as stated of the Javanese species. Colour uniform light brown, with dark maroon tips to the fur of the upper parts. Length of fore-arm (of a large specimen) three inches and five-eighths, and of tibia an inch and a half. Inhabits the central region of Nepal.

2. *H. larvatus* (? Horsfield).—A species which I have little hesitation in identifying with this, has the fur of a brighter ferruginous than is represented in Dr. Horsfield's two figures, and the under-parts more particularly are much deeper-coloured than would appear from the second figure of the plate adverted to. The fur of the upper-parts is vivid fulvous, more or less tinged with maroon upon the back, and weaker towards the base of the hairs; that of the under-parts being somewhat less intense: membranes dusky, but it would seem tinged with the prevalent hue of the fur. Length about four inches, of which the tail measures one and a quarter; fore-arm two inches and a half; longest finger three and a quarter; tibia an inch and one-sixteenth; foot with claws five-eighths of an inch: ears angulated, measuring anteally seven-eighths of an inch to tip, and three-quarters of an inch broad; length of head an inch. Both in this species and the last there is a minute false molar anterior to the carnassier in the upper jaw, which appears to be wanting in those which follow. Inhabits Arracan, whence forwarded to the Society's museum by Capt. Phayre, to whom we are likewise indebted for the next species.

3. *H. vulgaris* (? Horsfield); a species mentioned by Mr.

* It is probable that the development of this sinus, and also of the throat-sac of the *Taphozoi*, depends much on season, like the infra-orbital cavities of various Ruminants and analogous glandulous follicles in many other animals.

Gray as inhabiting India. It differs from the last in being rather smaller, and of a brown colour above, much paler at the base of the hairs and at their extreme tips, and lighter-coloured below: the ears more apiculated, or rather they appear so from being strongly emarginated externally towards the tip; the tail and interfemoral membrane would likewise seem to be shorter, but the latter has been withdrawn from the skin in the dry specimen before me, which, as before mentioned, was received from Arracan. Length of fore-arm two inches and a quarter, and of tibia an inch; ears anteally three-quarters of an inch, and nearly as much broad.

4. *H. speoris*: *Vesp. speoris*, Schneider, but evidently not of M. Desmarest, which is *Rh. marsupialis* of M. Geoffroy's lectures, founded on the *Rhinolophe cruménifère* of Lesson and Lesueur: *Rh. dukhunensis*, Sykes, P. Z. S. 1831, p. 99: *H. apiculatus*, Gray, the male, and *H. penicillatus*, Gray, the female, Mag. Zool. and Bot. No. 12. For description, vide Elliot in Madras Journal, No. 24. p. 98. Colour nearly as in *H. armiger* (v. *nobilis* ?): length of fore-arm two inches, and of tibia an inch. Inhabits Southern India.

This species is approximated to *H. insignis* (Horsf.) in Mr. Gray's paper, and it may be the doubtfully cited *H. insignis* from Ceylon of Mr. Waterhouse's 'Catalogue of the Mammalia in the Zoological Society's Museum.'

Others have the facial crests altogether less complicated, and no fringes of membrane exterior to the nose-leaf.

5. *H. fulvus*, Gray, Mag. Zool. and Bot. No. 12; *Rh. fulgens*, Elliot, Madras Journal, No. 24. p. 99.—This is perhaps the most vividly coloured of the whole class of Mammalia; at least I know of no species which can at all compete with it for brilliancy of hue. The colour of the fur is here alluded to, for that of the naked skin of the mandrill and of certain *Cercopitheci* can scarcely be surpassed. The general tint of the fur is splendidly bright ferruginous, that of the upper parts being slightly tipped with a darker shade; membranes dusky. Length, according to Mr. Elliot, an inch and nine-tenths; of tail nine-tenths of an inch; expanse ten inches and a half; weight 4 dr. 20 gr.: fore-arm an inch and five-eighths; longest finger one and a half; tibia three-quarters of an inch; foot (minus claws) a quarter of an inch; ears anteally eleven-sixteenths of an inch, and the same across; their form scarcely apiculated. Inhabits Southern India, where very rare.

6. *H. murinus*, Gray, ibid.; *Rh. murinus*, Elliot, ibid.—This I have not yet seen, but shortly expect some specimens from Mr. Jerdon, who informs me that it is common at Nellore. It closely resembles the last in all but colour, but has the crest-membranes

still less developed. Colour dusky brown, paler beneath. Inhabits Southern India.

Taphozous.—Three new species of this genus have been described by me in Journ. A. S. x. 971 *et seq.*; and in xi. 784, I verified and gave a more detailed notice of the *T. longimanus*, Hardw., Linn. Trans. xiv. 525, and distinguished the species which I had previously referred with doubt to *T. longimanus*, by the appellation *T. Cantori*. This last-mentioned bat I have not again obtained in the neighbourhood of Calcutta, but have received a specimen from Mr. Jerdon, procured in the vicinity of Nellore (on the Coromandel coast), where it would appear to be not uncommon. This species is easily recognised by its flatly out-lying ears, recurved tail, little-developed gular sac, and by the whiteness of the base of its fur, which shows conspicuously.

Another species from Southern India is my *T. brevicaudus*, which is at once distinguished from all the other known species by the shortness of its tail and interfemoral membrane. The specimen was from Travancore.

Since my description of *T. longimanus* was published, I have had several fresh specimens, and very recently obtained thirteen alive (of which two only were males) from the interval between a pillar and the wall against which it was placed. Five others escaped. These bats clung with perfect facility to the smooth mahogany back of a cage into which they were put, hitching their claws in the minute pores of the wood, and creeping upon it in a manner that was surprising. The females were each about to give birth to a single offspring (early in August). Their size was remarkably uniform, both sexes measuring four inches and a quarter from snout to tail-tip, by sixteen and a quarter in alar expanse; the tail protruding half an inch; nostril not closed, but having a valvular kidney-shaped orifice, and tremulous, as observable in various other bats (for instance, the *Cynopterus marginatus*). The variation in colour was not great, nor had it any relation to sex; but one or two were more hoary-tipped, imparting an ashy appearance, and one only was marked with yellowish or fulvescent.

I have also procured in this vicinity specimens of my *T. fulvidus*, and supply the following description of a recent male that was shot early one morning, in bright daylight, creeping upon the stem of a palm. Length, to end of tail, four inches, the membrane extending three-quarters of an inch further; tail seven-eighths of an inch, and (as usual) wholly retractile within the membrane; alar expanse fifteen inches; length of fore-arm two and three-eighths; tarse an inch; foot and claws half an inch. General colour slightly grizzled chestnut-brown, purer on head and neck; the abdominal region covered with shorter hair, weakly infuscated, and less tinged with chestnut; axillary part of the membrane, from between the elbow to the flank inclusive, covered with longer and whitish hairs. Face, ears and membrane washed with dusky; the portion of membrane between the hind-leg and proximate finger narrowly edged with whitish. One specimen purchased of a bazar shikarree is so much darker, that before I had obtained a good series of *T. longimanus,* I had some doubt whether it ought not to be referred to that species; and such an example may have been the original *longimanus* of Hardwicke, described as of a snuff-brown colour: but this name had better now remain as I have appropriated it. In general, the present species is of a tolerably bright chestnut hue. Like the preceding one (to which it is closely allied), the male has a very large throat-sac, the ears bend upwards, and the tail is straight and rigid, not recurved as in *T. Cantori,* and also as in the following species. The specimens which I formerly described had been long soaked in spirit, which seems to have discharged the colour from the face and membranes; and one of them which I have had taken out and stuffed, has the under-parts more uniformly coloured, the longer hair upon the membrane towards the axilla, and that of the abdomen, scarcely differing in hue from that of the breast; whereas in the recently procured examples here described, the difference of colour in these parts is very conspicuous.

T. crassus, nobis.—This is a well-marked species, having the recurved tail of *T. Cantori,* and ears bending upwards as in *longimanus* and *fulvidus.* It is particularly distinguished by its blackish colour, and the broad dull white margin of the membrane between the tibia and proximate finger; this margin increasing much in depth as it recedes from the finger-tip, and merging gradually into the black of the rest of the membrane, becoming at first mottled with the latter. Length to end of tail four inches, the membrane reaching five-eighths of an inch beyond; tail three-quarters of an inch, the terminal five-sixteenths protrusile and recurved; expanse fifteen inches and a half; fore-arm two and five-eighths; first phalanx of longest finger two and a half; tibia an inch; foot large, measuring with claws eleven-sixteenths of an inch; the sac little developed. Ears five-eighths of an inch apart at base anteriorly. Fur of the upper-parts black, or dark blackish brown, a little hoary at the tips, and light brown at the extreme base; under-parts inclining to ashy black, and more grizzled; membranes dusky, with the exception of the whitish margin described. On the particular specimen before me are some pure white dashes on one side of the back, being traces of partial albinism. The nostrils appear to be quite closed by a valve, which would open at the will of the animal. Taken at Mirzapore, and presented to the Society by Major R. Wroughton, to whom it is also indebted for examples of the *Rhinopoma*, and for numerous other interesting specimens.

T. pulcher, Elliot.—A species from Southern India, recently discovered by Mr. Elliot, who informs me that it is "black-brown above with white pencillings, and pure white below." That naturalist will give a more detailed description of it in the 'Madras Journal.'

Rhinopoma.—From descriptions with which I have been favoured, I had long felt satisfied that a bat of this genus inhabited the renowned *taj* at Agra, where great numbers of them would seem to exist; and there can be little doubt that the species is that marked *Rh. Hardwickii*, Gray, from India, in Mr. Waterhouse's catalogue of the stuffed specimens of mammalia in the Zoological Society's museum, and also that likewise referred to *Hardwickii* in Mr. Elliot's catalogue of the mammalia of the Southern Mahratta country, as being found in old ruins to the eastward of that province. But a specimen in the Society's collection received from England, and said to be African, differs in no respect that I can perceive, and comparing both with the figure of *Rh. microphylla* in the national French work on Egypt, the only difference arises from what I presume is an inaccuracy in that figure, viz. that the caudal vertebræ are not represented to be sufficiently elongated. Even on comparison of the skulls together, and with that figured by M. Geoffroy, I have been unable to detect any diversity worthy of notice. The following description is drawn up from specimens received from Agra and Mirzapore. Entire length (of a full-grown male) to end of the long slender tail, five inches and a half, the latter passing the membrane by two inches and a quarter; expanse twelve inches and a half; (length of a female five inches, by eleven inches in expanse;) fore-arm two inches and a quarter; longest finger two and three-quarters; tibia an inch and a quarter; foot with claws five-eighths of an inch; ears from base anteally seven-eighths of an inch, posteally half an inch, and width of the joined pair, from tip to tip, an inch and seven-sixteenths. Fur very fine and delicate; its general colour a soft dull brown, paler at base, where inclining towards albescent; the face, rump, and abdominal region naked, the skin of the rump corrugated, and together with the face and membranes dusky, having a tinge of plumbeous; the skin of the arms underneath, and of the belly and nates inferiorly, is transparent, the latter covering an enormous accumulation of fat, which above reaches over the loins and along the spine. Nostrils closed and valvular, forming obliquely transverse slits in the truncated muzzle; the claws conspicuously white.

Dysopes.—I know of but one Indian species of this genus, which is the *Vespertilio plicatus* of Buchanan Hamilton, Linn. Trans. v. 261; the *Nyctinomus bengalensis* of M. Geoffroy; and I am inclined to regard the *D. murinus* of Hardwicke's published drawings as no other, indifferently represented. I was favoured with a live specimen of this animal by Mr. Ridsdale, of Bishop's College Press, and lately obtained another which flew in at a window: Mr. Masters also has presented the Society with a stuffed one: all of these being much of a "snuff-brown" colour, the fur of the under-parts tipped paler: but there is an old specimen of what may perhaps be another species in the museum, the fur of which is remarkably close and velvety, and very dark fuliginous brown above, with a shade of maroon, the under-parts similar, but paler and somewhat reddish. So far as I can judge from the state of the specimen, it presents however no structural characters at variance with those of the other that can warrant its being distinguished as a species; but I yet suspect that it is a different species from the *plicatus**. The affinity of this genus for *Taphozous* is very apparent in the living or recent specimens, the present group having even the same peculiar mode of folding the wings, which is not the case even with *Rhinopoma*, wherein there is merely a tendency or inclination to that particular mode of duplicature of the wings.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

Dec. 10, 1844.—William Yarrell, Esq., Vice-President, in the Chair.

Descriptions of new species of *Mitra* and *Cardium*, by Lovell Reeve, Esq.:—

Cardium.

Cardium incarnatum. *Card. testâ gibboso-globosâ, longitudinaliter costatâ, costis quatuor et viginti, rotundis, complanatis, margines versus medio obsoletè brevispinosis, interstitiis angustis, subprofundis, transversim striatis; pallidè incarnatâ, radiis roseis transversis hic illic ornatâ.*

Conch. Icon., *Cardium*, pl. 1. f. 2.

Hab. Bay of Manila (found in sandy mud at the depth of six fathoms); Cuming.

A warm flesh-tinted shell, of which Mr. Cuming collected a few odd valves in the above-mentioned locality, and has lately received several perfect pairs.

Cardium mindanense. *Card. testâ subobliquè cordiformi, longitudinaliter costatâ, costis novem et viginti, squamiferis, squamis*

* It is probably the Malayan *D. tenuis*, v. *Nyctinomus tenuis*, Horsfield.

numerosis, confertis, posticè fornicatis, costarum interstitiis subprofundis; albidâ, fusco hic illic nebulosâ; intus posticè vividè purpurascente.

Conch. Icon., *Cardium*, pl. 4. f. 19.

Hab. Cagayan, island of Mindanao, Philippines (found among sand at low water); Cuming.

The vaulted structure of the scales in this species is about intermediate in its character between that of the scales of the *Cardia consors* and *isocardia.*

Cardium australiense. *Card. testâ transversè ovatâ, Donaciformi, medio subcontractâ, posticè flexuoso-angulatâ, subrostratâ, anticè compresso-attenuatâ; dimidio postico radiatim sulcato, antico lævigato, nitente; albidâ, areâ posticâ strigis brevibus fuscis utrinque ornatâ.*

Conch. Icon., *Cardium*, pl. 5. f. 24.

Hab. Port Lincoln, South Australia; Harvey.

This shell may be chiefly distinguished from the *Cardium Donaciforme,* to which it is in many respects allied, by the contracted flexuous prolongation of the posterior portion, and by the peculiarity of one half of the shell being conspicuously grooved, whilst the other half is smooth and shining.

Cardium oviputamen. *Card. testâ obliquè ovatâ, tenui, ventricosâ, radiatim tenuissimè striatâ; niveâ, opacâ, strigis lineisve rosaceo-fuscescentibus exilibus undatis concentricè nebulosâ, epidermide pallidâ margines versus indutâ; marginibus intus subtiliter crenulatis.*

Conch. Icon., *Cardium*, pl. 7. f. 36.

Hab. ——?

The general appearance of this and the following species is very like that of the *Cardium serratum*; both however are of a less oblique form, and the *Cardium oviputamen* under consideration is more ventricose.

The concentrically waved pinkish brown marks above noticed, though faintly indicated, are nevertheless characteristic, as distinguished from those of a different pattern, in the following species.

Cardium vitellinum. *Card. testâ obliquè ovatâ, tenuiculâ, radiatim striatâ; lutescente-albâ, maculis parvis numerosis rosaceo-fuscescentibus umbones versus copiosè lentiginosâ, epidermide luteâ indutâ; marginibus intus crenulatis.*

Conch. Icon., *Cardium*, pl. 7. f. 37.

Hab. ——?

This shell is of a less ventricose ovate structure than the preceding, and farther distinguished by its different tinge and style of colouring.

Cardium hystrix. *Card. testâ subquadrato-cordatâ, posticè concavo-angulatâ, radiatim costatâ, costis ad duas et triginta, angustis, compressis, posticis squamulis brevibus, cæteris spinis squamæformibus erectis, umbones versus subinflexis, elegantissimè ornatis; costarum interstitiis striis elevatis transversim subtiliter* *cancellatis; albidâ, costarum interstitiis pallidè rosaceis, lineâ vividè coccineâ utrinque pictis; intus purpureo-rufescente.*

Conch. Icon., *Cardium*, pl. 8. f. 40.

Var. *β. Testâ extus omninò niveâ.*

Hab. Island of Corrigidor, Philippines (found in coarse sand at the depth of about seven fathoms); Cuming.

The exquisite delicacy and beauty of this shell is remarkable; each rib is surmounted with a close-set row of slender scale-like spines, and the interstices are minutely cancellated; they are moreover tinged with pink, and down each side of the ribs is a bright scarlet line.

There is another very beautiful small specimen of the *Cardium hystrix* in the collection of Miss Saul; and Mr. Cuming is also in possession of two of the white variety.

Cardium rubicundum. *Card. testâ oblongo-ovatâ, vix obliquâ, radiatim costatâ, costis acutè convexis, septem et triginta, quarum anticâ squamoso-crenatâ, medianâ utrinque obtuso-squamatâ, posticâ tuberculatâ; rubicundâ, umbones versus albicante rubido-fusco maculatâ; marginibus intus vividè rubris.*

Conch. Icon., *Cardium*, pl. 9. f. 44.

Hab. Zanzibar, east coast of Africa.

An extremely pretty species, remarkable for its vivid colouring and for the elaborate character of its sculpture.

Cardium assimile. *Card. testâ oblongo-ovatâ, obliquè radiatim costatâ, costis quinque et triginta, basi latis, approximatis, summitatem versus attenuatis, anticis crenatis, postremis tuberculatis, medianis lævibus, lateraliter subtilissimè impresso-serratis; pallidè purpureo-rufescente, umbones versus albicante, maculis sparsis variegatâ.*

Conch. Icon., *Cardium*, pl. 9. f. 45.

Hab. Zanzibar, east coast of Africa.

This species approximates very closely to the *Cardium subelongatum*, yet there are differences which cannot be overlooked; it has a greater number of ribs and the ribs are of another structure.

Mitra.

Mitra Norrisii. *Mitr. testâ elongato-ovatâ, crassâ, solidâ, spirâ subobtuso-acuminatâ; striis transversis et longitudinalibus, elevatis, confertis, undique subtilissimè reticulatâ aut clathratâ, transversis prominentioribus; eburneâ, epidermide corneâ, tenui, nigerrimâ; columellâ sexplicatâ.*

Conch. Icon., *Mitra*, pl. 1. f. 6.

Hab. —— ?

I have much pleasure in dedicating this fine species, so entirely distinct from any hitherto described, to Thomas Norris, Esq., a worthy and esteemed patron of the natural sciences, whose magnificent collection of Mitres has so greatly contributed to the completeness of my monograph in the work above referred to. It is impossible to convey an adequate idea of the finely reticulated sculpture of this unique shell by a lithographed figure, it being so fine that the interstices of the net-work resemble minute punctures.

Mitra Dennisoni. *Mitr. testâ fusiformi, spirâ attenuato-acuminatâ, anfractibus subconcentricè costatis, transversim sulcatis, sulcis angustis, costas super plus minusve obsoletis; rubido-aurantiâ, zonâ unicâ albidâ cingulatâ, cærulescente-olivaceo inter costas peculiariter tinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 3. f. 14.

Hab. Puteao, province of Albay, island of Luzon, Philippines (found on mud-banks at low water); Cuming.

I dedicate this fine species with much pleasure, at the particular request of Mr. Cuming, to J. Dennison, Esq., a gentleman who has acquired considerable fame in the conchological world on account of the very choice and select character of his collection of shells.

Mitra floccata. *Mitr. testâ elongato-ovatâ, crassiusculâ, lævigatâ, punctorum seriebus undique cinctâ; lutescente-spadiceâ, albo longitudinaliter floccatâ; columellâ quadriplicatâ, labro prope basin crenato.*

Conch. Icon., *Mitra*, pl. 3. f. 16.

Hab. —— ?

The specimen here figured, from the collection of Mr. Cuming, is the only one of the species I am acquainted with.

Mitra solida. *Mitr. testâ ovato-elongatâ, crassâ, solidâ, spirâ subturritâ; anfractibus numerosis, convexis, lævigatis, transversim sulcatis, sulcis angustis, striis subtilissimis prope suturas decussatis; spadiceo-fulvâ, albo sparsim et irregulariter floccatâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 3. f. 18.

Hab. —— ?

This interesting species may be recognized by its many convex, deep-sutured whorls; and the whorls, being longitudinally striated near the sutures, exhibit a slight cancellated appearance.

Mitra inquinata. *Mitr. testâ fusiformi-oblongâ, subangustâ, spirâ acuminatâ, transversim impresso-striatâ, striis puncturatis; eburneâ, rubido-fusco longitudinaliter inquinatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 5. f. 29.

Hab. —— ?

Though a species of very simple character, it is quite distinct from any hitherto described.

Mitra gracilis. *Mitr. testâ elongatâ, spirâ valdè productâ, suturis subprofundis; anfractibus transversim subtilissimè costatis, costis angustis irregularibus, interstitiis liris obtusis minutissimis pulcherrimè decussatis; albidâ, fuscescente pallidè fasciatâ, costis fusco articulatis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 5. f. 31.

Hab. Island of Ticao, Philippines (found in sandy mud at the depth of six fathoms); Cuming.

A most delicately sculptured shell, with somewhat the character of the *Mitra granatina* about it.

Mitra declivis. *Mitr. testâ elongato-turritâ, basi truncatâ, spirâ acuminatâ; anfractibus supernè angulato-declivibus, lævibus, transversim exilissimè impressis; cinereo-carneâ, epidermide nigerrimâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 6. f. 44.

Hab. —— ?

This shell appears to be quite distinct from the *Mitra glabra*; there is no appearance of transverse brown lines, the whorls are angularly bent next the suture, and the spire is more sharply acuminated.

Mitra coccinea. *Mitr. testâ elongato-fusiformi, spirâ acuminatâ; anfractibus longitudinaliter obtuso-costatis, interstitiis transversim elevato-striatis, anfractûs ultimi costis subevanidis; vividè coccineâ aut lutescente, balteo unico albo cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 7. f. 49.

Hab. Islands of Masbate and Luzon, Philippines (found on the reefs at low water); Cuming.

This species may be easily recognized by its peculiarity of colouring,—bright scarlet, encircled by a simple white belt.

Mitra tumida. *Mitr. testâ abbreviato-fusiformi, spirâ brevi, apice acuto; anfractibus tumidis, supernè plano-angulatis, longitudinaliter rudè costatis, costis ad angulum noduloso-tumidis; albidâ aut virescente, anfractibus ad angulum rufo tinctis, ultimo balteo nigro latiusculo cingulato; columellâ tri- aut quadriplicatâ; aperturæ fauce nigricante-fuscâ.*

Conch. Icon., *Mitra*, pl. 8. f. 51.

Hab. New Holland.

A few specimens of this peculiarly swollen shell were lately brought from New Holland in H.M.S. *Beagle*.

Mitra rupicola. *Mitr. testâ abbreviato-fusiformi, in medio obesiusculâ, spirâ attenuatâ; anfractibus supernè angulatis, costis latiusculis obtusis longitudinalibus et transversis decussatis, ad decussationem nodosis; carneâ, epidermide fuscâ, corneâ, crassâ, ad apicem erosâ, indutâ; columellâ triplicatâ.*

Conch. Icon., *Mitra*, pl. 8. f. 53.

Hab. St. Elena, West Columbia (dredged from a rocky bottom at the depth of fourteen fathoms); Cuming.

A new and very distinct species, at present unique in the collection of Mr. Cuming.

Mitra balteolata. *Mitr. testâ fusiformi, spirâ acuminato-turritâ; anfractibus transversim elevato-striatis, longitudinaliter costatis, costis confertis, anfractûs ultimi subevanidis; balteolis nigris duobus in medio cingulatis, supra cinereo-albidâ, lineâ unicâ fuscâ circum-ornatâ, infra aurantiâ, interdum cinereo-viridescente tinctâ, apice fusco; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 8. f. 54.

Hab. Mollucca and Philippine Islands (found at the islands of Zebu and Burias, under stones at low water); Cuming.

Allied to the *Mitra plicata.*

Mitra chalybeia. *Mitr. testâ elongato-ovatâ, basin versus sulcatâ; anfractibus convexis, lævigatis, juxta suturas rudè subtilissimè crenulatis; cinereo-cærulescente alboque longitudinaliter strigatâ, transversim indistinctè fasciatâ, lineis rubido-fuscis æquidistantibus undique cingulatâ; columellâ rufo-aurantiâ, quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 9. f. 59.

Hab. —— ?

A new and very characteristic species, at present unique in the collection of H. Cumiñg, Esq.

Mitra fulgurita. *Mitr. testâ cylindraceo-elongatâ, subangustâ, transversim impresso-striatâ, striis puncturatis; pallidè spadiceo-fulvâ, strigis angustis albis longitudinalibus ornatâ; columellâ quinqueplicatâ, subumbilicatâ.*

Conch. Icon., *Mitra*, pl. 9. f. 61.

Hab. —— ?

An interesting new species, marked with white lightning-like longitudinal streaks.

Mitra lignaria. *Mitr. testâ oblongo-ovatâ, crassiusculâ, spirâ acuminato-productâ; anfractibus supernè depressis, longitudinaliter subobliquè obtuso-costatis, transversim subtiliter liratis, liris binis; rubido-aurantiâ, epidermide fuscâ indutâ; columellâ quadriplicatâ; aperturâ breviusculâ.*

Conch. Icon., *Mitra*, pl. 9. f. 64.

Hab. St. Elena, West Columbia (dredged from rocky ground at the depth of about fourteen fathoms); Cuming.

This shell has somewhat the character of the *Mitra rupicola* found in the same locality; the spire is however longer, the aperture consequently shorter, and the sculpture is of a different character.

Mitra lacunosa. *Mitr. testâ oblongo-ovatâ, spirâ breviusculâ, transversim sulcatâ, sulcis confertis, regularibus, profundè puncturatis; longitudinaliter lacunosâ, lacunis subconcentricè undatis; albicante, aurantio-fuscescente prope apicem maculatâ, anfractu ultimo fasciâ latiusculâ aurantio-fuscescente cingulato; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 10. f. 65.

Hab. —— ?

This species is characterized, independently of its peculiar style of colouring, by numerous longitudinal waved grooves or gutters having the appearance of sea-breaks.

Mitra pellis-serpentis. *Mitr. testâ oblongo-ovatâ, crassâ, solidâ, spirâ subacuminatâ, liris plano-granulatis transversis et longitudinalibus subtilissimè decussatâ; intus extusque lutescente; columellâ quadriplicatâ; labro supernè contracto, intus striato-crenulato.*

Conch. Icon., *Mitra*, pl. 10. f. 66.

Hab. Islands of Mindoro and Bohol, Philippines (found under stones at low water); Cuming.

The granular coriaceous sculpture of this shell varies considerably in different individuals.

MITRA CUMINGII. *Mitr. testâ ovatâ, utrinque attenuatâ, spirâ acuminato-turritâ; anfractibus supernè angulatis, longitudinaliter costatis, costis numerosis, ad angulum mucronatis, liris transversis angustis cancellatis, interstitiis impressis; aurantio alboque peculiariter maculato-variegatâ, maculis aurantiis nigro-lineatis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 10. f. 67.

Hab. Matnog, province of Albay, island of Luzon (found on the reefs); Cuming.

I dedicate this species to H. Cuming, Esq., as being one of the most beautiful and characteristic of the many interesting new Mitres collected by that indefatigable naturalist during his researches amongst the Philippine Islands.

MITRA RUBIGINOSA. *Mitr. testâ elongato-ovatâ, subfusiformi, transversim crebrisulcatâ, sulcis puncturatis; albâ, rubiginoso-tinctâ; columellâ quinqueplicatâ, plicis infimis subobscuris.*

Conch. Icon., *Mitra*, pl. 10. f. 68.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

The iron-mould spots on this shell exhibit rather a tessellated style of arrangement.

MITRA INTERLIRATA. *Mitr. testâ subelongatâ, spirâ acutâ, transversim liratâ, liris numerosis, acutiusculis, lirâ minore intercurrente, interstitiis striis longitudinalibus elevatis cancellatis; albâ, maculis perpaucis distantibus aurantio-fuscescentibus tinctâ; columellâ subumbilicatâ, quinqueplicatâ, plicis infimis subobscuris; basi leviter ascendente; aperturâ longiusculâ.*

Conch. Icon., *Mitra*, pl. 10. f. 70.

Hab. Island of Masbate, Philippines (found in sandy mud at the depth of four fathoms); Cuming.

The narrow intermediate ridge forms a prominent feature in this species.

MITRA ZEBUENSIS. *Mitr. testâ subfusiformi, nitidâ, basin versus sulcatâ, liris planiusculis, confertis, subtilissimè cancellatâ, liris longitudinalibus fortioribus; albidâ, anfractuum parte superiori maculis grandibus perpaucis castaneo-fuscis ornatâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 10. f. 73.

Hab. Island of Zebu, Philippines (found on the reefs at low water); Cuming.

The brown spots being situated around the upper part of the whorls give an irregular tessellated character to the spire.

MITRA INFECTA. *Mitr. testâ ovatâ, basi recurvâ, spirâ acuminatâ; anfractibus striis impressis cinctis, ultimo tumidiusculo; pallidè flavâ, maculis castaneo-fuscis pictâ; columellâ obsoletè sexplicatâ.*

Conch. Icon., *Mitra*, pl. 11. f. 75.

Hab. Island of Annaa, Pacific Ocean (found on the reefs at low water); Cuming.

A solid, rather ventricose shell, with a peculiar twist at the base.

Mitra acupicta. *Mitr. testá acuminato-turritá, anfractibus convexis, numerosis, longitudinaliter crebriliratis, transversim impresso-striatis; albidá, apice basique rosaceis, liris punctis cæruleis et fuscis profusè variegatis; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 11. f. 76.

Hab. Žanzibar, east coast of Africa.

The surface of this beautiful shell has the appearance of being curiously embroidered with small coloured beads.

Mitra obesa. *Mitr. testá abbreviato-ovatá, solidá, supernè valdè obesá, spirá brevissimá, sulcis spiralibus et radiantibus decussatim impressá; anfractu ultimo basin versus sulcato, supra lævigato; albá, lineis rubido-fuscis remotiusculis cingulatá, epidermide vividè viridescente omninò indutá; columellá sexplicatá.*

Conch. Icon., *Mitra*, pl. 12. f. 87.

Hab. —— ?

I have no information concerning the locality of this extremely interesting species, of which there is an example in the collection of Thomas Norris, Esq.

Mitra ustulata. *Mitr. testá elongatá, spirá angusto-acuminatá, transversim subtilissimè striatá; albidá, lineis capillaribus fuscescentibus remotiusculis cingulatá, maculis grandibus ustulato-fuscis nebulosá; columellá sexplicatá.*

Conch. Icon., *Mitra*, pl. 13. f. 89.

Hab. —— ?

This species is at present unique in the collection of Thomas Norris, Esq.

Mitra crebrilirata. *Mitr. testá acuminato-turritá, longitudinaliter subobliquè liratá, liris angustis, crebris, interstitiis impresso-cancellatis; olivaceá vel olivaceo-fuscá, lineá unicá pallidá infra suturas plerumque cinctá; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 13. f. 92.

Mitra rosea, Kiener (not of Duclos).

Hab. Ceylon.

Figured by M. Kiener for the *Mitra rosea* of Duclos, which is the *Voluta ignea*, Wood, *Mitra subulata*, Lamarck.

Mitra polita. *Mitr. testá acuminato-turritá, lævigatá, politá, ad basin sulcatá, prope apicem subtilissimè plicato-costatá; fuscá vel cinereo-fuscá, lineá unicá pallidè flavicante cingulatá; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 13. f. 94.

Hab. Islands of Zebu and Luzon, Philippines (found in mud on the shore at low water, and at the depth of six or seven fathoms); Cuming.

At the desire of one or two gentlemen whose opinions in conchological matters cannot be lightly esteemed, I have described the *Mitræ polita* and *crebrilirata* as new and distinct species; it must be admitted, however, that I have felt strongly inclined to regard the former as the Eastern analogue of the *Mitra ebenus, smooth variety,* of the Mediterranean, and the latter as the analogue of the *Mitra ebenus, ribbed variety,* of the same region.

Mitra variabilis. *Mitr. testâ oblongo-ovatâ, medio subobesâ, lævigatâ, transversim subtilissimè punctato-striatâ; lutescente-olivaceâ, lineis fuscis capillaribus remotiusculis cinctâ, anfractu ultimo zonâ unicâ cærulescente-albâ medio ornato; columellâ quadriplicatâ; aperturæ fauce olivaceo-fuscâ.*

Conch. Icon., *Mitra*, pl. 13. f. 95.

Hab. Torres Strait (found under stones at low water); Dring.

The variable character of this species consists in its being sometimes flaked or indistinctly streaked with bluish white.

Mitra cylindracea. *Mitr. testâ cylindraceo-ovatâ, utrinque attenuatâ, sulcis capillaribus puncturatis, supernè remotiusculis, cingulatâ; lutescente-olivaceâ, maculis albis irregularibus infra suturas ornatâ, anfractu ultimo in medio maculato-fasciato; columellâ quadriplicatâ; aperturæ fauce fuscescente.*

Conch. Icon., *Mitra*, pl. 13. f. 97.

Hab. —— ?

The painting of this shell is not much unlike that of the *Mitra variabilis.*

Mitra pullata. *Mitr. testâ fusiformi, spirâ acuminato-turritâ; anfractibus supernè subangulatis, transversim impresso-striatis, longitudinaliter plicato-costatis, costis supernè obtuso-mucronatis; aurantio-lutescente, lineâ subtilissimâ fuscâ cingulatâ, anfractu ultimo fasciâ latâ nigricante-fuscâ ornatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 14. f. 102.

Hab. Island of Ticao, Philippines (found on the reefs); Cuming.

The *Mitra pullata* is exactly intermediate between the *Mitræ balteolata* and *plicata*, differing sufficiently from both to constitute a distinct species.

Mitra oleacea. *Mitr. testâ oblongo-ovatâ, Bucciniformi, spirâ brevi; anfractibus convexis, lævigatis, epidermide corneâ olivaceo-fuscâ nitidâ indutâ; columellâ quadriplicatâ, basi truncatâ; labro in medio leviter contracto.*

Conch. Icon., *Mitra*, pl. 14. f. 105.

Hab. —— ?

There is a peculiarity in the form of this species which distinguishes it from any other of the Melania-like group.

Mitra obeliscus. *Mitr. testâ acuminato-turritâ, spirâ acutâ; anfractibus longitudinaliter costatis, costis angustis, crebris, interstitiis impresso-cancellatis; lutescente-fuscâ, lineâ unicâ albâ cingulatâ; columellâ quadriplicatâ, basi contorto-recurvâ.*

Conch. Icon., *Mitra*, pl. 15. f. 107.

Hab. Bais, island of Negros, Philippines (found among coarse sand and stones at the depth of seven fathoms); Cuming.

The whorls are numerous in this species and rather contiguous.

Mitra funerea. *Mitr. testâ abbreviato-fusiformi, spirâ acutâ; anfractibus rotundis, liris transversis et longitudinalibus creberrimè decussatis, anfractu ultimo lævigato, ad basin sulcato; fuscâ, balteo unico angusto flavicante cingulato; columellâ triplicatâ, basi recurvâ.*

Conch. Icon., *Mitra*, pl. 15. f. 108.

Hab. Pasacao, South Camarinos, island of Luzon, Philippines (found in sandy mud at the depth of six fathoms); Cuming.

The whorls of the spire have a peculiar rounded decussated appearance, with the yellow belt just falling in the sutural depression.

Mitra variegata. *Mitr. testâ suboblongo-ovatâ, transversim regulariter sulcatâ, anfractuum limbo superiori subobsoletè crenulato; albidâ, olivaceo-spadiceo nebulatâ et variegatâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 15. f. 111.

Hab. Islands of Ticao and Mindanao, Philippines (found on the reefs at low water); Cuming.

The whorls of this shell are very slightly angulated, and the clouded variegated painting only appears below the angle.

Mitra cærulea. *Mitr. testâ subfusiformi-oblongâ, transversim regulariter sulcatâ, sulcis angustis, puncturatis; cærulescente-albicante, anfractu ultimo, fasciâ latissimâ cæruleâ, marginibus albimaculatis, cincto; basi et aperturæ fauce aurantio-fuscescentibus; columellâ quinqueplicatâ, umbilicatâ.*

Conch. Icon., *Mitra*, pl. 15. f. 113.

Hab. Islands of Ticao and Capul, Philippines (found on the reefs at low water); Cuming.

The white flake-like spots which appear on the upper edge of the blue band of the last whorl are just visible on the whorls of the spire above the sutures.

Mitra fulgetrum. *Mitr. testâ subfusiformi, solidiusculâ; anfractibus supernè leviter angulatis, transversim impresso-sulcatis, sulcis angustis, subtilissimè puncturatis; rubido-castaneâ, strigis albis prominentibus undatis longitudinaliter ornatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 15. f. 115.

Hab. Island of Burias, Philippines (found under stones at low water); Cuming.

The white longitudinal waved streaks are very strikingly depicted.

Mitra pretiosa. *Mitr. testâ fusiformi, spirâ acuminato-turritâ, transversim subtiliter costatâ, longitudinaliter confertim impresso-sulcatâ; suturis subprofundis; albidâ, rubido-fusco balteatâ et punctatâ.*

Conch. Icon., *Mitra*, pl. 15. f. 116.

Hab. —— ?

In painting this shell reminds one of the *Mitra crenifera*; the sculpture is however of a quite different pattern.

MITRA GRUNERI. *Mitr. testâ abbreviato-fusiformi, subharpæformi, spirâ brevi, turritâ, acutâ; longitudinaliter acutè costatâ, costis supernè mucronato-tuberculatis, anfractuum parte superiori plano-angulatâ; olivaceo-viridescente, lineis tribus rubido-fuscis subdistantibus inter costas seriatim pictâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 16. f. 119.

Hab. Island of Masbate, Philippines (found on the reefs at low water); Cuming.

It is somewhat a matter of surprise that this very characteristic species, which is not uncommon, has never been described. I dedicate it with much pleasure to E. L. G. Gruner, Esq., of Bremen.

MITRA CALIGINOSA. *Mitr. testâ ovato-fusiformi, solidiusculâ, spirâ breviusculâ; anfractibus convexis, lævigatis, transversim impresso-striatis; albâ, epidermide corneâ nigricante undique indutâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 16. f. 121.

Hab. —— ?

I have no locality for this species, which is a rather solid white shell, closely enveloped by a dark blackish epidermis.

MITRA FUNICULATA. *Mitr. testâ abbreviato-fusiformi, spirâ breviusculâ; anfractibus supernè subangulatis, liris angustis elevatis subdistantibus undique funiculatis, interstitiis striis subtilissimè cancellatis; roseo-albicante, epidermide fuscescente indutâ, liris fuscescente-punctatis; columellâ quadriplicatâ, plicis infimis subobscuris; aperturâ longiusculâ.*

Conch. Icon., *Mitra*, pl. 16. f. 122.

Hab. Isle of Plata, West Columbia (found in coral sand at the depth of fourteen fathoms); Cuming.

A species intermediate between the *Mitræ circulata* and *sulcata*.

MITRA CONCENTRICA. *Mitr. testâ acuminato-ovatâ, subfusiformi, longitudinaliter concentricè costatâ, costis supernè mucronatis, interstitiis impresso-striatis; albidâ, ferrugineo-fusco hinc et hinc maculato-tinctâ, ad basinque fasciatâ; columellâ quinqueplicatâ; aperturæ fauce striatâ.*

Conch. Icon., *Mitra*, pl. 17. f. 128.

Hab. Isle of Annaa, Pacific Ocean (found on the reefs at low water); Cuming.

This species is very closely allied to the *Mitra mucronata*, from which it only differs in the concentric disposition of the ribs, and in their being denuded of tubercles.

MITRA SENEGALENSIS. *Mitr. testâ fusiformi, spirâ acutè acuminatâ; anfractibus lævigatis, supernè tumidiusculis; livido-olivaceâ, flammulis perpaucis albidis longitudinaliter ornatâ; columellâ triplicatâ; aperturæ fauce livido-castaneâ.*

Conch. Icon., *Mitra*, pl. 17. f. 129.

Hab. Senegal; Petit.

A very characteristic species, quite distinct from any hitherto described.

Mitra impressa. *Mitr. testâ elongatâ, sub-Terebræformi, longitudinaliter subtiliter costellatâ, costellis lævigatis, interstitiis transversim peculiariter impresso-sulcatis; fuscescente-rubidâ, macularum serie unicâ subindistinctâ cingulatâ, costellis albidis; columellâ quinqueplicatâ, basi leviter recurvâ.*

Conch. Icon., *Mitra*, pl. 17. f. 130.

Hab. —— ?

A truly interesting species, of which this is the only specimen I have seen. It is of a deep brick-red colour, covered with close whitish longitudinal ribs, each whorl being encircled round the middle with an indistinct row of spots of a darker red.

Mitra solidula. *Mitr. testâ oblongo-ovatâ, crassâ, solidâ, spirâ brevi, obtusâ, prope apicem subtilissimè concentricè sulcatâ; anfractibus convexis, lævigatis, transversim exiliter striatis; olivaceo-fuscâ, plicis albis; columellâ concavo-expansâ, callositate albicante supernè armatâ, quadriplicatâ; labro peculiariter planulato, supernè canaliculato, intus crenulato.*

Conch. Icon., *Mitra*, pl. 18. f. 133.

Hab. Island of Corrigidor, bay of Manila (found under stones at low water); Cuming.

This is a species of an interesting group of shells, of which the *Mitra Ziervogeliana* forms the type, distinguished by their solid structure, the prominent development of the columellar plaits, the presence of a callosity, and the peculiar flattened surface of the outer lip.

Mitra livida. *Mitr. testâ subquadrato-ovatâ, spirâ breviusculâ, acutâ; anfractibus lævigatis, longitudinaliter costatis, costis tumidis, infernè evanidis; livido-olivaceâ, balteo unico angusto cingulatâ, costis olivaceo-lutescentibus; columellâ quadriplicatâ; labro leviter sinuato; aperturæ fauce pallidè lividâ, striatâ.*

Conch. Icon., *Mitra*, pl. 18. f. 134.

Hab. —— ?

I am much indebted to M. Deshayes for the loan of this very interesting species, of which I know no other specimens.

Mitra choava. *Mitr. testâ ovatâ, solidâ, glabrâ, spirâ brevi; nigricante-fuscâ, plicis albis; columellâ concavâ, callositate armatâ, quadriplicatâ; labro peculiariter planulato, supernè canaliculato, intus crenulato.*

Conch. Icon., *Mitra*, pl. 18. f. 135.

Hab. Isle of Johanna, Mozambique Channel; Hennah.

The characters of the *Mitra choava* are very similar to those of the *Mitræ solidula* and *anthracina*; each species may, however, be fully distinguished by its difference of form and other minor peculiarities.

Mitra anthracina. *Mitr. testâ acuminato-ovatâ, spirâ acutâ, glaberrimâ; anthracinâ; columellâ subconcavâ, quadriplicatâ, cal-*

lositate parvá, supernè armatá; labro peculiariter planulato, supernè leviter canaliculato, intus crenulato.

Conch. Icon., *Mitra*, pl. 18. f. 137.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

Very closely allied to the *Mitra solidula*, but of a more elongated form, with a smooth shining surface.

Mitra robusta. *Mitr. testá ovatá, crassá, spirá brevi, subobtusá; anfractibus tumidiusculis, transversim sulcatis, basin versus præcipuè, longitudinaliter concentricè plicato-rugosis; rubido-fuscá; columellá concavá, quadriplicatá, callositate armatá; labro incrassato, planulato, supernè canaliculato, intus crenulato.*

Conch. Icon., *Mitra*, pl. 18. f. 140.

Hab. ——?

This species partakes of the characters of the *Mitræ Woldemarii* and *Ziervogeliana* in about equal proportions.

Mitra pulchella. *Mitr. testá acuminato-ovatá, spirá subturritá, longitudinaliter costellatá, costellis angustis, planis, confertiusculis, basin versus subgranosis, transversim impresso-striatis; aurantio-lutescente, fasciá purpurascente inter costas ornatá; columellá quinqueplicatá.*

Conch. Icon., *Mitra*, pl. 19. f. 142.

Hab. Island of Barbadoes, West Indies; Humphreys.

The painting of this shell has a very pretty appearance.

Mitra histrio. *Mitr. testá subovatá, spirá breviusculá, longitudinaliter costatá, costis subobtusis, basin versus granulosis, interstitiis transversim striatis; vividè coccineá, suturis nigris, nigro interdum nebulosá, balteo albo angusto, balteoque nigro, cingulatá; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 19. f. 144.

Hab. ——?

A gaily-coloured scarlet shell more or less banded and bedaubed with black.

Mitra rubritincta. *Mitr. testá oblongo-ovatá, crassiusculá, acutè acuminatá, transversim undique sulcatá; albá, maculis grandibus aurantio-rubris supra infraque seriatim nebuloso-tinctá; columellá quadriplicatá; labro crenulato.*

Conch. Icon., *Mitra*, pl. 19. f. 147.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

The surface of this shell is characteristically grooved throughout.

Mitra speciosa. *Mitr. testá obeso-ovatá, utrinque attenuatá, transversim impresso-striatá, longitudinaliter costellatá, costellis planiusculis, basin versus granulosis; rosaceo-albicante, costis fasciá latissimá fuscá aut purpurascente-fuscá tinctis, apice rosaceo; columellá quadriplicatá, plicá superá valdè maximá.*

Conch. Icon., *Mitra*, pl. 19. f. 148.

Hab. Island of Capul, Philippines (found on the reefs); Cuming.

This shell, at a glance, has very much the appearance of the *Mitra pulchella*, but upon examination it will be observed that the dark band which encircles the one is painted on the ribs, whilst in the other it appears in the interstices.

Mitra cavea. *Mitr. testâ ovatâ, glabrâ, longitudinaliter costellatâ, costellis obtusis; cinereo-nigricante, costis macularum albicantium serie unicâ ornatis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 19. f. 149.

Hab. —— ?

The specimen here described, from the collection of Thomas Norris, Esq., is the only example of the species I have seen.

Mitra telescopium. *Mitr. testâ ovato-fusiformi, lævigatâ, nitidâ, transversim punctato-striatâ; anfractibus contiguis, ultimo basin versus subcontracto, suturis conspicuis, profundis; cærulescente-albâ, anfractu ultimo infernè rufo-castaneo, spiræ apice nigricante; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 20. f. 80.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

This new and very characteristic shell exhibits the same peculiarly contracted structure as the *Mitra abbatis*, and the whorls have the same contiguous telescope-like appearance.

Mitra ignobilis. *Mitr. testâ subobeso-fusiformi, basi leviter recurvâ, spirâ acuminatâ, transversim undique sulcatâ, sulcis confertis, subsuperficiariis; albicante, maculis grandibus ustulato-fuscis seriatim nebulosâ; columellâ sexplicatâ, plicis infimis, subobscuris.*

Conch. Icon., *Mitra*, pl. 20. f. 152.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

In order not to confound this species with one of very similar appearance, the *Mitra ustulata*, it is important to notice that the surface of the former is grooved throughout, whilst that of the latter is very finely striated and marked with rather distant brown hair lines.

Mitra decurtata. *Mitr. testâ abbreviato-ovatâ, subventricosâ, crassâ, solidâ, spirâ brevi, apicem versus acutâ; lævigatâ, infernè sulcatâ; nigerrimo-fuscâ, punctis albidis perpaucis prope basin, lineâque albâ conspicuâ infra suturas cinctâ; columellâ quadriplicatâ; aperturâ amplâ; labro supernè sinuato et contracto.*

Conch. Icon., *Mitra*, pl. 20. f. 154.

Hab. —— ?

A fine new species, of which I have seen several examples in an excellent state of preservation.

Mitra badia. *Mitr. testâ acuminato-ovatâ, transversim subtilissimè striatâ; undique badiâ; columellâ quadriplicatâ, plicâ infimâ subobscurâ; aperturâ breviusculâ.*

Conch. Icon., *Mitra*, pl. 20. f. 157.

Hab. —— ?

This is rather an unsatisfactory species, though certainly not referable to any hitherto described.

Mitra cadaverosa. *Mitr. testâ ovato-turritâ, spirâ acutâ; anfractibus transversim impresso-striatis, supra et infra plus minusve angulatis, longitudinaliter costatis, costis ad angulos exasperato-mucronatis; albâ, balteo angusto fuscescente inter costas cingulatâ; columellâ quadriplicatâ; aperturæ fauce striatâ.*

Conch. Icon., *Mitra*, pl. 21. f. 160.

Hab. Philippine and Lord Hood's Islands (found under stones at low water); Cuming.

However closely this shell may approximate to the *Mitra exasperata*, it is uniformly white, and always exhibits a strong peculiarity in the band which appears in the interstices and not upon the summit of the ribs.

Mitra carnicolor. *Mitr. testâ subabbreviato-fusiformi, liris parvis subobtusis, alternis majoribus, undique cingulatâ, liris striis impressis longitudinaliter incisis; extus pallidè carneolo-fuscescente, intus rosaceâ; columellâ quinqueplicatâ, plicâ infimâ subobscurâ.*

Conch. Icon., *Mitra*, pl. 21. f. 164.

Hab. —— ?

A neatly sculptured delicately tinted shell, quite distinct from any hitherto-described species.

Mitra Hindsii. *Mitr. testâ lanceolato-fusiformi, spirâ acutissimè turritâ; anfractibus supernè angulatis, infra angulum leviter contractis, transversim carinato-costatis, costâ super angulum prominentiore, interstitiis concavis, subtilissimè elevato-striatis; lutescente, costis spadiceis, epidermide tenui indutâ; columellâ quadriplicatâ, plicis duabus inferioribus ferè obsoletis; aperturæ fauce subrosaceâ.*

Conch. Icon., *Mitra*, pl. 21. f. 165.

Hab. Gulf of Nicoya (found in mud at the depth of about seventeen fathoms); Hinds.

This beautiful species, which I have the pleasure of dedicating to a most zealous labourer in the field of conchological research, may be recognised by its graceful form and by the keel-like elevation of the ribs.

Mitra latruncularia. *Mitr. testâ abbreviato-fusiformi, tenuiculâ, basi truncatâ; transversim undique sulcatâ, sulcis angustis, crebris, punctatis; albidâ, rubido-castaneo tessellatâ et fasciatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 21. f. 166.

Hab. —— ?

A slight thin shell closely grooved throughout, the grooves being minutely punctured and the intermediate ridges prettily tessellated with white and reddish brown.

Mitra Deshayesii. *Mitr. testâ subfusiformi, spirâ turritâ, anfractibus supernè angulatis, ad angulum nodosis, infra lævibus;*

livido-viridescente, nodis aurantio-coccineis, strigis in medio interruptis e nodis descendentibus; columellâ quadriplicatâ.

Conch. Icon., *Mitra*, pl. 22. f. 170.

Hab. —— ?

I have two examples of this extremely interesting species from the collection of M. Deshayes, and two from that of Thomas Norris, Esq.

Mitra pruinosa. *Mitr. testâ ovato-fusiformi, spirâ acuminatâ, lineis impressis longitudinalibus et transversis decussatim exsculptis; spadiceo-fuscescente, strigis niveis brevibus angustis e suturis subirregulariter descendentibus; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 22. f. 171.

Hab. —— ?

This is another peculiarly characteristic species for which I have no locality.

Mitra Solandri. *Mitr. testâ ovato-oblongâ, crassiusculâ, spirâ elevatâ, apice subobtuso; undique sulcatâ, sulcis latiusculis, confertis, peculiariter subtilissimè corrugatis, liris intermediis angustis, carinæformibus; pallidè fusco alboque fasciatâ; columellâ quadriplicatâ.*

Hab. —— ?

An ancient species described many years since in manuscript by Dr. Solander under a name that is occupied.

Mitra flammigera. *Mitr. testâ fusiformi, spirâ acutè acuminatâ, suturis impressis; anfractibus supernè tumidiusculis, transversim undique liratis, liris alternis majoribus, interstitiis lineis impressis decussatis; albidâ, flammis latiusculis spadiceis longitudinalibus pictâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 22. f. 173.

Hab. —— ?

The sculpture of this attractive species approaches very nearly to that of the *Mitra interlirata*, from which it differs more materially in form.

Mitra loricata. *Mitr. testâ fusiformi, utrinque attenuatâ, spiræ anfractibus plano-convexis; fortiter noduloso-granosis, granis regularibus, seriatim creberrimè digestis; albidâ, maculis perpaucis aurantio-fuscescentibus hic illic fasciatim tinctâ; columellâ quinqueplicatâ.*

Conch. Icon., *Mitra*, pl. 22. f. 174.

Hab. —— ?

The entire surface of this species, from the collection of W. Metcalfe, Esq., is very strongly closely granulated.

Mitra maculosa. *Mitr. testâ oblongo-ovatâ, spirâ breviusculâ, suturis impressis; anfractibus transversim punctato-striatis, parte superiori lutescente-albâ fuscescente partim tinctâ, infra castaneo-fuscâ albipunctatâ; columellâ quinqueplicatâ; labro intus supernè sinuato.*

Conch. Icon., *Mitra*, pl. 22. f. 175.

Hab. Australia and island of Annaa, Pacific Ocean (found at the latter place on the reefs); Cuming.

This species may be recognised by its peculiarity of colouring, the upper portion of the whorls being nearly white, stained just here and there with brown, the lower chestnut-brown speckled with white dots.

Mitra proscissa. *Mitr. testâ oblongo-ovatâ, utrinque attenuatâ, spiræ anfractibus contiguis, suturis impressis; transversim undique liratis, liris latiusculis, obtuso-convexis, confertis, interstitiis angustis, subtilissimè cancellatis; albidâ, maculis aurantio-fuscescentibus bifasciatim tinctâ.*

Conch. Icon., *Mitra*, pl. 22. f. 177.

Hab. —— ?

It may be as well to caution the reader against confounding this shell with the *Mitra ferruginea*, a name which I have seen erroneously attached to it in one or two important collections.

Mitra rotundilirata. *Mitr. testâ oblongo-ovatâ, utrinque attenuatâ, transversim undique liratâ, liris rotundis, confertis, interstitiis angustis, striis elevatis decussatis; aurantio-castaneâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 23. f. 178.

Hab. —— ?

The ridges of this shell are peculiarly rounded, and impart a kind of crimped appearance to the lip.

Mitra Ruppellii. *Mitr. testâ fusiformi-ovatâ, basim versus leviter contractâ, transversim undique liratâ, liris subrotundis, interstitiis lævibus; castaneo-fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 23. f. 179.

Hab. Red Sea; Rüppell.

An interesting species, in which the ridges are almost as rounded as in the former; they are however wider apart, and the interstices are not crossed with raised striæ.

Mitra ticaonica. *Mitr. testâ ovatâ, crassâ, solidâ, spirâ brevi, suturis profundis; anfractibus transversim undique exiliter sulcatis, juxta suturas læviusculis; spadiceo-brunneâ, aperturæ fauce vividè purpureo-fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 23. f. 181.

Hab. Island of Ticao, Philippines (found on the reefs at low water); Cuming.

A very characteristic stout solid species, with a dark purple-brown richly-enamelled mouth.

Mitra planilirata. *Mitr. testâ oblongo-ovatâ, spirâ subacuminatâ, transversim undique sulcatâ, liris intermediis peculiariter planulatis; fuscâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 23. f. 184.

Hab. —— ?

This species may be easily distinguished from those which it so nearly resembles in general appearance by its peculiarly flattened ridges.

Mitra peregra. *Mitr. testâ oblongo-ovatâ, spirâ subobtusâ;*

transversim fortiter sulcatâ, sulcis pertusis; rubidâ, liris transversis profusè albimaculatis; columellâ quinqueplicatâ.

Conch. Icon., *Mitra*, pl. 24. f. 186.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

This species, which appears to be figured by Kiener for the *Mitra nucleola*, may be connected by a series of intermediate varieties with the *Mitra cucumerina*.

Mitra astricta. *Mitr. testâ oblongo-ovatâ, basi truncatâ; anfractibus lævibus, cinereo-fuscis, fasciâ albidâ infra suturam, lineisque fuscescentibus parallelis crebris undique cinctis; columellâ quadriplicatâ; labro subeffuso.*

Conch. Icon., *Mitra*, pl. 24. f. 188.

Hab. —— ?

The entire surface of this shell is enlaced with fine brown lines.

Mitra sinensis. *Mitr. testâ cylindraceo-oblongâ, crassâ, spirâ brevissimâ, acutâ; transversim crebriliratâ, liris angustis, prominentibus, granosis, lineisque longitudinalibus impressis exilibus decussatâ; fuscâ; columellâ decemplicatâ, callositate conspicuâ supernè armatâ; intus fuscâ, nitidè encausticâ.*

Conch. Icon., *Mitra*, pl. 24. f. 190 *b*.

Mitra crenulata (pars), Kiener, Icon., f. 105 *a*.

Hab. Coast of China.

This fine species, though one of great rarity, has been probably confounded hitherto with the *Mitra crenulata*, an error into which I had myself fallen, until the arrival of a magnificent specimen most liberally forwarded to me for inspection by M. Gruner of Bremen, and which has been invaluable as the means of establishing a new and very important species. It differs entirely from the *Mitra crenulata*, independent of colouring and size, in the character of its sculpture, whilst the columella has an additional number of plaits and is armed with a remarkable callosity at the summit.

Mitra glans. *Mitr. testâ ovatâ, subcylindraceâ, supernè obesâ, crassâ, solidâ, spirâ brevissimâ, partim occultâ; longitudinaliter obtuso-costellatâ, costellis fortiter granulosis; vividè aurantio-fuscâ, granulis albidis, intus albâ; columellâ octoplicatâ.*

Conch. Icon., *Mitra*, pl. 24. f. 191.

Hab. Island of Masbate, Philippines (found on the reefs at low water); Cuming.

Characterized by its very distinctly granulated sculpture, and by its short obese form.

Mitra undulosa. *Mitr. testâ cylindraceo-ovatâ, crassâ, spirâ brevissimâ; læviusculâ, lineis exiliter impressis undique cinctâ; albâ, lineis fuscis cingulatâ, undulisque fuscis angustis longitudinalibus variegatâ; columellâ octoplicatâ.*

Conch. Icon., *Mitra*, pl. 24. f. 192.

Hab. Island of Ticao, Philippines (found among coral sand on the reefs at low water); Cuming.

The lineated character of the painting is so different from that of the *M. crenulata*, that I cannot refrain from separating it as a distinct species.

Mitra nanus. *Mitr. testá abbreviato-ovatá, spirá brevi, acutá, transversim undique sulcatá, sulcis basin versus profundioribus; rubido-fuscá, balteo angusto flavicante, peculiariter albimaculato, cinctá; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 24. f. 193.

Hab. —— ?

Distinguished by its narrow yellow belt, which has a peculiar white knotted appearance.

Mitra porphyritica. *Mitr. testá obeso-ovatá, basi subgranosá, spirá acutè turritá; longitudinaliter plicato-costatá, costis angulatis; anfractibus supra albicantibus, infra olivaceo-cinereis, albizonulatis; columellá quadriplicatá; aperturá brevi.*

Conch. Icon., *Mitra*, pl. 25. f. 195.

Hab. Island of Ticao, Philippines (found under stones at low water); Cuming.

A short stout species, with a sharp angularly turreted spire, encircled with bands of a peculiarly livid olive-ash-colour.

Mitra virgata. *Mitr. testá oblongo-ovatá, spirá brevi, apice acuminatá; lævigatâ, nitidá, basin versus impresso-striatá; nigerrimo-fuscâ, virgis albis longitudinalibus flexuosis, interdum medio interruptis, ornatá, anfractu ultimo zonulâ pallidá angustá nonnunquam supernè cingulato; columellá quadriplicatá; labro medio contracto, supernè sinuato.*

Conch. Icon., *Mitra*, pl. 25. f. 197 *a* and *b*.

Mitra retusa, var., Gray; Zool. Beechey's Voyage.

Hab. Island of Luzon, Philippines (found under stones and in crevices of rocks); Cuming.

This species is exactly intermediate between the *Mitræ paupercula* and *retusa*.

Mitra chrysalis. *Mitr. testá ovatá, spirá brevi, subretusá; transversim undique sulcatá; fuscá aut fuscescente, anfractu ultimo maculis interruptis medio uniseriatim cincto; columellá quadriplicatá; labro medio contracto.*

Conch. Icon., *Mitra*, pl. 25. f. 200.

Hab. —— ?

May be distinguished from the young of the *Mitra cucumerina* by its peculiarly contracted lip.

Mitra concinna. *Mitr. testá ovatâ, basi contractá, spirá turritá; anfractibus supernè angulatis, longitudinaliter costatis, costis angulum super granoso-mucronatis, liris parvis obtusis transversim decussatis; liris transversis vividè luteis, interstitiis nigricante-castaneis; columellá quadriplicatá.*

Conch. Icon., *Mitra*, pl. 26. f. 203.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

A bright prettily painted species, very closely approximating in form and sculpture to the *Mitra crocata*.

Mitra venustula. *Mitr. testâ ovatâ, spirâ acuminatâ, anfractibus convexis, longitudinaliter granoso-costatis, vividè luteis, zonulis angustis nigerrimo-castaneis duabus tribusve cingulatis; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 26. f. 204.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

The whorls of this species have not the same angular structure as those of the preceding, nor are the ribs granosely pointed at the upper extremity.

Mitra flavescens. *Mitr. testâ ovatâ, spirâ subacuminatâ, anfractibus longitudinaliter costatis, costis supernè subnodosis, liris granosis decussatis; flavescente, zonâ fuscâ medio albilineatâ cinctâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 26. f. 207.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

Allied to the preceding species by its style of sculpture, but differing in form and pattern of colouring.

Mitra variata. *Mitr. testâ ovatâ, basi contractâ, spirâ turritâ; anfractibus supernè angulatis, longitudinaliter costatis, costis latiusculis, obtuso-prominentibus, interstitiis transversim impresso-striatis; luteâ, ustulato-fusco variè fasciatâ et lineolatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 26. f. 209.

Hab. ——?

This shell exhibits a beautiful variation of colour; the ribs are not crossed with granose ridges, like those of the *Mitræ concinna, crocata,* and *flavescens*, but have the interstices engraved with fine impressed striæ.

Mitra affinis. *Mitr. testâ ovatâ, spirâ acuminato-turritâ; anfractibus longitudinaliter obtuso-costatis, costis liris planiusculis transversis decussatis; aurantio-rubrâ, fasciâ luteo-albicante cingulatâ; columellâ quadriplicatâ.*

Conch. Icon., *Mitra*, pl. 26. f. 211.

Hab. Island of Masbate, Philippines (found under stones at low water); Cuming.

The specific differences of this shell are not of an unimportant character; the cross ridges are somewhat flattened, the white band is broader, and the granules are of the same uniform colour as the ground.

Mitra turben. *Mitr. testâ oblongo-ovatâ, basi attenuatâ, spirâ obtuso-rotundatâ, suturis subprofundis; longitudinaliter creberrimè plicato-costellatis, costellis interstitiisque transversim impresso-striatis; aurantio-lutescente; columellâ quinqueplicatâ, plicis prominentibus; aperturâ intus striatâ.*

Conch. Icon., *Mitra*, pl. 27. f. 213.

Hab. Philippine Islands (found under stones at low water); Cuming.

It is a curious fact that the whole of the specimens of this species collected by Mr. Cuming have the lower portion of the lip broken away.

MITRA CITRINA. *Mitr. testâ ovato-conicâ, supernè rotundatâ, solidiusculâ, spirâ brevi, apicem versus subtiliter sulcatâ, apice elato, acuto; lævigatâ, aurantio-citrinâ, livido-castaneo variè tinctâ; columellâ quinqueplicatâ; aperturâ longissimâ.*

Conch. Icon., *Mitra*, pl. 27. f. 215 *a* and *b*.

Hab. —— ?

A new and very remarkable Cone-like species, in the collection of Thomas Lombe Taylor, Esq., of Starston, Norfolk.

LINNÆAN SOCIETY.

March 18, 1845.—E. Forster, Esq., V.P., in the Chair.

Read "Remarks on the Examination of some Fossil Woods which tend to elucidate the structure of certain tissues in the recent Plant." By Edwin John Quekett, Esq., F.L.S. &c. &c.

The structures which Mr. Quekett proposes to elucidate are the fibres of spiral vessels and the dots of the woody fibres of *Coniferæ*.

On the first head he states, that in the examination of a specimen of fossil Palm-wood, he observed that a portion of it readily broke down into minute fragments, which, on examination under the microscope, were seen to be composed of cylinders more or less elongated and minute rounded granules. Round the cylinders was wound a perfect screw (with either a single or compound helix) undoubtedly fashioned from the interior of the spiral vessel, and affording the most satisfactory evidence that the spiral fibre is really formed in the interior of the vessel, as most recent observers have maintained.

On the second point, the nature of the dots on the woody fibres of *Coniferæ*, Mr. Quekett's observations derived from fossils also confirm the views now most generally entertained by microscopic observers of the recent structures. In a specimen of fossil wood from Fredericsberg in Virginia, received from Prof. Bailey, which was easily broken into minute fragments in the direction of the woody fibres, he found a beautiful example of casts of woody tissue with numerous spirals traversing the interior. At various parts were seen arranged the ordinary coniferous dots, to the outside of which (projecting beyond the outline of the fibre when seen obliquely) adhered small bodies of the same size which bore the precise representation of the coniferous disc, and were evidently casts of cavities existing in the original plant: some of these were also seen detached. These appearances, Mr. Quekett states, prove the correctness of the modern belief, that the discs are formed by depressions on the outside of the walls of two contiguous fibres, giving rise to cavities of a lenticular form.

Mr. Quekett concludes his paper with some observations on the process of silicification in its various stages and modifications; and endeavours thereby to account for the readiness with which some silicified woods break down into separate portions, exhibiting perfect casts of the organs within which the siliceous matter was deposited, while others are cemented into a mass incapable of organic separation.

Read also "Notes on the Variations of Structure in the British species of *Eurytomidæ.*" By Francis Walker, Esq., F.L.S. &c.

In this paper Mr. Walker enumerates the variations in each segment of the British *Eurytomidæ*, and comes to the conclusion that, in grouping the species of a genus of this family, the primary divisions may be formed from the variations of the thorax, and the secondary divisions from the variations of the abdomen, of the antennæ, and of the nervures of the wings. He regards *Eurytoma* as the typical genus of the family; and believes that the three genera *Isosoma*, *Systole* and *Decatoma* converge towards it by as many radii. An undescribed genus, to which Mr. Walker gives the name of *Porcia*, is nearly allied to *Decatoma*, and is thereby connected with *Eurytoma*.

Mr. Walker takes a summary view of the three genera *Eurytoma*, *Isosoma* and *Decatoma*, noticing under each the peculiar characters of the genus and the modifications to which they are subject. He points out the number of variations which occur in the British species in the structure of their segments, and gives arranged lists of the species, commencing with those which are most characteristic of the genus, and ending with those which are least so.

Read also the conclusion of Mr. Doubleday's "Remarks on the genus *Argynnis* of the 'Encyclopédie Méthodique,' especially in regard to its subdivision by means of characters drawn from the neuration of the wings."

Mr. Doubleday commences by referring to the successive attempts made by Jones, by M. Boisduval, and by M. Lefévre to apply the characters drawn from the neuration of the wings to the arrangement of *Lepidoptera*; and to the use of characters derived from the same source in the works of M. de Haan, Dr. Rambuhr, and Mr. Westwood. In the present paper he endeavours to test the value of the neuration of the wings in subdividing a large natural group, for which purpose he selects the genus *Argynnis* of the 'Encyclopédie Méthodique.'

After stating generally the theory of the wing proposed by M. Lefévre, Mr. Doubleday proposes an amended theory as follows: "That the structure of the wings in insects is to have *two* distinct sets of air-vessels or nervures, three belonging to the anterior half of the wing, three to the posterior; that in those species in which the wings are in the most truly normal condition these nervures are all fully developed and all subserve to their true functions; that in descending from these we first find some of the nervures less developed, but still subserving to their functions, then becoming gradually atrophied, and at last disappearing altogether; and that this gradation depends partly on the rank which the species hold in the true system of nature, and partly on their œconomy." The three upper nervures exist, Mr. Doubleday states, in the anterior wings of a large portion of the *Heterocera*; but the lowest or discoidal one is often wanting, though its nervules remain: in the *Rhopalocera* it is always wanting, and its nervules are united either to the subcostal or median nervures.

Admitting the correctness of the above views, we have in the *Rhopalocera* a median nervure with constantly three nervules, above which are the two discoidal nervules, and then the subcostal nervure, generally offering five nervules, but sometimes only three. Various modifications in the number and connexion of these nervules are indicated in different genera.

The genus *Argynnis*, Godart, always offers five subcostal nervules, never, as Mr. Doubleday believes, anastomosing with the costal nervure. Removing from it three species, *Arg. Alcandra, Aceste* and *Lucina*, and perhaps *Arg. Metea*, and adding to it some of the *Cethosiæ*, it becomes a most natural group. Of the subdivisions previously made in it Mr. Doubleday takes a brief review, and then proceeds to point out the sections into which he proposes to divide it, which are founded in a great degree on the position of the subcostal nervules.

The first of these is *Agraulis* properly so called; the second comprehends *Argynnis Thais, Clagia* and their allies; *Arg. Iole* forms the type of a third; the fourth is formed by the genus *Phalanta* of Dr. Horsfield, including some species not previously referred to it; the fifth has for its type *Arg. Egesta*; the sixth includes the genus *Clothilda* of M. Blanchard; the seventh M. Boisduval's section *Majores*, with the addition of *Lathonia* and some other species; the eighth comprises his *Minores*, with the exception of one or two species; and the remaining species compose the genus *Melitæa* properly so called. In all these sections Mr. Doubleday describes at length the structure of the nervures and their nervules, and notices the geographical distribution of the species.

The paper was accompanied by a series of figures illustrative of the neuration of the wings of various species.

April 1.—E. Forster, Esq., V.P., in the Chair.

Read "Observations on two Malayan species of *Semnopithecus*." By Theodore Cantor, M.D., Civil Surgeon, Prince of Wales's Island. Communicated by T. Horsfield, M.D., V.P.L.S.

The *Semnopitheci* which form the subject of Dr. Cantor's paper are *Semn. cristatus*, Horsfield, and a new species which Dr. Cantor names and characterizes as follows:—

Semnopithecus halonifer, nitidè cinereo-nigrescens, cristâ occipitis canâ, abdomine subalbido, caudâ subcinereâ, facie auribus manibus pedibus tuberibusque ischiaticis nigris, palpebris labiisque lacteis veluti halonibus circumdatis: tarsis palpebrarum nigris, phalangibus digitorum primis membranâ inter se junctis.

Juvenis: Pallidior, cristâ occipitis cinereâ, facie nigro-cærulescenti.

Neonatus: nitidè fulvus.

Of this species, which inhabits the jungle in troops of from five to twenty, Dr. Cantor gives a detailed description, with an account of its habits both wild and in a state of captivity, and details of the dissection of a young male, particularly as regards the stomach, which presented, with some modifications, the same highly developed structure as the other species of the genus which have been examined. It appears to be most nearly allied to *Semn. maurus*, Horsf.

Semn. cristatus, Horsf., is also a native of Prince of Wales's Island and the opposite part of the Malayan Peninsula. Dr. Cantor compares it with the foregoing species and gives some particulars of its habits in captivity, and of the dissection of a young female.

The paper was illustrated by figures of *Semn. halonifer* and of its stomach and cæcum, and of the head of *Semn. cristatus*, its stomach and gall-bladder.

April 15.—R. Brown, Esq., V.P., in the Chair.

Read the commencement of a paper, entitled "Some Observations upon the Structure of two new species of *Hectocotyle* parasitic upon *Tremoctopus violaceus*, Delle Chiaje, and *Argonauta Argo*, L.; with an exposition of the hypothesis that these *Hectocotyle* are the males of the *Cephalopoda* on which they are found." By Albert Kölliker, Professor of Physiology and Comparative Anatomy in the University of Zurich. Communicated by R. Brown, Esq., V.P.L.S.

Read also a "Description of the Wild Dog of the Malayan Peninsula." By Theodore Cantor, M.D., Civil Surgeon, Prince of Wales's Island. Communicated by Dr. Horsfield, V.P.L.S.

Chrysæus soccatus, ore vulpino, supernè ferrugineo-fulvus pilis dorsi nigro apiculatis infrà subfulvus, rostro naso labiis palpebris striâque obliquâ carpali nigris, caudæ pendulæ vulpinæ besse apicali nigro, digitis (anticis 5 posticis 4) pilis longioribus occultis veluti soccatis.

This species, of which Dr. Cantor gives a detailed description, appears, he states, to form an intermediate link between *Chrysæus sumatrensis*, Ham. Smith, and *Chrys. javanicus* of the same author. But in the former of these two species all the feet are pentadactylous; neither of them has the feet hairy; and the second tubercular tooth of the lower jaw is present in both, but absent in *Chrys. soccatus*. A pair of the last-named species were captured in Malacca and brought to Prince of Wales's Island, where they died a few days after their arrival. Dr. Cantor states, on the authority of Wm. Lewis, Esq., Assistant Resident Councillor at Penang, that they hunt deer and antelopes in troops of from thirty to fifty or more. He gives also some particulars of their anatomy, and a figure of the species.

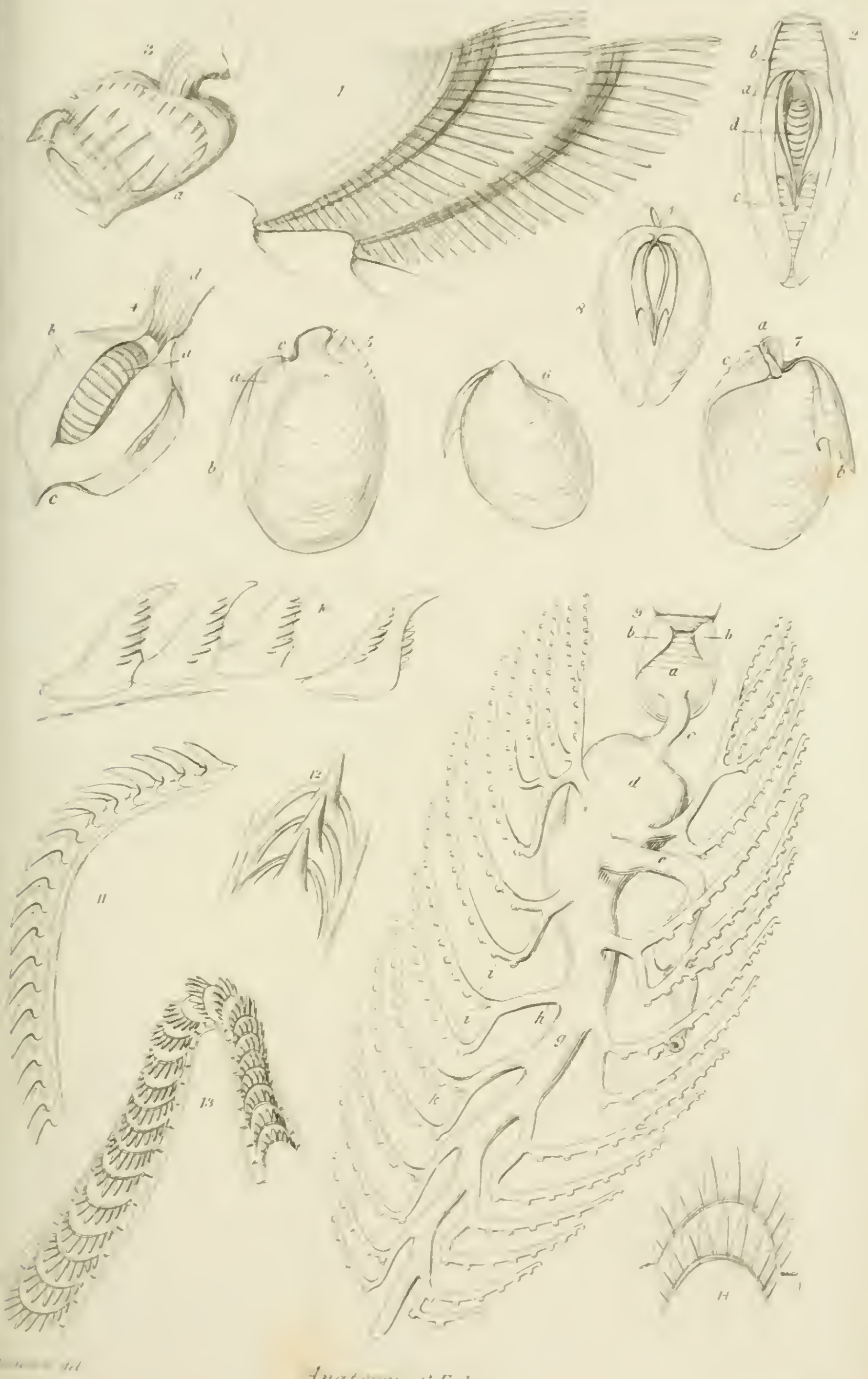
INDEX TO VOL. XV.

END OF THE FIFTEENTH VOLUME.

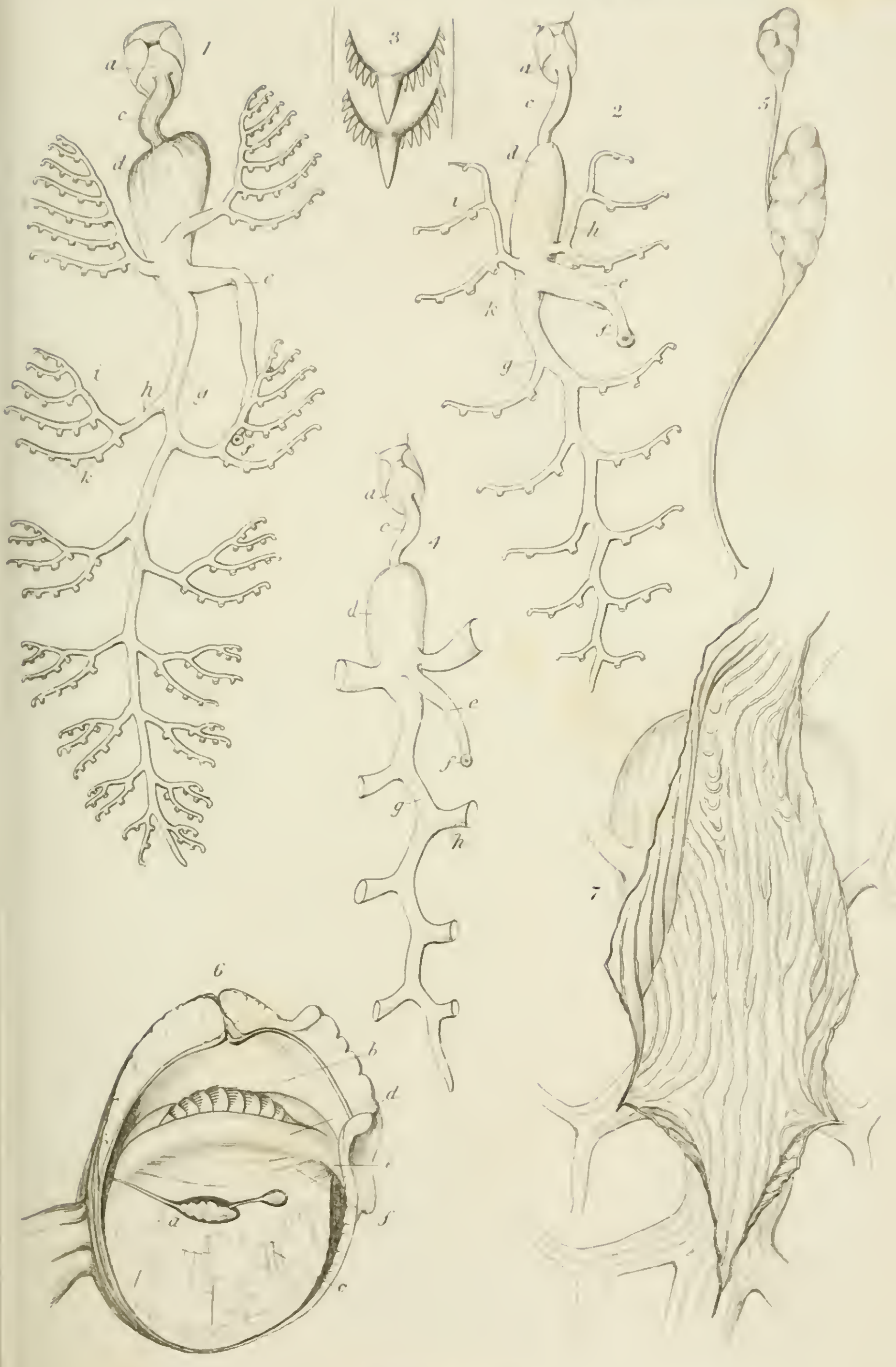
PRINTED BY RICHARD AND JOHN E. TAYLOR,
RED LION COURT, FLEET STREET.

ALERE FLAMMAM.

...eck del. Anatomy of Eolis. J. D. C. Sowerby sc.



Anatomy of Eolis



Anatomy of Eolis

A Hancock del

J.W. Sowerby

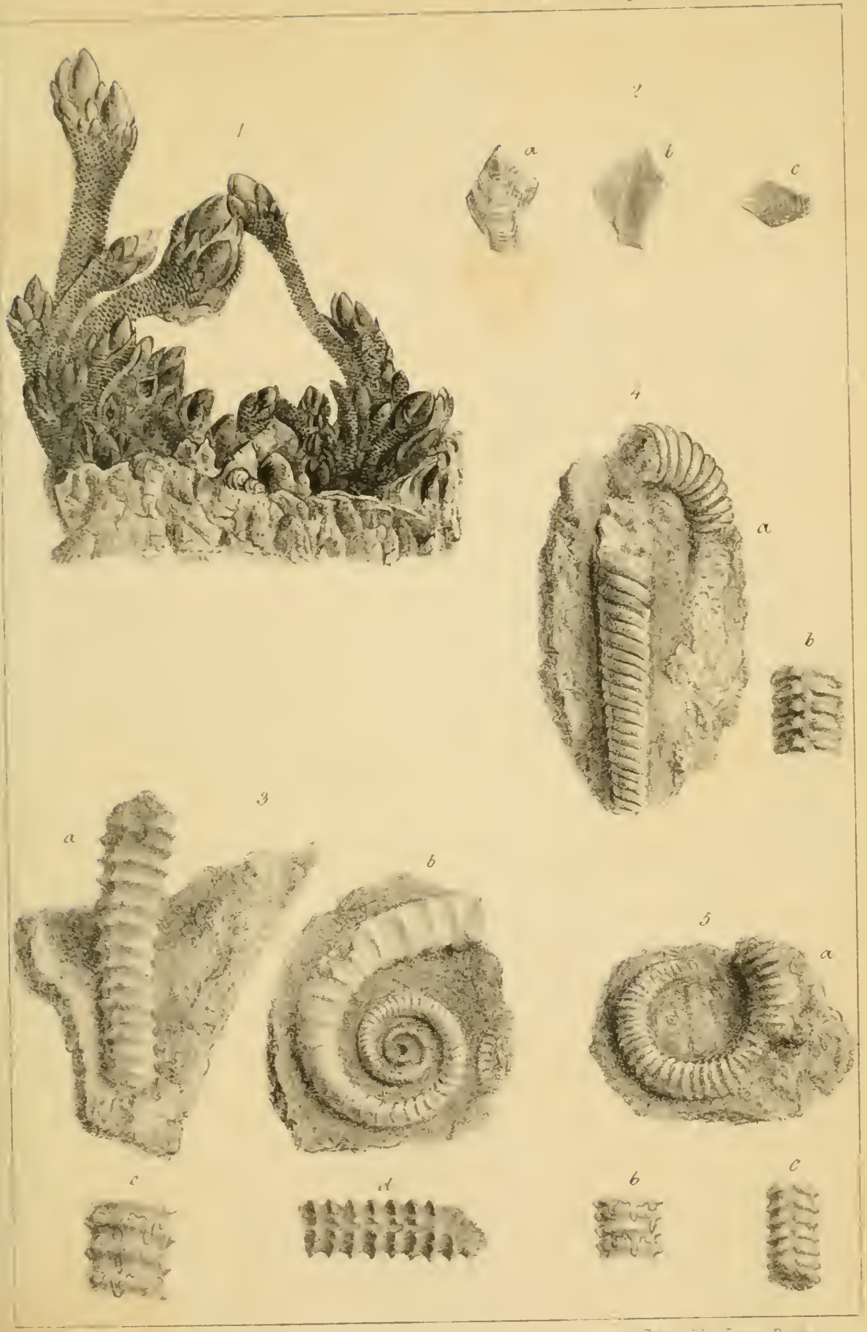
J. Hancock del.

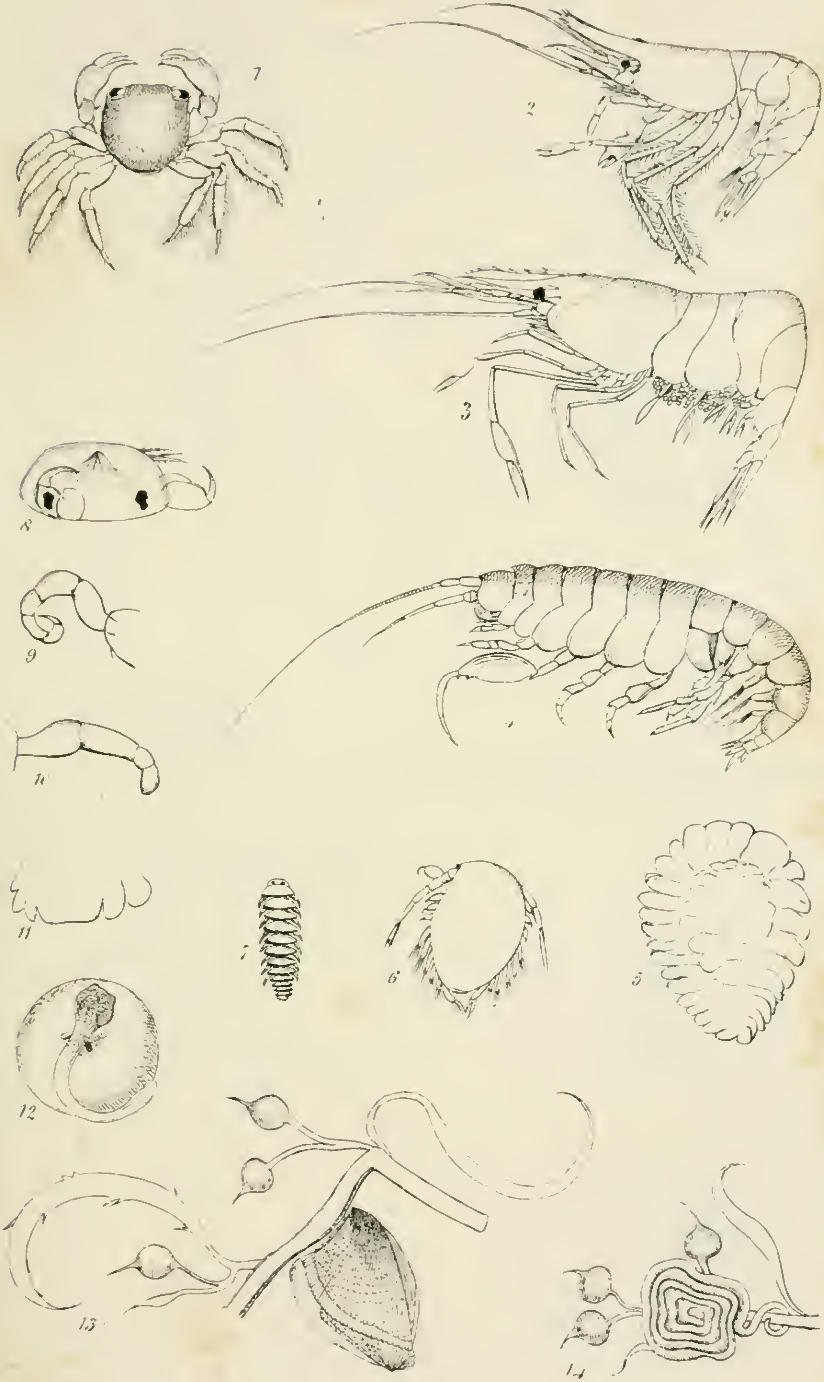
Anatomy of Eolis.

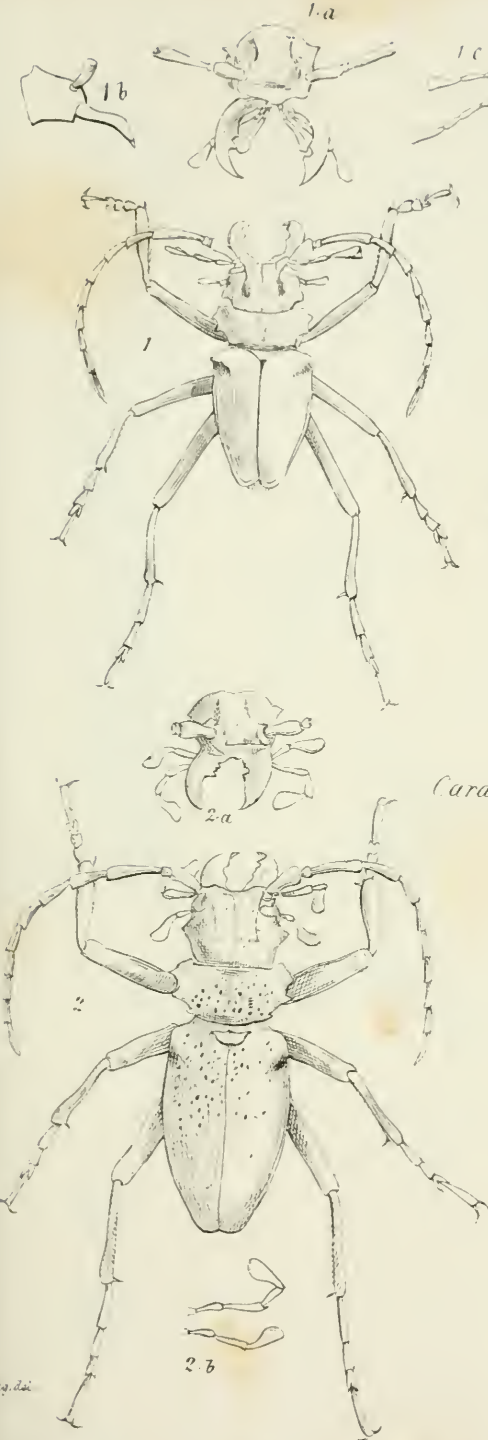
A. Hancock, del.

J. D. C. Sowerby, sc.

Anatomy of Eolis.


1
2
a
b
c
4
a
b
3
a
b
5
a
c
d
b
c


1
2
3
4
5
6
7
8
9
10
11
12
13
14

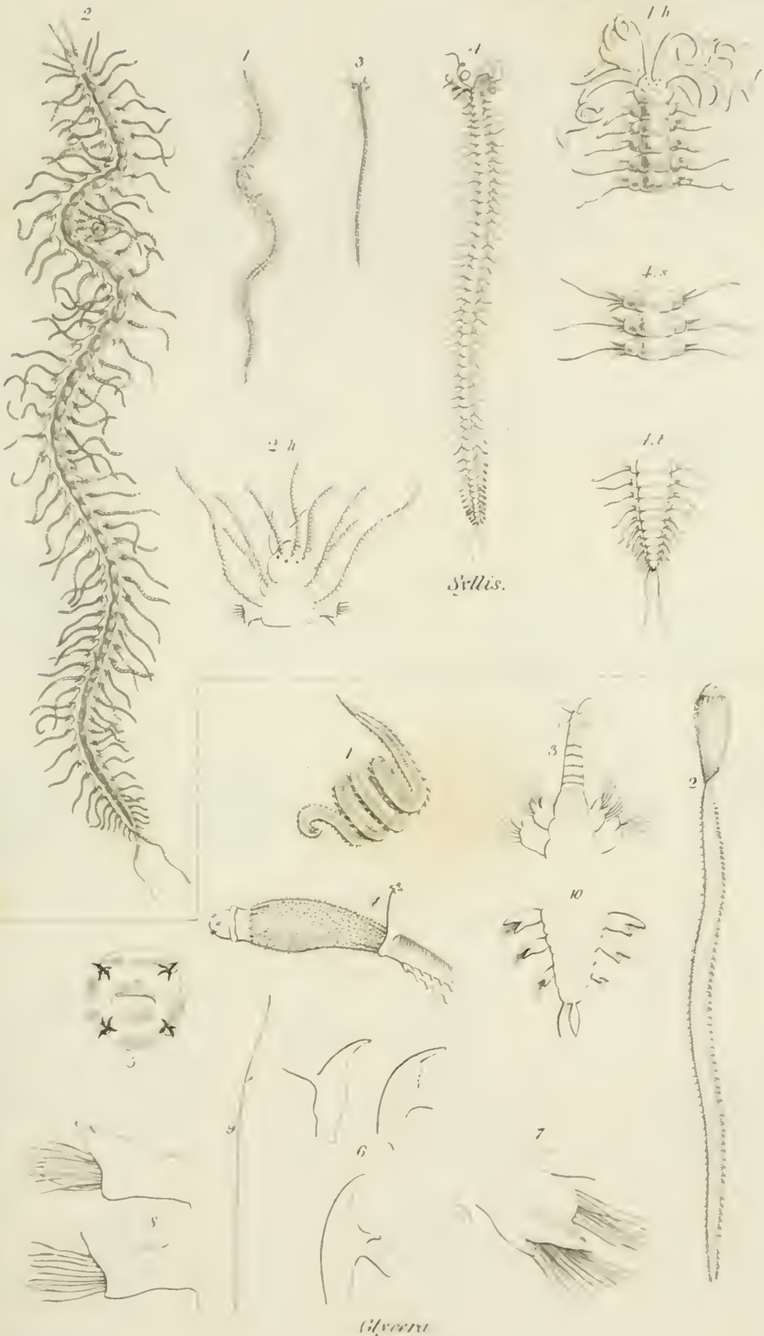


Carabus (Procrusticus) Parafa. White.
(Xanthus)

Purpuricenus
Fellowsii. White
(Xanthus)

W.W.ng. del.

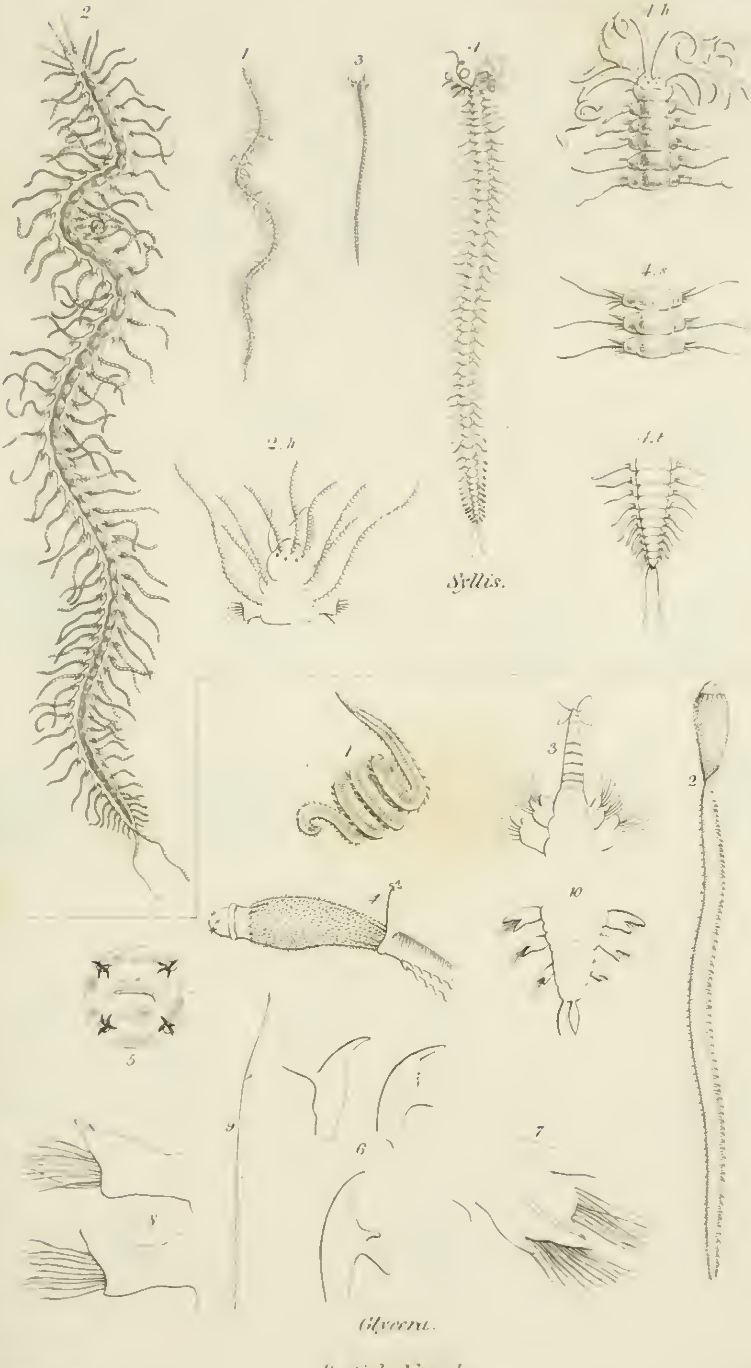
Prionus (Prionaca[illegible]s) Cacicus White
Mexico (fig 1 & fig [illegible]



British Nereides.

G. Johnston M.D. del.

J. D. C. Sowerby sc.

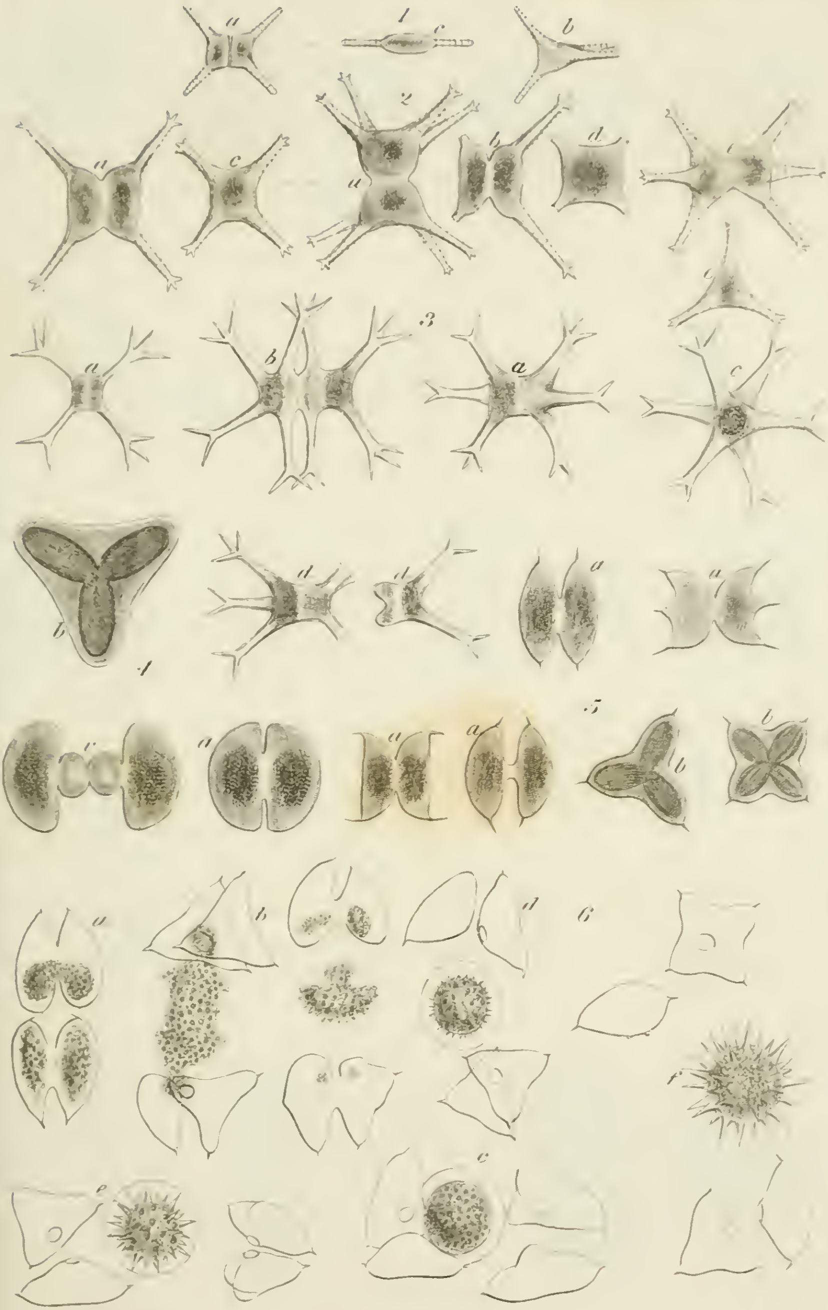


Syllis.

Glycera.

British Nereides.

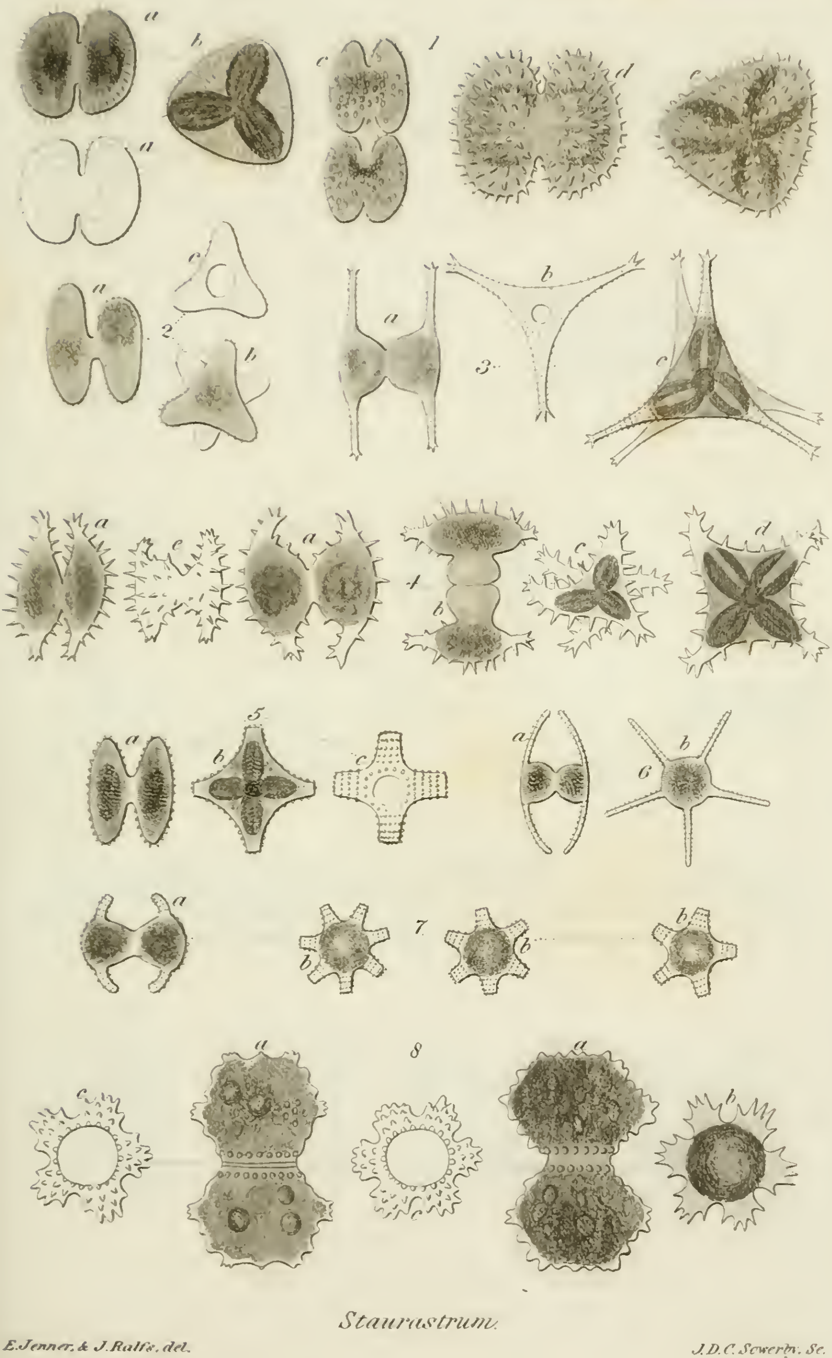
G. Johnston M.D. del. J.D.C. Sowerby sc.



Staurastrum.

E. Jenner & J. Ralfs del.

J. D. C. Sowerby Sc.



Staurastrum.

E. Jenner & J. Ralfs, del.

J. D. C. Sowerby, Sc.

Jn Ralfs del.

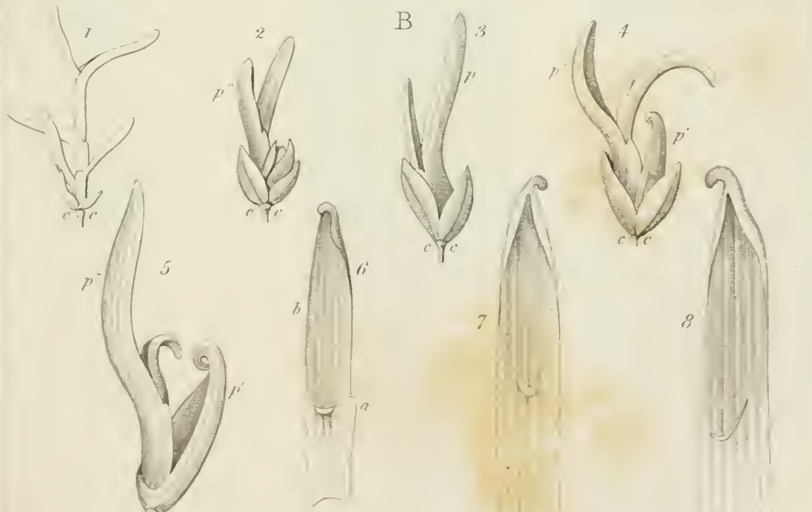
J.D.C. Sowerby sc.

A

Morphology of Zoophytes.

R. Q. Couch del.

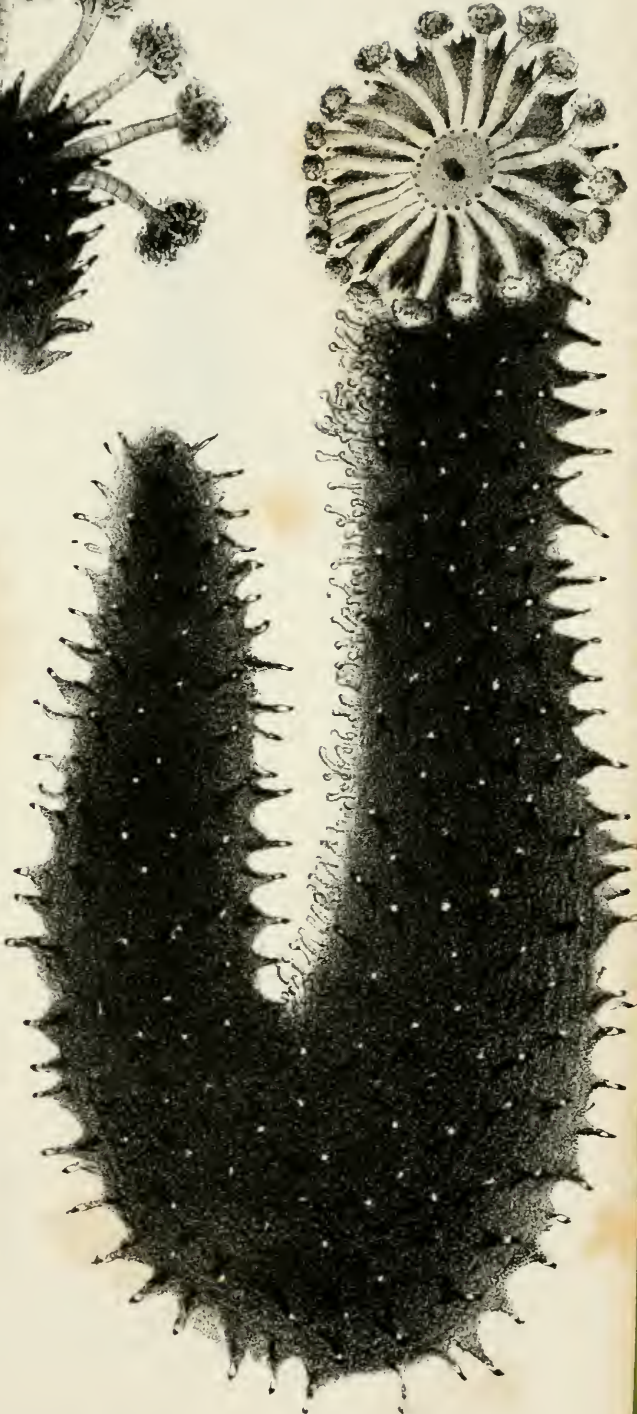
B



Moss del. J. Pierre sc.

Morphology of Grasses.

2



1.

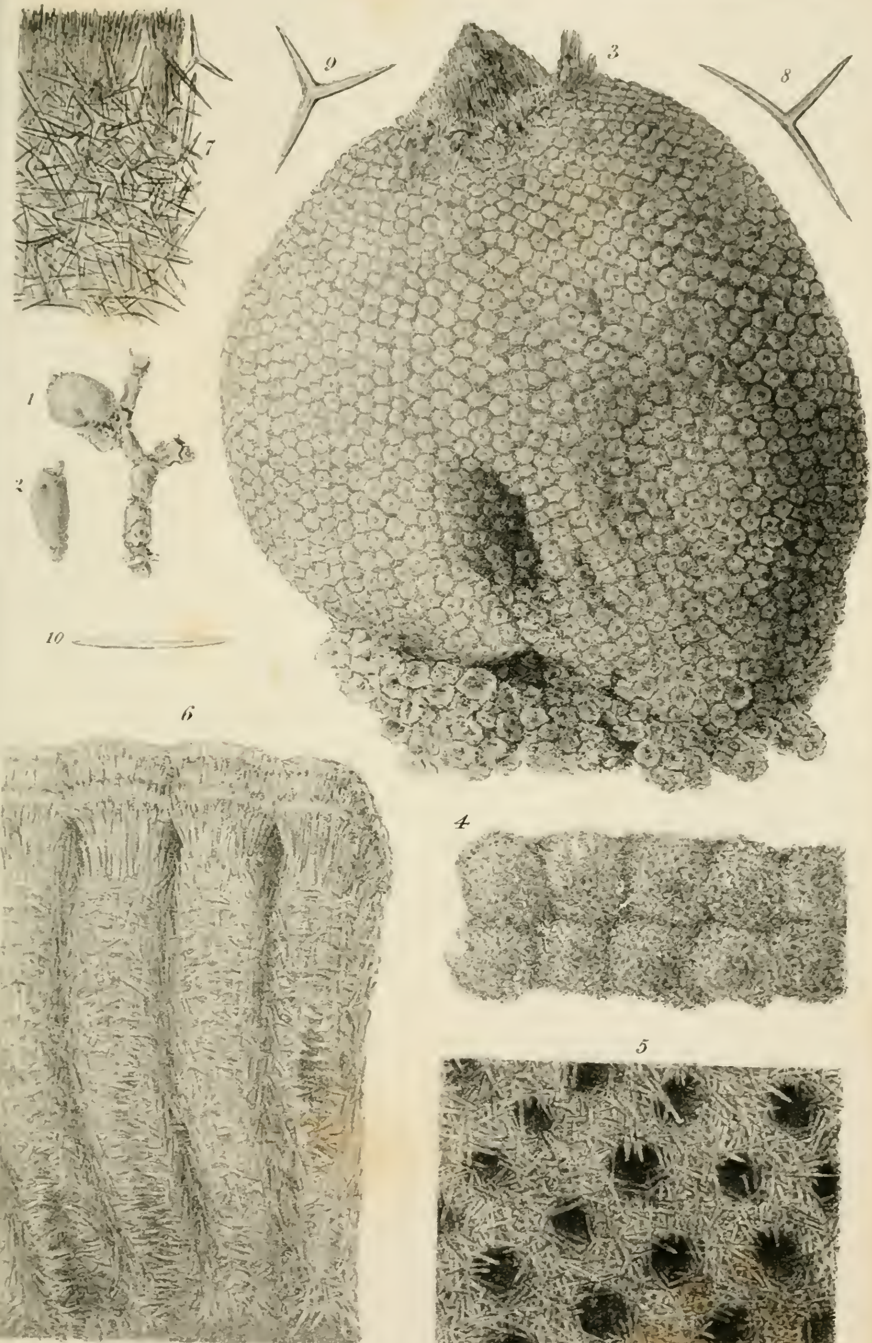
2

3

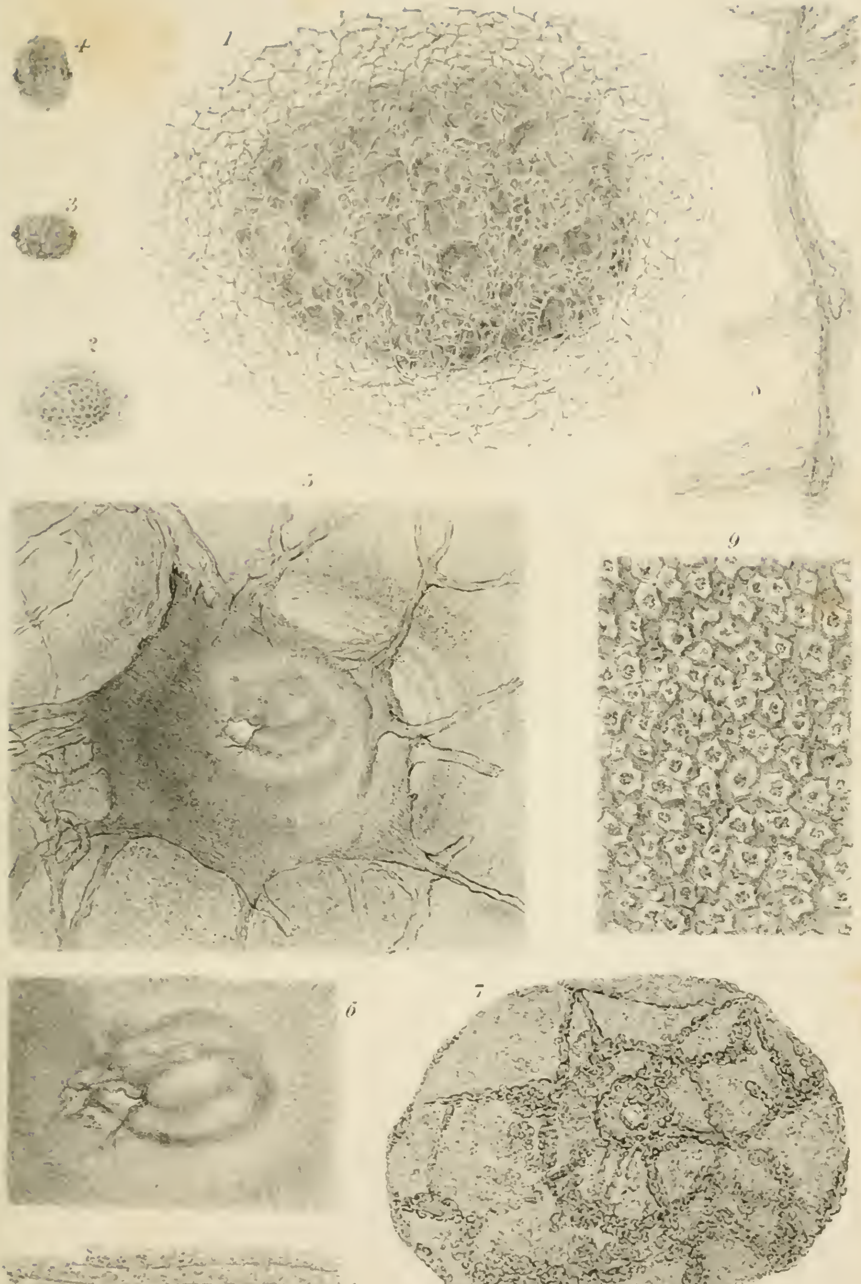
The Nigger.


3
2
1
6.b
4
6a
5
6
7

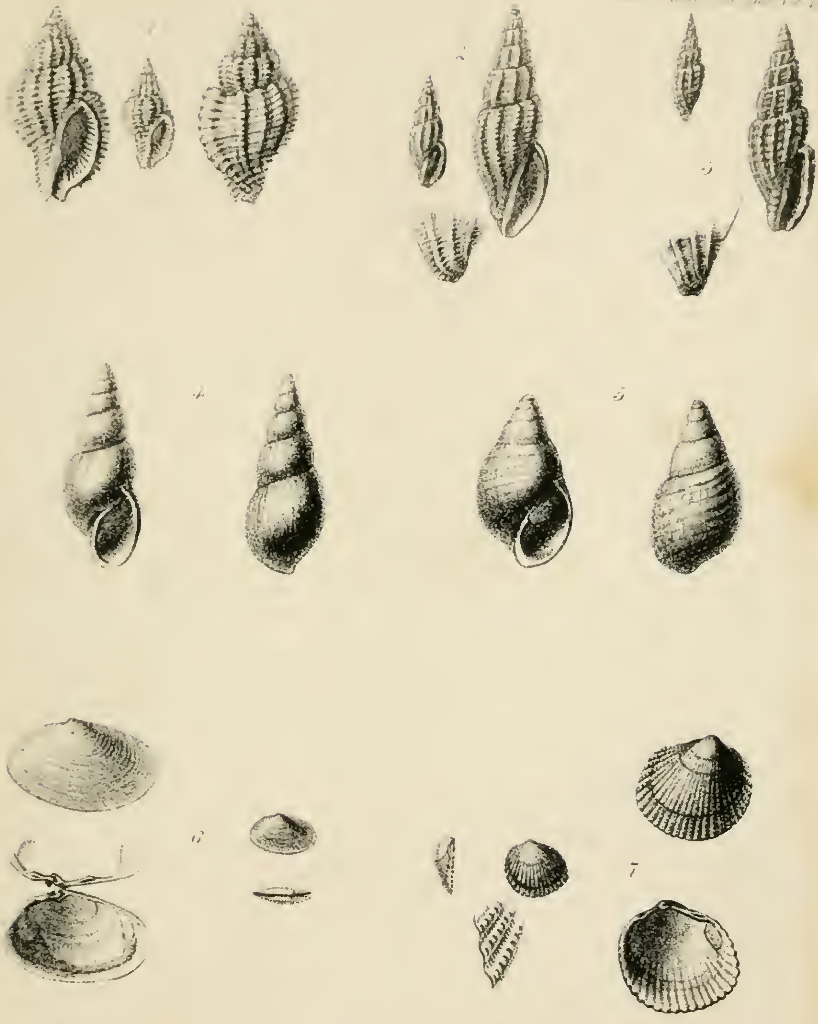
1 Priapulus. 2,3,4. Syrinx



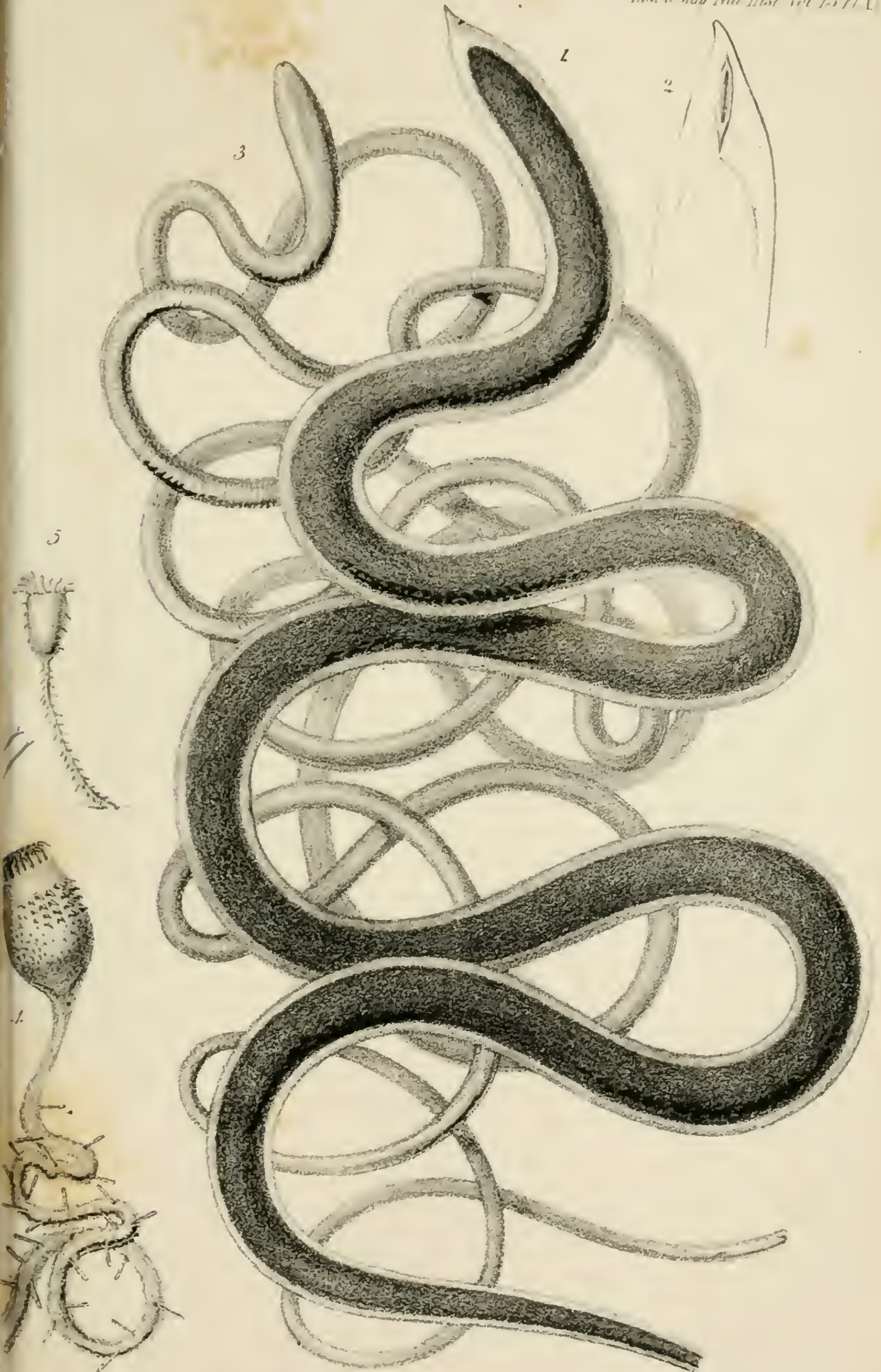
J. W. Leonard M.M.S. Delin et Lith.



Delin. et Lith.



J. Sowerby del. New British Mollusca



J. De C. Sowerby ad nat.