THE TRANSACTIONS OF THE LINNEAN SOCIETY OF LONDON.

VOLUME XIX.

LONDON:

PRINTED BY RICHARD AND JOHN E. TAYLOR, RED LION COURT, FLEET STREET:

SOLD AT THE SOCIETY'S HOUSE, SOHO-SQUARE;

AND BY LONGMAN, BROWN, GREEN, AND LONGMANS, PATERNOSTER-ROW;

AND WILLIAM WOOD, TAVISTOCK-STREET, COVENT-GARDEN.

1845

MDCCCXLV.

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PART THE FIRST.

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TRANSACTIONS

OF

THE LINNEAN SOCIETY.

I. *Observations on the Genus* Derbe *of Fabricius. By* J. O. Westwood, *Esq., F.L.S., &c.*

Read December 1st, 1840.

THE insects composing the Homopterous order or suborder certainly exhibit the most extraordinary variations of form which are to be met with in this class of beings. Amongst a portion of these insects we trace two modifications: in a very great number, composing the subfamily *Membracides*, we find the prothorax enormously developed, and presenting an almost endless variety of appearance, and the head small; whilst in many of the family *Fulgoridæ* the head is the portion of the body which is subjected to an increased development. Having illustrated the typical genus of the latter of these two groups in a memoir which has been honoured by a place in the Society's Transactions, I purpose in the present paper to investigate another genus belonging to the same group, which, although not presenting so extraordinary an appearance as the true *Fulgoræ*, is, nevertheless, interesting both on account of several portions of its structure, and from the circumstance of its intimate connexion with the two groups established by Mr. Kirby in the Transactions of this Society under the names of *Otiocerus* and *Anotia*, both of which, and more especially the latter, continue so rare, that even in the most recent works upon the order we find scarcely any addition made to the information contained in the memoir of the reverend author. In describing these two genera, Mr. Kirby pointed out their relationship both to *Fulgora* and *Delphax*, omitting, however, all mention of the Fabrician genus *Derbe*, which is far more nearly allied to them than either of the two genera which he notices. The genus *Derbe* was, however, evidently unknown to him, as it was also to Latreille and most subsequent authors. In the 'Systema Piezatorum' this genus is composed of eight species, seven being inhabitants of South America, whilst the eighth is a native of New South Wales, and was described from the Banksian collection, now in the possession of this Society. Such, however, is the rarity of the species of which this genus is composed, that no individual belonging to it existed until very recently in the collections at Paris, nor am I aware of any other specimen in our English collections, except those in my own cabinet, subsequently described.

In 1832, M. Perchéron, a Parisian entomologist, who has especially directed his attention to the *Homoptera*, *Neuroptera*, and other neglected orders of insects, being desirous of obtaining a more perfect acquaintance with the genus than is to be gained from the Fabrician description, applied to M. Westermann of Copenhagen, by whose kindness he was enabled to publish a figure of the Fabrician specimen of *D. pallida*, in M. Guérin's 'Magasin de Zoologie.'

It happens unfortunately, however, that the species thus illustrated does not accord with the typical species of the genus, which therefore still remains unfigured. Subsequently M. Boheman, instigated by the same desire of reinstating this genus in its proper situation (and evidently unaware of M. Perchéron's figure), published a memoir in the Transactions of the Royal Academy of Sweden for the year 1837, in which he described several African species which he considered to belong to the genus, but which also differ as greatly from its true type as the species figured by M. Perchéron†.

On various previous occasions I have endeavoured to establish a fixed prin-

† Since this Memoir was read, the Marquis Spinola has published a very elaborate Memoir on the *Fulgoridæ*, in the 'Annales de la Société Entomologique de France,' for 1839, in which he forms the genera *Derbe* (describing, ex visu, *D. pallida*, figured by Perchéron), *Otiocerus* and *Anotia*, into a distinct subfamily, which he terms *Derböides*. These are the only groups in the subfamily with which he was acquainted, and of which the structure of the different parts of the head is principally employed, (as it is throughout his memoir,) for the discrimination of the different genera.—J. O. W., February 1842.

ciple relative to the selection of the *typical* species in genera, established by our predecessors, which combined several distinct forms under one generic name. For this purpose, I have considered that the species which could be proved to have been more especially under the examination of the founder of such genera, ought to retain the old generic name; and where this could not be learned from any particular expression, that we should resort to the first species in the genus. In the writings of Fabricius we almost invariably find that he had particularly examined one species in each genus, as he adds a detailed description of the various organs of its mouth to the description of the species, instead of giving it amongst the generic characters. In such case, it appears to me clear that we ought always to consider that insect as the type of the genus; and it further happens, (which is not always the case in other genera,) that in the genus *Derbe* the species thus determined as the type stands at the head of the genus; so that in this and other analogous cases there is no ground for our conferring the old generic name on any of his species, which, in our modern view of such groups, does not accord with the actually determined type. These observations must of course be regarded as bearing upon the subject independently of the *natural* arrangement of objects, whereby it may happen that the species thus selected as the type of a genus may not be its *natural* type; but still the advantages to be gained by adopting a uniform method in dealing with these old generic names are so great, that naturalists will doubtless join with me in preventing, as far as possible, a still further increase of the confusion in the nomenclature of generic groups.

The type of the genus *Derbe* is evidently, therefore, this first Fabrician species, namely, *D. hæmorrhoidalis*, a South American insect, to which is referred by Fabricius (but with an expression of doubt) Stoll's figure 160, which represents a species from Surinam, but which is regarded by Dr. Klug as distinct, under the name of *D. nervosa* (Burmeister, 'Handb. d. Entomol.' ii. p. 154). These two species, with the two others subsequently described, constitute a distinct group, for which I consider that the typical generic name *Derbe* ought to be retained, and the insects themselves to be regarded as the types of the higher group or subfamily to which they belong.

The insect figured by M. Perchéron (*D. pallida*, Fab.), although agreeing with these typical species in the structure of the head, rostrum and antennæ, is at once distinguished from them by the structure of its wings, which are pulverose, its short feet, and its generally weak form.

I possess two other species which agree with the typical species in their generic characters, and of which the following are descriptions.

DERBE SEMISTRIATA. *Westw.*

TAB. I. Fig. 1.

Luteo-fulva; alis pallidis costâ magis fulvescenti venis nigricantibus strigisque tenuibus fuscis inter venas (nisi in cellulis apicalibus) dispositis.

Expans. alar. lin. 16½ (mens. Angl.).

Habitat in Brasiliâ. In Mus. Westw.

Caput pallidum albido-luteum; *antennis* oculis et rostro concoloribus. *Collare* albido-luteum. *Mesothoracis* dorsum fusco-luteum, medio obscurius, posticè pallidius, maculis duabus parvis rotundatis nigris versus angulos posticos. *Tegulæ* fuscæ. *Scutellum* pallidum. *Pedes* luteo-albidi. *Alæ* nitidæ pallidè lutescentes; costâ anticarum magis fulvescente, in medio et ante incisionem ordinariam fuscâ, venis nigricantibus strigisque tenuibus fuscis inter venas dispositis, at in cellulis longitudinalibus apicalibus haud aut vix obviis; alæ posticæ strigis nonnullis in angulo externo, cellulâ anticâ discoidali venas tres ad apicem emittente, posticâ unicam tantùm.

DERBE STRIGIPENNIS. *Westw.*

TAB. I. Fig. 2.

Pallidè fusco-lutea; thoracis dorso carinâque faciei sanguineis, alarum venis fuscis strigis tenuibus fuscescentibus inter omnes venas ad apicem alarum currentibus, pedibus albidis.

Long. corp. lin. 3. Expans. alar. lin. 14. (mens. Angl.).

Habitat in Brasiliâ apud Rio Janeiro. In Mus. Westw.

Caput obscurè sanguineum, facie ante oculos nigricanti carinâ sanguineâ, clypeo rostro antennisque lutescentibus, rostro ad medium usque abdominis extenso. *Collare* luteo rufescens; mesothoracis dorso sanguineo, posticè luteo, maculis duabus parvis rotundatis nigris ad angulos posticos; scutello metathorace abdomineque luteo-fuscis, margine postico segmentorum posteriorum rufescente. *Pedes* elongati graciles, pallidè luteo-albidi. *Alæ* nitidæ pallidè fusco-luteæ, venis fuscis strigisque tenuibus fuscescentibus in medio membranæ inter omnes venas et usque ad apicem alarum extensis, cellulâ anticâ discoidali alarum posticarum ad apicem venas duas emittente, cellulâ posticâ etiam duas.

Obs. Insertio venarum in medio alarum anticarum paullò irregularis. In alâ dextrâ cellula angusta basalis ad apicem emittit venam post venam bifidam (ut in fig. 2 A†), et venæ duæ proximæ sunt longitudinales (*o* et *) et disjunctæ. In alâ sinistrâ (fig. 2 B) cellula basalis angusta versus apicem venam bifidam tantùm emittit; vena proxima longitudinalis (fig. B†) cum venâ parvâ transversâ venæ postcostalis conjuncta est; venæque proximæ duæ longitudinales sunt (fig. B, *o* et *), attamen ante originem conjunctæ.

Under the name of *Mysidia* I propose to arrange such of the South American species of these insects as have hitherto been described under the generic name of *Derbe*, but which differ from the typical species of the genus in various respects, as indicated in the following contrasted characters of the two groups, although they agree together in being exclusively inhabitants of South America.

MYSIDIA.	DERBE.
Statura debilis.	*Statura* robustior.
Pedes breviores.	*Pedes* longi graciles.
Rostrum ultra pedes posticos haud extensum.	*Rostrum* ad medium abdominis extensum.
Antennæ longitudine mediocri.	*Antennæ* breviores.
Oculi rotundati.	*Oculi* subrotundati haud emarginati.
Alæ breviores, latiores, teneræ, pulverosæ; *anticæ* integræ ad apicem rotundatæ; *vena mediastina* (fig. 3 A, *a*) bifida, ramo ejus antico ramulos nonnullos obliquos versus apicem emittenti, ramo postico ad apicem bifido; *vena postcostalis* (fig. 3 A, *b*) ad apicem trifida, venasque duas alias longitudinales pone medium bifidas in medio posticè emittens; *vena mediana* (fig. 3 A, *c*) ramos tres emittens, ramo medio bifido.	*Alæ* longiores, angustiores, nitidæ; *anticæ* ad costam ante apicem incisæ, membrana pone incisionem ramis tribus venæ mediastinæ curvatæ percursa; membrana reliqua venis numerosis regularibus longitudinalibus in medio venis transversis conjunctis percursa; *vena mediastina* (fig. 1 A, *a*) bifida, ramo antico ad apicem 4-ramuloso, postico ad apicem bifido; *vena postcostalis* (fig. 1 A, *b*) pone medium bifida, ramo antico bis bifido, postico bifido; *vena mediana* (fig. 1 A, *c*) ramos 10 longitudinales emittens, quorum tertius e basi bis bifidus.
Alæ posticæ venâ postcostali bifidâ aut trifidâ (TAB. I. fig. 3, 4, B, *z*).	*Alæ posticæ* venâ postcostali quadrifidâ (fig. 1, E, *z*).

I have found it exceedingly difficult to refer the very variable arrangement of the veins of the wings of these insects to a primary type; although it will appear quite evident, from the figures given in the accompanying plates, that the species of each subgenus agree in the general character of the veining of the wings, thus proving the value of this character. It appears to me, however, that we are able to trace the mediastinal, postcostal, median and anal great veins in some of these insects, although in others one or more of them become so modified as to seem lost, or to have sunk into mere branches of one of the others. The fore-wings of the three species of *Mysidia*, represented in Tab. I. fig. 3, 4 and 5, agree in the main arrangement of the veins; and it will be observed that these wings are comparatively short and broad, but the fore-wings of the typical species of *Derbe* are very much elongated, and are consequently furnished with a greater number of veins; there being, in fact, six longitudinal branches added. If, however, that portion of the wing of *D. semistriata* which is shaded in fig. 1 D, *x*, were to be cut out and inserted into the wing of *Mysidia*, in the situation indicated by the mark *x*, in fig. 3 A, the two wings will be found to be exactly alike in the veining; in other words, the part of the wing shaded in *Derbe semistriata* is supplemental, if I may so speak. It is moreover to be observed, that the posterior branch of the postcostal vein of *Mysidia*, indicated by the letter *o* (fig. 3 A), seems transformed into the true anterior branch of the median vein in *Derbe semistriata* (fig. 1 D, *o*). The normal condition of this vein in *Derbe* is still, however, indicated by the small transverse vein (*q*), which connects the postcostal and median veins; for on looking alone at the wing (fig. 1 D), it would be immediately concluded that the veins *o* and *o o*, and the several veins between them, are all branches of the great median vein C, and thus the little transverse vein *q* is but a supplemental one, giving support to these longitudinal veins. On looking, on the other hand, at the wing of *Mysidia pallida* (fig. 5), the vein *o* is found to be quite independent of the postcostal vein, forming a branch of the median vein much curved at its base (*p*), and only wanting the little transverse vein *q* to identify it with the wings (fig. 3 A and 4 A). On looking, then, at these two wings, we should immediately be led to conclude that the vein *o* was a posterior branch of the postcostal vein, the small vein *q* here becoming oblique, so as to form the true base of the longitudinal vein *o*, and to be connected with the outer branch of the median vein by a branch *p*, which is but in fact the modified base of the branch *o*, supposing that branch to be postcostal and not median. By adopting this view, we should arrive at the conclusion that the branch *o* in *Derbe semistriata* is postcostal, its true base being the short branch *q*, and that the other longitudinal veins in the shaded part of the wing (1 D *x*) are also postcostal.

The following species belong to the subgenus *Mysidia*.

Derbe pallida, Fabr. (Perchéron, Mag. de Zool. Ins., pl. 36).
D. squamigera, Fabr. ("Statura omninò præcedentis," *Fabr.*).
D. costalis, Fabr. ("Statura præcedentium," *Fabr.*).
D. punctum, Fabr.
D. testacea, Fabr.
D. nivea, Fabr.

I am in doubt respecting the three latter species, *D. punctum* being described as having elongated wings, although it agrees with my species in colour, and in having a black spot. *D. testacea* is described as of the "statura præcedentis." *D. nivea* agrees with mine in having the wings "teneris niveis," but they are immaculate.

The two following species also belong to this subgenus.

MYSIDIA ALBIPENNIS. *Westw.*

TAB. I. Fig. 3.

Parva tenera; alis albis: anticis puncto parvo ante medium costæ punctis nonnullis ad marginem internum venis transversis punctoque ante apicem nigris lunulis parvis fuscis marginalibus.

Long. corp. lin. 2. Expans. alar. lin. 8. (mens. Angl.).

Habitat apud Veram Crucem Americæ Æquinoctialis. In Mus. Westw.

Corpus totum albidum; *oculis* lutescentibus; *antennis* concoloribus. *Collare* album, maculâ parvâ purpureâ utrinque ad marginem anticum. *Tegulæ* albæ. *Abdomen* et genitalia concoloria. *Pedes* etiam albidi; tibiis anticis annulo fuscescenti ad basin alteroque ad apicem. *Alæ* tenerrimæ, albæ, pulverosæ, translucidæ, et parùm iridescentes, venis pallidis; *anticæ* puncto nigro parvo rotundo ante medium costæ; venâ parvâ transversâ (venam mediastinam et postcostalem conjungenti); basi ramorum duorum venæ postcostalis, puncto rotundo ad basin furcæ apicalis trifidæ venæ postcostalis, venis quatuor transversis discoidalibus, punctisque quatuor marginis interni nigris ; *posticæ* puncto parvo inter venam medianam et primam analem venâque transversâ versus apicem nigris; lunulâ parvâ fuscescenti inter omnes venas ad marginem posticum alarum omnium. *Vena* postcostalis alarum posticarum apice bifida.

Mysidia lactiflora. *Westw.*

Tab. I. Fig. 4.

Luteo-albida; vertice collarisque margine antico parùm sanguineis, hujus tegularumque marginibus posticis albis, alis albis margine antico lutescenti basin versus maculis tribus parvis maculâque majori ante apicem nigris.

Long. corp. lin. $2\frac{1}{2}$. Expans. alar. lin. $12\frac{1}{2}$. (mens. Angl.).

Habitat in Brasiliâ. In Mus. Westw.

Tota lutescenti-albida; *capite* parvo; oculis fuscis; vertice parùm sanguineo; antennis longis, albis. *Collare* album, margine antico luteo-sanguineo. *Tegulæ* magnæ, posticè albæ. *Mesothorax* posticè albus. *Pedes* omnes albidi. *Alæ* albæ, apicem versus albido tinctæ, pulverosæ, parùm translucidæ, venis pallidis; *anticæ* costâ luteo-albidâ, punctis tribus nigris ante medium, punctis duobus minutis ante apicem in ramis trifidis apicalibus venæ postcostalis, punctoque majore rotundato in venâ transversâ ramos duos posticos venæ postcostalis conjungente, nigris, venis tribus transversis discoidalibus fusco-tinctis, maculâ parvâ nigrâ versus marginis interni basin; *alæ posticæ* venis duabus transversis punctoque parvo versus angulum analem nigris, venâ postcostali ad apicem bis bifidâ.

The last of the Fabrician species of the genus *Derbe, D. elongata*, is an inhabitant of New Holland, and recedes so much from the type of the genus, especially in the form and veining of the wings, that it is necessary to establish a distinct subgenus for its reception. This insect was described by Fabricius from the Banksian cabinet, now in the possession of the Linnean Society, in which are preserved three specimens, from which the accompanying figure is taken. The following characters distinguish it from the other subgenera of this group.

Diospolis. *Westw.*

Lydda, Westw. in Proc. Linn. Soc., p. 84.

Rostrum brevius quam in *Derbe* typicali. *Antennæ* breves. *Alæ* anticæ longissimæ, angustissimæ, apice rotundatæ. Directio venarum anomala; regione venæ medianæ minimâ (Tab. II. fig. 1 *c*.) aut potius ejus rami *** in ramos venæ postcostalis (fig. 1 *b*.) transformati; ramo litterâ *o* indicato ramo *o* subgeneris *Mysidiæ* (meo judicio) analogo.

Diospolis elongata.

Tab. II. Fig. 1.

Derbe elongata, Fabr. Ent. Syst. iv. 34. Syst. Piez. p. 82.

Long. corp. lin. 2. Expans. alar. lin. 8. (mens. Angl.).

Habitat in Novâ Hollandiâ. In Mus. Soc. Linn. Lond.

Fulvo-flavescens. *Caput* concolor pallidum; oculi fusci. *Antennæ* pallidæ. *Rostrum* obscurè sanguineum. *Collare* flavo-fulvescens utrinque pone oculos rufum. *Mesothorax* flavo-fulvescens, lineis duabus tenuibus mediis posticè coalitis lateribusque rufis, scutello pallido lateribus rufis. *Abdomen* fusco-fulvum, lineâ mediâ punctisque in lineis quatuor dispositis pallidis; genitalia pallida. *Alæ* anticæ pallidè luteo-fulvæ, margine interno pallidiore, venis transversis venarumque longitudinalium basi apiceque fuscotinctis; alæ posticæ parvæ pallidiores. *Pedes* concolores, apice tarsorum fusco.

In the Transactions of the Royal Academy of Sweden for 1837 ('Kongl. Vetenskaps Academiens Handlingar,' Holm. 1838) M. Boheman has published a memoir, entitled 'Observationes in *Derbe* genus unà cum specierum quinque novarum descriptionibus.' The five species described in this memoir are inhabitants of Sierra Leone, and materially differ from the typical species of *Derbe* as well as from the other subgenera above described, with none of which, indeed, was M. Boheman acquainted. These five species were divided by M. Boheman into two sections, which the author suggested might easily be considered as subgenera. In the elongated form of the wings they agree with the typical species of *Derbe*; but the paucity of the veins gives them a nearer relation to *Mysidia*, and especially to *Diospolis*, from which genera, however, both the sections are quite distinct.

The following characters distinguish the first of M. Boheman's sections from the other subgenera of the group: I propose to name it

Thracia. *Westw.*

Antennæ capite ferè duplo longiores, basi approximatæ. *Oculi* orbiculati, integri. *Ocelli* nulli? *Rostrum* pectore longius. *Clypeus* dorso tricarinatus. *Tibiæ posticæ* medio subcalcaratæ. *Alæ* anticæ longissimæ, angustæ, apice truncatæ, venis 12 longitudinalibus inter angulum apicalem et analem, venâ mediastinâ (Tab. II. fig. 2 B, *a*) ad apicem bifidâ (*a* *). Vena postcostalis ultra medium alæ irregularis, apice bifida, posticè ramos quatuor emittens (rami sex postcostales 2 B, *b* *); vena mediana (2 B, *c*) posticè ramos tres emittens (vena et rami mediani 2 B, *c* *); venæ alarum posticarum venis brevibus transversis conjunctæ.

Thracia sinuosa. *Westw.* (Derbe sinuosa. *Boheman*).

Tab. II. Fig. 2.

Fuliginosa; rostro pedibusque pallidè testaceis, alis anticis vittâ costali sinuosâ fuscâ serieque punctorum fuscorum.

Long. corp. alis clausis lin. 7. Paris.

Habitat in Sierrâ Leonâ. Mus. D. Schönherr.

Thracia Bohemanni. *Westw.* (Derbe nervosa. *Boheman*).

Corpore subtùs pedibusque flavescentibus, abdominis lateribus anoque rufis, hemelytris pallidè fuscis nervis costalibus sanguineis reliquis albo-fuscoque punctatis.

Long. 5 lin.

Habitat in Sierrâ Leonâ. Mus. D. Schönherr.

Obs. Hæc species cum *D. nervosâ*, Kl. Burm. haud confundenda.

The other African species, described by M. Boheman as constituting his second section of *Derbe*, differ materially from those of his first section, as, indeed, he has justly observed; I have accordingly considered them as forming another subgenus under the name of

Phenice. *Westw.*

Antennæ capite manifestè breviores, basi remotæ. *Oculi* oblongi vel obovati, pro antennis distinctè emarginati. *Ocelli* distincti, ad latera frontis sub oculis positi. *Clypeus* ut in *Thraciâ*. *Rostrum* pectore vix longius. *Alæ* anticæ quam in *Thraciâ* breviores, apice subrotundatæ, venis ferè ut in *Mysidiâ* dispositis, 12 longitudinalibus ad marginem posticum inter angulum apicalem et regionem analem. Vena mediastina apice bifida (Tab. II. fig. 3 B, *a*); vena postcostalis (*b*) ad apicem deflexa etiamque bifida, ramos tres longitudinales posticè emittens, quorum ramus *o* manifestè analogus ramo *o* in figuris *Mysidiæ* et *Derbe*; vena mediana (*c*) ramos tres posticè emittens. [Ramulus litterâ *z* notatus, quamvis primo intuitu pro ramo venæ postcostalis haberi possit, evidenter ramulum medianum *z* in figurâ *Mysidiæ lactifloræ* representat; in *Phenice* tamen ramulus minutus ante medium adjectus est, e venâ postcostali emissus et ramo mediano continuus, unde ramus *z* postcostalis videtur potiùs quam medianus.] *Alæ* posticæ absque venis transversis.

Phenice fritillaris. *Westw.* (Derbe fritillaris. *Boh.*).

Nigra; rostro pedibus pectorisque lateribus flavis, capitis carinâ pallidâ fusco-punctatâ, hemelytris alisque albis nigro tessellatis.

Long. alis clausis $3\frac{1}{2}$ lin.

Habitat in Sierrâ Leonâ. Mus. D. Schönherr.

Phenice fasciolata. *Westw.* (Derbe fasciolata. *Boh.*).

Tab. II. Fig. 3.

Pallidè flavescens immaculata; pedibus concoloribus, abdominis lateribus luteis, hemelytris albis, fasciis irregularibus lætè fuscis.

Long. alis clausis vix 4 lin.

Habitat in Sierrâ Leonâ. Mus. D. Schönherr.

Phenice stellulata. *Westw.* (Derbe stellulata. *Boh.*).

Corpore fusco-rubricante; capite antennis pedibusque pallidis, hemelytris fuliginosis albo-punctatis; nervis costalibus sanguineis.

Long. alis clausis vix 3 lin.

Habitat in Sierrâ Leonâ. Mus. D. Schönherr.

On reviewing the characters of the five preceding subgenera, *Derbe*, *Mysidia*, *Diospolis*, *Thracia* and *Phenice*, we find that, notwithstanding the great variation in the form of the wings and the arrangement of their veins, the size of the antennæ, &c., there are certain characters which they possess in common, which we must accordingly regard as those of the *genus*. These consist of, 1st, the minute size of the terminal joint of the rostrum; 2nd, the comparative paucity of the veins of the wings as compared with those of *Flata*, *Lystra*, &c.; 3rd, the unarmed posterior tibiæ; and 4th, the minute annular form of the basal joint of the antennæ, and the large size of the second joint. I would have added to these the presence of ocelli, but we have seen that these organs are apparently wanting in *Thracia*. Now we find these four characters equally strong in the genera *Otiocerus* and *Anotia* of Kirby, as well as in some other insects which are described below, all of which I consequently regard as subgenera of *Derbe*.

OTIOCERUS. *Kirb.* (COBAX. *Germar.*)

appears indeed to be destitute of ocelli; and the antennæ, especially in the males, are very anomalous, but in all other respects these insects are true species of *Derbe*. Mr. Kirby having given no representation of the rostrum, I have added a figure of the entire head of the female of *O. Degeeri*, Kirb., in which sex the antennæ are very short and bilobed (TAB. II. fig. 4 B). This species has the anal angle of the fore-wings dilated into an angular projection (fig. 4 A), and has been accordingly formed into a distinct genus by Dr. Burmeister under the name of *Hynnis rosea*; but it will be seen, on comparing the veining of the wings of this species with that of *O. Coquebertii*, Kirb. (of which I have also given an enlarged figure, TAB. II. fig. 5.), that the arrangement of the veins is almost identical; so that it will be necessary to suppress Dr. Burmeister's genus *Hynnis*.

The eyes in *Otiocerus* are emarginate, as they are also in *Phenice*, although in the typical species of *Derbe* they are almost round.

On comparing the wings with those of *Derbe* and *Mysidia*, it will be seen that the postcostal vein here acquires a more important character than in those subgenera, the median vein, although distinct, being nearer the posterior margin of the wing, and its apical branches occupying only the region of the anal angle; whilst the apical branches of the postcostal vein (*b**) extend through the widest central part of the outer margin of the wing. The species of *Otiocerus* are from the southern parts of North America.

ANOTIA. *Kirb.*

differs from *Derbe* in no material respect. Like *Otiocerus*, it has the eyes emarginate, and the ocelli appear to be obsolete; the antennæ, having the second joint greatly elongated and emarginate at the top, do not materially differ from the typical character of the antennæ of the genus, whilst the veining of the wings, differing as it does from that of any of the other subgenera already described, can only be considered, as we have already seen, a character of subgeneric value. As in *Otiocerus* we find a similar apical branching of the mediastinal vein (TAB. I. fig. 6 A, *a*), the subcostal vein (*b*) arises from the mediastinal one, whilst the median vein (*c*) is of very inferior value. The strong vein *o* is evidently identical with the vein *o* of *Mysidia*, &c., although here it is quite unconnected with the little transverse vein *q*. It consequently here becomes a distinct branch of the postcostal vein. The large cell which it partly forms is irregular in the two fore-wings of Mr. Kirby's specimen of *A. Bonnetii*, (being the only individual I have seen of the subgenus, and from which the accompanying figures of the fore- and hind-wings are derived,) the left wing having only one branch emitted from its apex, whilst in the right wing there are two (fig. 6 B**).

A. Bonnetii is an inhabitant of Georgia in North America.

M. Guérin has figured an insect in his 'Iconographie du Règne Animal,' Insectes, pl. 58. fig. 13, under the name of *Anotia coccinea*, which he has described in the text of the 'Voyage de la Coquille' as an inhabitant of the Australian Archipelago, and which differs so materially from the type of the subgenus, especially in the veins of the wings, as well as their large size, that it will be necessary to establish a distinct subgenus for its reception: I propose to name it *Deribia coccinea*.

Under the subgeneric name of *Patara*, I propose to describe two minute insects, inhabitants of the West Indian islands, which are closely allied to *Anotia* in their general characters, and in the large size of the second joint of their antennæ; but in these insects this joint forms a very long, compressed and flat plate, of equal breadth throughout, and standing out from the head; and the veins of the wings are also quite differently arranged. The following are its technical characters:

PATARA. *Westw.*

Caput mediocre, fronte in carinam parvam productâ. *Oculi* maximi, subtùs emarginati. *Ocelli* obsoleti. *Clypeus* magnus. *Rostrum* ad basin pedum posticorum extensum, articulo penultimo elongato, ultimo minuto. *Antennæ* maximæ, articulo 1mo annuliformi, 2ndo maximo compresso, latitudine æquali, verrucoso, apice subtruncato et setigero. *Prothorax* brevis; tegulæ mediocres; abdomen subbreve, in maribus lobis duobus sublunatis convexis terminatum. *Pedes* graciles, simplices; tibiis posticis inermibus. *Alæ anticæ* longitudine mediocres, apice rotundatæ, venis paucis, cellulis tribus discoidalibus contiguis subquadratis inter venam postcostalem et medianam; vena mediastina bifida, ramo postico apice bifido, ramo postcostali per medium alæ currente (TAB. II. fig. 6 C, *b*) apice bis bifido (6*); vena mediana (*c*) ad apicem ramis ferè destituta, ramo ordinario *o* cum venâ postcostali et medianâ venis brevibus *p* et *q* connexo, venâ postcostali cum medianâ venis duabus transversis versus alæ medium connexâ, cellulas quadratas supradictas formantibus.

PATARA GUTTATA. *Westw.*

TAB. II. Fig. 6 A.

Capite thoraceque fulvis, alis anticis griseo-fuscis margine omni albo-guttato.

Long. corp. lin. $1\frac{1}{4}$. Expans. alar. lin. $3\frac{1}{2}$.

Habitat in Insulâ S[ti] Vincentii, Dom. Guilding. In Mus. Dom. F. W. Hope.

Caput fulvum, oculis antennisque nigricantibus. *Prothorax* et *mesothorax* fulvi, hoc lineis tribus dorsalibus notato. *Metathorax* et *abdomen* brunneo-rufa. *Pedes* pallidè lutescentes. *Alæ* anticæ disco griseo-fusco, margine omni albo-guttato, guttâ mediâ costali majori, apicalibus rotundatis; margine ipso tenuissimo, punctis inter guttas albas sanguineis; venæ discoidales obscuriores; alæ posticæ fuscescentes venis sanguineo-fuscis.

PATARA ALBIDA. *Westw.*

TAB. II. Fig. 7.

Luteo-albida; antennis nigricantibus, alis anticis albis farinosis apicem versus fuscescenti tinctis guttis albis sanguineisque ornatis.

Long. corp. lin. 1. Expans. alar. lin. $2\frac{3}{4}$.

Habitat in Insulâ S[ti] Vincentii, Dom. Guilding. In Mus. Dom. F. W. Hope.

Pallidè luteo-albida. *Caput* angustum; oculi magni, nigro-purpurei. *Antennæ* nigricantes, compressissimæ. *Thorax* totus concolor pallidus. *Pedes* albidi. *Abdomen* paullò obscurius, appendiculis duabus (♂ genitalibus) albidis. *Alæ* anticæ albæ, farinosæ, versus apicem pallidè fuscescenti tinctæ, venis tamen ad margines apicemque alarum guttis albis terminatis, punctis sex parvis marginalibus purpureis (scil. 2 apicali-costalibus majoribus et 4 apicalibus), venis duabus transversis discoidalibus fuscis, reliquis multò pallidioribus; cellulis 3 discoidalibus subquadratis, albis, nitidis, iridescentibus; venâ primâ transversâ rectâ obscuriore; cellulâ inter venam analem marginemque internum serie duplici tuberculorum fuscorum. *Alæ* posticæ albæ, venis paullò obscurioribus.

Another minute insect inhabiting the West Indies is the type of my subgenus *Cenchrea*, which differs from all the rest in the very minute size of the antennæ, the very slightly produced front of the head, and the form and veining of the wings. The following are its characters:

Cenchrea. *Westw.*

Caput transversum; oculis magnis subtùs emarginatis. *Frons* parùm producta. *Ocelli* 2 sub oculos positi. *Antennæ* minutæ, in cavitatem circularem marginis lateralis prothoracis extensæ, articulo primo annulari, secundo brevi subrotundato tuberculato, setâ dorsali. *Rostrum* ad basin pedum posticorum extensum, articulo penultimo longo, ultimo minuto. *Prothorax* latus, lateribus dilatatis et ad angulum anticum semicirculariter elevatis. *Mesothorax* transversus, lineâ tenui mediâ elevatâ. *Abdomen* breve latum, lobis duobus terminatum. *Pedes* postici longi inermes. *Alæ* anticæ elongatæ, angulo antico apicali valdè obtuso, venis perpaucis longitudinalibus; vena mediastina (Tab. II. fig. 8 C, *a*) pone medium bifida, ramo postico ad apicem bifido; vena postcostalis etiam pone medium bifida, ramo antico bifido (*b**), ramo ordinario *o*† cum venâ postcostali medianâque venis minutis transversis *p* et *q* conjuncto.

Cenchrea dorsalis. *Westw.*

Tab. II. Fig. 8.

Pallidè testaceo-fulva; alis anticis flavescentibus margine interno fuscis apice punctis duobus purpureis notato.

Long. corp. lin. 1¼. Expans. alar. lin. 5.

Habitat in Insulâ S^ti^ Vincentii, D. Guilding. In Mus. Dom. F. W. Hope.

Caput pallidum, medio magis brunnescens; oculi magni nigri. *Thorax* pallidus, vittis longitudinalibus brunneo-fulvis. *Abdomen* fulvo-brunneum, apice pallido pulveroso. *Pedes* pallidi albidi. *Alæ* anticæ flavescentes, venis pallidis, margine externo lato fusco, strigâ parvâ obliquâ nigricanti pone medium costæ, maculis duabus purpureis in margine apicali; alæ posticæ albæ, versus medium parùm infuscatæ, venâque furcatâ fuscâ, reliquis pallidis.

† This ramus ordinarius, *o*, is as troublesome to determine, as the analogous branch emitted from the middle of the extremity of the discoidal cell in butterflies.

EXPLANATION OF THE PLATES.

N.B. The same letters and marks are used throughout the figures to indicate such of the veins of the different wings as I consider to be the analogous representatives of each other.

Tab. I.

Fig. 1. ***Derbe semistriata,*** Westw.

A. The head with the frontal carinæ and antennæ seen from above and in front.

B. The head seen sideways.

C. The same seen from beneath.

D. The fore-wing. *a*. The mediastinal vein. *b*. The postcostal vein. *c*. The median vein. *d*. The anal vein. *o*. The representative of the outer branch *o* of the median vein of ***Mysidia.*** *q*. The small transverse vein connecting the postcostal and median veins, here forming, with *o*, a branch of the postcostal vein, the veins between *o* and *oo* being branches from this vein. The shaded part. *x*, represents the supplemental part of the wing not found in *Mysidia*.

E. The hind-wing.

Fig. 2. ***Derbe strigipennis,*** Westw.

A. A part of the right fore-wing, showing the regularity of the branches † *o* and *.

B. The left fore-wing, with the same branches similarly marked.

C. The hind-wing.

Fig. 3. ***Mysidia albipennis,*** Westw.

A. The fore-wing, with the principal veins marked as above. *b** Terminal branches of the postcostal vein. *x*. The situation where the portion of the wing shaded in Fig. 1 D. is omitted in ***Mysidia.***

B. The hind-wing. *z*. The postcostal vein, simply bifid at the tip.

Fig. 4. ***Mysidia lactiflora,*** Westw.

A. The fore-wing. *o*. The terminal branch of the median vein, connected with the preceding branch of the same vein by the short branch *p*, but also at the same time so connected with the postcostal vein by the shorter branch *q*, as to appear rather as a branch of the latter than the former. *z*. The base of the second branch of the median vein.

B. The hind-wing.

C. Head seen sideways.

Fig. 5. Fore-wing of *Mysidia pallida*, Westw. *o*. The terminal branch of the median vein, being connected therewith by the curved base *p*, and quite distinct from the postcostal vein, the branch *q* being here obsolete.

Fig. 6 A. Fore-wing of *Anotia Bonnetii*, Kirb., the branch *o* being quite independent at its base either of the median vein *c*, or of the short branch *q*.

B. Part of the right fore-wing of the same, showing the two branches emitted from the apex of the large discoido-apical cell.

C. The hind-wing of the same.

Tab. II.

Fig. 1. *Diospolis elongata*, Westw. *** Longitudinal veins emitted from the postcostal vein, although analogous to the branches of the median vein of *Mysidia*.

Fig. 2. *Thracia sinuosa*, Westw.

A. Antenna.

B. Fore-wing, lettered as above. *a**. Terminal branches of the mediastinal vein. *b**. Terminal branches of the postcostal vein. *c**. Terminal branches of the median vein. *z*. The second branch of the median vein, but also connected with the postcostal vein by a short transverse vein.

C. Hind-wing.

Fig. 3. *Phenice fasciolata*, Westw.

A. Antenna.

B. Fore-wing, lettered as above.

C. Hind-wing.

Fig. 4 A. Fore-wing of *Otiocerus Degeerii*, Kirb., lettered as above.

B. Head of ditto, seen sideways.

Fig. 5. Fore-wing of *Otiocerus Coquebertii*, Kirb., lettered as above.

Fig. 6 A. *Patara guttata*, Westw.

B. Head of the same, seen sideways.

C. Fore-wing of the same, lettered as above.

D. Hind-wing of the same.

Fig. 7. *Patara albida*, Westw.

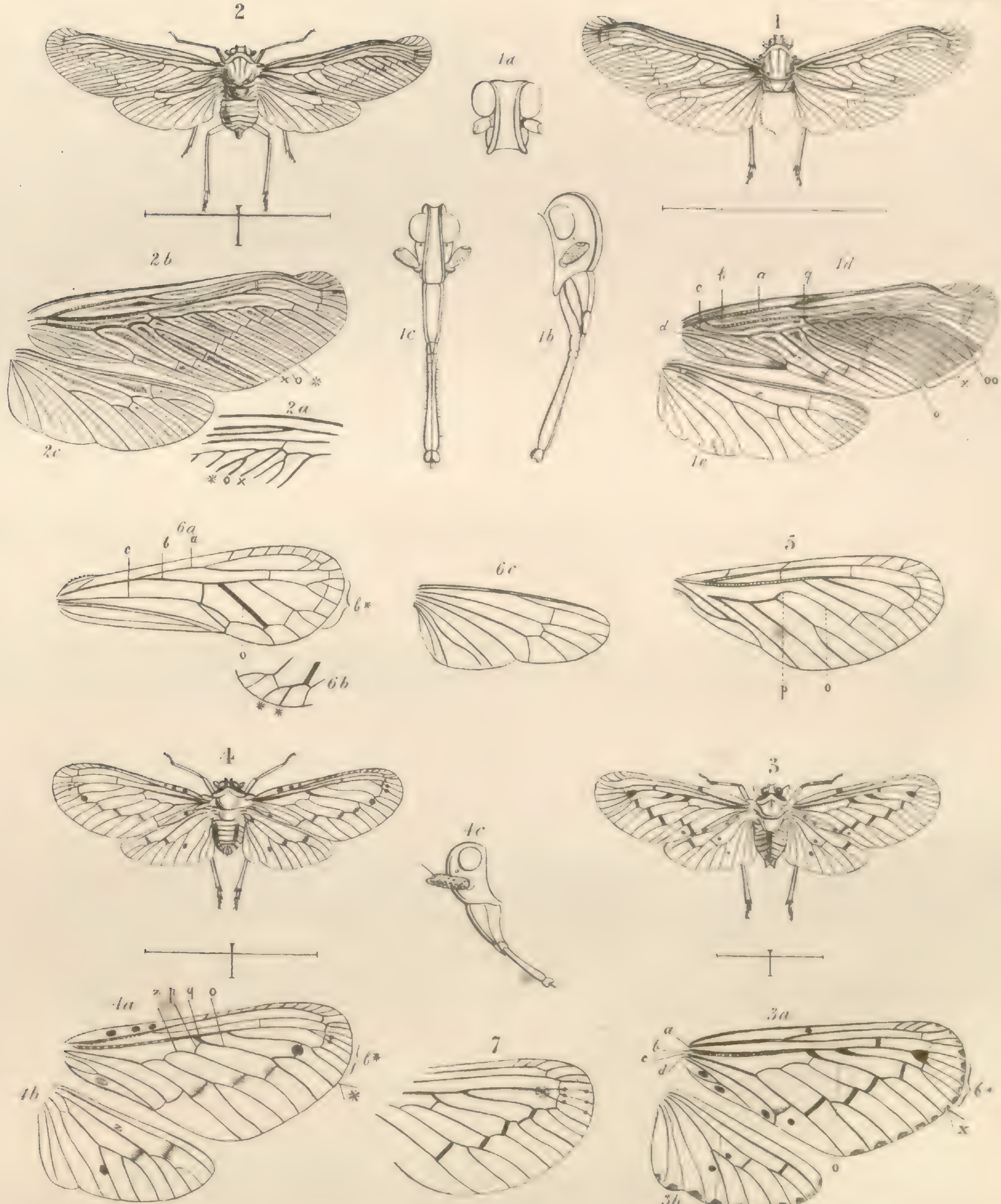
Fig. 8. *Cenchrea dorsalis,* Westw.

A. Head of the same, seen sideways.

B. Antenna extracted from the ear-like cavity at the side of the head.

C. Fore-wing, lettered as above.

D. Hind-wing.



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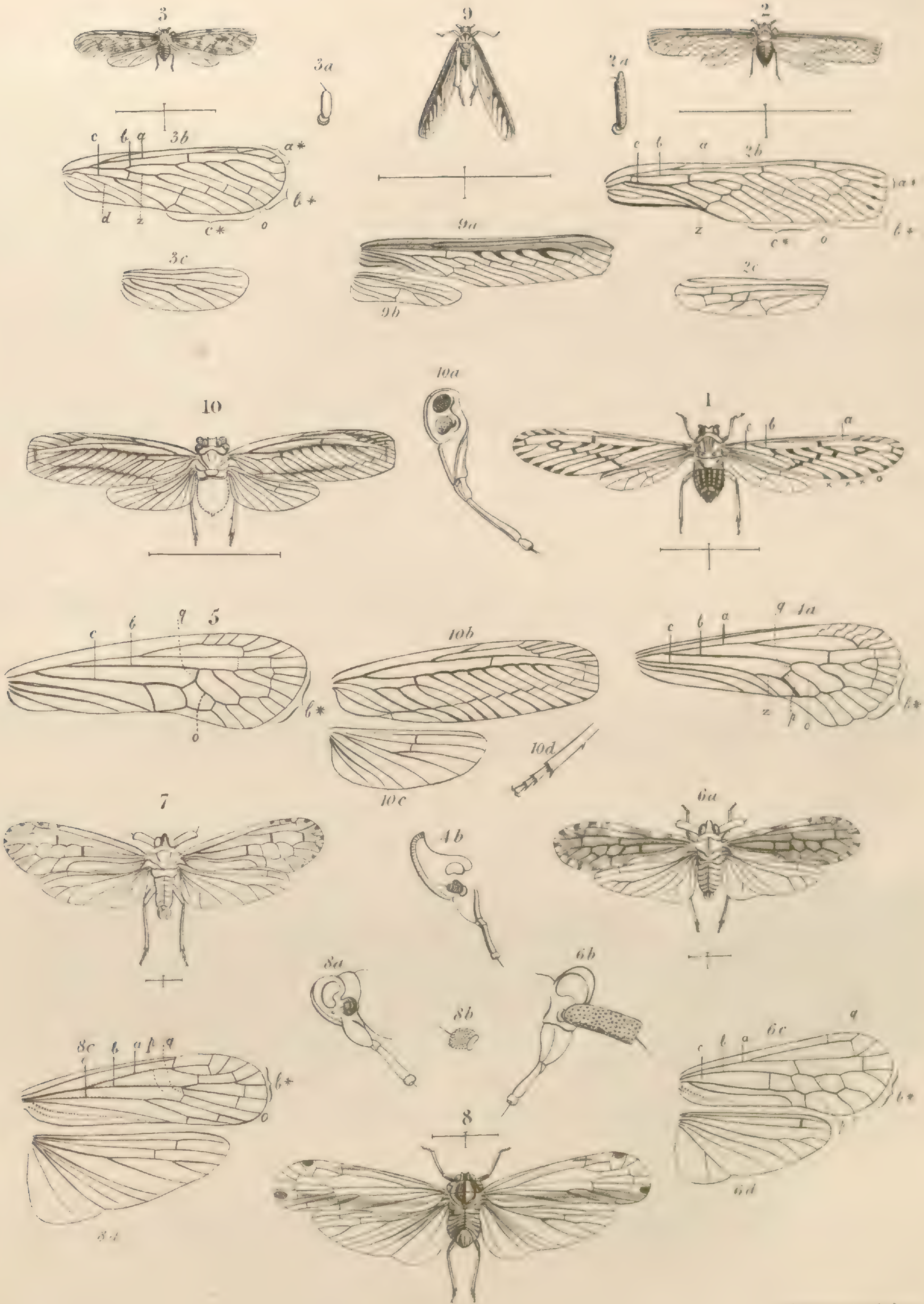
Day & Haghe Lithrs to the Queen.



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II. *Descriptions of several new Homopterous Insects belonging to various Subgenera of* Derbe *of Fabricius.* *By* J. O. Westwood, *Esq., F.L.S., &c.*

Read February 2nd, 1841.

I BEG leave to offer to the Linnean Society the following descriptions of new species of Homopterous insects belonging to various subgenera of the genus *Derbe,* illustrated by me in a paper lately communicated to this Society; one of the species forming a new and very interesting subgenus, and described from an unique specimen in the collections of this Society.

Mysidia subfasciata. *Westw.*

M. alba; alis fusco transverse nebulosis punctoque ante apicem nigro ornatis.

Long. corp. lin. 2¼. Expans. alar. lin. 9.

Habitat in Brasiliâ, D. Burchell et Swainson. In Mus. Soc. Zool. Lond. et D. Burchell.

M. albipenni valdè affinis a quâ differt prothoracis margine antico pallide fulvo aut concolori; alis magis pulverosis, albis, nebulis transversis fuscis notatis; venâ postcostali ante apicem maculâ rotundatâ nigrâ notatâ (ad basin areæ parvæ triangularis); venis tribus brevibus ex illâ areâ posticè emissis interdum bipunctatis; venis quatuor transversis ante apicem alarum nigricantibus; maculis reliquis parùm distinctis; ramo postico venæ postcostalis ad apicem irregulariter furcato; venis alarum posticarum ut in *M. albipenne* dispositis. Pedes uti in hac spècie colorati.

Thracia Javanica. *Westw.*

Tab. II. fig. 9.

T. fulva; abdomine obscuriore vittâ centrali pallidiori, alis pallide hyalinis: anticis fasciâ latâ costali fuscâ.

Long. corp. lin. 2½. Expans. alar. lin. 13½.

Habitat in Javâ, D. Horsfield. In Mus. Soc. Mercat. Ind. orient.

Statura et summa affinitas *D. sinuosæ*: fulva; abdomine paullò obscuriori, lineâ tenui longitudinali dorsali flavâ, genitalibus rufescentibus. Organa hæc externè partes sequentes exhibent, scil. laminam corneam dorsalem lateribus deflexis apice acutè bifidam, appendicibus duabus lateralibus multo minoribus conicis lobisque duobus magnis apice rotundatis inermibus concavis inferis. Mesothoracis dorsum tricarinatum; alæ pallidè hyalinæ, margine antico latè obscurè rufescenti-fusco, ad venam postcostalem extenso, basin versus pallidiori et magis suffuso; ramis quatuor posticis venæ postcostalis ad basin nigricantibus, inde margo obscurus internè sinuosus apparet; venis ramisque longitudinalibus quam in *T. sinuosâ* magis regularibus; venis in margine obscuro rufis, reliquis flavidis, ad apicem obscurioribus; venis brevibus transversis obscuris. Pedes et rostrum pallidè flavidi; tibiis posticis calcare ante apicem alteroque apicali brevi armatis.

Notwithstanding the diversity of the geographical range of this species, and the much greater regularity of the veining of its wings, I cannot even subgenerically separate it from the West African species described by Boheman, as it agrees with the latter in all its essential characters; and even the same general arrangement of the veins of the wings will be found to exist both in it and *T. sinuosa*.

Zeugma. *Westw.*

Subgenus novum, intermedium inter *Derbem* et *Mysidiam*, cum hac venâ medianâ tres tantùm ramos emittente et cum illâ ramis numerosis longitudinalibus congruens.

Caput anticè bicarinatum. *Antennæ* rotundatæ. *Ocellos* haùd detegere possum. *Rostrum* ultra basin pedum posticorum extensum, articulo ultimo brevissimo. *Prothorax* lateribus deflexis et pro antennarum receptione concavo-dilatatis. *Alæ anticæ* oblongo-ovatæ, apice subtruncatæ; venâ mediastinâ ante medium alæ bifidâ, ramo antico apice ramulos 4 obliquos emittente, ramo postico apice tres ramulos emittente; venâ postcostali ad apicem alæ currente posticèque ramos 8 emittente; venâ medianâ ramos tres tantùm emittente, ramo ultimo cum venâ postcostali venâ parvâ transversâ conjuncto; ramis omnibus longitudinalibus venæ postcostalis medianæque venâ parvâ transversâ conjunctis. *Tibiæ posticæ* calcare minuto pone medium alteroque apicali armatæ.

ZEUGMA VITTATA. *Westw.*

TAB. II. fig. 10.

Fulva; alis anticis flavidis vittâ latâ mediâ versus apicem deflexâ alterâ posticâ parallelâ apiceque vittâ abbreviatâ fasciâque tenui transversâ fuscis.

Exp. alar. lin. 10.

Habitat ——? In Mus. Soc. Linn. Lond.

I greatly regret that I can give no account of the habitat of this curious species, which is contained in the cabinet of this Society. The very peculiar colouring of the wings is owing to the more complete development of that character which is found throughout the group, namely, the tendency to an increase of colour at the base of the posterior branches of the postcostal vein, and in the small transverse veins connecting the longitudinal ones: hence in this insect we find the middle vitta extending over that part of the postcostal vein which emits the posterior branches, whilst the posterior vitta extends over the series of small transverse veins; the short transverse apical fascia in like manner covers the two very short transverse veins connecting the mediastinal with the postcostal, and the latter with its last branch. On comparing the figure of the fore-wing with that of *Derbe semistriata*, it will be found that the chief difference consists in the branches succeeding the small transverse vein (connecting the postcostal and median veins) running up to the postcostal vein; instead of being united, as in *Derbe*, to a branch which has the appearance of being a continuation of the median vein. In *Mysidia*, indeed, we find this branch wanting, and, consequently (except in the number of the branches), the fore-wings of *Mysidia* and *Zeugma* agree together.

EXPLANATION OF THE FIGURES.

TAB. I.

Fig. 7. Apex of the fore-wing of *Mysidia subfasciata*, Westw., magnified.

TAB. II.

Fig. 9. *Thracia Javanica*, Westw.

a. Fore-wing.

b. Hind-wing.

Fig. 10. *Zeugma vittata*, Westw.

a. The head seen sideways.

b. The fore-wing.

c. The hind-wing.

d. Apex of the hind leg.

III. *Some Account of* Aucklandia, *a new Genus of* Compositæ, *believed to produce the* Costus *of Dioscorides.* *By* Hugh Falconer, *M.D., Superintendent of the Hon. East India Company's Botanic Garden at Saharunpore. Communicated by* J. F. Royle, *M.D., F.R.S. & L.S.*

Read November 17th, 1840.

Ord. Nat. *Compositæ*, Tr. *Cynureæ*, Subtr. *Carlineæ*, DeCand., Prodr. 5. p. 351.

Aucklandia. *Falc.*

Char. Diff. *Capitulum* homogamum. *Antherarum* caudæ lanato-plumosæ. *Pappi paleæ* æqualiter biseriales, plumosæ, basi ternatim quaternatimve cohærentes, in annulum deciduum concretæ. *Achænium* glabrum.

Char. Gen. *Capitulum* homogamum, multiflorum. *Involucrum* ovato-globosum, imbricatum, multiseriale: squamis oblongis, adpressis, cum acumine calloso patulo in setam desinente. *Receptaculum* convexum alveolato-fimbrilligerum. *Corollulæ* æquales 5-fidæ, tubo elongato gracili basi subdilatato, fauce longiusculè ampliatâ, lobis linearibus æqualibus. *Antheræ* apice breviter appendiculatæ, basi in caudas lanato-plumosas productæ; *filamenta* glabra. *Styli rami* elongati, liberi, divergentes. *Achænium* glabrum, obovatum, crassum. *Pappi paleæ* æquales, biseriales; setis plumosis, basi ternatim quaternatimve cohærentibus, in annulum deciduum concretis.

Herba *orgyalis, perennis, alpicola, in montibus Cashmeeriensibus copiosissimè obvia*; radice *crassâ, subfusiformi-ramosâ, valde aromaticâ*; caule *simplici erecto stricto folioso*; foliis *alternis, amplissimis, sublyratìm pinnatifidis, lobo terminali maximo hastato-cordato erosè dentato, dentibus setâ terminatis*; capitulis *terminalibus, sessilibus*, 5–8 *aggregatis*; floribus *atro-purpureis.—Radix* Costus *dicta in medicinâ veterum et Arabicâ celeberrima, et Asiaticis hodiernis in usu frequentissimo, diu sed falsò a Linnæo et aliis e* Costo Arabico *inter* Scitamineas *provenisse autumata.*

Aucklandia Costus. *Falc.*

Habitat passim in elatis apertis montibus circa Cashmeer ad altitudinem 8000–9000 ped. supra mare. Floret Julio; fructus maturescit Octobri. (Vidi viv. spont. florent. et fructif.)

Descr. *Herba* subgregaria, 6–7 pedes alta, puberula; caulibus annuis; radice perenni. *Radix* irregulariter cylindracea, cartilagineo-succulenta, crassa, ramosa, odorem gratum suballiaceum valde pungentem redolens, et saporem fervidum mordicantem aromaticum demùm subamarum ferens; collo crassitie ferè carpi, 2–3-chotomo, totidem vel plures ramos emittente, deorsùm in ramulos plures divergentes, leviter flexuosos et tortos, subfusiformes, spithamam usque ad pedem longos, pollicem ad sesquiunciam crassos, diviso, undique fibras succulentas simplices vel divisas pennam anserinam crassas emittentes; epidermide leviter corrugatâ, in plantâ recenti sordidè et pallidè luteâ, in siccâ fuscâ vel griseo-nigricanti. *Caules* solitarii, vel plures fastigiatìm aggregati, quisque simplex, teres, erectus, strictus, glaber, longitudinaliter sulcatus, foliosus, basi medullâ farctus, suprà fistulosus, demum suberosus evadens; prope radicem circiter pollicem, apice pennam anserinam crassus. *Folia* radicalia longè petiolata, membranacea, alterna, erecta, amplissima, interruptè sublyratìmque pinnatifida, lobo terminali maximo, latè cordato, auriculis subhastatim angulatis, 14 uncias longo, 16 uncias lato, margine eroso-dentato dentibus setâ terminatis, suprâ glabro atro-viridi, subtùs glaucescenti, in venis puberulo; lobis lateralibus parvis sinuato-oblongis, 1–1½ pollicem longis, remotiusculis, in petiolum decurrentibus; petioli elongati, compressi, suprà canaliculati, 24–28 uncias longi: *folia* caulina remota, sursùm decrescentia, mediocritèr petiolata, deltoideo-cordata, acuta, quandoque acuminata, auriculis acutis, cæterùm radicalibus conformia. *Æstivatio* foliorum involuta, junioribus densissimè velutino-glanduliferis: venatio radiatìm divergens, venis apertè et distanter reticulatis, majoribus intra marginem anastomosantibus. *Capitula* homogama, multi- (circiter 70-) flora, terminalia, sessilia, arctè 5–8 aggregata, nunc raró in foliis supremis axillaria solitaria, 1½ unciam circiter longa. *Receptaculum* inexpansum subglobosum, demùm ovato-ventricosum, pollicem crassum: *squamæ* numerosissimæ, multiseriales, imbricatæ, oblongæ, adpressæ, inermes, cum acumine calloso, setaceo, patulo vel recurvo, inferioribus nunc squarrosis, margine ciliato-scabridæ, basi incrassatæ, juniores lanâ intertextâ vestitæ. *Receptaculum* cartilagineum, convexum, alveolatum; *alveolorum* marginibus in fimbrillas setiformes subæquales, persistentes, ovariis triplo longiores productis. *Flores* atro-purpurei. *Corollulæ* omnes hermaphroditæ, æquales, tubulosæ, 5-fidæ, extùs plus minus curvatæ, 8–10 lineas longæ, tubo elongato, gracili, limbo triplo longiore, basi subdilatato et in annulum incrassato, fauce longiuscule ampliatâ, laciniis angustè linearibus reflexis. *Stamina* 5: *filamenta* filiformia glabra; *antheræ* angustè lineares, apice breviter et acutè appendiculatæ, basi in caudas longas, plumoso vel lanato-laceras, attenuatas, productæ. *Pollen* globosum, echinulatum. *Stylus* crassiusculus, filiformis, glaber, basi bulbosus, ultra corollulam et antherarum tubum exsertus, supernè nodoso-tumefactus, ad nodum zonâ pilorum longiorum cinctus; ramis elongatis, linearibus, crassiusculis, omninò liberis, divergentibus, extùs æqualiter puberulis. *Stigmatum* series inconspicuæ et haud prominulæ, ramorum apicem attingentes ibique confluentes. *Pappus* setaceus bi-serialis sordidè luteus, corollulis paulò brevior, setis subæqualibus, plumosis, basi sublamelliformibus, ternatim quaternatimve cohærentibus et in annulum ab ovario solubilem deciduum concretis. Achænium angustè obovatum, infernè attenuatum, glabrum, medio crassum, hinc a dorso ad margines paululùm attenuatum, plerumque plus minus arcuatum, apice nectario brevi styliformi, et margine membranaceo parùm prominulo lacero coronatum, basi areolâ terminali instructum, 3–4 lineas longum, $1\frac{1}{2}$ latum. *Integumentum* exterius (pericarpicum) nitidiusculum griseo-spadiceum; intimum (endopleura) diaphanum, tenue, carneum. *Embryo* majusculus, erectus, orthotropus, angustè oblongus, leviter ad margines arcuatus, pallidè viridis; *radiculâ* brevi obtusâ; *cotyledonibus* latis, planis, dorso subconvexis, sensim nec abruptè in radiculam transeuntibus.

I have named this plant in honour of George Earl Auckland, Governor-General of India, not in compliment to his rank, but as a distinction well merited by his Lordship's services in the cause of Indian botany. The plant was met with during a journey in Cashmeer, undertaken under Lord Auckland's auspices; and its value, as yielding a useful product, makes the application appropriate to the useful direction of his Lordship's views in promoting botanical investigation in our Indian empire.

Aucklandia partakes of the characters of *Saussurea*, *Dolomiæa* and *Carlina*. Its technical difference from the first mainly rests on the characters of the pappus, which, however, in conjunction with the habit, are sufficiently marked to entitle the plant to the rank of a distinct genus.

De Candolle founds his distinction between *Saussurea* and *Aplotaxis* upon the single row of setæ in the pappus of the latter. But this ground is untenable, as a considerable number at least of the Himalayan species have really an outer row of very caducous and filiform setæ, while the inner row is more permanent. These outer setæ frequently disappear in the dried specimen, or are detected with difficulty. Probably De Candolle has drawn his inference from specimens imperfect in this respect. The fact was observed and first brought to my notice by my friend Mr. M. P. Edgeworth. *Lagurostemon*, which De Candolle comprises as a section of *Saussurea*, seems to have better claims to the rank of a distinct genus than *Aplotaxis*.

The medicinal root, celebrated among the ancients under the name of *Cos-*

tus, has long been a disputed point among botanical writers. Linnæus, upon no good grounds, conjectured it to be produced by the *Costus Arabicus*, which opinion appears to have been first disproved by Jacquin. Sprengel, in his Commentaries on Dioscorides,* states that the Arabian *Costus* was not so designated from growing in Arabia, but because it was imported from India into that country. He does not, however, hazard a conjecture about the plant which produces it. Professor Royle, in his 'Illustrations,'† gives the history of the *Costus* as found in the works of the Persian Hukeems, and correctly infers, that the "*Putchuk*" of the Calcutta bazars is the same as the Arabian *Costus*. He throws out a hint that the root might be the produce of an umbelliferous plant. Ainslie, in his 'Materia Indica,'‡ gives *Putchuck* as the Tamil synonym of *Costus Arabicus*. The necessarily limited nature of a private scientific library at a remote station in India, prevents me from entering further upon the historical part of this subject.

The account of *Costus* given by Dioscorides § is thus:—"Arabian *Costus* is the best; it is of a white colour, and light, and emits a very grateful and sweet odour. Indian *Costus* holds the second rank; it is thick and light like Ferula (καὶ κοῦφος ὡς νάρθηξ). The third sort is the Syrian, which is heavy, in colour like box-wood, and emitting a strong odour. The best *Costus* is that which is fresh, light-coloured, compact, and of firm texture, dry, not worm-eaten, devoid of an acrid smell, and which tastes hot and biting." The medicinal properties are then detailed.

The Persian Hukeems have evidently founded their account of the *Costus* upon that of Dioscorides. The best is to be found in the Tofteh-ool-moomineen ‖, which is thus:—"Kŏost (قسط) is a root resembling in appearance that of the Mandragora (Lŏofah لفاح), and comes from the borders of Hindoostan. The plant which yields it is humifuse and stemless, and has broad leaves. There are three sorts: the first, called Arabian or Ocean *Kŏost*,

* Kühn's Leipzig edition, 1830, tom. ii. p. 353.
† p. 360.
‡ vol. ii. p. 164.
§ Sprengel's edition, tom. i. p. 29. (lib. i. cap. xv.).
‖ MS., article قسط.

(Kŏost Arabee and Kŏost buhree (قسط عربي و قسط بحري), is sweet, light, white and fragrant. The second, called Indian *Kŏost*, is of a dirty yellowish colour, light, thick, bitter to the taste, and having but little fragrance. The third is of a dirty red colour, and heavy, and in weight* like box-wood, and fragrant, and without a bitter taste. What follows refers to the first sort, or sweet Kŏost. The best is what is fresh, white, not worm-eaten, and having a hot biting taste. It retains its virtues good for four years: and the difference between it and Elecampane (?) (Rasun (راسن), or Damascus *Kŏost*, is in this, that Elecampane is harder, and has not the fragrant odour and biting taste of Kŏost. Kŏost is hot and dry in the third degree; it is diuretic, revulsive, emmenagogue, hepatic, deobstruent, a universal antidote to animal poisons, attenuates the secretions, a powerful aphrodisiac, vermifuge, lithontriptic, &c. &c." He then goes on to enumerate the diseases in which Kŏost is efficacious, a list comprising nearly the whole chapter of human ills.

That the root of *Aucklandia* is the *Costus Arabicus* of the ancients, is supported on numerous grounds. 1st. It corresponds with the descriptions of the *Costus* given by the ancient authors. 2nd. The coincidence of names: in Cashmeer the root is called *Kŏot*; and the Arabic synonym is said to be *Kŏost*, both given as synonyms by the Persian Hukeems, and names by which the medicine is known in all the bazars of Hindoostan Proper; in Bengal the Cashmeer *Kŏot* is called *Putchuk*: and it appears by a note in Dr. Royle's 'Illustrations,' that Garcias ab Horto gives "Pucho" as the Malay synonym of

* The reading adopted by Dr. Royle, and what occurs in all the Persian manuscripts to which I have been able to refer, is سنگین و در وزن شبیه بچوب شمشاد, "heavy, and in weight like box-wood:" but it appears to me that this is erroneous, and that رنگ, "colour," ought to be read instead of وزن, "weight:" 1st, because the description would then accord with that of Dioscorides; 2nd, because the Persian Materia Medica authors, in hardly any one other instance, give a similitude in weight, while they constantly quote some corresponding colour; 3rd, because the root is already declared to be heavy: writing "wuzun" for "rung" is an error quite within the probable contingencies of transcription.

Costus Arabicus. 3rd. *Kŏot* is used at the present day for the same purposes in China, as *Costus* was formerly applied to by the Greeks and Romans. 4th. The direct testimony of the Persian authors, that *Kŏost* comes from the "borders of India," and that it is not a production of Arabia. 5th. The commercial history of the root gathered in Cashmeer under the name of *Kŏot.* It is collected in large quantities and exported to the Punjab, whence the larger portion goes down to Bombay, where it is shipped for the Red Sea, the Persian Gulf and China; a portion of it finds its way across the Sutluj and Jumna into Hindoostan Proper, whence it is taken to Calcutta, and bought up there with avidity, under the designation of *Putchuk*, for the China market. These proofs appear to be as conclusive as a question of the kind will admit of.

In M'Culloch's 'Commercial Dictionary*,' it is stated that "Putchok" is the root of a plant which grows abundantly in Sinde. I have no means of referring at present to his original authority; but it is probable that this is a mistake, which has originated in Sinde being one of the countries through which *Kŏot* passes in its commercial transit; in like manner as it was called *Costus Arabicus* by the ancients, from Arabia being the country from which it was brought to them.

In Ainslie's 'Materia Indica†,' "Kootka" is mentioned, on the authority of Kirkpatrick, as a root produced in Nepal. This, however, is the produce of a very different plant, and has no relation with *Kŏot*, besides the similarity of names.

Aucklandia grows in immense abundance on the mountains which surround Cashmeer; but, like certain other plants of that valley, its range of distribution in the Himalayas is very limited. It is nowhere found, except in the immediate vicinity of Cashmeer, although *Rhæum Emodi*, *Aconitum heterophyllum*, and *Rhododendron anthopogon*, the plants with which it is associated, have a very extensive range of distribution all along the western half of the Himalayan range. It does not extend northwards beyond the valley of the Krishna Gunga, where I found it near Goress. I nowhere met with it in the valley of the Indus Proper, either in or below Little Thibet. I know not

* 2nd edition, p. 959, Art. "Putchok."

† Vol. i. p. 165.

whether it occurs in the Hindoo-koosh range or no. Mr. Griffith will be able to determine this*.

Aucklandia is a gregarious plant, occupying the open, sloping, moist sides of the mountains, at an elevation of about 8000 to 9000 feet above the sea. In Cashmeer it is chiefly used for the protection of bales of shawls from worms, which its very pungent odour is well calculated to effect. It is not used by the Cashmeerians in medicine†, or, at any rate, it has but little reputation with them in that way. The same is the case in Hindoostan, where, notwithstanding the high virtues attributed to it by the Persian authors, it is hardly ever prescribed in practice. I have frequently been asked, when in Cashmeer, where and for what purpose the immense quantities of the root, annually collected, could find a market. The roots are dug up in the months of September and October, when the plant begins to be torpid; they are chopped up into pieces from two to six inches long, and exported without further preparation. The quantity collected is very large, amounting, so far as I could learn, to 10,000 or 12,000 khurwars (of 96 seers or 192 lbs. or about two million pounds per annum). In 1838, the Governor of Cashmeer had imposed a contract upon Raja Kak, the Peshcar of Kamraj, to supply 5000 khurwars from the western purgunnahs alone; the zumeendars agreeing to land the article at Somfre, a town on the Behut river below the city, for Hurry Singhee Rs. 2.8 the khurwar, including cost of collection, carriage, &c., the

* *Dolomiæa macrocephala,* belonging to a nearly allied genus of the *Carlineæ*, and having also, like the *Aucklandia,* a highly aromatic root, is well known in Cashmeer and Thibet by the name of "Dhoop" and "Googul Dhoop." It is burned as an incense in their temples by the Hindoo Cashmeerians. It occurs associated with *Aucklandia,* but, unlike the latter, it has an extensive range of distribution, stretching from Nepal to Cashmeer.

† These remarks refer to the root. From inquiries made subsequently to my leaving the valley, I am led to believe that the stem of the Kŏot plant is called "Wuft-Angil" in Cashmeer: it is suspended from the necks of children to avert the influence of the evil eye, and to expel worms. In the Punjab, to which it is exported in large quantities, the stem of the Koot is called "Mool-Guttee" (perhaps a vitiation of Mool-Kootee?), and it is used for the same purposes as in Cashmeer. I find that an article is brought from the Punjab to Jugadree in large quantities, and thence exported to Bengal under the name of "Poongee." It is said to be the stem of the Koot, and the specimens which I have seen agreed with it in every respect. I have not yet been able to follow up the history of "Poongee" in Bengal.

Hurry Singhee rupee being a debased coin, equal in value to 10 anas 8 pie of the Company's rupee, at the average rate of exchange. Taking the Company's rupee at 2*s*., and assuming Rs. Hurry Singhee 3, which it sometimes reaches, to be the average price of Kŏot per khurwar, the cost of collection and transport to a mercantile depôt in Cashmeer would be 2*s*. 4*d*. per cwt., a fact which will hardly be credited in England, and strongly indicative of the depressed condition of the valley, and of the great abundance of the article. Kŏot, however, is not allowed to reach its fair mercantile value, as the Governor keeps the trade in his own hands by forcing contracts on the zumeendars, who alone collect it. The commodity is laden on bullocks, and exported to the Punjab, whence it finds its way to Bombay, and a portion gets to Calcutta through Hindoostan. Immediately before it enters the Company's territories the value is enhanced at Jugadree on the Jumna to Company's rupees, 6. or 8. per maund, or about 16*s*. 9*d*. to 23*s*. 4*d*. per cwt. At Calcutta and Bombay it is readily bought up for the China market, where, according to the Canton price-current lists*, it fetches 13 Spanish dollars the pecul: taking the pecul at 133 lbs., and the Spanish dollar at 4*s*. 4*d*., the commercial value of Kŏot at Canton is 47*s*. 5*d*. per cwt., an immense increase upon the prime cost of the article in Cashmeer.

The Chinese burn Kŏot, like the ancients, as an incense in the temples of their gods; and they also attach great efficacy to it as an aphrodisiac. Taking into account the vast population, and the uniformity in manners and customs which prevails all over China, it is probable that the consumption of Kŏot by the Chinese is at present limited by the supply, and that they would readily take a much greater quantity than under existing circumstances finds its way into the market. The demand for the article in Cashmeer is so lively, that a surplus stock never remains in hand for any length of time; and as the plant is not an annual, but a perennial, which requires several years to mature the root into a commercial quality, it seems probable that the valley could not furnish any considerable increase upon the quantity now collected, without tending to extirpate, or, at any rate, greatly suppress the numerical amount of

* M'Culloch's Dictionary of Commerce, Art. 'Canton,' p. 237.

the plant. The Kŏot is entirely a spontaneous production, which costs no trouble besides the collection of it.

From an examination of the circumstances under which *Aucklandia* grows, and the plants with which it is associated, I have no hesitation in stating that *Kŏot* could be produced to an unlimited extent, of the best quality, in the Himalaya mountains within the British territories, at elevations of about 8000 feet above the sea. It would form a valuable addition to the native wealth of the Hill people. Some plants introduced from Cashmeer are now undergoing a trial at the experimental Garden at Mussooree.

IV. *Description of a new Genus of* Lineæ. *By* Charles C. Babington, *Esq., M.A., F.L.S., F.G.S.*

Read January 19th, 1841.

THE addition of a new genus to the small order *Lineæ*, and one which tends to establish more fully the relationship of that family to *Malvaceæ*, cannot but be considered as an interesting circumstance. Our plant approaches *Malvaceæ* by its perfectly closed indehiscent single-seeded carpels, the coats of which are peculiarly thick and hard; and there is also an apparent tendency to that imperfect gynobasic structure which exists in *Malvaceæ*. It differs from the usual structure of *Lineæ* by having petals which are imbricated, not twisted, in æstivation, and not unguiculate, although slightly attenuated below; and by the remarkably thick coats of its one-seeded perfectly closed carpels, which do not open even when the capsule falls to pieces for the purpose of disseminating the seed.

Cliococca.

Char. Essent. *Sepala* 5, integra. *Petala* 5, in æstivatione imbricata. *Stamina* 5. *Capsula* 10-locularis; loculis clausis, indehiscentibus.

Char. Gen. *Sepala* 5, rarissimè 4, ad $\frac{1}{3}$ partem coalita, integra, persistentia, in anthesi erecto-patentia, per æstivationem imbricata, cum pedunculo continua, æqualia vel inæqualia, 2 exteriora. *Petala* 5, sepalis alterna, oblonga, vix basi attenuata nec unguiculata, decidua, in æstivatione imbricata. *Stamina* 5, petalis alterna et breviora, æqualia, angulis ovarii prominentibus opposita; filamenta subulata, basi ovata, in annulum hypogynum connata, dentibus totidem brevibus interjectis; antheræ cordato-ovatæ, biloculares. *Ovarium* angulis 5 rotundatis, basi et apice truncatum, apiculatum: decem-loculare, septis infra verticem desinentibus; loculis uniovulatis, binis connexis. *Styli* 5, staminibus breviores, angulis ovarii prominentibus alterni, omninò distincti, filiformes; stigmata capitata. *Capsula* subglobosa, basi et apice truncata, 10-locularis: loculis distinctis, clausis, dorso sulcatis, binis intùs connexis, indehiscentibus, monospermis, parietibus crassis; demùm in folliculos decem indehiscentes dirupta. *Semen* oblongum, compressum, nitidum, læve.

Herba (*Australasiaca*) *perennis, multicaulis*; foliis *undique sparsis, lineari-subulatis*; floribus *terminalibus, subcymosis, parvis, purpureis.*

C. tenuifolia.

Species unica. Perennis. *Caules* e basi lignoso plurimi, parùm ramosi, procumbentes. *Folia* sparsa, linearia, crassa, paginâ superiore convexa, inferiore obtusè carinata, acuta, aristata. *Inflorescentia* cymosa, dichotoma. *Pedunculi* brevissimi, uniflori, terminales. *Flores* parvi. *Sepala* inæqualia, ovato-lanceolata, apice attenuata, acuta, aristata, integerrima, persistentia, 3–5-nervia, viridia vel in superiori parte fusco-rufescentia. *Petala* 5, oblonga, decidua, vix basi attenuata, haud unguiculata, viridia, apice rotundata, purpurea, sepalis duplò breviora. *Staminum* filamenta subulata, basi dilatato-ovata, dentibus brevibus alternis interjectis, in annulum hypogynum connata, petalis breviora. *Antheræ* cordato-ovatæ. *Capsula* matura truncata, stylorum basibus persistentibus coronata, in superiori parte fusco-purpurea, sepalis brevior.

Hab. in Australiâ. Floruit in Horto Botanico Cantabrigiensi mense Julio.

This interesting little plant was raised from seeds gathered in the interior of New South Wales by Mr. Melluish, whilst accompanying a party in pursuit of bushmen, and sent by him to the Cambridge Botanical Garden about four or five years since, where it has now flowered during three successive years.

The generic name refers to the indehiscent nature of the carpels, and is derived from κλείω, "to close," and κόκκος, "a grain or carpel."

EXPLANATION OF TAB. III.

Fig. 1. *Cliococca tenuifolia*, of the natural size.

2. A portion of one of the branches, with an entire leaf, and a second cut transversely, magnified.
3. An expanded flower, magnified.
4. The same, with the calyx and petals removed.

Fig. 5. Two of the stamina, with the intermediate squamulæ.
6. A separate petal.
7. Æstivation of the calyx.
8. The ripe fruit, with a portion removed, showing the interior of one of the cells cut longitudinally, and three others cut transversely, magnified.
9. One of the cells of the ripe fruit, seen from without, magnified.
10. A lateral view of the same.
11. A transverse section of the same.
12. Seed.
13. Embryo.

V. *On an edible Fungus from Tierra del Fuego, and an allied Chilian Species.* By the Rev. M. J. Berkeley, *M.A.*, *F.L.S.*

Read March 16th, 1841.

A VERY interesting account is given in 'Darwin's Researches,' p. 298, of a production which occurs very commonly in Tierra del Fuego, on *Fagus betuloides*, and forms a very important article of food to the natives. From his description, it is clear that it is referrible to the order *Fungi*, though its immediate affinities are very obscure. I was, therefore, highly gratified at having the specimens preserved by Mr. Darwin submitted to me for inspection by the kindness of Professor Henslow; and Mr. Darwin has himself been so good as to send me his original notes. I have thus been enabled to establish a new and highly curious genus, containing two well-defined species, and to ascertain with tolerable certainty its position in the mycologic system. One or two points, indeed, remain to be cleared up, but must be left to some botanist who may have an opportunity of examining these Fungi in their place of growth.

Mr. Darwin has referred me to a posthumous list of Fungi collected by Bertero, published originally in a journal, called 'Mercurio Chileno,' of which a translation by Ruschenberger is given in Silliman's 'North American Journal,' vol. xxiii. p. 78, containing a notice of a Fungus gathered in Chile, on *Fagus obliqua*, evidently congeneric with the Fuegian species. Mr. Darwin was also so fortunate as to meet with specimens which afford materials for the establishment of this second species.

Previous to detailing the characters of the genus and species, I shall beg leave to give copious extracts from Mr. Darwin's notes, which, it is to be observed, are to be regarded as loose memoranda, affording merely materials for publication, but of which the value would be much impaired by a bare analysis; and also to transcribe the greater part of the passage from Bertero's list.

"In the beech forests," says Mr. Darwin, speaking of Tierra del Fuego, "the trees are much diseased; on the rough excrescences grow vast numbers of yellow balls. They are of the colour of the yolk of an egg, and vary in size from that of a bullet to that of a small apple; in shape they are globular, but a little produced towards the point of attachment. They grow both on the branches and stems in groups. When young they contain much fluid and are tasteless, but in their older and altered state they form a very essential article of food for the Fuegian. The boys collect them, and they are eaten uncooked with the fish. When we were in Good Success Bay in December they were then young; in this state they are externally quite smooth, turgid, and of a bright colour, with no internal cavity. The external surface was marked with white spaces, as of a membrane covering a cell. Upon keeping one in a drawer, my attention was called, after some interval, by finding it become nearly dry, the whole surface honeycombed by regular cells, with the decided smell of a Fungus, and with a slightly sweet mucous taste. In this state I have found them during January and February (1833) over the whole country. Upon dividing one, the centre is found partly hollow and filled with brown fibrous matter; this evidently merely acts as a support to the elastic semitransparent ligamentous substance which forms the base and sides of the external cells. Some of these balls remain on the trees nearly the whole year; Captain Fitzroy has seen them in June.

"Feb. 1834. Port Famine. When young, colour 'ochre-yellow and Dutch-orange' of the Wernerian nomenclature; smell strong; taste sweet. From the root a hollow vessel passes to the centre, from which white ligamentous rays extend through the semi-gelatinous mass to the bottom of the cells.

"June 1834. Found some* very turgid, and highly elastic; a section of the central parts white, and the whole, under a high power, looking like a vermicelli pudding, from the number of small thread-like cylinders. At about one-twentieth of an inch from the external surface, there were placed, at regular intervals, small cup-shaped bodies, one-twelfth of an inch in diameter, of a bright 'Dutch-orange.' The cup was filled with adhesive, elastic, colourless, quite transparent matter; and hence at first appeared hollow. The upper

* One of these specimens is represented at (*b*.), and a section of a smaller one, fig. 4.

edge of the cup was divided into conical points about ten or twelve in number, and these terminated in an irregular bunch of the above-mentioned threads; the cup was easily detached from the surrounding white substance, excepting at the fringed superior edge. Over the cup was a slight pit in the exterior surface; this afterwards becomes an external orifice to the cup, when the gelatinous mass has perhaps formed seeds."

Mr. Darwin found them much infested with larvæ, to which undoubtedly the cavity in many specimens is owing.

The following observations in Mr. Darwin's notes refer to the species noticed by Bertero:—

"Sept. 1834. On the hills near Nancagua and San Fernando there are large woods of Roble, or the Chilian oak. I found on it a yellow fungus, very closely resembling the edible ones of the beech of Tierra del Fuego. Speaking from memory, the difference consists in these being paler coloured, but the inside of the cups of a darker orange. The greatest difference is, however, in the more irregular shape, in place of being spherical: they are also much larger. Many are three times as large as the largest of my Fuegian specimens. The footstalk appears longer; this is necessary from the roughness of the bark of the trees on which they grow. In the young state there is an internal cavity. They are occasionally eaten by the poor people. I observe that these are not infested with larvæ, like those of Tierra del Fuego."

The account in Bertero's list is as follows:—

"*Fagus obliqua,* Mirb., *Roble,* oak, a tree common in the high mountains. In the spring is formed on the branches of this tree a great number of whitish tubercles, the parenchyma of which is spongy, though sufficiently consistent at first. I thought it a galla or excrescence, produced by the wound of some insect, as is seen on some other trees in Europe, and I gave the matter but little attention; but two days afterwards they became unglued from the branch, and I observed with surprise that the skin was broken, and the whole surface covered with pentagonal tubes precisely similar to the alveoli of a honeycomb, at first full of a gelatinous substance of the colour of milk, which disappeared with the maturation; afterwards throwing out from these cavities with some force an impalpable powder, when it was touched, exactly as is observed in the *Peziza vesiculosa.* At the end of two days these bodies softened, lost their expulsive property, and rotted. It perhaps forms a new genus, approximating to the *Sphæriæ.* Its vulgar name is *Dignénes.* Some persons eat them, but their insipid and styptic taste is disagreeable."

Cyttaria.

Receptacula carnoso-gelatinosa in stroma commune subglobosum, epidermide crassiusculâ vestitum, aggregata; basi stipitiformi granulatâ. *Cupula* peripherica, primò clausa, gelatinâ distenta, demùm epidermide ruptâ aperta. *Hymenium,* margine excepto, separabile. *Asci* ampli, distincti, demùm liberi, paraphysibus immixtis. *Velum* persistens demùm ruptum, margine plus minus reflexo. *Sporidia* pallida.

Genus Bulgariæ *affine, sed stromate pulvinato ex variis individuis composito* Sphæriam *concentricam quodammodo referente, et hymenio separabili valdè diversum. Certè ad seriem* Pezizarum *pertinet, perithecio spurio non obstante. Confer* Sphæriam monocarpam *Schum. ad* Pez. rhizopodam *a clar. Friesio ascriptam. Nomen dedi a κύτταρος ob superficiem fungi alveolatam.*

Spec. 1. Cyttaria Darwinii.

Vitellina; globoso-depressa; cupulis parvis ore irregulari demùm apertis.

Hab. in *Fagum betuloidem* in Tierra del Fuego. Dec.—Jun.

Small specimens, half an inch in diameter, are globose, but depressed above and below so as to resemble a little button-mushroom; strongly umbilicate below, with the edges of the umbilicus slightly puckered, and supported by a short brown stem ($1\frac{1}{2}$ line high, 2 lines thick), which proceeds from the umbilicus and is granulated like shagreen, as if beset with a small, black, parasitic *Sphæria.* Epidermis tough, very smooth and shining. A vertical section presents a brown fibrous mass springing from the stem, which gives off on every side elongated radiating bodies divided from each other by a dark line, but which do not separate easily from one another. The divisions of the internal mass towards the circumference are more minute but well marked, and the epidermis quite distinct. In this state there is not the slightest trace of the peripherical cups.

In a more advanced stage of growth, when the balls are from 1 to 2 inches in diameter, the cups first begin to appear, the interior presenting in other respects nearly the same appearance as before, except that the divisions are larger. They are formed beneath the cuticle, and are at first covered by a portion of the matrix. The cuticle becomes depressed, though still tough and thick. The hymenium is separable in a body from the surrounding substance, except at the top, but I have not been able to detect either the toothed edge noticed by Mr. Darwin, or the gelatinous contents which had perhaps been dispersed by the spirit in which the specimens were preserved. The cells or cups themselves are ovate, lined almost to the top by the hymenium, which is, however, at present not perfectly developed. The substance interposed between the top of the cells and the cuticle is gradually absorbed, and the cuticle itself becomes thinner and tightly stretched over the cavity, and at length bursts and forms a membranous border to the irregular orifice. The margin appears to be a little reflected, but I could not ascertain this point accurately. The hymenium is now perfect, and consists of very slender paraphyses, and abundant, large, slightly flexuous asci, which contain eight sporidia, whose original form could not be made out, as they were contracted by the action of the alcohol. With the sporidia are a few globose granules. The asci at length become free, in which case they are generally slightly swollen at the base, and at last, in old specimens, there is scarcely any trace of them in the hymenium, which consists of the paraphyses only. When the cups are quite formed and perforated, the cellular arrangement of the contents of the balls has wholly vanished, and there are only a few faint radiating lines in place of the regular divisions. The whole substance is composed of branched, more or less flexuous threads. Occasionally the stem is not at all distinct, and the general form less globose, probably from the individuals having grown more deeply in the fissures of the bark. In the largest specimen figured there were traces of fine punctures, which had evidently arisen from the whole surface having been granulated like the stem in an early stage of growth, as some of the punctures below had still a little black granule set in them. There were besides other dots, which appear to indicate the position of undeveloped cups.

I have considered all the Fuegian specimens as belonging to one species. It is possible, however, that the larger specimens may prove distinct, though the differences, which are not apparently important, more probably arise from the period of the year at which they were gathered, as noticed above in Mr. Darwin's notes.

Spec. 2. Cyttaria Berteröi.

Pallidior irregularis, basi subelongatâ, cupulis majoribus: ore pentagono: margine fisso reflexo.

Hab. in Chili in *Fagum obliquam* vere et æstate.

Paler than the last, $1\frac{1}{2}$—3 inches in diameter, not regularly globose, as in the last, but produced at the base. Cups large, 3-10ths of an inch or more broad: aperture more or less decidedly pentagonal, bordered by the revolute margin, which is split into portions corresponding with the sides of the aperture. Asci more slender and longer than in the last; sporidia elliptic, smaller, separated by a granular mass. The flesh in the full-grown plant, which alone I have seen, is mottled, consisting of branched flexuous filaments. There are a few black granules about the base.

This species is clearly very distinct. I have described the asci and their contents as observed in specimens preserved in spirits. They are very different from those of *Cyttaria Darwinii.* The colour of the cuticle in the preserved specimens is brown, so that they strongly resemble potatos. In the other species the preserved specimens are nearly colourless.

King's Cliffe, March 2, 1841.

EXPLANATION OF TAB. IV.

Cyttaria Darwinii.

Fig. A. *Cyttaria Darwinii,* in various stages of growth.

a. Young specimen.

b. Large specimen, before the hymenium is perfected.

c, c. Specimens in which the hymenium is perfected but the epidermis not yet ruptured.

d. Elongated form, in which some of the cups are perforated.

e. Full-grown specimen, with all the cups exposed.

1. Section of (*a.*) magnified.
2. Portion of the substance, highly magnified.
3. Section of stem, magnified to show the granules.
4. Section of specimen resembling (*b.*), in which the hymenium is scarcely perfected.
5. Section of a small specimen in which the hymenium is perfected and the cups perforated.
6. Portion of substance of ditto, from between the cups, with a fragment of the epidermis attached; highly magnified.
7. Section of one of the cups magnified, in which the hymenium is just perfected, showing that the cup is lined with it nearly throughout. The part above (β,β) is at length confluent with the epidermis, and bursts.

8. Asci with sporidia, highly magnified; two of the asci (*a, a*) are swollen at the base and just ready to become free.
9. Portion from an old specimen, highly magnified: showing the paraphyses and empty asci.

Cyttaria Berteröi.

Fig. B. *Cyttaria Berteröi*, nat. size. One specimen, from some accident, has not attained its normal form.

1, 1. Sections of the two normal specimens.
2. Orifice of one of the cells, magnified.
3. Portion of the substance, highly magnified.
4. Asci and sporidia, highly magnified.

VI. *Synopsis of the Coleopterous Family* Paussidæ; *with Descriptions of a new Genus and some new Species. By* J. O. Westwood, *Esq., F.L.S., &c.*

Read June 1st and 15th, 1841.

ELEVEN years ago I had the pleasure of submitting to this Society a monograph of the remarkable family of beetles named *Paussidæ*, which was honoured by publication in the 16th volume of the Society's Transactions. Since that period numerous additions have been made to the list of species, and even of genera, and our acquaintance with the structure of some of the previously described species has been rendered more perfect. I avail myself, therefore, of the opportunity offered by the occasion of presenting to the Society the description of several additional new species, to add an entire synopsis of the species now known, feeling convinced that the extreme rarity of the insects, of many of which we are still acquainted with only single specimens, will render this supplement to my former memoir acceptable.

Of the genera regarded in my monograph as belonging to this family, one, Trochoideus, must be removed, as an examination of its cibarian organs has proved that it belongs to the *Endomychidæ*. I am now acquainted with four, if not five species of this genus.

Sp. 1. *Tr. cruciatus*, Dalm. [Linn. Trans. xvi. p. 675.]
In Gum Copal.

Sp. 2. *Tr. Dalmanni*, Westw. in Trans. Ent. Soc. ii. p. 96. pl. 10. f. 8.
Madagascar.

Sp. 3. *Tr. Desjardinii*, Guér., Rev. Zool., No. 2. p. 22. Westw. in Trans. Ent. Soc. ii. p. 97.
Island of Mauritius.

Sp. 4. *Tr. Americanus*, Buquet in Guér. Rev. Zool., June 1840, p. 174.
Bogota, Columbia.

Sp. 5.? *Tr. Hopei*, Westw. ined. Possibly identical with *T. Americanus.*
New Granada. In Mr. Hope's Collection.

The following is a synopsis of the genera really belonging to the family, two additional ones being introduced, which have been discovered since the publication of my monograph.

Antennæ quasi biarticulatæ:
  Caput thorace haud immersum, collo distincto, ocellis nullis.
    Palpi labiales articulo ultimo elongato . . . . 1. Paussus.
    Palpi labiales articulis æqualibus . . . . 2. Platyrhopalus.
  Caput immersum, ocellis duobus . . . . 3. Hylotorus.
Antennæ quasi 6-articulatæ:
  Prothorax angulis anticis valdè productis . . . . 4. Pentaplatarthrus.
  Prothorax transversus, angulis anticis rotundatis, posticis valdè emarginatis . . . . 5. Lebioderus.
  Prothorax truncato-cordatus . . . . 6. Ceratoderus.
Antennæ quasi 10-articulatæ . . . . 7. Cerapterus.

Genus 1. Paussus, *Linn.*

The species of this genus might be formed into subgenera from the variations in the formation of the club of the antennæ, the joints of the maxillary palpi, the form of the thorax and of the feet, the number of spurs to the tibiæ, and the geographical distribution. I shall, however, in this place divide them only as heretofore into two primary groups from the form of the thorax.

A. Thorax quasi bipartitus.

a. Antennarum clava posticè haud excavata.

Sp. 1. *Paussus microcephalus*, Linn. [Linn. Trans. xvi. p. 631.]
Africa?

Sp. 2. *P. Jousselinii*, Guér., Rev. Zool., No. 2. p. 21. Trans. Ent. Soc. ii. p. 90.
Near Rangoon.

Sp. 3. *P. Linnæi*, Westw. [Linn. Trans. xvi. p. 634.]
Habitat unknown.

Sp. 4. *P. Burmeisteri*, Westw., Trans. Ent. Soc. ii. p. 86. pl. 9. f. 3.
Cape of Good Hope.

Sp. 5. *P. rufitarsis*, Westw. [Linn. Trans. xvi. p. 638.]
Habitat unknown.

Sp. 6. *P. pilicornis*, Donov. [Linn. Trans. xvi. p. 643.]
Bengal.

Sp. 7. *P. turcicus*, Frivaldsk. Hung. Trans., 1835. Westw. in Trans. Ent. Soc. ii. pl. 10. f. 2.
Balkan Mountains.

b. Antennarum clava posticè excavata.

Sp. 8. *P. thoracicus*, Donovan. [Linn. Trans. xvi. p. 640.]
Bengal.

Sp. 9. *P. Fichtelii*, Donovan. [Linn. Trans. xvi. p. 641.] Saunders, in Trans. Ent. Soc. vol. ii. pl. 9. f. 1.
Bengal.

Sp. 10. *P. fulvus*, n. sp.

Luteo-fulvus subopacus, elytris magis rufescentibus, antennarum articulo basali thoracis lateribus posticè femoribusque obscurioribus, capite suprà profundè impresso.

Long. corp. lin. 3.

Habitat in Indiâ Orientali.

Caput pone oculos thorace paullò angustius, luteo-fulvum, subopacum, tenuiter punctatum, lineâ impressâ medianâ e margine antico ad verticem ductâ, in impressionem magnam orbicularem lateribus elevatam desinente; antennarum articulus basalis punctatus; clavâ magnâ, latâ, ovatâ, depressâ, luteâ, margine antico parùm irregulari, postico dilatato profundè excavato, margine omni sinuato, angulo externo basali valdè obtuso. *Prothorax* bipartitus; parte anticâ paullò latiori, lateribus angulariter productis; mediâ profundè transversim impressus, lateribus utrinque elevatis. *Elytra* prothorace multò latiora, rugosula, opaca. *Pedes* valdè compressi; tibiis calcaratis, posticis latioribus.

Sp. 11. *P. tibialis*, n. sp.

Castaneus nitidus, elytris singulis plagâ magnâ nigrâ, tibiis 4 anterioribus elongatis; posticis multò latioribus compressis, antennarum clavâ posticè profundè excavatâ.

Long. corp. lin. $2\frac{3}{4}$.

Habitat in Bengaliâ. In Mus. D. Westermann.

Castaneus; caput thorace paullò angustius, lateribus pone oculos obliquis punctatis, lineâ impressâ longitudinali medianâ ad verticem ductâ; antennarum clavâ subovatâ, margine antico acuto curvato, parte posticâ incrassatâ et profundè excavatâ, sinûs marginibus ferè integris; angulo basali externo subacuto. *Palpi* maxillares articulo 2ndo maximo, rotundato-dilatato, apice emarginato, articulis 3tio 4toque minutis. *Prothorax* capite paullò latior, bipartitus; parte anticâ, lateribus obtusè angulatis, in medio transversè elevatâ; parte posticâ in medio profundè impressâ, lateribus tenuibus, elevatis. *Elytra* thorace latiora, posticè sensim dilatata, fulvo-castanea, disco nigro nitido. *Tibiæ* 4 anteriores tenues, subcylindricæ; 2 posticæ breviores, latiores, compressæ.

Sp. 12. ***P. excavatus***, Westw. [Linn. Trans. xvi. p. 637.]
Senegal.

Sp. 13. ***P. ruber***, Thunb. [Linn. Trans. xvi. p. 635.]. Westw. in Trans. Ent. Soc. vol. ii. pl. 9. f. 5.
Cape of Good Hope.

Sp. 14. ***P. Stevensianus***, n. sp.

P. pallide luteus, capite rugosulo; tuberculis duobus elevatis inter oculos, antennarum clavâ magnâ posticè excavatâ, elytris apicem versus fasciculis duobus minutis pilorum instructis.

Long. corp. lin.

Habitat in Indiâ Orientali. In Mus. D. Stevens.

Caput thoracis ferè latitudine, pallidè luteum, rugosulum, angulis posticis pone oculos parùm rotundatis, collo distincto, lineâ longitudinali impressâ e fronte ad verticem capitis ductâ, tuberculis duobus elevatis summo apice excavatis, inter quæ et oculos utrinque linea tenuis impressa. *Antennæ* punctatæ; clavâ magnâ, margine antico acuto, curvato, postico valdè excavato, marginibus excavationis sinuato-tuberculatis, angulo basali externo in dentem obtusum producto. *Prothorax* bipartitus, partis anticæ lateribus acutè angulatis, carinâ transversâ elevatâ, in medio interruptâ; parte posticâ utrinque elevatâ, in medio depressâ. *Elytra* pallidè luteo-subnitida, posticè obscuriora, parùm rugosula, thorace ferè duplò latiora, posticè utrinque versus angulos posticos fasciculo pilorum rigidorum parvo. *Pedes* elongati, tenues, punctati; tibiis posticis parùm latioribus; tarsis distinctè 5-articulatis. *Palpi* maxillares articulo 2ndo latissimo. *Calcaria* obsoleta, setis nonnullis brevibus tamen ad apicem tibiarum internum, ut et in apice articulorum tarsi. *Abdominis* articulo penultimo in medio fisso. *Caput* et *thorax* subtùs pallida; mesosterno abdomineque obscurioribus.

I have only seen a single specimen of this species in the collection of Samuel Stevens, Esq., who obtained it, together with specimens of *Platyrhopalus denticornis* and *P. aplustrifer*, in a small collection of Indian insects, without any indication of its precise locality.

Sp. 15. *P. cochlearius*, Westw. in Trans. Ent. Soc. vol. ii. pl. 9. f. 6.
South Africa.

Sp. 16. *P. Klugii*, Westw. in Trans. Ent. Soc. vol. ii. pl. 9. f. 2.
Cape of Good Hope.

B. Thorax subcontinuus.

a. Species Africanæ.

Sp. 17. *P. sphærocerus*, Afzel. [Linn. Trans. xvi. p. 643.]
Sierra Leone.

Sp. 18. *P. armatus*, Dej. [Linn. Trans. xvi. p. 644.]. Westw. in Trans. Ent. Soc. vol. ii. p. 89. pl. 9. f. 7. *a, b, c*. *P. cornutus*, Chevrolat in Guér. Mag. Zool., Ins. pl. 49. and details 1 *b*. and 1 *c*.
Senegal.

Sp. 19. *P. curvicornis*, Chevrolat in Guér. Icon. R. An., Ins., pl. 40. f. 8; and Rev. Zool., No. 2. p. 21. Westw. in Trans. Ent. Soc., vol. ii. p. 89. *P. cornutus*, var.? Chevr. in Guér. Mag. Zool., Ins. pl. 49. f. 1 *a* 2. and 2 *a*.
Senegal.

Sp. 20. *P. Shuckardi*, Westw. in Trans. Ent. Soc., vol. ii. p. 87. pl. 9. f. 4.
South Africa.

Sp. 21. *P. lineatus*, Thunb. [Linn. Trans. xvi. p. 647.]
Cape of Good Hope.

Sp. 22. *P. affinis*, Westw. [Linn. Trans. xvi. p. 646.]
Africa*.

b. Species Indicæ.

Sp. 23. *P. cognatus*, n. sp.

Rufo-castaneus nitidus punctatus, elytris singulis plagâ magnâ nigrâ, capite anticè lineâ tenui impressâ; vertice impressionibus duabus semicircularibus, antennarum clavâ subovatâ basi extùs in hamum productâ.

Long. corp. lin. 4.

Habitat in Bengaliâ. In Mus. DD. Melly et Westermann.

P. affini, W. valdè affinis; differt magnitudine majori, impressionibus verticalibus, abdomi-

* On the authority of the British Museum Catalogue I am now able to give *Africa* as the habitat of *P. affinis*. If it were possible that a mistake had been made as to this locality, I should consider the species to be Indian, and that it and *P. cognatus* are not specifically distinct.

nis formâ, ut et loco natali. *Caput* trigonum, punctatum, lineâ tenui impressâ abbreviatâ, e margine antico verticem versus ductâ, vertice ipso impressionibus duabus semicircularibus in medio conjunctis; antennarum clavâ parvâ, thorace haud longiori, ovatâ, angulo basali externo in hamum producto. *Prothorax* cordato-truncatus, parte anticâ capite paullo latiori, lateribus rotundatis, dorso in medio impresso; margine postico parùm latiori. *Elytra* fulvo-castanea, nitida, disco nigro. *Abdomen*, segmento penultimo in medio paullò fisso; apicali brevissimo, transverso, utrinque tuberculo minuto instructo. *Pedes* subbreves, parùm compressi; tibiis breviter bicalcaratis.

Sp. 24. *P. Saundersii*, n. sp.

Fulvo-rufescens subnitidus punctatus, capite thoraceque obscurioribus, antennarum clavâ oblongo-ovatâ basi extùs in hamum setigerum productâ.

Long. corp. lin. 3¼.

Habitat in Indiâ Orientali. In Mus. D. W. W. Saunders.

Affinis *P. cognato*; differt tamen clavâ antennarum longiori, elytris unicoloribus, &c. *Caput* inter oculos impressionibus duabus semicircularibus notatum. *Antennarum* clava obscura, luteo-setosa, oblongo-ovata, margine carinato, angulo basali externo in hamum setigerum producto. *Prothorax* cordato-truncatus, in medio transversè impressus, impressione utrinque in tuberculum parvum laterale desinente; parte anticâ paullò elevatâ, lateribus rotundatis; margine postico parùm latiori. *Elytra* thorace multò latiora, sensim dilatata, fulvo-rufescentia, subnitida, punctata, setosa. *Pedes* longitudine mediocres; tibiis subcylindricis apice breviter bicalcaratis, tarsis distinctè 5-articulatis. *Palpi* maxillares articulo 2do magnitudine mediocri.

Sp. 25. *P. Hardwickii*, Westw. [Linn. Trans. xvi. p. 649.]
Nepaul.

Sp. 26. Sp. inedit. *Latr.* [Linn. Trans. xvi. p. 651.]
Isle of France.

Obs. P. ruficollis, Fabr. [Linn. Trans. xvi. p. 650.] is given by Dr. Erichson as one of the *Malachii*, and as identical with his *Collops* 4-*maculatus* (M. 4-maculatus, *Fabr.*).

Genus 2. Platyrhopalus. *Westw.*

Sp. 1. (27.) *P. denticornis*, Donov. [Linn. Trans. xvi. p. 657.]
East Indies.

Sp. 2. (28.) *P. unicolor*, Westw. [Linn. Trans. xvi. p. 659.] *P. denticornis*, Gyll., Schönh.
East Indies.

Sp. 3. (29.) *P. acutidens,* Westw. [Linn. Trans. xvi. p. 661.]
Nepaul.

Sp. 4. (30.) *P. Westwoodii,* Saunders in Trans. Ent. Soc., vol. ii. p. 84. pl. 10. f. 5.
East Indies.

Sp. 5. (31.) *P. angustus,* Westw. in Trans. Ent. Soc., vol. ii. p. 92. pl. 10. f. 6.
East Indies.

Sp. 6. (32.) *P. Melleii,* Westw. [Linn. Trans. xvi. p. 683.]; and in Trans. Ent. Soc., vol. ii. pl. 10. f. 4. Guérin, Icon. R. An., Ins. pl. 40. f. 11.
Malabar.

Sp. 7. (33.) *P. aplustrifer,* Westw. [Linn. Trans. xvi. p. 664.]
Bengal. Also in M. Westermann's Collection; and certainly belonging to this genus.

Sp. 8. (34.) *P.? lævifrons,* Dej. [Linn. Trans. xvi. p. 661.]
Senegal.

Sp. 9. (35.) *P.? dentifrons,* Dej. [Linn. Trans. xvi. p. 662.]
Senegal.

Genus 3. Hylotorus. *Dalm.*

Sp. 1. (36.) *H. bucephalus,* Gyll. [Linn. Trans. xvi. p. 654.]
Sierra Leone.

Genus 4. Pentaplatarthrus. *Westw.*

Sp. 1. (37.) *P. Paussoides,* Westw. [Linn. Trans. xvi. p. 619.]
South Africa. I have seen specimens in the Royal Collection at Berlin, and in the Cabinets of Messrs. Shuckard and Children.

Genus 5. Lebioderus. *Westw.*

Sp. 1. (38.) *L. Goryi,* Westw. in Trans. Ent. Soc., vol. ii. p. 94. pl. 9. f. 8.
Java.

Genus 6. Ceratoderus, *n. g.*

Corpus oblongum, depressum. *Caput* transverso-quadratum, posticè collo instructum, disco inter oculos bi-impresso. *Antennæ* quasi 6-articulatæ, articulis 4 intermediis transversis, planis, ultimo semicirculari. *Maxillæ* minutæ, planæ, corneæ, apice acutæ, curvatæ, intus sub apice dente acuto armatæ. *Palpi* maxillares 4-articulati, articulo 2do magno ovali, 3tio 4toque minoribus subcylindricis; *palpi labiales* articulo ultimo præcedenti haud multo majori, ovato, apice truncato. *Prothorax* capite vix latior, cordato-truncatus, trans medium lineâ impressâ. *Elytra* oblongo-ovata, depressa. *Pedes* breviusculi; femoribus tibiisque compressis, his apice haud calcaratis; tarsis distinctè 5-articulatis, articulo basali sequenti longiori.

Sp. 1. (39.) *C. bifasciatus.*
P. bifasciatus, Kollar in Ann. Wien. Mus. 1836, t. 31. f. 7. *a*, *b*. Westw. in Trans. Ent. Soc., vol. ii. p. 91. pl. 10. f. 3.
East Indies.

Genus 7. Cerapterus. *Swederus.*

Sp. 1. (40.) *C. latipes,* Swed. [Linn. Trans. xvi. p. 669; and xviii. p. 582.]
Bengal.

Sp. 2. (41.) *C. Horsfieldii,* Westw. [Linn. Trans. xvi. p. 670; and xviii. p. 583.]
Java.

Sp. 3. (42.) *C. 4-maculatus,* Westw. [Linn. Trans. xviii. p. 583.]
Java.

Sp. 4. (43.) *C.* (Orthopterus, MacL.) *Smithii,* MacL. [Linn. Trans. xviii. p. 583.]
South Africa.

Sp. 5. (44.) *C.* (Arthropterus, MacL.) *MacLeaii,* Donov. [Linn. Trans. xvi. p. 672; and xviii. p. 584.]
New Holland.

Sp. 6. (45.) *C.* (Phymatopterus, Westw.) *piceus,* Westw. [Linn. Trans. xviii. p. 584.]
New Holland.

Sp. 7. (46.) *C.* (Homopterus, Westw.) *Brasiliensis,* Miers. [Linn. Trans. xviii. p. 584.]
Brazil.

Sp. 8. (47.) *C.* (Pleuropterus, Westw.) *Westermanni,* Westw. [Linn. Trans. xviii. p. 585.]
Java.

VII. *On a reformed Character of the Genus* Cryptolepis, *Brown.* *By* Hugh Falconer, *M.D., Superintendent of the Hon. East India Company's Botanic Garden at Saharunpore. Communicated by* J. F. Royle, *M.D., F.R.S., F.L.S., &c.*

Read June 15th, 1841.

Cryptolepis, *R. Brown in Mem. Werner. Soc.*, vol. i. p. 69. (*Vermischte Botanische Schrift.*, ii. p. 405.).

Char. Gen. *Calyx* 5-partitus. *Corolla* infundibuliformis, 5-fida; tubo intus processubus 5, carnosis, obtusis, inclusis, cum limbi laciniis alternantibus, instructo; fauce nudâ. *Stamina* imo corollæ tubo inserta, inclusa; filamenta brevissima, distincta; *antheræ* sagittatæ, dorso penicillato-barbatæ, basi stigmatis margini adhærentes. *Massæ pollinis* solitariæ, granulosæ, corpusculi glandulæformis appendiculæ lineari tenuissimæ applicitæ. *Ovaria* 2. *Stylus* brevissimus. *Stigma* dilatatum, margine attenuatum, apiculo conico. *Squamulæ hypogynæ* nullæ. *Folliculi* divaricatissimi, ventricosi, acuti, recti. *Semina* ad umbilicum comosa.

Frutex *volubilis, glaberrimus, succo lacteo scatens*; foliis *oppositis, brevè petiolatis, latè ellipticis, cum acumine subulato brevi, suprà lætè virentibus, subtùs albido-glaucis, transversi venosis*; petiolis *supra basin articulatis*; corymbis *axillaribus, brevè pedunculatis, curtatis*; floribus *subsessilibus, majusculis, citrinis*, corollæ *limbo patulo, segmentis ligulatis.*

Cryptolepis Buchanani, Rœm. et Schult. Syst., iv. p. 409.
C. reticulata, *Royle Illustr.*, p. 270.
Nerium reticulatum, *Roxb. Flor. Ind.*, ii. p. 9.
Hab. passim in Indiâ Orientali.

Mr. Brown, in his celebrated monograph, in the 'Memoirs of the Wernerian Society,' refers the genus *Cryptolepis*, which he there establishes, to the *Apocyneæ*, placing it next to *Apocynum*. He has been followed in this respect by all subsequent systematic authors. I find the same position assigned to it by the latest authorities, such as Endlicher, Lindley, &c., who seem to have taken Mr. Brown's definition on trust, from not having had an opportunity of verifying it by an appeal to specimens of the plant. But besides these authors, Dr. Wight, the last writer on the Indian *Asclepiadeæ*, in his excellent Monograph (p. 64), states that *Cryptolepis Buchanani* belongs to the *Apocyneæ* ; and as he had the revision of Dr. Royle's collections in the *Asclepiadeæ*, it is probable that some specimens were open to his examination, taken from the same plants in the Saharunpore garden which yielded the characters given in my definition. Yet it is very evident that the plant described above has the whole of the accessory stigmatic apparatus of *Asclepiadeæ,* with granular pollen as typically developed as in *Cryptostegia* or any other of the *Periploceæ*, although in a less considerable degree of evolution ; and that it must rank in that order along with them.

The extreme minuteness of the appendiculæ in *Cryptolepis* might possibly account for their eluding even the keen glance of Mr. Brown, directed to the dry specimen. But there are two other points of difference between the characters which I have noticed and those given by him, which lead me to suspect that my plant must be distinct from the one examined by that great observer. He mentions five hypogynous scales in his generic definition, whereas in my plant I do not find a trace of them. And it may be observed in reference to this point, that hypogynous scales are wanting (so far as I have the means of ascertaining) in the series of Periploceous genera allied to *Cryptolepis*. *Decalepis* of Wight and Arnott forms no exception ; as, in it, the lower whorl of scales is attached to the base of the tube, and not hypogynous. Mr. Brown further states the corymbs to be interpetiolar ; whereas, in the species noticed by me, they are axillary, a character of considerable importance in the habit. Roxburgh ('Flor. Ind.,' vol. ii. p. 9.) makes mention of this, in the description of his *Nerium reticulatum.*

It may not be out of place to add a few particulars regarding the characters of the sexual organs. The stamens arise from the bottom of the tube of the corolla ; the filaments are distinct and very short ; the anthers very thin and membranous, of a triangular or sagittate shape, very acute, and supplied at the back with a bearded pencil of hairs. They are connivent over the stigmatic head with their edges closely adjoining, and agglutinated at the base to its thinned margin. The pollen is scanty, and not collected in masses of definite aggregation, the grains being in a lax state of cohesion, but not quite free. It differs in this respect considerably from the pollen of *Cryptostegia* ; which is applied to the appendiculæ, cohering in a web-like mass. The compound stigmatic head is of a dilated and well-defined pentagonal form, with an abbreviated conical apex. The margin is thinned off to rather a fine edge, which at each of the five angles is notched with a sharp and rather deep emargination: the corners of these notches are tipt with a moist and viscid looking denuded surface, differing in appearance and texture from the rest of the margin of the stigmatic head. Leading up from these emarginations to the apex of the stigma, there are five straight, shallow, narrow, converging furrows, along which are laid as many very delicate, narrow-oblong or linear, bronze-coloured, horny-looking, transparent, membranous straps or appendiculæ. The lower end of these appendiculæ is attenuated where it passes through the marginal notch, and is applied to the centre of an oval, thin, delicate glandular corpuscle, which stretches across the notch, adhering to its under surface, and placed in contact with the moist tips of its angles. They have no adhesion at the fecundating stage with the furrows on which they lie, and are readily detached, while the glandular corpuscle sticks with considerable tenacity to the angles of the stigma. Pollen grains in irregular aggregations are strewed interruptedly over the surface of the appendiculæ, which is viscid. Compared with the same organ in *Cryptostegia*, these appendiculæ are extremely minute.

I have examined a great number of flowers, with the object of finding some of the pollen grains emitting their tubes at some point along the margin of the stigma, with an instrument quite equal to the observation; and tried in some cases to excite the pollen artificially by applying it to the viscid corners of the notches, but without success in either case. The extensive laceration of the floral envelopes, and the rapid evaporation from the wounds during the hot months in India, followed by very speedy withering, were at least sufficient to account for the failure.

Cryptolepis, although an unquestionable Periploceous *Asclepiadea*, appears to constitute the closest known transition from that family to the *Apocyneæ*, in the very reduced state of evolution of the accessory stigmatic apparatus, as compared with the other *Periploceæ*; in the lax aggregation of its pollen-grains; and in a portion at least of the stigmatic margin being in the ordinary condition of a denuded and secreting surface.

Since the above remarks were written (July last), I have learnt by letters from Dr. Wight and Mr. Griffith, that both have been long aware of *Cryptolepis* being an *Asclepiadea*, Dr. Wight having ascertained the fact soon after his return to India.

Messrs. Wight and Arnott have arranged the mass of Wallich's Indian species of *Periploca* under their new genus *Streptocaulon*, the distinction of which is founded on the beardless anthers, and the flexuous direction of the aristæ of the scales. One of their species, *S. calophyllum*, is common in the Himalayas, and in it I find that the anthers are pointed and somewhat bearded; it has also shining leaves, and the follicles are parallel or divergent, not divaricate. A new species of the same group, from the neighbourhood of Cashmeer, with a peculiar pseudo-aphyllous habit, has the anthers decidedly bearded, and the aristæ of the throat-scales flexuose. The separation of either from *Periploca* seems hardly admissible; and I suggest that *S. calophyllum* be replaced under *Periploca*, along with the Cashmeer species, of which the characters are subjoined. Messrs. Wight and Arnott, the original constructors of *Streptocaulon*, had their doubts about its claims to rank as a distinct genus.

1. *Periploca calophylla.*

Volubilis glabra, foliis angustè lanceolatis longè attenuatis utrinque nitidis transversè venosis, cymis subsessilibus paucifloris, floribus breviter pedicellatis, corollâ intùs parcè hirsutâ, squamis hirsutissimis, folliculis elongatis gracilibus subparallelis (nec divaricatis!).

Streptocaulon calophyllum. *Wight, Contr.*, p. 65.

Hab. Passim in vallibus exterioribus montium Himalensium.

2. *Periploca Hydaspidis.*

Volubilis ramosissima glabra, ramis fasciculatis nodoso-articulatis, foliis tenuissimis linearibus apiculatis adpressis remotis caducis, cymis axillaribus multifloris, floribus breviter pedicellatis, corollâ intùs squamisque tomentosis.

Hab. Secus ripas Hydaspidis extra Cashmeer prope "Khutao Kelah." Fl. Septembri.

EXPLANATION OF PLATE V.

Fig. A. A flowering branch of *Cryptolepis Buchanani.*

1. A corolla seen from above.

2. Limb and upper part of the tube of the corolla removed, showing the calyx, and the anthers closely connivent over the top of the stigma.

3. The same seen erect.

4 and 5. Anthers, front and back views. N.B. The shade near the margins in fig. 4. indicates the slits of the cells, which are more marked than represented in the figure.

6. The same as fig. 2, but the anthers removed to show the *appendiculæ* in situ: considerably enlarged.

7. Stigma and ovaria, &c., seen erect; the corpuscles and their appendiculæ removed, to show the viscid corners of the notches, which are enlarged a little out of proportion.

8. Stigma seen from above; the corpuscles removed.

9. Stigma seen from below (turned upside down), to show the gland-like corpuscles stretching across the notches, and applied to the viscid corners. (N.B. Not well executed.)

10, 11 and 12. Corpuscles and their appendiculæ, with pollen grains strewed over the latter. (N.B. No attempt by the native artist to show accurately the form or mode of aggregation of the grains.)

13. Nearly ripe follicles.

14 and 15. Structure of the follicles.

16. The unripe seeds.

G. Jarman

VIII. *Notes on the Habits of the Box-Tortoise of the United States of America.* Cistuda Carolina, *Gray.* *By* George Ord, *Esq., F.L.S., &c.*

Read November 2nd, 1841.

THIS animal is common in Pennsylvania, where it is known under the names of Land-Tortoise and Land-Turtle. It appears to be more attached to dry situations than to those which are wet; and when found in the latter, it may be conjectured that some favourite food had attracted it thither. In the swamps where the night-heron (*Ardea nycticorax*) breeds, we may be sure of finding the Land-Tortoise feeding upon the remains of the fish which lie scattered under the trees inhabited by the herons. This tortoise seems to prefer animal food when in a putrid state. Insects and worms, and the various kinds of tender mushrooms, are its common fare. On strawberries, raspberries, and soft peaches it feeds greedily.

The flesh of this harmless animal is excellent; but our farmers seldom eat it, through a prejudice similar to that which prevents them from eating frogs. Some few years ago, a retired naval officer took up his abode in the county of Bucks, Pennsylvania. This gentleman, being an epicure, commissioned the boys in the neighbourhood to procure him bull-frogs and land-tortoises. This strange attachment to heathenish food was the occasion of our officer's conduct being viewed with suspicion: indeed some gossips ventured to affirm that the poor man had lost his reason.

The Box-Tortoise hibernates in the earth. About the middle of October it retires to its winter-quarters, which are well selected in regard to convenience and warmth, a loose soil and a southern exposure being desirable. A heap of decayed brush-wood is not unfrequently chosen as a cover to its retreat. In severe winters some of these animals perish, in consequence of not having penetrated the earth to a depth beyond the reach of frost. About the 20th of April the tortoises reappear. On emerging from their hibernacle they are feeble, and do not use much exercise until invigorated by a warm atmosphere.

I kept a number of these animals for several years in my garden, where they had ample range, abundance of suitable food, and convenient places of winter retreat. Notwithstanding these advantages, they but seldom produced young, although they regularly deposited their eggs in the earth at the proper season. This I am induced to attribute to the circumstance of the eggs having been destroyed by the pismires, as happened in an instance hereafter to be related.

From my books of memoranda I make the following extracts:—

"1814. *June* 22, *Wednesday*. This evening, about sunset, I beheld one of my land-tortoises in the act of digging a place of deposit for her eggs. She scooped out the earth with her hind-feet, using them alternately. The hole was dug as deep as she could reach, and the earth at the bottom was loosened, after a sufficiency had been removed to the surface. The first egg was secured in the loose earth at the bottom of the hole; in four or five minutes another egg was laid, and disposed of in the same manner; and so on, until six eggs were laid, about the same time elapsing between each. The earth was now scraped from the sides of the hole (which was also done after each egg had been laid), and carefully pressed upon the eggs; and finally she reached that upon the surface, scraping it into the hole by degrees, and packing or treading it at intervals. All this ceremony occupied a considerable time; and she had not finished filling up the hole when I left the place, which was about nine o'clock. She kept in one position during the whole process, except what change her motions made in digging and covering. The eggs appeared to come from her with all the facility and speed of fæces. Shortly after laying the last egg she uttered a guttural sound, several times repeated. She wrought altogether with her hind-feet, alternating frequently; and did not once look at the deposit during the operation.

"*June* 23. This morning I examined the deposit, and found the hole so carefully covered up, that its exact situation was not visible without search. There was the appearance of urine having been ejected upon the spot. I removed the eggs into a box partly filled with earth, which box I have placed upon the roof of an out-house. My tortoises lay every season, but the eggs do not hatch: this must be owing to the ants eating them. Though I have kept tortoises for several years, I have never known more than two or three instances of their breeding. There is in my garden at present one tortoise, which was hatched there three or four years ago: it is now not more than half-grown.

"Where the eggs laid in the deposit the cavity was roundish; the upper part of the hole was oblong.

"On the evening of the *24th of June* 1813, I saw one of my tortoises preparing a deposit for her eggs; and her mode of proceeding was similar to that of the one above-mentioned. However, I did not see her lay owing to the approach of darkness. The next morning I examined her nest, and perceived in it three eggs. I marked the spot, and re-examined it in the autumn, but found only the shells of the eggs; and these shells had no fœtal indications about them.

"The eggs in the box, mentioned above, shared the fate of the others; they were destroyed by the pismires.

"*Tuesday, June* 26, 1832. Being a few days ago in the country, I procured ten individuals of our land-tortoise, the greater part females. These were set at large in our garden. This evening, after sunset, I observed three of them in the act of digging holes wherein to deposit their eggs. The approach of night prevented my seeing them lay. Two of them having been disturbed, they abandoned the place.

"*June* 27. One of the before-mentioned tortoises succeeded in depositing her eggs, and carefully covered them up as usual. I have placed stakes around the spot. The hole was dug entirely with the hind-feet, as in the instance before related.

"*June* 29. Yesterday evening, just before sunset, one of the tortoises which had been disturbed when about to lay, dug out a fresh hole and deposited her eggs. It would hence seem that these animals possess the power of retaining their eggs, when circumstances occur to render it necessary.

"*July* 2. This evening, at the usual hour, two of my tortoises laid.

"*July* 3. Another tortoise deposited her eggs near the spot selected by one of those of yesterday. Some of these tortoises, if not all of them, have laid twice this season.

"*Monday, September* 24. This day one of the eggs of the deposit of the 28th of June was hatched; it was the uppermost egg. I took notice of the young just as it struggled out of the shell: it seemed to be almost blind; its case was very soft or cartilaginous; and in the centre of the under shell, or between the abdominal and the femoral shields, there was a large umbilical process. This animal was tolerably active, although the earth was cold from the effects of a north wind: it could crawl with ease. It measured an inch in length on the upper shell. I looked at four other deposits, and found the eggs in an apparently good state. I have removed eight of these eggs, and secured them in a box of loose earth, in the hope that the embryos will be matured. From the foregoing dates, it appears that the egg laid eighty-eight days in the ground before it was hatched.

"*Saturday, September* 29. I examined yesterday the deposit of the eggs of the tortoise which laid on the 26th of June. I could not perceive that any of them were hatched. The ants having commenced eating the shell of the uppermost egg, I removed it and opened it: it contained a perfectly-formed fœtus, attached to a yolk-bag, which, from the size of the latter, together with the quantity of albumen, wherein the whole floated, led me to believe that the animal would not have come forth for some days yet: it is alive: it measures an inch in length on the upper shell: the yolk-bag is three quarters of an inch long.

"*September* 30. The young tortoise, mentioned yesterday, which I had placed carefully in a bed of cotton, died last night.

"Examined another deposit, and found all the eggs addled.

"*October* 14. This morning another young tortoise appeared, from the deposit of the 28th of June. It is livelier and larger than that first hatched, measuring an inch and three quarters in length on the upper shell: its eyes are completely open. It is probable that this tortoise has been brought forth some days, although it did not succeed in working its way to the surface of the earth until this morning. When I first observed the one which appeared on the 24th of September, it had the shell adhering to it.

"*Monday, October* 15. This morning another young tortoise made its appearance: it is of a size between the other two. All three seem to be in good health.

"I inspected the deposit from which the three tortoises proceeded, and found a fourth one yet in its shell, but struggling to get free. The nest contained five eggs. One egg was addled.

"The last young one, still in its shell, I replaced into the earth, near the surface; and in the afternoon it succeeded in disengaging itself, and came forth. It is rather larger than any of the rest. The one first hatched is the smallest of all. The difference between the age of the first and that of the last is worthy of note; it being no less than twenty-one days. The first remained in the shell eighty-eight days; the last, one hundred and nine days. But this difference may have been owing to the first egg's having been near the surface of the earth, and, consequently, having possessed the advantage of the sun; and yet the egg which I opened on the 28th of September, and which contained a living young one, was also near the surface, in a warm spot. If I had not opened this egg, I doubt whether its embryo would have been matured much before this date.

"The old tortoises are now preparing to latibulize. They conceal themselves in their retreats during the cool weather, and come out on a warm day.

"*October* 21. Examined the eggs which I placed in a box of earth on the 24th of September. Found them heavy and plump; opened one of them: it contained a living young, not quite so large as that mentioned on the 29th of September. The yolk-bag was considerably larger than that of the other; and so great was the quantity of albumen, that the moment I made an orifice with my penknife, it spouted out with force. The albumen did not entirely fill the cavity of the egg opened on the 28th of September; there was a large dint in it when I took it from the earth.

"*December* 1. The old tortoises have all retired into their winter quarters.

"Finding that no more young ones came forth, I took up all the eggs that I had any knowledge of. Every egg contained a fœtus, each having a pretty large yolk-bag, showing that they were not yet sufficiently matured for exclusion. One contained an embryo hardly a fourth part as large as the rest, though its form was nearly complete. Two only of the eggs contained living young; the rest appeared to have been dead for some days, as the yolk-bags were disengaged from the animals, and showed signs of decomposition, although they had not become putrid. We have had some severe frosts this season: the surface of the ground has been hardened by them, and these have, doubtless, occasioned the death of the embryos.

"It should seem that the late summer did not prove sufficiently warm to favour the production of these singular animals; for with all the advantages which our garden affords, (and it lies well exposed to the sun,) out of upwards of twenty eggs, but four brought forth mature young. One of these four escaped from the inclosure some days ago: the remaining three I have placed near some old tortoises; and have spread hay over the *latibulum*, to guard them from the rigours of winter."

In the month of March, 1833, I removed to the country; consequently I lost the opportunity of making any further observations on the tortoises which remained at the city residence. I learned, however, that the young ones reappeared in the spring with the adults, and lived in the garden for several years.

Philadelphia, September 26, 1840.

IX. *On the existence of Spiral Cells in the Seeds of* Acanthaceæ. *By Mr.* Richard Kippist, *Libr. L.S. Communicated by the Secretary.*

Read March 17th, 1840.

THE existence of spiral cells in the envelopes of the seed, has, as regards several families, been long known among botanists. They were first discovered by Mr. Brown in the pericarps of *Casuarineæ*, and subsequently in the testa of some *Orchideæ*. Lessing detected them in *Compositæ*; Horkel and Schleiden in *Labiatæ*, *Polemoniaceæ*, and *Hydrocharideæ*; and Dr. Lindley has published in the 'Botanical Register' a detailed account of their appearance in the seeds of *Collomia*. As, however, I am not aware that any author has yet noticed their occurrence in those of *Acanthaceæ*, and as I have been fortunate enough to meet with them in many species of that family, presenting, as it appears to me, some peculiar characters, and in some cases attaining an unusual degree of development, I venture to hope that the following account of my observations may not prove unacceptable to the Linnean Society.

My attention was first directed to this subject by witnessing the very beautiful appearance under the microscope of an Acanthaceous seed, forming part of a collection brought by Mr. Holroyd from Upper Egypt, and presented by him to Professor Don. It is of a lenticular form, covered, especially towards the margin, with whitish hairs, which are closely appressed to the surface, and glued together at their extremities, so as rather to resemble corrugations of the testa than distinct hairs; on being placed in water, however, they are set at liberty, and, expanding on all sides, are seen to consist of fascicles of long, cylindrical, transparent tubes, firmly cohering for about one-third of their length, and presenting all the characters of spiral vessels. These fascicles usually contain from five to twenty tubes; each tube inclosing one, two, or occasionally even three spiral fibres, which adhere closely to the membrane.

The fibre may be sometimes seen to divide into two in the upper part of a tube, the branches usually continuing distinct; sometimes, however, after making a few turns, they again coalesce. Towards the free extremity of the tube the fibre is frequently broken up into a number of distinct rings; and in other cases the spire again becomes continuous, after having been interrupted by two or three such rings. In those portions of the tubes which adhere together the fibre is completely reticulated; towards the extremity, the coils, though quite contiguous, are usually distinct, and readily separate by the expansion of the tube; in the intermediate parts they adhere more firmly together, being connected by slender ramifications of the main fibre. The expansion of the hairs in water is accompanied by a copious discharge of mucilage, which makes its escape by distending and finally rupturing laterally the spiral tubes in which it is contained.

The testa, which is distinctly visible in the spaces between the hairs, consists of nearly regular hexagonal cells, each containing an opake mass of grumous matter, which, not filling the entire cavity, leaves a wide transparent border. Cells similar to these, but more elongated and gradually passing into the form of tubes, immediately surround the base of each hair, which appears to be filled up by a conical mass formed of the transparent tubular portions.

The seeds brought home by Mr. Holroyd unquestionably belong to a species of *Acanthodium*, and were at first considered by Professor Don to be those of *Acanthodium spicatum*, an opinion which seemed to be confirmed by their striking resemblance to the figure and description given by Delile in the botanical part of the great French work on Egypt*; but having been since favoured by the kindness of Mr. Brown with a seed from an authentic specimen of

* The following is Delile's account of the seed of *Acanthodium spicatum* from the work above quoted:—

"Les graines sont couvertes de poils blancs, couchés de bas en haut et comme collés, qui naissent de la tunique de la graine: ces poils, lorsque l'on met la graine dans l'eau, la retiennent d'abord flottante par l'air qui occupe leurs intervalles; il se dégage presque aussitôt, et la graine tombe au fond de l'eau; elle se hérisse de toutes parts par les poils qui se dressent à sa surface: les rangs de poils couchés sur les bords de la graine se séparent les uns des autres et presque simultanément, après ceux des faces de la graine; ils sont surtout longs et abondans sur ses bords, et sont coudés par leur extrémité libre que l'on voit se déployer dans l'eau du sommet vers la base de la graine. Ces poils mouillés se couvrent et sont agglutinés par un enduit visqueux, transparent."

Delile's plant, I have carefully compared the two, and although to the naked eye the resemblance both of the seed and capsule is very striking, the result of a careful microscopic examination has left some doubt of their identity. As yet no seedlings have been raised of Mr. Holroyd's plant, and unfortunately he possesses no specimen.

The cells of the testa appear to me to be somewhat smaller in Mr. Holroyd's seeds than in Delile's, but they certainly do not differ very materially in this respect, the principal distinction between them being that in the former the spiral fibre adheres closely to the membrane, whilst it is usually quite free in the latter, the expansion of the fluid within the cell frequently detaching a portion of the membrane and exposing the fibre, which is often singularly confused and entangled: as, however, they agree in every other particular, it may be a question whether the difference observable in Delile's seed be anything more than the result of age destroying the elasticity of the fibre, and thus preventing it from expanding simultaneously with the membrane. What renders this the more probable is, that I find an entire conformity in the fibre of another species of *Acanthodium* gathered many years ago by Mr. A. P. Hove in the Lymree desert of Guzerat, for which I am also indebted to Mr. Brown. This seed bears a very close resemblance to the two already described, in the structure both of the testa and the investing hairs, which here also are formed of partially-cohering cylindrical tubes, containing one or two spiral fibres; but the hairs are more thinly scattered in the Indian seed, and consist of a smaller number of tubes (about 5—8).

The peculiar appearances of these seeds induced me to extend my inquiries to other genera of the same natural family, with the view of ascertaining how far the tendency to develope spiral hairs on the testa prevails among them, and whether that peculiarity might afford any assistance in characterizing genera. Although the presence of spiral cells is by no means universal in *Acanthaceæ*, yet I have met with many examples of them, and with a considerable diversity in the structure and arrangement of the hairs which clothe the seeds.

Besides *Acanthodium*, the only other genus in which I have met with fasciculate hairs is *Blepharis*, of which I have examined three species, two of them natives of India (*B. boerhaaviæfolia* and *B. molluginifolia*), the other *B. rubiifolia*, for which I am indebted to the kindness of Mr. Brown, being from the banks of the Congo. In all three the structure of the testa and its appendages is very similar to that of *Acanthodium*, but differs in the following particulars:—

First. The testa is less transparent than in *Acanthodium*, the cells being formed of thicker membrane, smaller, and more nearly filled with dark grumous matter, and the cells surrounding the bases of the hairs are precisely similar in form to the rest, not elongated, as in *Acanthodium*. Secondly. The hairs consist of a larger number of tubes (sometimes amounting to fifty), which are quite cylindrical, not compressed, of nearly equal diameter throughout their whole length, and containing a thicker and more loosely coiled spiral fibre. This fibre is very generally single; and instead of being reticulated in the coherent portions of the tubes, it either continues spiral, or is disposed in distinct rings, which are separated from each other by an interval of four or five times the width of the fibre; whereas in *Acanthodium* the coils are usually quite contiguous. The species differ from each other only in a few unimportant particulars, chiefly in the size and number of the tubes composing the hairs, which are smaller and more numerous in *Blepharis molluginifolia* than in either of the others. In *B. rubiifolia* they appear to me to be rather larger, and occasionally, but very rarely, contain two spiral fibres.

Although the fasciculated hairs already described are, as we have seen, of rare occurrence in *Acanthaceæ*, many species of that family have their seeds abundantly supplied with appendages, which, notwithstanding that they do not adhere together, are evidently of the same nature. The most common form of these appendages is that of subulate tubes or hairs, usually so closely appressed as not to be perceptible upon the dry seed, but expanding in water, and often discharging abundance of mucilage from their extremities. They are very generally furnished with an internal fibre, which is disposed either in a spiral manner, or in distinct rings, and both forms frequently occur in the same tube. They sometimes occupy the entire surface of the seed, sometimes they are confined to its margin. Examples of spiral hairs covering the entire surface are afforded by many species of *Ruellia*. In *R. formosa* the hairs are short, thick and blunt, shaped somewhat like icicles; and the fibre, which is always simple, usually takes an annular form, sometimes becoming spiral towards the base of the hair; those of *R. strepens* have the fibre disposed in rings towards the extremity, but spiral and not unfrequently branched in the lower part. The mucilage is very copious, and may be seen to flow from the extremity of the tube, carrying with it a quantity of granular matter, which slowly dissolves in water. A row of dark spots, apparently formed of the same substance as the granules, may be sometimes seen adhering internally to one side of the tube.

Of the genus *Hygrophila*, whose seeds have a close analogy to those last described, I have examined five species, *H. salicifolia*, *H. quadrivalvis*, *H. obovata*, *H. phlomoides*, and *H. radicans*, and find in all a striking resemblance of structure: the seed is entirely covered with moderately long, blunt-pointed tubes, densely crowded together, and furnished with numerous closely-approximated rings, the fibre being seldom spiral. On the application of water an abundant flow of mucilage takes place from a terminal pore; but when this does not afford a ready outlet, the tubes are frequently detached from the testa by the rapid expansion of the fluid within, and numbers of them may be seen floating about loose in the water.

The seeds of *Dyschoriste cernua*, *D. littoralis*, and *Œchmanthera tomentosa* closely resemble the preceding in the form and arrangement of the hairs, which occupy the entire surface. They are usually short, blunt, and furnished with distant rings, which are very faintly marked, but being much more evident along the outer edge, often present the appearance of a row of dark spots on the side most distant from the surface of the seed. These spots I at first believed to be actual holes, but never having seen any mucilage discharged through them, although it may be observed to escape in abundance from the extremities of the hairs, I am inclined to think that this appearance results merely from the varying thickness of the fibre.

In *Strobilanthes*, *Stenosiphonium*, *Dipteracanthus* and *Ætheilema*, the hairs do not usually, as in all the preceding genera, occupy the entire surface of the testa; on the contrary, they are for the most part confined to the margin, and are found closely appressed in the dry seed, forming a kind of membranous border. The testa itself consists of more or less elongated cells, of a somewhat woody texture, with very thick lateral walls, which are always arranged in a direction parallel to the longer axis of the seed. In *Strobilanthes scabra* and *S. lupulina* these cells are many times longer than broad, cylindrical or compressed, apparently porous, somewhat wavy or bent at their extremities: the marginal hairs are long, slender and tapering, furnished with numerous approximate rings, which are frequently replaced towards the base by spiral fibre. In *Strobilanthes imbricata*, *S. Brunoniana* and *S. monadelpha*, the testa is formed of much shorter cells, but in other respects similar to those of the foregoing species. The hairs of *S. imbricata*, which are short, thick and annular, proceed chiefly from the margin. In *S. Brunoniana* and *S. monadelpha*, the hairs, which resemble those of the last species, except in being longer, occupy a considerable part of the surface of the seed, although much more numerous at the margin than elsewhere. The seeds of *S. fimbriata* and *S. Wallichii* differ materially from those of the other species I have examined in the nature and disposition of the hairs, which are short, blunt-pointed, and entirely destitute of fibre in both; they are distinctly visible on the dry seed, and do not change their position or emit any mucilage on being placed in water. In the former species they are remarkably rigid, and entirely cover the seed, to which they are obliquely attached by a decurrent base; in the latter they are formed of rather thinner membrane, and frequently half filled by a yellow resinous-looking substance: with the exception of a small vacant space round the hilum, they occupy the entire surface of the testa.

The seeds of *Stenosiphonium subsericeum* and *Ætheilema reniforme* bear a close resemblance to those of *Strobilanthes Brunoniana* and *monadelpha*, the border being formed of slender, tapering, annular hairs, whilst smaller ones of a similar construction extend inwards over the greater part of the surface. The testa appears to consist of an outer membrane, formed of nearly quadrangular cells covering a layer of more elongated woody ones.

Of the genus *Dipteracanthus*, I have examined three species, *D. patulus*, *D. erectus* and *D. dejectus*: in the two former the seed is of a lenticular form, concavo-convex, with a narrow membranous border, formed of moderately long hairs, blunt-pointed*, destitute of fibre, and discharging copious streams of mucilage from their extremities. The testa is composed of short thick-walled, woody cells on the surface, and of a transparent membrane beneath,

* Among the mucilaginous fluid emitted by the seeds of *D. patulus*, I observed a number of faint rings, apparently of half-formed fibre: it is not improbable, therefore, that in the fully mature seed the hairs may be either annular or spiral.

traversed by elevated ridges, which inclose irregular areas, often more or less quadrangular in form, with a raised point in the centre: on the concave surface the woody cells are frequently extended into short, rigid, slightly-recurved hooks, very different from the elongated membranous hairs which occur on the edge. The marginal hairs of *D. erectus* sometimes contain a quantity of granular matter, and the hooks on the disc are somewhat longer than in *D. patulus*. The seed of *D. dejectus* scarcely seems to differ in structure from those of the two species already noticed, except in having spiral hairs on the border; but the only specimen I have had an opportunity of examining was very imperfect.

In *Blechum Brownei* the seed is furnished with a narrow whitish border, formed of short, cylindrical, membranous cells, rounded at their ends, entirely destitute of fibre. These cylindrical cells are arranged in a radiating manner, not appressed like the hairs which compose the border of *Strobilanthes*, *Dipteracanthus*, &c. On being moistened they become greatly distended by the expanding mucilage within, and ultimately assume the form of wide, blunt, wavy tubes, constructed of an exceedingly delicate membrane, without fibre or any very distinct markings, and frequently terminated by a small club-shaped appendage, looking something like the rudiment of a second cell.

In a considerable number of *Acanthaceæ* the seed is invested with very numerous long, slender, tapering hairs, formed of simple membrane, and proceeding equally from every part of the testa, closely appressed, but expanding in water, without any discharge of mucilage. This structure I have found to be very prevalent in the genus *Barleria*, having examined nine species without observing a single exception; it also occurs in many species of *Lepidagathis* and *Goldfussia*, in *Eranthemum* nervosum*, and *E. Wightianum*, *Phlogacanthus thyrsiflorus*, *Hemiadelphis polysperma*, and *Neurostachys tetragonostachys*.

In *Lepidagathis fasciculata*, *L. mucronata* and *L. hyalina*, the hairs are much shorter and blunt-pointed, but devoid of fibre, and scattered over the whole surface of the testa, as in the majority of the species. Those of *L. scariosa*

* A remarkable difference of structure occurs in the seeds of *Eranthemum crenulatum*, and another species closely allied to *E. bicolor*; the testa in both is entirely destitute of hairs, and reticulated with anastomosing ridges formed of elongated cells; in the areas between the elevated ridges the cells are shorter and nearly hexagonal.

often present a peculiar chain-like appearance, from their being contracted at short intervals, and apparently compressed in opposite directions. In two species of *Goldfussia*, *G. divaricata* and *G. lamiiflora*, they are very long and slender, but distinctly jointed or annular. Those of *G. pentstemonoides* and *G. colorata* are often singularly refracted and waved at their extremities.

Hairs of a very remarkable form occur on the seeds of two closely-allied Chilian plants, one of them being the *Ruellia dulcis* of Cavanilles, the other a new species found at Concon by Mr. Miers, who informs me that they will probably form together a new genus, to which he proposes to give the name of *Micræa*. In both species the testa is entirely covered with moderately long rigid hairs, which are directed upwards, and distinctly visible upon the dry seed, longitudinally striated, appearing as if formed by the adherence of several very slender tubes, and armed with numerous recurved hooks, which are evidently hollow, and seem to communicate with the tubes; each hair is usually terminated by two of these hooks, pointing in opposite directions. The hairs do not discharge mucilage, or change their position materially on being placed in water.

A structure very similar to the above occurs in the seeds of *Rhaphidospora glabra*, whose hairs differ chiefly in being shorter, thicker, and much more closely beset with recurved teeth: as in *Micræa*, they are entirely destitute of mucilage, and may be clearly seen upon the dry seed, which they render perfectly hispid.

Hairs, bearing some resemblance to those of *Rhaphidospora*, although much reduced in size, occur on the seeds of a species of *Dicliptera*, brought by Afzelius from Sierra Leone, and contained in the Smithian herbarium. The testa consists of small, nearly regular, hexagonal cells, and is thickly beset with little rounded tubercles, of a paler colour, but formed of the same kind of tissue as the rest of the testa. Each of these tubercles is produced into a very short hair, terminated by from three to six recurved radiating hooks, and having on the sides a few other hooks similar but smaller. In *Dicliptera Roxburghiana* the hairs nearly resemble those of the preceding, but they do not appear to be seated upon tubercles; whilst in *D. bupleuroides* the seed is covered with slightly prominent tubercles, formed of very minute hexagonal cells, but destitute of hairs.

Nelsonia tomentosa, *Ebermaiera thyrsoidea*, and *Erythracanthus prostratus*, all belonging to Nees von Esenbeck's tribe of *Nelsoniæ*, bear a striking resemblance in their seeds, which are very small, nearly globular, usually somewhat tuberculated, and furnished with very minute hairs, closely appressed, sparingly scattered over the surface, and wholly destitute of mucilage. In *N. tomentosa* these hairs expand very slowly when wetted, and present the appearance of short simple tubes, more or less incurved or uncinate at their extremities, and frequently ending in a double hook. In *Ebermaiera* and *Erythracanthus* the hairs appear to be similar, but owing to their extreme minuteness, and the very slight action which water has upon them, I have not been able to satisfy myself fully upon this point.

Having now completed my account of those *Acanthaceæ* whose seeds I have observed to be furnished with hairs, it only remains for me to mention the species in which no such appendages have been met with, and to indicate such peculiarities of structure as may seem to deserve particular notice, premising as a general remark, that the whole of them agree in being destitute of mucilage.

Acanthus mollis, *Acanthus arboreus*, *Dilivaria ilicifolia*.—The entire absence of hairs on the seeds of these two genera is remarkable, when we consider their close relationship to *Acanthodium* and *Blepharis*, in which these organs are most highly developed. The structure of their testa is totally different, being very thick, opake, and even woody, whilst in the two latter genera it is thin and membranous.

Crossandra infundibuliformis.—The seed, which is oval and slightly compressed, is covered with numerous flat, scale-like, imbricated processes, which give it some resemblance to a pine-cone; the scales which proceed from the sides of the seed are broad, thin, striated, dilated upwards, and irregularly jagged at their extremities; the marginal ones being usually longer and narrower.

Asystasia coromandeliana, *A. macrocarpa*, *A. Neesiana*, *A. Kunthiana*.—There is much resemblance between the first three species in the size, form, and structure of their seeds, which are unusually large, reniform, much compressed, swollen, and more or less crenated at the margin, with an uneven and furrowed surface. The testa is very thick and opake, and consists of an outer layer of polygonal thick-walled cells of very small diameter, covering a loose spongy mass of thinner and more transparent tissue. In *A. coromandeliana* the external cells are very nearly hexagonal and prismatic, like those of a honeycomb. The seeds of *A. Kunthiana* differ much from those of the three former species, being much smaller and concentrically rugose, as in some species of *Rostellaria* and *Rungia*.

Justicia Ecbolium, J. rotundifolia, J. dentata.—In their large size, incrassated border, and dense woody testa, the seeds of these three closely allied species agree with those of *Asystasia coromandeliana*, but differ in their obliquely-cordate or almost rhomboid form and nearly straight margin, and in being furnished with numerous small radiating tubercles. The testa consists of elongated hexagonal prisms, which, when viewed laterally, bear considerable resemblance to barred or porous vessels. The species differ but little from each other in the form of their seeds; those of *J. dentata* appear to be rather more acuminated, and the tubercles are more prominent than in those of *J. rotundifolia*, which are somewhat rounder and blunter, with a thicker and more strongly-marked border.

Rostellaria procumbens, R. diffusa, R. quinquangularis, R. peploides, R. Vahlii.—The seeds of the above-named species of *Rostellaria* present a great similarity of structure, especially the four first, which are furnished with narrow, concentric, slightly undulated ridges, formed of small, nearly regular, prismatic cells: those of *R. procumbens* and *R. diffusa* have the external ridges nearly continuous, while in *R. quinquangularis* and *R. peploides* they are more or less interrupted, and occasionally anastomose: but in *R. Vahlii* their place is supplied by a number of short oval prominences, constructed of similar tissue, which are scattered over the seed.

Eranthemum crenulatum, Rungia repens, Andrographis echioides.—These, like the preceding, have their testa disposed in elevated ridges formed of thick-walled hexagonal cells, concentric in the two former, reticulated and covered with very minute projecting points or glands in the latter. Similar glandular prominences occur on the seeds of *Rostellaria quinquangularis* and *peploides*.

Hypoëstes Wallichii, H. purpurea.—The seeds of both species present numerous short blunt tubercles, closely crowded together, and formed of thick-walled hexagonal cells. In *H. Wallichii* these tubercles are crowned with a ring of very small deflexed hooks, which are wanting in *H. purpurea*.

Gendarussa Neesiana, G. quadrifaria, G. tranquebariensis, G. orixensis, Adhatoda Betonica, A. trinervia, A. argyrostachya, Rhinacanthus communis, Rungia Wightiana, R. origanoides, R. parviflora, Peristrophe pubigera, P. montana, P. speciosa, P. lanceolaria.—Very little difference of structure is to be observed in the seeds of the above species, which, until the subdivision of that genus by Professor Nees von Esenbeck in his revision of the *Acanthaceæ*, were all placed together under *Justicia*. They are for the most part small, compressed, triangular or cordate, with a loose spongy testa, consisting of nearly hexagonal cells with thick side-walls, and so much crumpled as to form numerous closely crowded hollow tubercles. The tubercles, which occupy the entire surface of the seed, are usually blunt and rounded at their extremities; but in *Gendarussa tranquebariensis* and *orixensis* they are prolonged into decurved points. These characters are less conspicuous in the genus *Peristrophe*: the seeds of *P. pubigera* and *P. montana* differ little, except in their larger size; but in *P. speciosa* and *P. lanceolaria* the testa is thinner and more even; the tubercles also are very small and less numerous in *P. speciosa*, whilst in *P. lanceolaria* they are almost if not altogether wanting.

These observations having been chiefly made on such seeds as could be obtained from dried specimens, many of them in an unripe or imperfect condition, it is scarcely possible that I should in every instance have avoided mistakes: it would, however, be a great pleasure to me could I hope that this very imperfect view of the subject might prove the means of leading to a more accurate investigation of the seeds of this interesting family; and I trust that whoever may pursue the subject further, will make allowance for the difficulty of attaining to perfect accuracy with such materials.

EXPLANATION OF TAB. VI.

Fig. 1. Fasciculate hair from the testa of a species of *Acanthodium* (*A. spicatum*, Del.?), collected in Upper Egypt by Mr. Holroyd.

2. Portions of single tubes of the same, more highly magnified.

Fig. 3. Portions of similar tubes, from the seed of an authentic specimen of *A. spicatum*, Delile.

4. Fasciculate hair, from the testa of *Blepharis molluginifolia*, Juss.
5. Portion of a single tube of the same.
6. Hairs from the testa of *Ruellia formosa*, Andr.
7. Part of the membranous border of *Blechum Brownei*, Juss.
8. Hair of *Ruellia dulcis*, Cav.
9. Ditto of *Raphidospora glabra*, Nees.
10. Portion of the testa of *Dicliptera Roxburghiana*, Nees.
11. Ditto ditto of *Nelsonia tomentosa*, Dietr.
12. Portion of the testa of *Rostellaria Vahlii*, Nees.
13. Single tubercle from the testa of *Gendarussa orixensis*, Nees.

The figures are all highly magnified.

X. *Description of a new Genus of Plants from Brazil.* By JOHN MIERS, *Esq., F.L.S.*

Read March 2nd, 1841.

ON my last visit to the Organ Mountains in February 1838, prior to my departure from Rio de Janeiro, I observed growing in a green sward of *Jungermannia*, upon the banks of the river Paquequér, within the influence of an atmosphere rendered extremely humid by the fine spray from an impending waterfall, a minute plant, of a very transparent texture and of a singular structure, a notice of which I now beg to offer to the consideration of the Linnean Society. It is constantly unisexual, the male and female plants growing near to each other in the same spot: its root consists of several branched fibres; and its stem, composed of cellular tissue, is erect, cylindrical, striately ribbed, and about an inch in height, presenting near its base two or three small, distant, bract-like, acute, adpressed leaves. The inflorescence is either solitary and terminal, or divides into two or three one-flowered branches proceeding from the axil of an obovate bract larger than the leaves: the bracts are somewhat spathe-like, and somewhat amplexicaul at the base, with an acute point, enwrapping the bud in its young state: it withers, but is persistent. Each peduncle is erect, striated, and one quarter to three-eighths of an inch in length, supporting a solitary flower. The flower in bud appears like a three-sided cone with rounded angles, exhibiting near the apex three pore-like minute apertures, which are openings into as many long coiled tubes, easily distinguishable through the semi-diaphanous perianthium. This perianthium is persistent, and is composed of three distinct obovate segments, concave in the bud, with valvate æstivation, the sutures being alternate with the rounded angles: when expanded it is fully patent, with the margins laterally reflected, and from just below the apex of each segment, on the inner surface, proceeds a hollow capillary horn of three times the length of the segments, which, though coiled in æstivation, as before mentioned, is quite patent and extended when the flower expands. In the male plant are observed three distant pairs of anther-lobes, of an oval form, suspended side by side from the summit of corresponding cavities in the base of a somewhat three-sided, central, hyaline cone of a fleshy consistence, which, when cut through, exhibits a structure formed of numerous minute, lengthened, adhering cells; the lobes of the anthers are opake and white, bursting outwardly by a longitudinal fissure: the pollen is white and somewhat farinaceous. These pairs of anther-lobes probably belong to different stamina, the enlarged connectives of which form the bulk of the fleshy cone; in which view of the case the stamina would be placed opposite to the segments of the perianthium, and not alternate with them, as they at first sight appear. In the female plant, which in size and habit exactly resembles the other sex, the structure of the perianthium is precisely similar; and in lieu of the central staminiferous cone, there appears an entirely superior, semiglobular mass, consisting of innumerable minute carpels, with rather long, subulate, free-pointed styles: though I could not distinguish any stigma, it is probable that this organ, which is too minute to be seen, is lateral, since the summit of the style is somewhat gibbous. I cannot find a record of any plant bearing a resemblance to the one under consideration, which I believe to be quite new, and may, from the very characteristic subulate processes of the perianthium, be better distinguished by the name of *Triuris* than by that of *Mycopsis*, by which I had at first designated it. The following are the details of its characters:—

Triuris.

Char. Diff. *Flores* dioici. *Perianthii foliola* 3, obovata, infra apicem processu longo instructa. ♂. *Antheræ* 3, sessiles, loculis disjunctis, imo androphoro magno carnoso centrali insertæ. ♀. *Pistilla* numerosissima, aggregata, supera. *Styli* simplices, subulati. *Fructus* (ignotus).

Planta *pusilla, hyalina, subaphylla*; foliis *bracteiformibus.*

Char. Nat. *Flores* dioici. *Perianthium* 3-phyllum, hyalinum, persistens; foliola obovata, præfloratione valvata, post anthesin patentia, marginibus reflexis, infra apicem cornu capillari, cylindraceo, 2–3plò longiore, ante anthesin gyrato incluso, demùm porrecto, patentissimo, instructa. ♂. *Stamina* 3, sessilia. *Antheræ* 2-loculares, loculis ovalibus, disjunctis, longitudinaliter dehiscentibus, in foveis basalibus androphori apice suspensis. *Pollen* album, subfarinaceum. *Androphorum* centrale magnum carnosum hyalinum obtusè conico-3quetrum, in quovis latere foveâ basali, in quâ antherarum loculi suspensi. ♀. *Gynæcium* superum, e pistillis minimis numerosis uniovulatis aggregatis, singulo stylo libero superato, compositum. *Styli* subulati. *Fructus* (ignotus).

Planta Brasiliensis *omninò diaphana, albida; ♂ et ♀ in distinctis stirpibus;* radice *fibrosâ.* Caulis *simplex, erectus, pollicaris, striatus, subaphyllus.* Folia *pauca, bracteiformia, adpressa, obovata, acuta, hyalina.* Flores *solitarii vel subracemosi:* pedunculus *uniflorus, ¼-pollicaris, basi bracteatus;* bractea *folio caulino paululùm major et latior, subamplexicaulis.*

T. hyalina.

Hab. in humidis Serra dos Orgãos Provinciæ Rio de Janeiro.

At the period of my quitting the Organ Mountains the female plant had not attained a sufficient degree of maturity, and I was not able to observe in each carpel more than what appeared to me a solitary ovule in a very elementary stage, and this was so minute and indistinct as to be evident only by the appearance of a darker oval form in the centre. I cannot, therefore, offer any positive evidence as to the character of the embryo or structure of the seed, or whether it is mono- or di-cotyledonous. I am led to place it from its general aspect near to *Juncagineæ* or *Fluviales*, some of which are also occasionally diœcious, and *Posidonia*, which is sometimes polygamous, has three approximate pairs of sessile anthers on a receptacle: the plants of these orders, however, have no perianthium, or, at most, a very depauperated one, while *Triuris* is remarkable for the development of this organ. There exists some resemblance in the appearance of the stems, scale-like leaves, and general subhyaline texture, to the Burmanniaceous plants found in the same locality; but the difference of general structure removes it entirely from that family. To some of the terrestrial species of *Orchideæ* it bears a slight resemblance in habit, and also in the union of the connectives or filaments into a central columnar mass, in which respects it also bears a slight resemblance to *Apostasieæ* and *Aristolochieæ*, although in all other essential points it is quite at variance with them. In *Myristiceæ* also we find diœcious plants with the same character; but in all these cases the structure and situation of the ovaries, the form of the perianthium, and every general character are totally dissimilar. The diœcious genus *Ruscus*, too, placed by some in *Liliaceæ*, by others in *Smilaceæ*, offers the male flower with three or six sessile anthers, upon a fleshy central column, but its female flower is of a wholly different structure to that of *Triuris*; and the plant itself, though presenting also only bracteiform leaves, is very unlike it in habit. It is deserving of notice, that the leaves of some *Butomeæ* offer an analogy with the sepals of *Triuris* in the remarkable foramen observed in their apex.

The texture of the membranous coat of the ovulum, viewed under a high magnifying power, presents the same appearance as the epidermis of the whole plant, viz. raised prominent vesicles, having in the centre of each globule or cell a distinct nucleus offering that peculiar kind of texture which has been pointed out by Mr. R. Brown as generally existing, though frequently less perfectly developed, in all monocotyledonous plants.

From all these considerations, it seems to me we may safely conclude that *Triuris* belongs to the class of Endogenous plants; and, as it cannot be distinctly referred to any of the orders above-mentioned, it may probably be taken as the type of a distinct family, holding a place between *Burmanniaceæ* and *Fluviales*, but whose positive rank in the system cannot be known until we obtain more perfect information relative to the structure of the embryo.

EXPLANATION OF TAB. VII.

Fig. *a*. Male plant of *Triuris hyalina*, of the natural size. A. Slightly magnified.
1. An unopened bud.
2. The same, seen from above.
3. The same, artificially opened.
4. An expanded flower, seen laterally.
5. The same, seen from above. All slightly magnified.
6. A section of the fleshy cone supporting the anthers, more highly magnified.

Fig. *b*. Female plant of the same, of the natural size. B. Slightly magnified.
7. An unopened bud.
8. The same, artificially opened.
9. An expanded flower.
10. The pistilla, after the removal of the perianthium. All slightly magnified.
11. A single pistillum, more highly magnified.
12. Cells of the epidermis of the ovulum, highly magnified.

THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY

OF

LONDON.

VOLUME XIX.

PART THE SECOND.

LONDON:

PRINTED BY RICHARD AND JOHN E. TAYLOR, RED LION COURT, FLEET STREET:

SOLD AT THE SOCIETY'S HOUSE, SOHO-SQUARE;

AND BY LONGMAN, ORME, BROWN, GREEN, AND LONGMANS, PATERNOSTER-ROW;

AND WILLIAM WOOD, TAVISTOCK-STREET, COVENT-GARDEN.

MDCCCXLIII.

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XI. *An Appendix or Supplement to a Treatise on the* Œstri *and* Cuterebræ *of various Animals. By* Bracy Clark, *F.L.S., Corresponding Member of the Royal Institute of France, &c.*

Read April 6th and 20th, 1841.

THE first memoir published by me on this subject was written in the year 1796, and printed in the Linnean Transactions for that year, vol. iii. p. 289, which memoir, considerably enlarged, and forming a separate publication, was republished by me in the year 1815, with a supplement added the year following, containing further remarks and discoveries respecting this singular race of insects, to which I now beg leave to add a second appendix in the present communication. A great deal of new matter having sprung up on these subjects in the course of the years which have elapsed since I first wrote, mixed also pretty plentifully with error and confusion, (at least such I apprehend to have been the case,) I propose to review it in this essay, leaving the justice and propriety of my conclusions for the consideration and decision of others.

Not having encouragement enough for the republication of my above-mentioned work on these subjects, I am desirous by this memoir to make some additions, and also to correct some passages of that publication, in order to supply materials for any future edition of it that may at a future day possibly be undertaken by myself or others.

In the commencing or historical part of my work, at page 5, after the word "conjecture," I should desire to have inserted the following notice, viz. "That the fly alluded to by Moses in the above passage, and which is said by him 'to hiss and make a noise,' could, I suspect, have been no other than the *Œstrus Bovis* of our enumeration; and this hissing noise, so described by the inspired writer, would greatly tend to confirm the truth of Virgil's elegant description of the same thing, of its making a shrill sound or *susurrus* whilst depositing its ovum on the back of the beast. It is true, that Bruce in his 'Travels in Abyssinia' has given the figure of a fly, which he supposes might be the object alluded to by Moses; but on referring to his figure (pl. 39), it has no resemblance to this genus of flies, the *Cuterebræ*, but is rather, though with something fictitious about it, allied to the genus *Stomoxys*, or perhaps *Tabanus*, both of which genera are certainly silent flies in their attacks upon the cattle."

In this historical part of my essay I would desire also to insert the following passage: "We are informed by Festus Avienus, cited by Bochart, in his work entitled 'Chanaan,' lib. i. cap. 39. p. 723, that Himilco, a Carthaginian, had been sent by the senate of Carthage to discover the western shores and parts of Europe; that he successfully accomplished the voyage, and that he wrote a journal of it, which Festus Avienus had seen; and that in that journal the Islands of Britain are mentioned by the name *Œstrymnides Insulæ*, probably on account of their being greatly infested by the *Œstrum* or *Gadfly*. Which singular passage, if it can be relied upon, would appear to indicate that, at this very early date, (perhaps the very first and earliest account of these islands in existence,) our island was covered with immense forests abounding in cattle, which caused it to become the favourite resort of those troublesome insects, so much so as to be a leading object of remark to those adventurers."

At page 5 of the above essay on the *Œstri*, I would desire to rescind the following lines: "and believe that the agony the fly occasions in depositing the egg in the skin will account sufficiently for the violent agitation of the herd without this sound;" substituting for it the following: "A further and apparently positive testimony has reached me, of an ear- and eye-witness, that the female fly in depositing her egg does really accompany it with a noise most frightful to the cattle. A Herefordshire farmer of my acquaintance informed me last summer, that when he has been at plough, and especially about mid-day, and with the sun shining bright and clear, he has repeatedly been surprised in his operations by the arrival of this unwelcome guest, whose visit caused him serious annoyance, the animals attached to the plough (oxen) becoming perfectly ungovernable and scampering off with his machine. And he further states, that he can with his lips imitate the noise these flies make so exactly as to start a team of oxen by doing it near them. It is not an easy matter by words to convey a notion of the precise sound he gives; but as nearly as I can express it by letters of the alphabet, I will endeavour to do so. It commences by a forcible whispering shrill sound, the air passing through the almost closed lips, in pronouncing the following letters, *pt—pth—ung*, concluding with the more sonorous *ung*, prolonged for some time. I am, therefore, now most fully induced to believe in the accuracy of the Mantuan bard, who was, I doubt not, practically acquainted with these things, and for which property of accuracy he has been particularly and justly celebrated."

We may also further observe, that there cannot well be any very painful infliction, as the fly has really no instrument fitted for such a purpose, the feminine ovipositor being a mere tube, made of flexible materials, piece inserted within piece, exactly as in the common telescope. However, it is possible on its reaching the cuticle or skin of the beast, which is always highly sensitive in these hairy animals, that it might produce a degree of uneasy tickling, which, added to the noise, and perhaps an instinctive fear also impressed upon them, is altogether sufficient for the extraordinary alarm we see.

In the same page, insert as a note on *Tanagri*, " ex τάναγρος, i. e. *locus humidus.*" Heder. Lexicon.

At page 7, after naturalists, insert, " Pliny has also noticed the *Œstri*, and has recommended for protecting animals from their attacks, to anoint them well with oils and fats."

At page 8, after "*Bots*," insert, " The acute and witty author of Hudibras also has not let slip the manners of this singular race of flies: he says of them, following Pliny, though obviously in mistake,

> ' The learned write, an insect breeze
> Is but a mongrel prince of bees.' "—Part iii. c. 2.

At page 14, after " Modeer," insert, " This last writer it was who first added a new species to the Linnean enumeration of them. His account appears in the 'Acta Suecica,' tom. vii. p. 125, and the species is introduced to our notice under the name of *Œstrus Trompe.* What the specific name alludes to I can hardly tell *, but I have of late been led to doubt that this fly might be no

* Since writing the above, on casually inspecting the 'Fauna Suecica' of Linnæus, I believe that I have found the solution of the mystery as to the name. *Trompe.* At p. 429 of that work, No. 1722, under *Œstrus nasalis,* he writes " *Lappis, trompe.*" It is, therefore, clearly the vernacular name given it by

other than the male of *Œstrus Tarandi,* since it is found only where the reindeer frequent, although I am aware one writer asserts its having been seen in Germany. Under considerable doubts about this species, I gave in Pl. I. fig. 28. a figure of a fly I apprehended might be the one alluded to; but not to create any confusion, I called it, leaving it for further inquiry, *Œstrus Stimulator.* I now know it to be the identical insect in question, as well-ascertained specimens of this fly, obtained from Sweden, were found in the collection of J. G. Children, Esq., when his cabinet came to the hammer two years ago. I purchased them all, seven in number, and these on examination proved to be every one males, at least without any exserted ovipositor, which is common to all the females of the genus. I next examined two fine specimens contained in my own cabinet, both of which proved also to be males, at least without the ovipositor; and afterwards two others in the cabinet of my worthy friend Mr. W. E. Shuckard, Librarian to the Royal Society, which also proved to be males, or in the same circumstances as to the ovipositor; and these facts led me almost to the necessity of concluding that they were the males of *Œ. Tarandi.* The body, it is true, is particularly short and robust in this insect, whilst in *Œ. Tarandi* it is as remarkably long and taper; but this difference of structure admits of a ready explanation from the very different offices of the two flies, the female having to penetrate through the long, dense, matted coat of the reindeer's back, which must demand some force and address, and such a structure of the abdomen. Linnæus, who was himself an eye-witness of this operation in his Lapland tour, tells us that the animal stands quite still to receive the infliction, which is also very remarkable.

the Laplanders. But this name has obviously nothing to do with the real *nasalis.* Indeed it is pretty plain to me that that excellent man under this name first described the *Trompe,* as the above synonym would distinctly indicate; and in his full description he remarks on the globular figure of the antennæ, which strongly serves to confirm it. Afterwards, it would appear, he met with the real *nasalis,* that is *Œ. veterinus* of my enumeration, and he then added to the description, "*Segmentum primum pilis albis,*" which is decisive of his then having in view this insect, viz. my *veterinus,* or the *nasalis* according to his 'Systema,' suspecting, perhaps, that his previous *Œ. Trompe* was not a distinct species from *Œ. Tarandi.* It is pretty clear to me that he also derived the notion of this fly entering the nose of the animal from the ignorant Laplanders, and applied this remark first to the *Œ. Trompe,* which he was then evidently describing, and afterwards to the *Œ. veterinus.* I need hardly remark here, that *Œ. nasalis,* i. e. *veterinus,* is certainly a bot of the horse, and lives in the stomach of that animal in its larva state, and is supposed (see my dissertation) to deposit its ova on the chest or breast of the horse.

We may further remark, in confirmation of this apprehension of *Œ. Trompe*, Mod., being only the male of this species, that exactly the same colours prevail in the wings of both, and the wings in this genus are highly characteristic of species. Modeer gives precisely the same term to the wings of both flies, *alis fuliginosis*, an expression rather stronger, perhaps, than the colour admits of, not truly sooty black, but of a dusky, smoky brown, mixed with a golden tinge in certain lights. The colouring of the body in both insects is nearly the same; that of *Œ. Trompe* rather brighter, as is most frequently the case in the males of all animals.

There is, however, one objection to our supposition, which was remarked to me by my friend Mr. W. E. Shuckard, viz. that the *neuration* of the wings has a small point of difference. The wing is faithfully given at Pl. I. fig. 29. of my treatise, and it may be seen that the large middle cell is bounded backwards, towards the thin part of the wing, by a flexuose margin or thread; whereas he tells me that in *Œ. Tarandi* this is straight. Whether this be fatal to my conjecture I know not, but after candidly stating it, I leave it for others on the spot where they are found to determine. A description of this species is given in my treatise under the name of *Œ. Stimulator*, as was before stated.

Herman Burmeister, in his 'Manual of Entomology,' Shuckard's translation, p. 557, makes the larvæ of *Œ. Trompe* to inhabit the *temporal cavities* of the reindeer, but does not furnish us with his authority for this assertion, and perhaps for *temporal* cavities should be read *maxillary* or *frontal*.

I have further to remark, that on examining the antennæ of this supposed species, *Œ. Trompe*, I observed a shining black spherical knob or globe attached to them, which is not to be seen at all, or at least in the same degree, in the female (if such it be): and noticing this fact, I was led to carry my observations to that supposed variety of *Œ. Bovis*, given in my enumeration as *Œ. Bovis*, var. *α. vernalis*, see p. 68, under the impression that it might be some early, abortive, or ill-fed individual of *Œ. Bovis*. Dr. Leach, however, considered this to be a distinct species, giving to it the name of *Œ. ericetorum* (vid. 'Œstrideous Ins.,' p. 2), but which I always objected to as not being sufficiently distinct. On examining this insect I found it to possess the very same globose antennæ as the above *Œ. Trompe*, which further confirmed me in the opinion that this is the male of *Œ. Bovis*, as that is the male of *Œ. Tarandi*.

This male being found in wild places and on heaths where cattle frequent in summer, is perhaps awaiting the appearance of the female flies a little later in the season. If this be true, it will reduce the genus by two species, and render it more clear, simple and appreciable. I possess numerous specimens of this *Œ.* "*ericetorum*," and on examining them, find the termination of the abdomen in all of them without any stylus, see Tab. I. fig. 30, 31, of my "Essay," and conceive them, therefore, to be all males. I may further observe, that in my later description of this insect, I was led at that period to conjecture that this fly might possibly be the male of *Œ. Bovis*, but dared not affirm it, since Dr. Leach assured me he had one specimen in his collection with a stylus, which I now regard as a mistake; and having but little time to give to these pursuits, I left the subject in a doubtful state. It is necessary to add that fig. 31. of my treatise (where this insect is represented with a stylus to the abdomen) was given solely on the authority of Dr. Leach.

Having thus expunged two species, I shall proceed to obliterate a third, the *Œ. Pecorum* of Fabricius. Although some sort of grief, trouble or suffering appears to be allotted to every animal in the creation in its present condition, we have yet to learn that any naturalist, butcher or other person among the Laplanders has seen the larva of any *Œstrus* in the nose or fauces of these animals. The stag has them, it is true, in the throat, but then he has no infliction on his back or stomach; and no animals appear to be tormented in both ways. However, let search be made as to this supposed nose-bot, which will be very easily done on the spot. It is true there are four species belonging to the horse, but they are all confined to one part only, viz. the stomach. As to the insect which Fabricius describes, it is pretty clear to me, if any one could show a specimen of it, which I never yet saw, that it would prove to be no other than a dark-coloured variety of the *Œ. veterinus* of my enumeration (a colour they often assume), and answer to his description sufficiently well.

I am almost sorry to commit such havoc as to destroy a fourth species, which I do with the more regret, as it was designed to do me honour and to bear my name. This is another species of Dr. Leach's creating (see *Œstrus Clarkii*, 'Œstrideous Insects,' p. 2), which, on examination at the British Museum, where it is still to be seen so ticketed, proved to be no other than a very light-coloured variety of my *Œstrus veterinus,* called by mistake *nasalis* by Linnæus, supposing it to be a bot of the nose. How Dr. Leach could altogether pass over my *Œ. veterinus* in his enumeration is quite inexplicable, figures of it appearing in the Linnean Transactions, admirably done by Sydenham Edwards, and again repeated in my dissertation.

Fabricius, than whom no one hardly has described insects better, in his last work has honoured my labours with his notice, adopting my suggestions in most particulars, but seems to have had some lurking hesitation about the propriety of my genus *Cuterebra*, whose characters in contrast to the *Œstri* are of the most marked kind, differing from them in several highly essential particulars, in which Latreille and all later naturalists, with whose opinions I have become acquainted, have most readily acquiesced.

I may here transiently notice, that some time since a communication appeared in the Linnean Society's Transactions, vol. xiv. p. 353, from the pen of my friend Mr. W. Sharp MacLeay, endeavouring to prove that the Linnean genus *Œstrus* did not represent the *Oistros* of the Greek writers. This idea he derived from France, the same opinion or suggestion being found in Olivier (see Encyclopédie Méthodique, Hist. Nat. viii. p. 453), and afterwards in Latreille and others, supposing that a *Tabanus* was more likely to have been the object noticed by the ancients. This, however, I disproved clearly, establishing my deductions from the terror of the animals under the attack of this fly, which had been so well described by their poets that it at once fixed the object; since no other of the fly kind save the little gnat accompanies his attack with any sound, (and that this gnat was not the object of their descriptions was very clear,) and the *Tabani* are all silent in their blood-sucking attacks. Other reasons were also there advanced, and were deemed by all unprejudiced readers sufficient to disprove any such idea; had however the contrary happened, and a change had taken place, it would have been accompanied with the most lamentable confusion in these pursuits. See Linn. Trans. vol. xv. p. 406 for my reply.

I am reluctantly compelled to expunge yet one more supposed species of this genus, which is evidently the result of careless compilation on the part of the German naturalists. De Villars of Lyons, in his useful and candid work, the 'Entomologia,' has presented us with an *Œstrus* which he calls by the specific name of *lineatus*; this is copied into the works of Meigen, Megerle and others as a new and true species. Conversant and familiar with the appearances of these insects in nature, I was at no loss to discover in this *Œ. lineatus* my old acquaintance the *Œ. Bovis*, the grand stumbling-block of naturalists. The ribs and furrows on the thorax, whence De Villars named it *lineatus*, proclaimed it to be the same, and his figure, for he has given us an engraving of it also, fully served to confirm it.

At page 16, line 18 of my dissertation, insert: "On examining the work of Prof. Pallas, 'Novæ Species Quadrupedum e Glirium Ordine,' p. 50, I find the description of an *Œstrus* infesting *Lepus alpinus*, to which he gives the name of *leporinus*, and which would appear to belong to my genus *Cuterebra*. His description of it is as follows: 'Totus ater subpiloso-glaber, facie alarumque margine crassiore lutescentibus. Magnitudine *Muscæ carnariæ*; caput facie subinflatâ pallidum, vertice, oculis, antennis, papillâque oris fusco nigricantibus; collum excentricum, ori approximatum. Corpus glabrum; thorax suprà opacè niger punctis atris quatuor parium, duplici serie transversâ positis, quorum media antica oblongata. Scutellum prominulum apice pilis sparsum. Abdomen atrum, polito-nitidum, subtùs opaco-variegatum. Pedes pilosi, nigri. Alæ fuscæ basi margineque crassiori lutescentes, puncto exiguo disci, lituràque parvâ ad basin, nigris. Squamæ subalares albæ; halteres albo capitulo.'"

It would appear from Pallas and the American naturalists, that this singular tribe of insects, the *Cuterebræ*, extend through all the northern and subnorthern regions of the New and Old Continents; and they appear in these countries to infest chiefly the hares, rabbits, rats, mice, moles, &c. My brother sent me a small one of this genus from the Illinois, that had been found living under the skin of a dead mouse: not probably that they feed on dead animals, but this ferocious little larva, which he said had cleared the ribs of nearly all their flesh, had resorted to such food from dire necessity; the animal having died from some cause or other, and there being a cessation of further secretion of pus, it was left with no choice but to do that or die.

The above species described by Pallas is very nearly allied to, or the same with, my *C. fontanella*, described in the Linnean Transactions, vol. xv. p. 410, and figured in my Treatise, pl. 2. fig. 23. It is most probably an allied species, as there appear some discrepancies on comparing the respective descriptions.

My late worthy and ingenious friend Latreille has written on this subject in a way that seems to require some remark, in the 2nd edition of the 'Règne Animal,' the joint production of himself and Cuvier, tome v. p. 499, where he gives a tolerable view of this family, derived chiefly from my labours, and afterwards, at page 503, enters on an enumeration of the species. On the subject of the *Œ. Equi*, although quoting my work, he omits altogether my account of the manner of their depositing their eggs on the knees of the horse, although a most singular and interesting fact. Proceeding to the *Œ. hæmorrhoidalis*, he omits the circumstance of their eggs being deposited on the chin and beard of the horse, and next passing to the *Œ. veterinus*, he renews the old and erroneous tale which was formerly attached to the *Œ. hæmorrhoidalis*, of its depositing its eggs on the margin or verge of the anus.

We may perhaps, at this point of our review, consider a little the strange proposition first started by Pallas, of there being in nature such a thing as a proper human *Œstrus*, which has since been maintained by others. For the honour of human nature I utterly discredit any such thing, as that the lord of the creation, walking erect and clothed from head to foot, and carrying if he pleases all sorts of offensive or defensive weapons, should be the natural object of attack of a large winged insect, pursuing and dodging him, for the purpose too of making him the subject of maintenance of its future offspring. The facts which appeared to favour such a doctrine are easily explained, I apprehend, by the eagerness and solicitude of the parent fly to find a suitable opportunity of depositing its eggs, which induces it to resort, in the absence of the proper nidus, to the next best object that presents itself, and if it finds a man fast asleep and with any part of his body exposed, he will certainly become the object of its infliction, nor is this to be much wondered at. But would it not be quite absurd, from such an *error loci*, to argue that this was the legitimate office and operation primarily intended by the Creator? Almost as well might we imagine the sea to be the proper habitat of the dragon-fly, because Berkenhout says he took one on that element three or four leagues from land; or, on finding a *Cimex rufipes* on a gentleman's bag-wig in Fleet Street, as he says he did, to give this as the natural habitat of that species.

Most certain, however, it is, that the *Œstri* and *Cuterebræ*, if disappointed of their natural nidus for deposit, and impelled by hard necessity, will find out strange receptacles for their young. But we may remark, that if they did succeed in depositing their eggs in the human body, they are quite sure to lose their labour, and their object would be frustrated by the removal of the larvæ, which the individual himself can do readily, or his surgeon would not fail to do for him, so that the race must speedily become extinct if such were bestowed upon them as their natural and proper nidus and place of deposit.

In a late medical periodical, whose title I do not exactly recollect at the moment, is a strong statement of a case of this kind, by the late Surgeon Howship, intended to establish the doctrine of the existence of a human *Œstrus*, at page 174 of the number containing it, elaborately written, and assisted by my friend Mr. John Curtis, of well-known entomological celebrity. The larva there given, though much altered in appearance by being pulled out and lengthened, and perhaps by a degree of putrefaction ere it was placed in spirits, agrees in so many, if not all, particulars of make with the larva of *Œstrus Bovis*, given in my plate, that there is little doubt of its being the same. I at first imagined it might prove the larva of a *Cuterebra*, whose parents are very bold in respect of deposit, but a subsequent investigation makes me rather refer it to the above. The sacculated appearance of the skin, and the double rows of spines, are exactly as described by me, and other strong circumstances leave little room to doubt of its being the above species, of all others the most active in producing these misplaced phænomena. We may observe that the cow's back is covered with hair; and the human scrotum also (the part where this specimen was found) being covered with hair, would the more readily induce the deposit in this particular part, if exposed. Sometimes the eggs have been laid in the skin of the human abdomen, the other parts above alluded to being perhaps covered at the time and not exposed to the attack of the insect, or they would probably have obtained a preference.

Mr. Howship, in the above-mentioned communication, appears to have mistaken the tail of the larva for its head, as was very natural, that part being largest and uppermost in the abscess. It is obvious that, had it been otherwise placed, respiration would have been impracticable, as the head is downwards in the abscess for the purpose of receiving nutriment with the mouth, surroundəd with pus of ready access, and the anus, on the contrary, is placed upwards, for the more ready ejection of the fæces out of the abscess, and is also placed near to the two respiratory plates. The head too of the fly is always contained in the narrow end of the chrysalis, contrary to its position in most other insects, as may be seen in my Treatise, pl. 2. fig. 7. A real *Cuterebral larva* is figured also in my enumeration, pl. 2. fig. 24, which seems too dissimilar to be of the same genus.

Another statement, somewhat hostile to my conclusions, which is perhaps deserving of notice, has also appeared in the 'Entomological Magazine,' No. 23. p. 33, renewing the old doctrine of the fatal effects of these larvæ, and of their eating or boring holes through the coats of the stomach of the horse, and stating, in supposed opposition to my opinion, that they really feed on chyle, and not on the green contents of the stomach. My answer to these remarks was given in the succeeding number of the same Magazine. I readily admitted that they fed on chyle, for such had ever been my opinion and was plainly stated as such in my works; but as to their boring propensities, these I could not acquiesce in, since they possessed no teeth nor other instruments of any kind by which they could possibly achieve any such intentions. Neither did I believe their instinct to be of so fallible a character as to permit them to gnaw away and destroy their own standing, and so let themselves fall through the openings they had made into the cavity of the abdomen, there miserably to perish, for from thence there was no outlet or escape. I thought this short announcement might help to suppress any suggestions of this kind in future, as such ideas had been very general, and were industriously entertained and spread. A preparation of a horse's stomach, so "gnawed" by the bots, used to be exhibited at our Veterinary College, as supporting this vulgar opinion; but on a more scrupulous examination of it, it turned out that the stomach had been suffered to get putrid and tender, and then the bots had been thrust by some one, some half, some a quarter, and some wholly through the coats of the entire stomach: it has been since destroyed, at least it is no longer to be seen there.

Having somewhat diminished the numbers of this active family at the commencement of my paper, I shall now proceed to repair the loss in some degree by the description of three species, not described in my enumeration, which the kindness and industry of my entomological friends have since supplied.

The first of these was originally found in Germany, and subsequently in our own country, having been taken June 12th, 1823, in the New Forest in Hampshire, a spot remarkable for its rare treasures in natural history. My esteemed friend Mr. Samouelle, who took it, very kindly lent it to me to draw and describe. Megerle has thought proper to give to it the specific name *pictus*, "painted." This I somewhat regret, as *pictus*, "painted," generally has an allusion to gay colours, and this is of a darkish blue. The specific name *cæruleus* would have been much preferable, as, for an *Œstrus*, this colour is quite unusual. The name of *pictus*, when the animal it infests is known, and its place of residence in the larva state ascertained, will probably be changed for a more useful and significant one, and so indeed of the remaining species, obliterating my own name likewise.

Œstrus Pictus. *The blue Bot-fly.*

Atro-cæruleus cinereo versicolor, thorace punctis quatuor liturâque atris. Diss. nostræ Tab. I. fig. 40.

Meigen, Syst. Beschreib., tom. iv. p. 172.

Curtis, Brit. Entom., pl. 106. fig. 1.

Habitat in Europâ. New Forest Angliæ, D. Samouelle.

Descr. *Œ. Equi*, nostræ enumerationis, ferè bis major, convexior, et thorace ratione abdominis robustiore. *Frons* cum antennis et oculis rufescentibus, argenteo parùm relucentibus; vertice fuscescente. *Thorax* longior, quàm in cæteris speciebus robustior, alis ad partem posteriorem insertis, penè utì in *Cuterebris*, ad latera cinereus, seu potiùs argenteo-cinereus, punctis 4 triquetris, atris, distinctis, lituràque in medio nigrâ, et punctis 4 nigris obscurioribus; posticè inter alas niger. *Scutellum* obscurè ferrugineum, punctis duobus inconspicuis ad basin. *Squamula* alarum convexa, major, margine obfuscata. *Abdomen* breve, e segmentis 4, pube in maribus inflexâ; supernè in medio latè nigrum, ad latera posticèque e cinereo argenteo mixtum et fritillis quasi tessellatum characteribusque variis atris conspersum; subtùs nigrum, argenteo irroratum, versicolor. *Pedes* simplices, rufi, femoribus anticorum subtùs pilis brevibus atris, utì tota corporis superficies. *Unguiculæ* distantes incurvatæ. *Alæ* limpidæ, ad basin et anteriùs obscuriores, maculis tribus nebulosæ, areolâque e venis confectâ. In plurimis cum *Œ. Ovis* consistit; anne hoc sit insectum pharyngem Cervorum infestans quærendum?

Œstrus Libycus.

Cinereus, thorace punctis 4 alisque punctis 3 nigris.

Habitat in Ægypto, D. Rüppel.

Descr. Mas magnitudine et staturâ ferè *Œ. Ovis*. *Totum corpus* cum capite cylindriforme. *Facies* magna, pars inferior cum antennis flavescenti-alba; vertice fusco, stemmatibus 3 nigris. *Oculi* rufescentes, majores. *Thorax* cinereus, anticè foveolâ impressus, utrinque punctis duobus pertusis âtris, posterioribus elongatis. *Scutellum* magnum, cinereum, lateribus nigro inquinatum, atomisque duobus mediis nigris. *Abdomen* breve, obtusum, argenteo-albidum, ad atera scabriusculum, punctis fuscis nonnullis elevatis quasi respiratoriis; subtùs album. *Pedes* rufescentes, femoribus annulo unico, tibiis annulis duobus, nigris. *Alæ* albo-pellucidæ, basi nigricantes, puncto fasciâque transversâ flexuosâ costæ adnexâ lineolâque, atris.

For the following remarkable species I am indebted to my amiable friend Mr. W. E. Shuckard, who obligingly presented it with the name also kindly annexed.

Œstrus Clarkii.

Cærulescenti-fuscus, alis obscuris anticè sinuatis basin versus atro bipunctatis.

Habitat ad Caput Bonæ Spei. W. E. Shuckard, monographus cel. Insectorum Hymenopterorum, qui, unà cum nomine triviali, lubentissimè mihi communicavit.

Descr. *Œstro Ovis* bis major. *Facies* nuda (utì totum corpus), lata, flavo-albida, antennis altè immersis nigris; oculi grisei; vertex fuscus, punctis duobus parvulis nigris lucidis. *Thorax* ratione abdominis grossus, oblongus, alis posticè insertis. *Scutellum* majusculum, dorso canaliculatum. *Abdomen* fusco-cæruleum, breve, ovatum, ex lineis impressis quasi in tesseras profundè divisum, dorso in medio longitudinaliter porcatum seu lineâ assurgenti munitum. *Femora* vix compressa, nigra, geniculis tarsisque griseis. *Unguiculæ* valdè divergentes, incurvæ, membranulis duabus interpositis. *Alæ* fuscæ, ad costam retrò sinuatæ, maculâ punctoque baseos atris distinctissimis, alteroque minimo in ipsâ costâ. *Halteres* flavo-lacteæ, tumidæ, majores, subtriquetræ.

Conjicit amicissimus Shuckard hanc speciem inter pecora majora Capensia habitasse.

I may here remark, that my kind friends have three times endeavoured to connect my name with an insect, and twice has it been proved to be nugatory by my own researches. The first was by my friend Jurine, at Geneva, attaching my name to a splendid *Tenthredo*, found by me near Orbe. This I ascertained on my return to England, from a miserable relic in the Linnean cabinet, to have been identical with *T. reticulata*, L., which I pointed out to Dr. Smith, who informed other naturalists. The second was Dr. Leach's *Œ. Clarkii*, which I have shown in the present memoir to have been no other than the Linnean *Œ. nasalis*, so called by mistake, the *Œ. veterinus* of my enumeration. The present I believe to be a real novelty.

XII. *On a new Genus of Plants from Chile.* By John Miers, *Esq.*, *F.L.S., &c.*

Read December 21st, 1841.

Among the many drawings which I made from living plants during my residence in Chile, between the years 1822 and 1824, and which were made known to several botanists during my short stay in England in 1825, is one which I now beg to offer to the notice of the Linnean Society. It represents a plant, to which I then gave* the name of *Cruckshanksia graminea*, after my friend Mr. Alexander Cruckshanks, a zealous contributor to South American botany; but as his name has since been commemorated under a handsome genus of the Cinchonaceous family, I have changed the title of my plant to that of *Solenomelus*, from σωλὴν *tubus*, μέλος *membrum*, on account of the confluence into a tubular form both of the stamina and stigmata. The plant belongs to the natural order *Irideæ*, and is very closely allied to *Sisyrinchium*, from which, however, it differs in some essential characters.

Solenomelus.

Cruckshanksia, *Miers, Trav.* ii. p. 529 (*non Hook.*).

Char. Diff. *Perianthium* petaloideum; tubo brevi, incurvo; limbo 6-partito, laciniis patentibus, 3 superioribus erectioribus, 3 inferioribus deflexis. *Tubus stamineus* cum tubo perianthii coalitus, indè liberus, ventricoso-tubulosus, ore *antheras* 3 sessiles gerens. *Stylus* filiformis. *Stigma* integrum, urceolato-tubulosum, margine ciliatum. *Capsula* triquetra, 3-locularis, loculicidè 3-valvis.—Herbæ *Chilenses perennes, habitu* Sisyrinchii. Spatha 2-*valvis, dorso sub apice mucronata.*

Char. Nat. *Perianthium* monophyllum, petaloideum, mox marcescens; tubo brevi, de repente curvato; limbo 6-partito, laciniis subæqualibus, basi spathulatis, marginibus subappositis, ovatis, 3 superioribus erectioribus, 3 inferioribus sigmoideo-patentibus

* Travels in Chile and La Plata, 1825, vol. ii. p. 529.

deflexis. *Tubus stamineus* cum tubo corollæ adnatus, deindè liberus, medio infernè ventricosus, valdè pubescens: *antheræ* tres, ad oram tubi sessiles, extrorsæ, 2-loculares, dorso carinato medio affixæ, basi emarginatæ, rimâ exteriore dehiscentes. *Ovarium* inferum, lineari-oblongum, subtrigonum, erectum. *Stylus* filiformis, basi incurvatus, deindè horizontalis, apice parùm adscendens. *Stigma* integrum, inclusum, urceolato-tubulosum; ore tubæformi fimbriato, ultra tubum stamineum vix exserto. *Capsula* coriacea, oblonga, utrinque attenuata, 3-gona, 3-sulca, 3-locularis, 3-valvis, dissepimentis valvarum medio affixis, ad axin 2-seriatim seminiferis, apice ab axi solutis, loculicidè dehiscens. *Semina* plurima, dimidiato-ovata, ab axi placentiferâ funiculo brevissimo horizontaliter orta; *testa* dura, fusco-brunnea, favoso-punctata, punctis depressis seriatim longitudinaliter dispositis; *raphe* longitudinalis elevata, ab hilo basilari sublaterali ad apicem carunculatum etiam sublateralem (chalazam) ducta; *integumentum internum* membranaceum; *albumen* corneum, depresso-punctatum; *embryo* in basi albuminis, ferè ad mediam longitudinem attingens, inclusus, teres, sublinearis, subincurvus; *radicula* a cotyledone vix distincta, centripeta.—Herbæ *Chilenses perennes*; radice *fibrosâ*; foliis *ensiformibus, equitantibus, radicalibus bifariis, caulinis alternis*; caule *subancipiti, ramoso*; floribus *terminalibus, spathaceis*; spathâ *communi 2-valvi, ensatâ, valvis dorso sub apice mucrone erecto instructis*; spathis *partialibus plurimis, inclusis, 2-valvibus, membranaceis*; floribus *breviter pedicellatis*.

1. Solenomelus Chilensis. Foliis lineari-ensiformibus, corollâ aurantiacâ.
Cruckshanksia graminea, Miers, Trav. ii. p. 529.
Habitat apud Concon, Chile, in locis umbrosis humidis.

2. Solenomelus punctatus. Foliis angustioribus, corollâ aurantiacâ; laciniis singulis supra basin puncto sanguineo notatis.
Habitat prope Concepcion, Chile.

The latter species, which I have had recently in flower, was last year raised from seed sent from Concepcion in Chile. From all the inquiries I have made I cannot learn that either species has before been cultivated in England, although I sent home abundance of seeds of the first-mentioned in 1821 and 1822.

The peculiarly curved form of the corolla, the confluence of the filaments throughout their entire length, and the union of the stigmata into an urceolate tube, offer characters that sufficiently distinguish this genus from *Sisyrinchium*. In many works on botany the latter genus is described as having the stamina "omninò connata," but in the numerous species that I have met with,

Trans. Linn. Soc. Vol. XIX. t. 8. p. 9.

J. Miers Esq. delin.

J. Smith Weddell sc.

I never found them to be so. Although sometimes the monadelphous tube is very short, in others it is united nearly throughout the length of the filaments; but in every other case I have always found short filaments manifest. It appears to me therefore desirable that the genus *Sisyrinchium* should be confined to those cases where the stamina are only partially united. Perhaps *S. odoratissimum* of Cavanilles, a plant which he found in Commerson's Herbarium, and which appears to be the same as *S. narcissoides*, Lindley (Bot. Reg. vol. xv. No. 1283.), who describes it as having entirely united stamens, should be separated from *Sisyrinchium*, not only on that account, but because it possesses a long infundibuliform corolla, with more distinct markings and a very odoriferous smell, a character quite at variance with all the other species of that genus*. It differs from *Solenomelus* by its deeply cleft style and the shape of its corolla; and upon more solid grounds than those on which *Libertia* has long ago been separated from *Sisyrinchium*, it may probably be admitted as a separate genus under the name of *Symphyostemon*, in which case it would occupy a place between *Tigridia* and *Ferraria*. The genus *Sisyrinchium* evidently requires a revision, but I have not at present materials at my command to enable me to attempt it, although I have met with many pretty and interesting species. It appears to me that several species added by Sprengel and others should be separated from *Sisyrinchium*, such as *S. collinum*, Cav., *S. filiforme*, Spr. (*Moræa filiformis*, Thunb., *M. virgata*, Linn.), and *S. flexuosum*, Spr. (*M. flexuosa*, Linn.), as they cannot belong to that genus on account of their bifid stigmata, but must appertain more strictly to *Moræa*.

EXPLANATION OF TAB. VIII.

Fig. 1. A plant of *Solenomelus Chilensis*, of the natural size.
2. A flower removed from the spatha.
3. The pistillum, surrounded by the staminal tube.

* To the same will also belong *S. flexuosum*, Lindl. *non* Spr., described by that eminent botanist in the same work.

Fig. 4. The staminal tube removed.

5. *a.* The anthers, of the natural size; *b.* magnified.

6. The pistillum, after the removal of the staminal tube.

7. *a.* The stigma, magnified; *b.* cut open longitudinally. *c.* The ciliated margin, more highly magnified.

8. *a.* The ripe capsule; *b.* cut transversely; *c.* bursting at the apex; *d.* a separate valve.

9. *a.* Seeds, of the natural size; *b.* seen laterally and on the side of the raphe, much magnified.

10. A seed, much magnified, after the removal of the testa.

11. A longitudinal section of the seed, dividing the embryo.

12. The embryo removed.

XIII. *On* Edgeworthia, *a new Genus of Plants of the Order* Myrsineæ. *By* Hugh Falconer, *M.D., Superintendent of the Hon. East India Company's Botanic Garden at Saharunpore. Communicated by* J. F. Royle, *M.D., F.R.S., F.L.S., &c.*

Read March 15th, 1842.

Edgeworthia.

Nat. Ord. Myrsineæ. *Tr.* Theophrasteæ.

Calyx 5-partitus; laciniis obtusis imbricatis. *Corolla* hypogyna, subcampanulata; tubo brevi crasso, intùs squamis 5 adnatis acuminatis, cum limbi 5-partiti lobis acutis (in æstivatione contorto-imbricatis) alternantibus, instructo. *Stamina* 5, corollæ tubo inserta, ejus denique laciniis opposita, exserta; filamenta subulata, basi cum squamis confluentia; antheræ extrorsæ, versatiles, loculis longitudinaliter dehiscentibus. *Ovarium* uniloculare; placenta basilaris, parva; ovula pauca, erecta, anatropa. *Stylus* elongatus, in alabastro etiam exsertus! *Stigma* minutum, indivisum. *Drupa* mono- (rarò di-) sperma. *Semen* peltatum, hilo lato excavato umbilicatum; testâ osseâ. *Embryo* intra albumen (cartilagineum) ruminatum excentricus, transversè arcuatus. *Radicula* infera.—Arbuscula *sempervirens*; foliis *alternis exstipulatis, solitariis vel fasciculatis, ellipticis, integerrimis, coriaceis, marginatis*; ramis *spinescentibus*; pedicellis *bracteolatis*; floribus *parvis, subsessilibus, in capitula axillaria subumbellata densè coacervatis, chloroleucis*; drupâ *eduli dulci*.

Obs. 1. Genus, inter *Theophrasteas, Jacquiniæ* et *Theophrastæ* juxta characteres tribuales affine, sed ab utroque et a sociis albumine ruminato, necnon inflorescentiâ, distinctum. Notatu dignissimum, stylum etiam in alabastro exsertum!

Obs. 2. *Edgeworthiam* nuncupavi, in honorem amicissimi M. P. Edgeworth Armigeri, generis præclari haud indignæ prolis, botanices peritissimi, et ob studia communia atque familiaritatis vincula pariter mihi cari. Complures stirpes a se ipso in montibus Emodi et Hindostaniæ provinciis borealibus lectas mecum humanissimè communicavit, quarum non paucas huc usque incognitas, proprio marte indagavit.

Edgeworthia Buxifolia (Tab. IX.).

Habitat in collibus aridis provinciarum Taxilæ et Peucelaotis in Bactriâ Inferiore; passìm obvenit prope Peshawur, Cohaut et Attock. Indigenis "Goorgoora" nominata. Floret

Februario; fructus maturescit Julio. Semina dura globosa vulgò in monilia precatoria conseruntur.

Descr. Arbuscula speciosa, sempervirens, in locis idoneis 12–14 pedes alta, ramosissima, conferta, habitu *Buxum* quamdam referens; trunco nunc diametrum cruralem attingente. Lignum durum, compactum; medulla centralis densè cellulosa; radii medullares attenuati, crebri, lamelliformes; corpus ligneum in segmenta amorpha utrinque confluentia disruptum, adeò ut lignum transversè sectum insigniter variegatum videatur; zonæ annotinæ nullæ distinctæ. Rami crassi, teretes, ferè ad basin caulis emissi, patentes, divergentes, foliorum delapsorum vestigiis tuberculati, cortice cinereo corrugato glabro; laterales abbreviati, gemmarum abortu in spinas robustas desinentes; novelli pube albicante villosâ obtecti. Folia valdè conferta, præsertìm versus ramorum extremitates aggregata, undique emissa, alterna, exstipulata, solitaria vel 3tim 4ternatimve fasciculata, patentia, simplicia, integerrima, elliptica vel obovata, obtusa, coriacea, crassa, avenia, pollicem-sesquipollicem longa, $\frac{1}{2}$–$\frac{3}{4}$-pollicem lata, glabra, suprà lævia nitida lætè viridia, subtùs pallida cinereo-glauca, margine calloso angusto subreflexo; novella villosa, in æstivatione complicata: costâ parùm elevatâ gracili. Petioli breves, crassiusculi, teretes, æquales, 2–3-lineas longi; juniores villosuli. Flores parvi, hermaphroditi, sessiles, in capitula parva axillaria sessilia segregata vel versus ramorum extremitates confluentia 4–10-flora coacervati; puncta glandulosa nulla. Pedunculus subnullus. Pedicelli brevissimi, crassiusculi, rufescentes, scabriusculè puberuli, bracteis minutis ovatis concavis persistentibus conformitèr puberulis suffulti. Calyx campanulatus, 5-partitus, minutus, persistens; laciniis obtusis, concavis, adpressis, subinæqualibus, densè puberulis, fuscis, imbricatis. Corolla hypogyna, subcampanulata, chloroleuca, calyce duplò longior; limbus 5-partitus, laciniis oblongo-lanceolatis, concavopatulis, acutis, in æstivatione contorto-imbricatis; tubus brevis crassus, intùs squamis 5 (staminodiis) adnatis, latè lanceolatis, setoso-acuminatis, exsertis, in æstivatione flexuoso-tortis, cum laciniis corollæ alternantibus, instructus. Stamina 5 corollæ tubo inserta ejusdemque laciniis opposita, exserta. Filamenta subulato-filiformia, tubo adnata, basi cum squamis confluentia, apice in æstivatione flexuoso-torta, nuda. Antheræ extrorsæ, ovatæ, basi bifidæ, apice acutæ integræ, medio dorso affixæ, subversatiles, biloculares, longitudinaliter dehiscentes; valvulis inæqualibus, exterioribus duplò latioribus. Pollinis granula ovoidea, utrinque obtusa. Ovarium ovato-hemisphericum, uniloculare, latâ basi sessile, liberum, pilis longis scabriusculis adpressis densè obtectum; placentâ parvâ, basilari, sessili. Ovula (semper ferè) 5, erecta, approximata, conniventi-verticillata, pressione mutuâ subcuneiformia, dorso crassa convexa, ventre attenuata plana, basi angustata, anatropa, funiculis brevissimis affixa; raphe latâ manifestâ, foramine umbilico approximato. Stylus elongatus, subdeclinatus, subulatus, apice acutatus, crassiusculus, exsertus, etiam in alabastro ultra corollam protrusus. Stigma terminale, minutum, indivisum. Fructus drupaceus (recentem nondum vidi) globosus, apice depressus, abortu 1- raro 2-spermus, subsessilis, basi calyce persistente instructus, magnitudine Uvæ minoris; sarcocarpio carnoso saccharino dulci. Semen abortu solitarium, rotundissimum, (vel nunc duo semiglobosa) diametro 4 lineas emetiens, erectum, sessile, hilo lato excavato impresso umbilicatum, foveis 3–4 impressis (ovulorum abortientium vestigiis) juxta hilum notatum; testa glaberrima, lævigata, fusca, ossea, intùs undique lamellis verticalibus elevatis crassis robustis flexuosis, albuminis sinus profundè penetrantibus, asperata; processu umbilicali incrassato, irregularitèr conico, lacero, ad medium usque albuminis intruso; micropyle juxta hilum prominulâ discolori; membrana interior adnata, spongiosa, fusca; albumen copiosum, embryone triplo majus, cartilagineum, album, lobato-ruminatum. Embryo magnus, subexcentricus, respectu umbilici transversè arcuatus, amphitropus, albidus; cotyledones elongatæ, planæ, foliaceæ, latiusculæ; radicula teretiuscula, crassa, brevis, hilo approximata; plumula inconspicua. (Vidi viv. Descript. et icon. ad exempla sicc. confect.)

Edgeworthia is one of the most characteristic forms of Lower Affghanistan, occurring in great abundance near Peshawur, and in the neighbouring hills. It grows associated with a species of *Dodonæa* (*D. dioica*, Roxb.?), *Olea Laitoona*, an undescribed Asclepiadeous genus (*Campelepis* *), and a species of *Rhazya*, all of which are prevailing forms. I met with it in August 1837, and it was subsequently found by Mr. W. Griffith, to whom I owe the first knowledge of the remarkable fact of the style being protruded in the bud.

I follow most systematic botanists in considering *Theophrasteæ* as a section merely of *Myrsineæ*; the distinctive characters of the tribe not appearing

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* CAMPELEPIS.

Nat. Ord. Asclepiadeæ, *Tr.* Periploceæ.

Corolla rotata, 5-fida; fauce coronatâ squamis 5 cum segmentis alternantibus, brevibus, flexuoso-trilobis, confluentibus, medio aristatis, aristis filiformibus erectis apice uncinatis; tubo intùs squamulis totidem inclusis, laceris, patentibus, staminibus oppositis, instructo. *Filamenta* distincta, fauci infra squamas inserta. *Antheræ* sagittatæ, apiculo acuto terminatæ, dorso barbatæ, basi stigmatis medio adglutinatæ. *Massæ pollinis* solitariæ, granulosæ, corpusculorum stigmatis appendiculis dilatatis applicitæ. *Stigma* dilatatum, muticum. *Folliculi* cylindracei, læves, divaricatissimi. *Semina* ad umbilicum comosa.

Frutex *erectus, ramosissimus, glaber, quasi aphyllus;* foliis *squamæformibus, deciduis, remotis;* cymis *brevè pedunculatis, paucifloris;* floribus *parvis, coriaceis;* corollæ *laciniis intùs prope apicem barbatis, disco leprosis.*

Campelepis viminea.

Habitat passim in Bactriâ Inferiore; prope Peshawur, Attock, &c.

sufficiently numerous or important to entitle it to the rank of a separate order. The other genera of true *Theophrasteæ* are South American, and the occurrence of *Edgeworthia* upon the skirts of the Continent of India is a fact of some interest. Of the species which are associated with it, two are of genera common to Northern Africa and Affghanistan, viz. *Forskählea tenacissima*, and *Rhazya Daphneoides*.

Botanic Garden, Saharunpore, July 25, 1841.

EXPLANATION OF TAB. IX.

Fig. 1. A flowering branch of *Edgeworthia Buxifolia*, of the natural size.
2. A flower-bud, magnified, showing the protruded style.
3. A flower, magnified.
4. The corolla slit open, showing the insertion of the stamina and squamæform staminodia.
5. The persistent calyx and ovary, magnified.
6. A portion of the corolla, showing the twisted æstivation of the stamina and staminodia in the bud.
7. The ovary, magnified and laid open longitudinally.
8. The same, cut transversely.
9. An ovulum, of the natural size, and magnified.
10. A ripe seed, of the natural size.
11 & 12. Sections of the seed, showing the ruminated albumen, the position of the embryo, and the thickened core at the base of the testa.
13. The base of the seed.
14. The embryo.

M. P. Edgeworth Esq. delin.

XIV. *On some rare and beautiful Coleopterous Insects from Silhet, chiefly in the Collection of* Frederick John Parry, *Esq., F.L.S., &c. By the Rev.* Frederick William Hope, *M.A., F.R.S., F.L.S., &c.*

Read March 1st, 1842.

THE last memoir which I had the honour of submitting to the notice of the Linnean Society, related to some insects of Assam; the present communication refers to others from Silhet, a locality south of the former, and for beauty they may justly vie with any which the gorgeous East produces.

It must be remarked of the above-mentioned localities, that both are extratropical, and as they are nearly adjacent, we might naturally anticipate a certain similarity of entomological character. The most remarkable peculiarity, however, is the entire accordance which these extratropical insects evince with those of the torrid zone, a similarity marked not by richness of colouring and metallic splendour only, but also by various typical forms which are regarded as peculiar to the tropics.

From a careful examination of the insects of the Himalaya along with those of our British East Indian Presidencies, and of others from Chusan, lately sent to England by one of the most indefatigable naturalists of the present day, Dr. Cantor, I have no fear in asserting, that uniformity will be found to be one of the leading characteristics of Indian entomology, and that the insects of Assam, Silhet, and other localities, must be regarded as possessing the tropical characters, although the regions themselves are extratropical. The geographical distribution, therefore, proposed by Latreille, graduated by isothermal lines and climatical parallels, is clearly as artificial and illusory as the imaginary lines which are supposed to bound the tropics.

The collection from which the present novelties are described belongs to Frederick John Parry, Esq. of Cheltenham, the possessor of one of the finest cabinets of exotic insects in Great Britain. The insects were obtained by purchase, and have been forwarded to me for the purpose of describing the novelties; and I may venture to assert, without fear of contradiction, that, when examined, they will be considered a very valuable addition to our acquaintance with oriental entomology. Before entering on the specific descriptions I have one other remark to make. The present collection of insects from Silhet, as well as others from other parts of India, are frequently greatly damaged by the substances used with the intention of preserving them; the collectors, not content with using abundance of arsenical soap, apply also to the insects a varnish (derived probably from the resin called anime), which is apparently painted over them, and to this is sometimes added turpentine, as well as other ingredients of a resinous nature, with which I am unacquainted. Now if spirits of wine are used to clean these insects, a white scurf spreads over the whole surface, and this is too often increased by a renewed application of spirit. The only means used at present have been warm water and brushing them well with a camel's hair brush. I am told, however, that a solution of caoutchouc is more efficacious than anything else in restoring the insects to their original brightness. It ought, however, to be repeated till the insects are thoroughly cleared of the arsenic and other ingredients, used with the intention of preserving them, but which certainly have often a contrary effect, as many insects, which externally appear sound, are internally entirely rotten and soon fall to pieces. For this reason the oriental collections offered for sale in this country are frequently scarcely worth purchasing.

Lucanidæ.

Hexarthrius, *Burmeister*.

Sp. 1. Hex. Parryi. Tab. X. fig. 2.

Niger, mandibulis exsertis subdenticulatis bidentatis, capite thoraceque scabriusculis, elytris posticè castaneis.

Long. lin. 36; lat. lin. 10.

Statura *Luc. Rhinocerotis*, Fab., at latior. *Antennæ* articulis quinque ultimis fusco-pubescentibus, sexto nigro valdè acuto. *Mandibulæ* arcuatæ, capite longiores, intùs crenatæ, bidentatæ. *Caput* utrinque unidentatum, disci medio fortiter impresso. *Thorax* angulis *anticis* externè obtusis, *posticis* ante apicem parùm acutis. *Elytra* humeris suturâ marginibusque nigris, reliquâ disci parte castaneo insignitâ. *Pedes* tibiis anticis externè denticulatis, mediis unispinosis, posticis inermibus.

The above insect, which is the largest species of *Hexarthrius* known, was obtained in Silhet; it is described from the rich oriental cabinet of Frederick Parry, Esq., and is named in honour of that zealous entomologist.

Odontolabis*, *Burmeister.*

Sp. 2. Odontolabis Cuvera. Tab. X. fig. 3.

Ater, mandibulis valdè exsertis denticulatis, elytris pallidè castaneis literâ V nigrâ signatis.

Long. mandibulis inclusis lin. 34; lat. lin. 11.

Caput supernè elevatum, anticè fortiter excavatum. *Mandibulæ* porrectæ, capite longiores, arcuatæ, dentatæ; dente ad basin acuto, 2do ultra medium longiori, apicibusque subfurcatis. *Elytra* flavo-testacea, tenuissimè nigro marginata, in disci medio literâ V nigrâ insignita. *Pedes* antici tibiis externè spinosis, quatuor posteriores inermes.

Mr. Saunders has figured in the 'Entomological Transactions' a *Lucanus* from India, which he regards as a variety of *Luc. bicolor* of Fabricius, but which is evidently a distinct species. I suggest, therefore, the name of *Saundersii* being applied to that of the above-mentioned author, as it was originally described by him: it belongs to the same genus as *Odontolabis*. *Lucanus Burmeisteri* of my cabinet is the type of a genus allied to *Odontolabis*, and is remarkable for having all its tibiæ unarmed.

Sp. 3. Odontolabis Baladeva.

Niger, mandibulis porrectis multidentatis, capite thoraceque utrinque unidentatis.

Long. lin. 26; lat. 10.

Habitat in Silhet.

Caput anticè et posticè sinuatum. *Mandibulæ* porrectæ arcuatæ, capite parùm longiores. *Thorax* utrinque dentatus, lævis, foveolis rotundatis binis posticè impressus. *Elytra* glabra, nitida; tibiis anticis externè denticulatis, quatuor posterioribus inermibus.

* From ὀδοὺς, *dens*, and λαβὶς, a pair of pincers.

To the same genus belong *Lucanus Dalmanni* and *Luc. Cumingii* of my cabinet. I am aware also of other species which are wrongly regarded as varieties of the Fabrician *Luc. Alces.*

Dorcas, *MacLeay.*

Sp. 4. Dorcas Westermanni.

Niger, mandibulis porrectis multidentatis capite thoraceque parùm brevioribus.

Long. lin. 26½; lat. lin. 9.

Thorax lateribus irregulariter angulatis. *Elytra* nigro-castanea, lineâ longitudinali (in singulo) ferè ad marginem impressâ. *Pedes* antici tibiis denticulatis; quatuor posteriores unispinosi.

The above insect, received from Silhet, is named in honour of Westermann, the prince of Danish entomologists.

Sp. 5. Dorcas De Haani.

Niger, mandibulis porrectis capite parùm longioribus: dente forti ferè trigono ante basin posito: reliquis minoribus.

Long. lin. 22; lat. lin. 7¼.

Habitat in agro Assamensi.

Caput clypeo lato ciliato, prominentiâ frontis anticè latiori. *Mandibulæ* capite longiores, apicibus valdè acutis, dente valido suprà et internè instructæ. *Thorax* lævis, marginatus. *Elytra* nigra, nitida, lateribus rugoso-punctulatis. *Pedes* tarsis subtùs auricomatis.

I have described the above species from my own collection: it was presented to me by Lady Jones, and was taken in the Assamese territories. It is here introduced, as it appears to recede from the typical oriental species of *Dorcas*, and is named in honour of Professor De Haan of Leyden, an able oriental entomologist.

Sp. 6. Lucanus Brahminus.

Niger, mandibulis valdè exsertis denticulatis capiti thoracique æqualibus, thorace posticè utrinque dentato, elytris glabris marginatis.

Long. lin. 21½; lat. lin. 6½.

Habitat in Silhet.

Totum corpus suprà nigrum; clypeo anticè 2-dentato. *Mandibulæ* apicibus acutis, denticulatæ, dente majori ad basin armatæ aliisque minoribus ante apicem instructæ. *Thorax* angulis anticis ferè rectis, posticè utrinque dentatus. *Pedes* tibiis anticis multidentatis, quatuor posterioribus unidentatis.

Sp. 7. Lucanus Buddha.

Niger nitidus, mandibulis valdè porrectis capite thoraceque longioribus denticulatis.

Long. lin. 21; lat. lin. 6.

Habitat in Silhet.

Caput anticè valdè excavatum, angulis omnibus subrotundatis. *Mandibulæ* thorace capiteque longiores, denticulatæ, dente ad basin robusto, 2do minori, 3tio majori, reliquis minutis, apicibusque subfurcatis. *Thorax* capite latior, marginatus. *Elytra* thorace minora, ferè recta, nigra, nitida. *Pedes* tibiis anticis externè serratis, mediis unispinosis, posticis inermibus.

Goliathidæ, *Lamarck.*

Diphyllomorpha, *Hope.*

Sp. 8. Diphyllomorpha Mearsii. Tab. X. fig. 1.

Suprà viridis, disco roseo-opalino tincto, femoribus tibiisque virescentibus flavo-ciliatis.

Long. lin. $10\frac{1}{4}$; lat. lin. 4.

Habitat in montibus Himalayanis.

Caput oblongo-quadratum, margine exteriori parùm reflexo; oculis magnis, nigris. *Antennæ* articulo 1mo crasso viridi, sex sequentibus piceis, lamellâ foliatâ nigrâ internè flavo-ciliatâ. *Thorax* convexus, marginibus externis subelevatis, disci lateribus punctulatis. *Elytra* acuminata, viridia, nigro marginata, disci medio opalino colore nitente. *Corpus* infrà aurato-viride, abdominis segmentis colore saturatiore inquinatis. *Pedes* quatuor anteriores rugoso-spinosi, bini postici rugosi flavo ciliati, tarsis nigricantibus.

The above insect is named in honour of G. Mears, Esq., late of the East India Company's service, and an assiduous collector of Indian entomology.

It will be seen that I regard the present species as the type of a distinct genus closely allied to *Rhomborhina.* I know of no instance in the *Cetoniadæ* where the antennæ differ so remarkably as in the above insect. The male has the fore tibiæ simple, and the long clava of the antennæ ; it has also the abdomen deeply impressed with a longitudinal furrow down the middle, which, although a great character in true *Cetoniadæ*, is rare in *Rhomborhinæ*. The male has also the podex larger than the female. Another character of still greater importance, separating it at once from the typical *Rhomborhinæ*, consists in the elongated, serrated, and narrower mesosternum.

Since writing the above, I have received a note from Captain Parry, informing me that the above insect was taken at Darjeling, thirty miles from the mountain of Dhawalaghiri, which is nearly in the centre of Nepaul, in about 85° of east longitude, and in latitude $28\frac{1}{2}$° north. The mountain is 8000 feet above the level of the sea. The appearance, therefore, of tropical forms on mountain ranges of considerable elevation is a fact worthy of record.

Rutelidæ, *Latreille*.

Mimela, *Kirby*.

Sp. 9. Mimela Passerinii, *Parry*.

Viridis, thoracis lateribus luteolis, elytrorum marginibus elevatis pallidè virescentibus, corpore infrà roseo-cupreo, pectore capillis longis flavescentibus obsito.

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

Habitat in montibus Himalayanis.

Caput clypeo ferè quadrato. *Antennæ* articulis ternis ultimis clavam elongatam lineari-lanceolatam efformantibus. *Corpus* suprà viride, creberrimèque punctulatum; infrà roseo-cupreum, pectore capillis longis flavescentibus obsito. *Pedes* piceo-cuprei, capillis rufis ciliati.

The above insect evidently belongs to *Mimela*, as the presence of a prosternum attests ; it is armed at the mesosternum with a small spine, like the barb of a spear. It is remarkable also by the leaflets of the antennæ being more fully developed than in the type of *Mimela*. As the species of this oriental genus are very numerous, it may be well to subdivide them : I suggest, therefore, the adoption of the term *Micraspis*, to include those species of *Mimela* which possess a prosternum as well as an armed mesosternum.

Buprestidæ, *Fab.*

Chrysochroa, *Delaporte.*

Sp. 10. Chrysochroa Edvardsii. Tab. X. fig. 4.

Viridi-aurata, thorace cupreo-purpureo, elytris fasciâ irregulari maculâ flavâ insignitis, corpore subtùs roseo-cupreo, pedibus concoloribus.

Long. lin. 27; lat. lin. $8\frac{3}{4}$.

Caput æneum, in medio fortiter excavatum, punctatum. *Thorax* cupreo-æneus, depressus, trapezoidalis; margine posteriori subsinuato. *Elytra* viridi-ænea, cupreo tincta, lineis longitudinalibus insignita; macula irregularis flava ad disci medium posita. *Corpus* infrà roseo-cupreum, punctatum, igne micante fulgidum, annulis abdominis posticè viridibus. *Pedes* femoribus cupreo-æneis nitidis; *tibiis* rectis viridibus; tarsis suprà concoloribus, subtùs fusco-spongiosis.

The nearest species of my acquaintance allied to *Chrysochroa Edvardsii* is a beautiful species named *Perottetii* by Mons. Guérin. The superb *Buprestis* just described is named in honour of Milne Edwards, Professor of Natural History in Paris, who has lately been elected to the Entomological Chair formerly held by Audouin, the successor of Latreille.

Longicornes.

Monohammus, *Megerle.*

Sp. 11. Monohammus sulphurifer, *Hope.* Tab. X. fig. 5.

Corpore toto suprà et infrà flavo-sulphureo, antennis pedibusque nigro cinereoque variegatis.

Long. lin. 13; lat. lin. $4\frac{3}{4}$.

Caput fronte declivi flavo; lineâ tenui longitudinali fortiter incisâ. *Thorax* utrinque spinis nigricantibus armatus. *Elytra* ad apicem rotundata, capillis sulphureis obsita, maculâ rotundatâ parvâ brunneâ (in singulo) ad disci medium insignita. *Pedes* nigricantes; tarsis infrà fusco-pilosis.

The above insect is from Silhet. In my former memoir on the 'Insects of Assam,' two other species of this genus will be found described; and on reference to my collection I find that I possess five other Indian species, which are provisionally named *sulphureus, plumbeus, argillaceus, cervinus,* and *miniatus.* The three first are from Assam, the next is from the Tenasserim coast, and the last from Japan. The oriental *Monohammi* evidently belong to a peculiar section, and should be separated from the European species and formed into subgenera.

Purpuricenus.

Sp. 12. Purpuricenus rubripennis. Tab. X. fig. 6.

Violaceus, elytris rubro-marginatis maculâ subquadratâ in medio disco insignitis, pedibus concoloribus.

Long. lin. 15; lat. lin. 4.

Habitat in Silhet.

Antennæ nigro-violaceæ. *Thorax* concolor, rugosus et tomentosus. *Scutellum* cyaneum. *Elytra* rubro-miniata, maculis irregularibus nigris insignita. *Totum corpus* infrà violaceum.

The genus *Purpuricenus* has not yet, I believe, been noticed as occurring in the East Indies. The above insect deviates from the typical species; it may remain, however, for the present arranged under that genus, until the species are more thoroughly investigated. One from Gozo, near Bombay, in my collection is named after Colonel Sykes, and a second, from Japan, is called *Titsingii* by De Haan. It is probable also that *Cerambyx sanguinolentus* of Olivier belongs to the same genus.

Zonopterus*, *Hope*, n. g.

Caput mandibulis arcuatis, fronte declivi, cornu brevi utrinque ad basin antennarum. *Antennæ* e medio oculorum surgentes, 11-articulatæ, articulo basali apice crassiori, 2do minimo, 3tio longissimo, 4to fere dimidio minori, 6 sequentibus ferè æqualibus, ultimo longiori acuto. *Thorax* depressus, capite duplò longior. *Elytra* thorace triplò longiora, parallela, apicibus rotundatis. *Pedes* femoribus 4 anterioribus incrassatis, posticis duplò majoribus subcompressis; tibiæ posticæ subincurvæ.

* From *ζώνη a belt,* and *πτερὸν a wing,* or *belted winged beetle,* a characteristic of the majority of the species.

Sp. 13. ZONOPTERUS FLAVITARSIS. TAB. X. fig. 7.

Niger, antennis bicoloribus, thorace nigro-tomentoso, elytris flavo bifasciatis, femoribus tibiisque atris; tarsis flavis.

Long. lin. 15; lat. lin. 4.

Caput nigrum, fronte declivi. *Antennæ* articulis quatuor primis atris, reliquis flavis. *Thorax* Callidiiformis dorso depresso. *Elytra* fasciis tribus atro-tomentosis duabusque aliis flavis. *Corpus* infrà pectore nigrino, annulisque abdominis pubescentiâ auratâ aspersis. *Pedes* femoribus tibiisque nigris, tarsis flavis subtùs spongiosis.

The above insect appears to be the type of a new genus, and also to be, as far as is known at present, peculiar to the East Indies. The nearest approximation, perhaps, is the *Saperda clavicornis* of Fabricius; it cannot, however, be arranged with any of the African longicorn beetles. A somewhat similar form (allied to the above) has lately been brought to this country from Manilla by Mr. Cuming, and no doubt they may eventually form genera of one and the same family. As the figure is ably delineated by Mr. Westwood, the foregoing short Latin characters may be regarded as sufficient to characterise the form, although the manducatory organs remain undescribed. Imperfect as they are, and clothed with the preservatives used, it is useless to attempt their examination, as the specimen, which is unique, would probably be destroyed.

COLOBOTHEA, *Serville.*

Sp. 14. COLOBOTHEA RUBRICOLLIS. TAB. X. fig. 8.

Rubro-picea, antennis concoloribus, elytris nigricantibus maculis flavo-ochraceis aspersis.

Long. lin. 15; lat. lin. 4.

Caput, antennæ, femora, tibiæque rubro-piceæ. *Thorax* concolor, cylindricus. *Elytra* nigricantia, humeris apicibusque rufo-piceis, variolosa, variolis fortiter insculptis, maculis binis majoribus aliisque minoribus flavo-ochraceis per totum discum aspersa. *Corpus* infrà piceum, abdominis segmentis utrinque serie duplici macularum flavarum insignitis, annulo ultimo immaculato. *Pedes* femoribus rubro-piceis, tibiis concoloribus, apicibus ciliatis. *Tarsi* quatuor anteriores suprà nigro variegati, infrà subaurato-spongiosi, postici undique fusco-spongiosi.

The above insect, remarkable for its size, inhabits Silhet. It diverges from the true *Colobothea*, which inhabits the New World: the Asiatic species belong to a distinct genus, and ought to be separated.

Sagridæ, *Leach.*

Sp. 15. Sagra carbunculus. Tab. X. fig. 9.

Cyanea, elytris igne auroque micantibus, pedibus posticis incrassatis; tibiis incurvis.

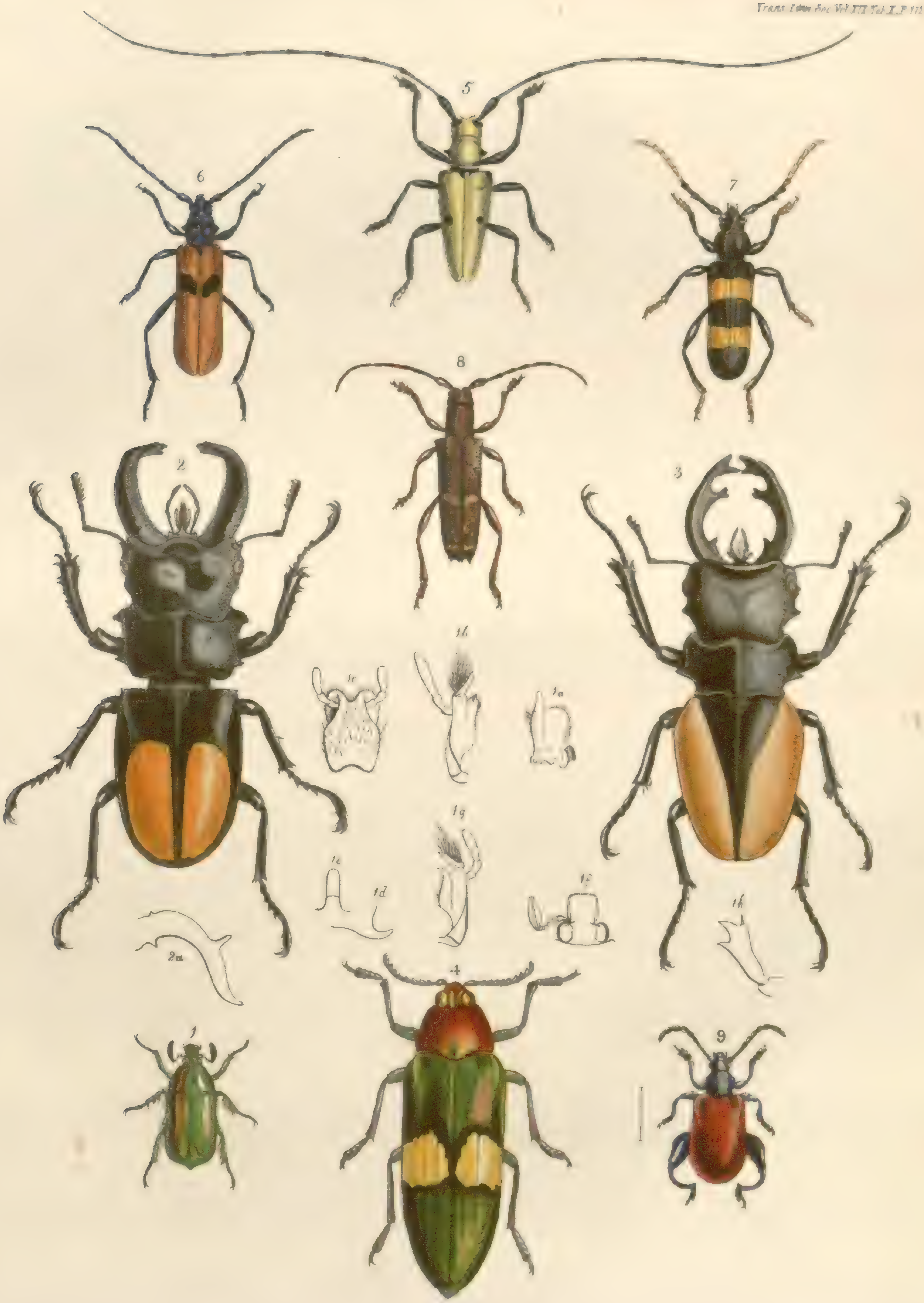
Long. lin. $4\frac{1}{2}$.

Caput, antennæ, thorax, corpus totum infrà *pedesque* cyanei. *Thorax* ferè quadratus, anticè ante oculos contractus, punctulatus. *Elytra* carbunculosa, igne auroque micantia, creberrimè punctulata. *Pedes* femoribus 4 anterioribus parùm incrassatis, tibiis subincurvis; posticis valdè incrassatis subunidentatis, tibiis arcuatis, tarsis flavo-spongiosis.

The *Chrysidæ*, or gold wasps of the *Hymenoptera*, have not unaptly been compared to the humming-birds of ornithologists; and the magnificent oriental beetles of the genus *Sagra* may justly be contrasted with the precious stones of the East, with the ruby, the sapphire and the emerald. As the above insect resembles a carbuncle, it is named accordingly.

EXPLANATION OF TAB. X.

Fig. 1. *Diphyllomorpha Mearsii.*
2. *Hexarthrius Parryi.*
3. *Odontolabis Cuvera.*
4. *Chrysochroa Edvardsii.*
5. *Monohammus sulphurifer.*
6. *Purpuricenus rubripennis.*
7. *Zonopterus flavitarsis.*
8. *Colobothea rubricollis.*
9. *Sagra Carbunculus.*



J. O. W. del.

Day & Haghe Lithrs to the Queen

XV. *A Catalogue of Spiders either not previously recorded or little known as indigenous to Great Britain, with Remarks on their Habits and Economy.* *By* John Blackwall, *Esq., F.L.S., &c.*

Read April 5th, and April 19th, 1842.

WITH a few exceptions, of sufficient importance to warrant their introduction, the spiders comprised in the following catalogue have never before been recognised as British species. In addition to any interest which may be derived from this circumstance, numerous facts have been supplied relative to their structure, instincts, economy, and haunts, with occasional remarks upon their nomenclature and systematic arrangement.

The kind assistance received from the cooperation of friends in collecting materials for this paper, I have endeavoured to acknowledge in an appropriate manner as suitable occasions presented themselves; but as the information communicated in it has resulted, for the most part, from my own researches, I must be considered responsible for its accuracy.

Should the observations recorded in these pages contribute in any degree to facilitate the acquisition of that desideratum in the zoology of Great Britain, a comprehensive history of our native spiders adapted to the present state of arachnological science, the principal purpose which they were intended to subserve will be accomplished.

Class Arachnida.

Order Araneidea.

Tribe Octonoculina.

Family Drassidæ.

Genus Drassus, *Walck.*

1. Drassus sericeus.

Drassus sericeus. Walck. Hist. Nat. des Insect. Apt., t. i. p. 619. Koch, Die

Arachn. (Fortsetzung des Hahn'schen Werkes), b. vi. p. 37. tab. cxc. fig. 457, 458.

In external structure this species makes a near approximation to *Drassus ater*. It frequents houses, especially such as are old, is a strong active spider, running with facility up smooth perpendicular surfaces by means of the adhesive matter emitted from the numerous papillæ of its climbing apparatus, and is decidedly nocturnal. I have met with it in several of the northern counties of England and Wales.

The papillæ or spinning-tubes connected with the terminal joint of each inferior mammula of *Drassus sericeus*, not only vary in number with the age of the animal, the full complement being nine large and two small ones, but a like number does not constantly occur on both mammulæ of the same individual, ten or eleven being sometimes observed on one, when nine or ten only are perceived on the other; coinciding in these particulars of their development with that of the papillæ with which the inferior mammulæ of *Drassus ater* and *Drassus cupreus* are provided. Since the publication of my observations on the spinning organs of spiders in the Linnean Transactions (vol. xviii. p. 219.), I have discovered that even adult specimens of *Drassus cupreus* and *Drassus sericeus* have not uniformly the same number of papillæ on the inferior spinners, and that the same individuals of both species, though capable of reproducing their kind, sometimes have one mammula more amply supplied with papillæ than the other, but that the two minute papillæ connected with each inferior mammula are present invariably. It is probable that the large papillæ are used by these spiders and by *Drassus ater* chiefly in constructing their cocoons, whose remarkably compact texture is best explained on the supposition that a copious supply of viscous matter in a state of fluidity is employed in their fabrication.

2. Drassus ater.

Drassus ater. Walck. Hist. Nat. des Insect. Apt. t. i. p. 618. Latr. Genera Crust. et Insect. t. i. p. 87.

Melanophora atra. Koch, Die Arachn. b. vi. p. 88. tab. cci. fig. 493.

This species is common in Denbighshire and Caernarvonshire, occurring in crevices and under detached pieces of rocks. In the month of May the female deposits 40 or 50 white spherical eggs, not agglutinated together, in a cocoon of a plano-convex figure, attached to the under side of stones by its plane surface; it is of a fine but very compact texture, and measures $\frac{2}{5}$ths of an inch in diameter: when newly constructed it is white, but becomes reddish before it is abandoned by the young, which, at that early period of their existence, have each inferior mammula provided with two large and two small papillæ. The female usually remains upon or near the cocoon, to which she is strongly attached.

Genus Clubiona, *Latr.*

3. Clubiona epimelas.

Clubiona epimelas. Walck. Hist. Nat. des Insect. Apt. t. i. p. 592.

Crevices in stone walls, and the under side of fallen leaves, are favourite haunts of *Clubiona epimelas*, which is found, though rarely, in the wooded districts of Denbighshire. The male has the palpal organs completely developed in June. In July the female constructs a plano-convex cocoon of white silk, of a compact but very fine texture, measuring $\frac{3}{10}$ths of an inch in diameter, in which she deposits about 150 spherical eggs of a pale yellowish white colour, not agglutinated together. The cocoon is attached by its plane surface to the under side of stones, and is enclosed in a sac of fine white silk, which also includes the female.

4. Clubiona accentuata.

Clubiona accentuata. Walck. Hist. Nat. des Insect. Apt. t. i. p. 594.
Clubiona punctata. Hahn, Die Arachn. b. ii. p. 8. tab. xxxix. fig. 99.

This active spider occurs on trees in the woods of Denbighshire and Caernarvonshire, concealing itself among the liverworts and lichens growing on their trunks and branches.

5. Clubiona erratica.

Clubiona erratica. Walck. Hist. Nat. des Insect. Apt. t. i. p. 602.
Cheiracanthium Carnifex. Koch, Die Arachn. b. vi. p. 14. tab. clxxxiv. fig. 438, 439.

Specimens of this handsome species have frequently come under my observation when exploring the woods and commons of Denbighshire. In July the female constructs a cell of white silk, of a fine compact texture, among the stems of gorse and heath, the leaves of plants, &c., which she curves about it and secures in that position by means of silken lines. In this cell she deposits about 140 spherical eggs of a deep yellow colour, which are not agglutinated together, but are contained in an exceedingly delicate tissue of white silk of a subglobose form, measuring $\frac{1}{4}$th of an inch in diameter, which is attached to the surface of the cell. The female appears to remain constantly near her eggs, not even quitting the cell to procure food.

Genus Argyroneta, *Latr.*

6. Argyroneta aquatica.

Argyroneta aquatica. Walck. Tabl. des Aran. p. 84. Latr. Genera Crust. et Insect. t. i. p. 94. Hahn, Die Arachn. b. ii. p. 33. tab. xlix. fig. 118. Koch, Die Arachn. b. viii. p. 60. tab. cclxix. fig. 636.

I have been favoured with specimens of *Argyroneta aquatica*, from the fens of Cambridgeshire, by Charles C. Babington, Esq., M.A., of St. John's College, Cambridge; and Thomas Glover, Esq., of Smedley Hill, near Manchester, has informed me that he has captured this species in small pools in Cheshire.

Family Cinifloniдæ.

Genus Ciniflo, *Blackw.*

7. Ciniflo ferox.

Clubiona ferox. Walck. Hist. Nat. des Insect. Apt. t. i. p. 606.
Amaurobius ferox. Koch, Die Arachn. b. vi. p. 41. tab. cxci. fig. 460, 461.

Having recently ascertained that this spider has eight spinners, and has the metatarsal joint of each posterior leg provided with a calamistrum, I no longer hesitate to transfer it from the genera *Clubiona* and *Amaurobius*, in which it has previously occupied a place, to the genus *Ciniflo*. Abounding in England and Wales, and frequenting the same localities as *Ciniflo atrox*, which it closely resembles in form, colour and economy, it is, notwithstanding its superior size, very generally confounded with that species.

Genus Ergatis, *Blackw.*

8. Ergatis latens.

Ergatis latens. Blackw. Linn. Trans. vol. xviii. p. 608.
Dictyna latens. Koch, Die Arachn. b. iii. p. 29. tab. lxxxiii. fig. 186. Lister, De Aran. p. 56. tit. xvi. fig. 16.

M. Walckenaër has confounded *Ergatis latens* with *Theridion denticulatum*, from which it differs essentially in colour, organization and economy, and has given references to Lister's description and figure of the former species among the synonyma of the latter. (Tabl. des Aran. p. 74.) The same distinguished arachnologist has placed *Ergatis viridissima*, Blackw., which is closely allied to *Ergatis latens*, in the genus *Drassus* (Hist. Nat. des Insect. Apt. t. i. p. 631), evincing by these incongruities the difficulty experienced in attempting to classify the *Ciniflonidæ* before the discovery of the remarkable characters upon which that family is founded.

Ergatis latens spins a whitish web of an irregular structure at the extremities of the stems of gorse, heath, &c., growing on commons in Denbighshire. The sexes pair in June, and in July the female constructs several contiguous, lenticular cocoons of greenish white silk of a compact texture, which she attaches to the stem surrounded by her web, distributing about them the refuse of her prey; each contains from 10 to 16 spherical eggs of a yellow colour, which are not agglutinated together.

Family Agelenidæ.

Genus Tegenaria, *Walck.*

9. Tegenaria domestica.

Tegenaria domestica. Walck. Aranéides de France (dans la Faune Française), p. 205. Koch, Die Arachn. b. viii. p. 25. tab. cclx. fig. 607, 608.
Aranea domestica. Latr. Genera Crust. et Insect. t. i. p. 96.

I have received specimens of *Tegenaria domestica* from the Universities of Oxford and Cambridge, but I never have met with it in the north of England and Wales. *Tegenaria civilis* is very frequently mistaken for *Tegenaria domes-*

tica, and references to Lister's description and figure of the former species (De Aran. p. 59. tit. xvii. fig. 17.) have been repeatedly included among the synonyma of the latter by arachnologists of the highest authority.

Family Lycosidæ.

Genus Lycosa, *Latr.*

10. Lycosa andrenivora.

Lycosa andrenivora. Walck. Hist. Nat. des Insect. Apt. t. i. p. 315.

This spider frequents commons and old pastures in various parts of England and Wales.

11. Lycosa agretyca.

Lycosa agretyca. Walck. Hist. Nat. des Insect. Apt. t. i. p. 308.
Lycosa ruricola. Hahn, Die Arachn. b. i. p. 103. tab. xxvi. fig. 77.

Lycosa agretyca occurs in old pastures in England and Wales. In the month of June the female excavates an elliptical cavity in the earth beneath stones, into which she retires with her cocoon, which is globular, composed of fine white silk of a compact texture, and is encircled by a narrow zone of a slighter fabric; it measures $\frac{1}{4}$th of an inch in diameter, and contains about 110 spherical eggs of a pale yellow colour, not agglutinated together. The cocoon is attached to the spinners of the female by short lines of silk, and the young, when they quit it, mount on her body and are supplied by her with food. This species frequently passes the winter in the cavities which it forms in the earth under stones.

12. Lycosa allodroma.

Lycosa allodroma. Walck. Hist. Nat. des Insect. Apt. t. i. p. 330. Koch, Die Arachn. b. v. p. 106. tab. clxxii. fig. 410, 411.

In the spring of 1836 I discovered a light-coloured variety of this fine spider among water-worn stones and fragments of rock on the banks of the river Llugwy, near Capel Curig, Caernarvonshire; and, supposing it to be unknown to arachnologists, I described it under the appellation *Lycosa leucophæa* in the 'London and Edinburgh Phil. Mag.' vol. x. p. 104.

13. Lycosa picta.

Lycosa picta. Hahn, Die Arachn. b. i. p. 106. tab. xxvii. fig. 79.

M. Walckenaër, regarding this handsome spider as identical with *Lycosa allodroma*, has placed the name given to it by Hahn among the synonyma of that species (Hist. Nat. des Insect. Apt. t. i. p. 330.). Of the specific distinctness of *Lycosa picta*, however, no doubt can be entertained by those observers who have had an opportunity of inspecting adult individuals. It is found in Cheshire and Denbighshire, frequenting sandy districts on the sea coast.

14. Lycosa lugubris.

Lycosa lugubris. Walck. Hist. Nat. des Insect. Apt. t. i. p. 329.
Lycosa sylvicultrix. Koch, Die Arachn. b. iii. p. 25. tab. lxxxii. fig. 182, 183.

The description of *Lycosa lugubris* given by M. Walckenaër is applicable to the male only, which differs greatly from the female in size and colour. Among the synonyma of this species he has included the *Lycosa meridiana* of Hahn (Die Arachn. b. i. p. 20. tab. v. fig. 16.), a spider decidedly superior to it in size and unlike it in colour, and has placed the *Lycosa sylvicultrix* of Koch, which is identical with *Lycosa lugubris*, among the synonyma of *Lycosa vorax* (Hist. Nat. des Insect. Apt. t. i. p. 313).

Lycosa lugubris abounds in the woods of Denbighshire and Caernarvonshire; the sexes pair in April and May, and in the latter month the female deposits about 50 spherical eggs of a pale yellow colour, not agglutinated together, in a cocoon of a lenticular form and compact texture, composed of silk of a dull greenish or yellowish-brown colour, and measuring $\frac{1}{5}$th of an inch in diameter; it is encircled by a whitish zone of a slight texture, and is attached to the spinners of the female. When the young quit the cocoon they pass through an opening which takes place in the zone and ascend the body of the mother.

15. Lycosa pallida.

Lycosa pallida. Walck. Hist. Nat. des Insect. Apt. t. i. p. 334.

This spider is of frequent occurrence on the banks of rivers in Denbighshire and Caernarvonshire; it pairs in May, in which month and in June the female deposits about 60 pale yellow eggs of a spherical figure, not agglutinated together, in a lenticular cocoon of dull green or yellowish-brown silk, of a compact texture, measuring $\frac{1}{5}$th of an inch in diameter, on quitting which the young mount on the body of the mother.

Like other species belonging to the same genus, *Lycosa pallida*, in constructing its cocoon, slightly connects the margins of the two compact portions, beneath which the thin fabric of the zone is folded. This simple contrivance affords an admirable provision for the development of the young in the fœtal state by an increase in the capacity of the cocoon consequent on the margins of the compact parts becoming detached by means of the expansive force within, the eventual liberation of the young being effected by the rupture of the zone, which is the weakest part. This interesting fact in the economy of the *Lycosæ* appears to have escaped the observation of arachnologists.

16. Lycosa piratica.

Lycosa piratica. Walck. Hist. Nat. des Insect. Apt. t. i. p. 339. Hahn, Die Arachn. b. i. p. 107. tab. xxvii. fig. 80.

Lycosa piratica frequents marshes and the margins of pools in England and Wales; it runs rapidly on the surface of water, even when encumbered with its cocoon, and frequently takes refuge from danger beneath the surface of that liquid, concealing itself among the leaves of aquatic plants, the air confined by the circumambient water among the hairs with which it is clothed enabling it to remain immersed for a considerable period of time. In June the female deposits from 80 to 100 spherical eggs of a deep yellow colour, not agglutinated together, in a globular cocoon of compact white silk, encircled by a narrow zone of a slighter texture; it measures about $\frac{1}{5}$th of an inch in diameter, and the young, when extricated from it, climb upon the body of the mother.

Genus Dolomedes, *Latr.*

17. Dolomedes fimbriatus.

Dolomedes fimbriatus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 345. Hahn, Die Arachn. b. i. p. 14. tab. iv. fig. 10.

Dolomedes limbatus. Hahn, Die Arachn. b. i. p. 15. tab. iv. fig. 11.

Dolomedes marginatus. Hahn, Die Arachn. b. i. p. 15. tab. iv. fig. 12.

I am indebted to C. C. Babington, Esq., for specimens of this fine spider, which is found in the fens of Cambridgeshire. Like *Lycosa piratica* and *Argyroneta aquatica*, it descends spontaneously beneath the surface of water, the period of time during which it can respire when immersed depending upon the supply of air enveloping its body. In May the female deposits several hundred eggs in a globular cocoon of brown silk, of a compact texture, measuring $\frac{3}{5}$ths of an inch in diameter, which she carries under the sternum, supporting it in that situation by means of the mandibles and palpi, additional aid being derived in all probability from silken lines connecting it with the spinners; a method which I have discovered that *Dolomedes mirabilis* constantly employs to retain its cocoon in a similar situation. This interesting fact supplies a new link in the chain of analogies which connects the genus *Dolomedes* with that of *Lycosa*.

Family Salticidæ.

Genus Salticus, *Latr.*

18. Salticus cupreus.

Salticus cupreus. Hahn, Die Arachn. b. ii. p. 42. tab. lv. fig. 128.
Salticus æneus. Hahn, Die Arachn. b. i. p. 65. tab. xvii. fig. 49.
Salticus flavipes. Hahn, Die Arachn. b. i. p. 66. tab. xvii. fig. 50.
Attus cupreus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 409.

Crevices among detached pieces of rock accumulated in heaps are the favourite haunts of this species, which occurs in woods growing in the mountainous parts of Denbighshire and Caernarvonshire. In June the female encloses herself in a cell of beautifully white silk, of a compact texture, on the exterior surface of which particles of soil, withered moss, and other materials are sometimes sparingly distributed; she usually attaches it to the under side of stones or dead leaves, depositing in it from 20 to 30 spherical eggs of a pale yellow colour, which are connected by fine lines of silk.

19. Salticus coronatus.

Attus coronatus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 412.
Salticus Blancardii. Hahn, Die Arachn. b. i. p. 64. tab. xvi. fig. 48.

This is a common spider in the woods of Denbighshire and Caernarvonshire.

20. Salticus gracilis.

Salticus gracilis. Hahn, Die Arachn. b. i. p. 73. tab. xviii. fig. 55.
Attus gracilis. Walck. Hist. Nat. des Insect. Apt. t. i. p. 423.

The only locality in which I have met with *Salticus gracilis* is Gwydir woods in Caernarvonshire.

Family Thomisidæ.

Genus Thomisus, *Walck.*

21. Thomisus brevipes.

Thomisus brevipes. Hahn, Die Arachn. b. i. p. 30. tab. viii. fig. 25. Walck. Hist. Nat. des Insect. Apt. t. i. p. 503.

I have found one or two adult females of this species under stones in fields adjacent to woods at Oakland, near Llanrwst, Denbighshire. The only male I ever captured resembled the female in colour; but, though the terminal joints of its palpi were very tumid, the palpal organs were not developed, proving that it had not attained maturity.

22. Thomisus bifasciatus.

Xysticus bifasciatus. Koch, Die Arachn. b. iv. p. 59. tab. cxxv. fig. 286, 287, 288.

As there does not appear to be the least necessity for following Koch's example in separating this spider from the *Thomisi*, I have retained it among them.

Adult males may be seen occasionally in July and August running on the ground in pastures near Llanrwst.

23. Thomisus citreus.

Thomisus citreus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 526. Latr. Genera Crust. et Insect. t. i. p. 111. Hahn, Die Arachn. b. i. p. 42. tab. xi. fig. 32.
Thomisus pratensis. Hahn, Die Arachn. b. i. p. 43. tab. xi. fig. 33.
Thomisus Dauci. Hahn, Die Arachn. b. i. p. 33. tab. ix. fig. 27.

Thomisus calycinus. Koch, Die Arachn. b. iv. p. 53. tab. cxxiv. fig. 283, 284.

Flowers growing in fields and gardens are the favourite resorts of *Thomisus citreus*, which occurs in the western parts of Denbighshire.

Genus Philodromus, *Walck.*

24. Philodromus dispar.

Philodromus dispar. Walck. Hist. Nat. des Insect. Apt. t. i. p. 553.

The sexes of this active spider, which is found in the wooded parts of Denbighshire and Caernarvonshire, differ greatly in colour.

25. Philodromus cespiticolens.

Philodromus cespiticolens. Walck. Hist. Nat. des Insect. Apt. t. i. p. 555.

This species occurs in woods in Denbighshire. In July the female fabricates a cell of compact white silk among the leaves growing near the extremities of the stems of shrubs, curving them about it and retaining them in that position by means of silken lines. In this cell, which she usually occupies, she constructs two lenticular cocoons of white silk, of a delicate texture, depositing in each from 40 to 100 spherical eggs of a pale yellow colour. The cocoons frequently differ considerably in size, the larger one measuring about $\frac{1}{4}$th of an inch in diameter.

26. Philodromus oblongus.

Philodromus oblongus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 558.
Thomisus oblongus. Latr. Genera Crust. et Insect. t. i. p. 112. Hahn, Die Arachn. b. i. p. 110. tab. xxviii. fig. 82.

I have received *Philodromus oblongus* among spiders sent to me from the north of Cheshire.

Genus Sparassus, *Walck.*

27. Sparassus smaragdulus.

Sparassus smaragdulus. Walck. Hist. Nat. des Insect. Apt. t. i. p. 582.
Micrommata smaragdina. Latr. Genera Crust. et Insect. t. i. p. 115. Hahn, Die Arachn. b. i. p. 119. tab. xxxiii. fig. 89 A. B.

A collection of spiders captured in various parts of England by C. C. Babington, Esq., and obligingly transmitted by him to me in the year 1840, contained an adult male of this species; and T. Glover, Esq., has taken *Sparassus smaragdulus,* in an immature state, in the woods at Tan y Bwlch in Merionethshire.

Family Theridiidæ.

Genus Theridion, *Walck.*

28. Theridion denticulatum.

Theridion denticulatum. Walck. Tabl. des Aran. p. 74.

Crevices in rocks and walls, and the branches of trees growing against buildings, are the usual haunts of this species, which is common in England and Wales.

29. Theridion signatum.

Theridion signatum. Walck. Tabl. des Aran. p. 76.
Asagena serratipes. Koch, Die Arachn. b. vi. p. 98. tab. cciv. fig. 502, 503.

M. Koch, without any apparent reason, has transferred *Theridion signatum* from the family *Theridiidæ* to that of *Agelenidæ.* (Uebersicht des Arachn. Syst. p. 13.)

This remarkable species is found among heath in Denbighshire, but is of rare occurrence. The fourth and fifth palpal joints of the male are so closely connected, as scarcely to present any perceptible trace of their union; indeed, as they appear to be quite incapable of separate motion, there seems to be an impropriety in regarding them as distinct joints.

Genus Neriëne, *Blackw.*

30. Neriëne trilineata.

Theridion reticulatum. Hahn, Die Arachn. b. ii. p. 39. tab. liv. fig. 124.
Bolyphantes trilineatus. Koch, Die Arachn. b. viii. p. 67. tab. cclxxii. fig. 641.

This spider, which belongs to the genus *Neriëne,* is found under stones in the neighbourhood of Manchester. Koch, perceiving that it and some nearly allied species differed essentially from the true *Theridia,* has proposed the genus *Bolyphantes* for their reception.

31. Neriëne graminicolens.

With the exception of the legs and palpi, which are of a uniform colour, without any dark annuli, *Neriëne graminicolens* so closely resembles *Neriëne trilineata,* as scarcely to be distinguished from it; but as this difference is constant in all stages of the growth of these spiders, I am disposed to regard them as specifically distinct.

Neriëne graminicolens occurs among long grass and coarse herbage growing at the roots of trees in old pastures at Oakland, and the male has the palpal organs and the metatarsal joint of the anterior legs completely developed in autumn. The contraction and expansion of the dorsal vessel are very apparent in this species, but the number of pulsations in a minute varies with the temperature of the atmosphere by which it is surrounded.

Genus Manduculus, *Blackw.*

32. Manduculus vernalis.

Theridion vernale. Hahn, Die Arachn. b. ii. p. 38. tab. liii. fig. 123.

In autumn, this spider, which belongs to the genus *Manduculus*, may be seen running on the ground in pastures in various parts of Lancashire and Denbighshire, and specimens of it were comprised in the collection of spiders received from C. C. Babington, Esq., in 1840.

Genus Pholcus, *Walck.*

33. Pholcus phalangioides.

Pholcus phalangioides. Walck. Tabl. des Aran. p. 80. Latr. Genera Crust. et Insect. t. i. p. 99. Hahn, Die Arachn. b. ii. p. 34. tab. l. fig. 119.

My friend Richard Potter, Esq., M.A., of Queen's College, Cambridge, and Professor of Natural Philosophy in University College, London, brought me living specimens of *Pholcus phalangioides* from Barmouth in Merionethshire, where he captured them in the summer of 1835. In 1836 I received an adult male from T. Glover, Esq., which he had taken in Liverpool, and I have in my possession an immature individual from the Isle of Wight.

Genus Linyphia, *Latr.*

34. Linyphia pallida.

Theridion pallidum. Koch, Die Arachn. b. iii. p. 64. tab. xciv. fig. 216.

M. Koch has placed this spider among the *Theridia*; but it is evident, from the structure of its maxillæ and legs, the disposition of its eyes, and its general economy, that it belongs to the genus *Linyphia.* In autumn it spins among grass growing in the grounds about Oakland a horizontal sheet of web, supported by fine lines united to its upper surface and to each other at various angles, and attached to objects situated above it. Like its congeners, it takes its station on the under side of the web in an inverted position, and there watches for its prey.

Family Epeïridæ.

Genus Epeïra, *Walck.*

35. Epeïra bicornis.

Epeïra bicornis. Walck. Tabl. des Aran. p. 57.

This species is found on the trunks of trees growing in the wooded parts of Denbighshire. In July the female constructs a subglobular cocoon of light brown silk, of a loose texture, measuring about $\frac{1}{3}$rd of an inch in diameter, in which the eggs are deposited.

36. Epeïra agalena.

Epeïra agalena. Walck. Tabl. des Aran. p. 59. Hahn, Die Arachn. b. ii. p. 29. tab. xlvii. fig. 115.

Epeïra agalena fabricates a geometric net of moderate dimensions, not open at the centre, among coarse plants and low bushes growing in pastures near Llanrwst. It does not appear to spin a cell, but usually takes its station on objects contiguous to its snare. In June the female constructs a subglobular cocoon of yellowish brown silk of a loose texture, about half an inch in diameter, in which she deposits 140 or 150 dark brown spherical eggs, agglutinated together in a globular mass measuring $\frac{1}{5}$th of an inch in diameter.

37. Epeïra scalaris.

Epeïra scalaris. Walck. Tabl. des Aran. p. 60. Hahn, Die Arachn. b. ii. p. 27. tab. xlvii. fig. 114.

This handsome spider is found in the neighbourhood of London.

38. Epeïra umbratica.

Epeïra umbratica. Walck. Tabl. des Aran. p. 61. Hahn, Die Arachn. b. ii. p. 24. tab. xlvi. fig. 112.

Epeïra umbraticola. Latr. Genera Crust. et Insect. t. i. p. 105. Lister, De Aran. p. 44. tit. ix. fig. 9.

Our celebrated countryman, Dr. Lister, has described this species with his accustomed accuracy; but, as neither Walckenaër nor Latreille appears to have referred to his account of it, I am induced to include it in this catalogue.

Epeïra umbratica is much more abundant in various parts of England and Wales than it is generally supposed to be; its apparent scarcity being attributable to its nocturnal habits and the care with which it conceals itself during the day.

In June the female constructs, under the exfoliating bark of trees and in crevices in old rails, a subglobular cocoon of white silk, of a slightish texture, measuring about $\frac{2}{5}$ths of an inch in diameter, in which she deposits between 100 and 200 spherical eggs of a yellowish brown colour, agglutinated together. On the exterior surface of this cocoon, small pieces of bark, wood and other extraneous materials are usually distributed, which serve to assimilate it to surrounding objects.

39. Epeïra fusca.

Epeïra fusca. Walck. Tabl. des Aran. p. 63.

Epeïra Menardi. Latr. Genera Crust. et Insect. t. i. p. 108.

Meta fusca. Koch, Die Arachn. b. viii. p. 118. tab. cclxxxv. fig. 685, 686, 687.

In removing *Epeïra fusca* from the *Epeïridæ*, and placing it among the *Theridiidæ* (Uebersicht des Arachn. Syst. p. 7), Koch appears to have lost sight of those principles of affinity and analogy which afford the only safe guide in the classification of natural objects.

Caves, cellars, overhanging banks and other obscure places constitute the principal haunts of this spider in Denbighshire and Caernarvonshire. In autumn the female fabricates a large oviform cocoon of white silk, of so delicate a texture, that the eggs, connected together by fine silken lines in a globular mass measuring $\frac{1}{4}$th of an inch in diameter, may be distinctly seen within it. Its transverse axis measures about $\frac{11}{10}$ths and its conjugate axis $\frac{8}{10}$ths of an inch, and it is generally attached by numerous lines, forming a short pedicle at one extremity, to the vaults and walls of caves, cellars, &c. The eggs, which are yellow and spherical, are between 400 and 500 in number.

40. Epeïra antriada.

Epeïra antriada. Walck. Tabl. des Aran. p. 62.

Epeïra antriada is common in obscure, damp situations n the north of England and Wales. Like *Epeïra inclinata*, it generally spins its net in an inclined position, leaving an open circular space at the centre, which it frequently occupies when watching for its prey; from this station it drops quickly to the ground on being disturbed, regaining it, when the danger is past, by means of a line drawn from the spinners in its descent. It has the habit of extending the first and second pairs of legs in a line with the body in the manner of *Tetragnatha extensa*.

Tribe Senoculina.

Family Dysderidæ.

Genus Dysdera, *Latr*.

41. Dysdera erythrina.

Dysdera erythrina. Walck. Hist. Nat. des Insect. Apt. t. i. p. 261. Latr. Genera Crust. et Insect. t. i. p. 90. Koch, Die Arachn. b. v. p. 76. tab. clxv. fig. 389.

Specimens of this spider have been captured in central parts of the town of Manchester, and in the summer of 1835, R. Potter, Esq., sent me an adult female from Cambridge.

42. Dysdera rubicunda.

Dysdera rubicunda. Koch, Die Arachn. b. v. p. 79. tab. clxv. fig. 390, 391.

The only individual of this species which has come under my observation, was an adult male, contained in the collection of spiders sent to me from Cambridge by C. C. Babington, Esq., to whose liberality this interesting addition to the Fauna of Great Britain is due.

43. Dysdera Hombergii.

Dysdera Hombergii. Walck. Hist. Nat. des Insect. Apt. t. i. p. 263.

Distinguished arachnologists have mistaken *Dysdera Hombergii*, first briefly described by Scopoli (Entomologia Carniolica, p. 403. no. 1119.), for the young of *Dysdera erythrina*, from which it differs in colour and organisation. Being convinced of its specific distinctness by a careful examination of specimens captured in 1832, in the same year I gave a description of it in the 'London and Edinburgh Phil. Mag.' vol. i. p. 190, under the appellation of *Dysdera Latreillii*, but the trivial name, of course, is superseded by that originally given to it by Scopoli.

Crevices in rocks and walls, and the under side of lichens and liverworts growing on trees, are the favourite resorts of *Dysdera Hombergii*, which is plentiful in the wooded districts of Denbighshire and Caernarvonshire. The sexes pair in May, and in the succeeding month the female envelops herself in an oval cell of white silk, of a slight texture, on whose exterior surface are disposed minute pebbles, small pieces of indurated soil, and other heterogeneous materials; in this cell she deposits between 20 and 30 spherical eggs of a pale pink colour, which are not agglutinated together.

Genus Oonops, *Templeton.*

44. Oonops pulcher.

Oonops pulcher. Templeton, Zoological Journal, vol. v. p. 404. pl. xvii. fig. 10.

In the 'London and Edinburgh Phil. Mag.' vol. x. p. 100, I proposed the genus *Deletrix* for the reception of this minute spider, which I described under the specific name *exilis* from immature females whose colours had been injured by captivity. At that time I was not aware that I had been anticipated by Mr. Templeton, whose genus *Oonops*, founded on the organic peculiarities of this species, has the claim of priority.

Oonops pulcher is found in crevices in rocks and stone walls, and among liverworts growing on trees in Lancashire, Denbighshire and Caernarvonshire, being abundant in the last two counties. In May the female fabricates near her retreat several contiguous, subglobose cocoons of white silk, of a delicate but compact texture, measuring about $\frac{1}{16}$th of an inch in diameter, in each of which she usually deposits two spherical pink eggs, not agglutinated together.

XVI. *On some rare and beautiful Insects from Silhet, chiefly in the Collection of* Frederick John Parry, *Esq., F.L.S., &c.* *By the Rev.* Frederick William Hope, *M.A., F.R.S., F.L.S., &c.* *Continued from page* 112.

Read November 1st, 1842.

Order Lepidoptera.

Family Papilionidæ.

Teinopalpus, *Hope*, n. g.

Corpus robustum; capite fronte conico. *Palpi* capite longiores, conici, porrecti. *Antennæ* clavâ sensim increscenti. *Pedes* antici perfecti, tibiis in medio appendiculatis. *Alæ anticæ* apice acutè falcatæ; cellulâ discoidali clausâ; venâ medianâ ramos quatuor emittente, ramo postico venæ subcostalis ad ramum furcatum præcedentem approximato. *Alæ posticæ* caudatæ.

Sp. 16. Teinopalpus imperialis. Tab. XI. fig. 1, 2.

Alis viridi-pulverosissimis; anticis fasciâ tenui transversâ medianâ nigrâ extùs flavo-marginatâ nebulisque duâbus fuscis submarginalibus; posticis caudâ unicâ terminatis maculâ magnâ medianâ flavâ nigro-cinctâ squamulis cinereis lunulisque marginalibus flavis viridibusque; omnibus subtùs aurantiis nigro-striatis dimidio basali viridi; posticis apicibus nigris griseo viridique variis.

Long. corp. lin. 15; expans. alar. unc. 3, lin. 10.
Habitat in Indiâ Orientali, Silhet; e Museo Dom. Parry descriptus.

Sp. 17. Teinopalpus Parryæ. Tab. XI. fig. 3, 4.

Affinis præcedenti at major, alis omnibus basi viridibus; anticis minùs falcatis nigro transversè strigatis nebulosisque; posticis bicaudatis plagâ magnâ medianâ pallidè luteâ nigro-pulverosâ strigâque undulatâ nigrâ:

extùs griseo-pulverosis lunulisque marginalibus viridibus flavisque ornatis: angulo anali latè flavo.

Long. corp. lin. 17; expans. alar. unc. 4, lin. 7.
Habitat in Indiâ Orientali, Silhet.

The above magnificent insect was sent to me by Captain Parry for description, and I have consequently named it after Mrs. Parry: it is possible that the present may be the female of the former species. There is, I believe, only another specimen in this country, which is in the rich Lepidopterous collection of the East India House.

Family Bombycidæ.

Genus Saturnia.

Sp. 18. Saturnia Zuleika. Tab. XI. fig. 5.

Alis pallidè puniceis fusco-irroratis albidoque variis: apicibus fuscis; anticis plagâ magnâ basali rufo-brunneâ; omnibus maculâ magnâ medianâ semilunari sanguineo-fuscâ lunulis tribus albis griseisque lineis ternis fuscis undulatis valdè angulatis inter ocellum marginemque posticum aliisque duâbus submarginalibus.

Long. corp. lin. 14; expans. alar. unc. 4, lin. 8.
Habitat in Silhet.

Order Homoptera.

Family Fulgoridæ.

Genus Aphana.

Sp. 19. Aphana amabilis. Tab. XII. fig. 1.

Viridis, alis anticis cretaceis maculis numerosis ovalibus aspersis; posticis coccineis: apicibus pallidè virescentibus.

Long. corp. lin. 12; expans. alar. unc. 2, lin. 9.

Corpus suprà aurantium; capite viridi, cornu erecto acuto tenui. *Prothorax* viridis, maculis tribus fulvis insignitus. *Corpus* infrà viride; pedibus concoloribus; pectore lanugine albidâ asperso.

This remarkably beautiful insect was received lately from Silhet; the spots which on the upper side appear to be white and green intermixed, are beneath entirely green.

Sp. 20. Aphana Aurora. Tab. XII. fig. 2.

Affinis *Aphanæ aurantiæ*, Hope; at minor, ferè totum corpus aurantium, alis anticis externè vix virescentibus internè aurantiis maculisque albidis minutissimis aspersis.

Long. corp. lin. 9; expans. alar. unc. 2, lin. 5.

Habitat in Indiâ Orientali, Silhet.

Corpus infrà concolor; alis maculis cretaceis insignitis; tibiis posticis externè spinosis.

Lystra.

Sp. 21. Lystra Westwoodii, *Parry*. Tab. XII. fig. 3.

Fusco-flava, rostro concolore inter oculos recurvo, fronte ferè trigono elongato, alis anticis dimidio basali fusco-flavis maculis fuscis magnitudine variis aspersis; posticis basi sanguineo colore fucatis lineâ atrâ marginatis punctisque tribus insignitis: reliquâ parte immaculatâ hyalinâ, corpore infrà nigro.

Long. corp. lin. 6; expans. alar. unc. 1, lin. 11.

The above insect is described from the rich collection of Captain Parry.

Sp. 22. Lystra dimidiata. Tab. XII. fig. 4.

Fusca, capite thorace pedibusque concoloribus, alis anticis dimidio basali virescente maculis minutis crebris atris asperso: apicibus subaurantio-hyalinis maculis cretaceis insignitis; posticis dimidio basali viridi: posteriori albidâ atropunctatâ: apicibus fuscis maculis virescentibus irroratis.

Long. corp. lin. 7; expans. alar. unc. 1, lin. 10.

Habitat in Silhet. In Museo Dom. Hope.

Sp. 23. Lystra punicea. Tab. XII. fig. 5.

Punicea, capite thoraceque pallidioribus, alis anticis dimidio basali roseo colore tincto maculis crebris nigris asperso: apicibus fusco-puniceis hyalinis maculâ in medio disco pellucidâ; posticis basi puniceis maculis atris insignitis: medio albidis: apicibus fusco-hyalinis.

Long. corp. lin. 6; expans. alar. unc. 1, lin. 11.

Habitat in Silhet; e Museo Dom. Hope descripta.

Eurybrachis.

Sp. 24. Eurybrachis basalis. Tab. XII. fig. 6.

Fusco-flava, capite flavescente, thorace brunneo, abdomine miniato, alis anticis fuscis flavo-reticulatis; posticis ad basin antrorsùm lineâ cæruleâ incurvâ insignitis posticè subroseis: reliquâ parte nigricante.

Long. corp. lin. 10; expans. alar. unc. 2, lin. 3.
Habitat in Silhet.

Sp. 25. Eurybrachis pulverosa. Tab. XII. fig. 7.

Candida, capite thoraceque flavis, abdomine concolore, caudâ gossypio ornatâ, alis anticis dimidio basali virescente: apicibus fusco-hyalinis sparsìm maculatis; posticis albidis maculâ irregulari nigrâ ad marginem anticum aliisque minutis concoloribus posticè locatis, pedibus quatuor anterioribus miniatis; posticis fuscis.

Long. corp. lin. 7; expans. alar. unc. 2, lin. 3.
Habitat in Silhet.

Sp. 26. Eurybrachis reversa. Tab. XII. fig. 8.

Fusco-flava, capite thoraceque concoloribus, abdomine medio albido: posticè gossypio flavo ornato: apice candido, alis anticis fusco-flavis ad basin subsanguineo colore tinctis: maculâ albâ rotundatâ ad marginem anticum secundâ minore ferè circa medium disci aliisque minutissimis sparsìm irroratis; posticis dimidio basali albido: apicibus irregulariter fusco-irroratis, pedibus quatuor anterioribus flavo-fuscis: tibiis obscurioribus; posticis femoribus pallidè testaceis: tibiis nigricantibus.

Long. corp. lin. 7; expans. alar. unc. 2, lin. 7.
Habitat in Indiâ Orientali, Silhet.

Sp. 27. Eurybrachis insignis, *Westwood.* Tab. XII. fig. 9.

Candida, capite thoraceque flavis, abdomine lateribus sanguineo colore fucatis, alis anticis flavescentibus maculis variis minutis nigris aspersis; posticis albidis maculâ irregulari nigrâ ad marginem anteriorem aliisque minutis concoloribus posticè; pedibus anterioribus fusco-flavis; posterioribus viridibus: tibiarum spinis nigricantibus.

Long. corp. lin. 7; expans. alar. unc. 2, lin. 2.
Habitat in regione Malabaricâ, e Museo Dom. Westwood descripta.

Corethrura*, *Hope*, n. g.

Corpus breve, crassum, abdominis apice longissimè floccoso. *Caput* anticè carinatum, ferè ut in genere *Derbe*; facie anticè visâ angustâ. *Promuscis* longitudine mediocris. *Clypeus* magnus, inflatus. *Antennæ* sub oculos insertæ, brevissimæ, apice longè setoso. *Ocelli* minuti, paulò ante oculos locati. *Pedes antici* tibiis depressis instructi. *Tibiæ posticæ* extùs 3-dentatæ.

Sp. 28. Corethrura fusco-varia. Tab. XII. fig. 10.

Subfusca, capite lineâ transversâ albidâ insignito, abdomine fusco-viridi: caudâ subochraceâ gossypio ornatâ, alis anticis fusco-variis farinâ albidâ irroratis; posticis pallidioribus hyalinis.

Long. corp. lin. 9; expans. alar. unc. 2, lin. 4.
Habitat in Silhet. In Museo Dom. Hope.

EXPLANATION OF THE PLATES.

Tab. XI.

Fig. 1. *Teinopalpus Imperialis,* upper side.
2. *Teinopalpus Imperialis,* under side.
3. *Teinopalpus Parryæ,* upper side.
4. *Teinopalpus Parryæ,* under side.
5. *Saturnia Zuleika.*

Tab. XII.

Fig. 1. *Aphana amabilis.*
2. *Aphana Aurora.*
3. *Lystra Westwoodii.*

* From κόρηθρον a broom, and οὐρὰ a tail.

Fig. 4. *Lystra dimidiata.*
5. *Lystra punicea.*
6. *Eurybrachis basalis.*
7. *Eurybrachis pulverosa.*
8. *Eurybrachis reversa.*
9. *Eurybrachis insignis.*
10. *Corethrura fusco-varia.*

J. O. W. del.

Day & Haghe Lithrs to the Queen

Day & Son Lith[rs] to the Queen

XVII. *Some further Observations on the Nature of the* Ergot *of Grasses. By* EDWIN J. QUEKETT, *Esq., F.L.S., &c.*

Read December 20th, 1842.

IN the third part of the eighteenth volume of the Transactions of the Linnean Society, are published my observations on the structure of the ergot of grasses, with a view to the discovery of the cause of that formation, which from numerous observations was there attributed to the grain becoming infected with a parasitic fungus, the nature of which was also described. It was stated that "the manner in which this singular production originates (for at present much respecting this part remains uncertain) is, that the sporidia, or more likely the nuclei within them, are by some means introduced into the interior of the grass and ultimately arrive at the grain, which they find the most suitable matrix for their development; or they may be brought into contact with the young grain from without, probably by the viscid fluid; but this is less likely to be the case, as the ergot can be detected before the paleæ have opened to admit the fluid."

Since the publication of the above theory of the production of ergot, experiments have been made to carry out the view there stated, and which have succeeded, I imagine, so far as to leave but little doubt as to the true origin of this substance.

The experiments were as follows. In the beginning of March 1840, twelve healthy grains of *rye*, of *wheat*, and of *barley* (grown in the neighbourhood of Epsom) were selected and placed in a shallow vessel, which contained a sufficient quantity of distilled water to moisten the grains, the whole being covered with a glass shade. In a few days germination commenced in nearly all the grains. At this period an ergot (taken by Prof. Henslow from some wheat grown in Suffolk the preceding year and given me by Dr. Pereira) was placed with the grains; and the sporidia, which were in abundance on its exterior, were detached in the water by means of a pencil brush, and the body of the ergot was then removed.

A similar experiment was performed with the same number of grains of the several plants, but the sporidia were in this case obtained from an ergot found on *Elymus sabulosus*.

The growth of the young plants was allowed to proceed for several days, until, by the exhaustion of the albumen, the grains appeared wrinkled; the leaves having at this period attained the height of three or four inches. In this state the several young plants were packed in wet mould during the third week in March, conveyed into the country, and planted side by side in the garden of William Hyder, Esq., of Court Lees, near Canterbury, who had kindly undertaken to watch the progress of the experiment.

The greater number of the plants failed in their growth, so that, when the harvest had arrived, there only remained four of rye (one grown with the fungus of the ergot of *Elymus* and three with the sporidia derived from the ergot of wheat), three plants of barley and four of wheat.

The ears on the rye were remarkable, scarcely one having a healthy corn, the paleæ being generally quite empty; yet there were nine ears containing ergots, some having a single specimen, others as many as six. In the barley the ears were full of healthy grains, with one exception where there appeared to be a diseased grain; and in the wheat the ears were full and without disease*.

Considering that these results were not altogether satisfactory, from the fact that grains of the same sample had not been sown and allowed to germinate without coming in contact with the sporidia diffused in water (for if ergots could not be detected on these, but frequently on the others, it seemed that the question would be set at rest), another experiment was instituted in the following autumn after this manner:—

Twelve grains of rye, of wheat, and of barley, were again selected and made to germinate as before described; and the sporidia from the exterior of one of the ergots of rye, produced in the previous year, were diffused in the water.

* Whilst the ergots were making their appearance, I had the opportunity of confirming Philippar's assertion of their very rapid growth, and also of satisfying myself that the fluid found on these bodies had an internal origin.

The specimens, when arrived at the same state of forwardness as the first, were planted in October on the same estate, but not within half a mile of the former spot; and twelve healthy grains of each kind, with every care taken to prevent them from having any sporidia attached to them, were planted in the same locality.

From the extreme quantity of rain during last winter, very few of the grains either of the infected or of the uninfected kinds arrived at maturity; so that in August last there were growing only two of rye, two of wheat and one of barley of the infected, and one of each kind of the uninfected.

On each rye plant exposed to the sporidia an ergot was discovered, and, as before, the almost entire absence of unhealthy grains in the ears of the wheat and barley, which bore perfect and apparently healthy fruit as if nothing had interfered with their usual growth.

Of the uninfected grains planted at the same spot and period, only three plants arrived at maturity, but these presented no unhealthy appearance.

On reflecting on these results, it may appear that something is yet wanting to clear the subject of the obscurity that has hitherto enveloped it. I grant that if ergots had appeared in the wheat and barley, nothing apparently would have been wanting to convince the most sceptical of the true cause of this production; but if it be evident, or even probable, that any of the ergots of the two seasons were produced in the rye by infecting the grain with the fungus whilst germinating, it seems to me that one solitary instance would be as conclusive as if a multitude of species were diseased and each bearing many specimens.

If we consider what the grass is that becomes the most frequently affected with ergot, it is undoubtedly rye; and it is not too much to suppose that there may be something in the constitution or structure of this plant that makes it more susceptible of the infection than other grasses, or it may not be impossible that other grasses may be infected by a different proceeding: for instance, the sporidia of the fungus may be required to be introduced through the stomata, of which their diminutive size would admit, or they may enter through any accidental aperture in the cuticle.

The fact of ergots being produced on all the infected plants of rye during two sets of experiments, renders it highly improbable that accident should have given rise to an occurrence happening so abundantly, which is undoubtedly of great rarity in this country in the ordinary course of events. Had the cause of the ergot been external, it is singular that as the wheat, barley and rye were growing side by side, the two former should have escaped being diseased and not the latter.

The absence of grains in most of the ears of the rye, even when no ergot was present, indicates that though the plants arrived at maturity, some cause must have so interfered with their usual habits as to suppress the development of the grain.

The inference that I conceive may be fairly drawn from these experiments is, that these ergots have been artificially produced by the process detailed; and it would appear most reasonable (even before the results of these experiments were known) to imagine that it must be so; for every ergot, on whatever grass it may be produced, is covered externally with a coating composed of the sporidia of a minute fungus, and these sporidia appear to be the same on all ergots. The inference necessarily follows, that they must be connected with its origin.

It cannot be imagined that every ergot when arrived at maturity acquires its coating of the fungus from external sources: if so, ergots unaccompanied with the fungus ought sometimes to be found, which never have been, if the examination has been made while they retain their position in the ear; and besides, the young ergot possesses it even before the flowers expand.

Shortly after expressing opinions similar to these, which were published in part iii. vol. 18. Trans. Linn. Soc., a paper was read on January 21, 1840, from the late Mr. Francis Bauer, who stated that he had not detected the fungus in his examination of ergot in the years 1805 to 1809, but that he had observed it in 1838; yet, to use his own words, he still maintains, "I am not yet convinced that these filamentous fungi with numerous sporidia are the cause or the consequence; because,

"1st, Every gramineous plant is equally infected with that minute filamentous fungus, yet very few of these plants produce ergots; and among agricultural grains, the rye is the only one that is subject to that disease; among the many hundred ears of wheat that I examined in every stage of its growth, I found only one spikelet that produced three ergots, and one spikelet with only one ergot.

"Because, 2nd, in autumn all decaying plants are infected with such filamentous fungi and minute sporidia; and Mr. Smith, when he brought to me the first specimen of his ergot, brought me also a specimen of a flower of *Canna indica*, in which not only the inside of the anther was infected with this filamentous fungus, but also the individual pollen grains were strongly infected with it."

On the first head, it may be observed that no doubt, from something inexplicable at present, the rye is the most frequently ergotized of the agricultural grains; still Mr. Bauer acknowledges to have found wheat similarly diseased, and others have found barley and oats.

On the second point, with reference to finding the fungus on other plants and on decaying vegetable matter, without any formation like an ergot, this fact does not appear to me to be opposed to the view which I have taken. It cannot be supposed that all fungi of this character attack one plant exclusively, or grow only in one situation. It is often found that fungous parasites do not confine themselves to one particular plant or organ, but are found to pass through the systems of different plants, and develope themselves on different organs. Thus, on the authority of the Rev. M. J. Berkeley (in Sir W. J. Hooker's 'English Flora,' part ii. vol. v.) it is stated that *Uredo segetum* attacks not only wheat, but barley, oats and other grasses; *Puccinia graminis* attacks the leaves and culms of various grasses; and *Puccinia striola* attacks *Carices*, *Junci* and species of *Allium*.

In my own experiments it was shown that the fungus peculiar to the ergots could be made to grow between moistened glasses, and consequently apart from the grain. It may, therefore, have many situations favourable to its growth; but because an ergot does not accompany it in its growth in all situations, it is not on this account to be inferred that it cannot produce an ergot when it selects the grain as its matrix, any more than it can be maintained, if *Cynips quercus petioli* lays its egg in the bark of the oak and no gall follows, that it is not the origin of that excrescence when it deposits its egg in the bud. It is necessary, I conceive, that to produce an ergot (which is decidedly a diseased grain) the attack can only be effectual on gramineous plants, or those having the ovary and seed similarly organized and analogous in chemical composition. It may not be improbable that the same fungus can create disease in other seeds, but then the form of the disease would be certainly unlike the figure of an ergot.

We have learned from Mr. Bauer that he could produce "smut" and some other diseases of grasses, by infecting the plants in early life with the sporules of particular fungi; it cannot, therefore, be difficult to conceive that other fungi possessing somewhat different effects, may also be taken into the interior of the same plants. The possibility then being proved of the introduction of the germs of fungi into grasses, each producing a different result according to its nature, I cannot help being impressed that the growth of the fungus, which is always found on the exterior of every ergot, can, when it attacks the grain of grasses, so alter its healthy character as to convert it into the diseased form so well known by its sizé and colour from perfect grains of the same plant.

XVIII. *On the* Radiata *of the Eastern Mediterranean. Part I.*, Ophiuridæ.

By Edward Forbes, *Esq.*, *F.L.S.*, *Professor of Botany in King's College, London.*

Read March 21st, and June 6th, 1843.

During my late researches in the Ægean Sea I found ten species of Star-fishes, of the order *Ophiuridæ*, several of which are undescribed. Of these, and of the other *Echinodermata* met with during my voyage, I propose, should it be the pleasure of the Society, to give a detailed account, and in the present communication I will commence with describing such as belong to the genus *Ophiura* and to an allied genus hitherto uncharacterized. The animal on which I have founded the genus *Pectinura* (from πέκω *pecto*, and οὐρὰ *cauda*), is a small starfish which came up in the dredge from 100 fathoms water on the coast of Lycia, where it lives among corallines, millepores and brachio-podous mollusca. Its disc is one-tenth of an inch across, flat, and covered with imbricated scales, which, however, are entirely hidden by a clothing of minute granules, these granules being transformed spines The pair of scales seen on the disc of all *Ophiuræ* are in this species extremely indistinct, or rather are so like their neighbours, that it is with difficulty we can distinguish them. The rays themselves spring from the disc, and some of the scales of the disc overlap their sides. They are short, as compared with the disc ; but in consequence of their being broken away towards their extremities in the only specimen I possess, I cannot state their positive length. They are covered above with scales, which are somewhat orbicular in form, and lap slightly over one another. Beneath, the scales are triangular, or rather fan-shaped, and have their sides encroached upon by the lateral ray-plates, which are squa-mose, and bear on their superior margins seven or eight spines of unequal lengths, but mostly as long as the ray is broad. These spines are smooth. On the under surface of the bodies the ovarian plates, which are seen separating the origins of the rays, are small and transversely oblong. Each bears a small accessory plate at its upper margin, but neither of the plates encroaches on the parts of the body which form the triangular spaces between the rays. The space between the ovarian plates and the little comb of spines which guards the mouth is covered with granules like those which cover the body. The colour when recent was grayish, in the dried specimen yellowish.

On this specimen alone I should scarcely have ventured to found a genus, remarkable as are its characters, but would rather have referred it for the present to the genus *Ophiocoma*, as an aberrant form approaching *Ophiura*; but I have had an opportunity of examining a large foreign species, which shows that it has rather a closer affinity with *Ophiura* than *Ophiocoma*, and in fact belongs to a distinct and well-marked genus, differing from the former in having the discs clothed with granules, in the absence of the pectinated scales embracing the origin of the rays, and in the ovarian plates (not soldered as in *Ophiura* into one) not encroaching on the body. From *Ophiocoma* it is distinguished by the lateral ray plates lapping over each other and the posterior ray plates, as in *Ophiura*, and instead of bearing the spines on a transverse ridge or keel, having them articulated to their superior margins, so that when the animal is dead they lie close to the rays, and do not bristle out as in *Ophiocoma*. As among the species of *Ophiura*, the twin plates of the disc opposite the origin of each ray, have a generic and not a specific value. The sources of essential specific character, judging from the species before me, are 1st, the form of the superior ray-scales; 2nd, the number of spines on the lateral ray-scales; 3rd, the form of the upper surface of the rays; and 4th, the form of the disc. The habit of the genus is that of *Ophiura*. Judging from analogy, the suckers, when observed, will be found to be simple and not pinnate or dentate. I now add the definition of the genus, and the specific character of the Mediterranean species.

Genus Pectinura, *Forbes*.

Corpus orbiculare, squamosum, granulosum, ad peripheriam radiatum: radiis simplicibus, squamosis, in corporis discum sub-prolongatis; squamis radiorum lateralibus adpressis, in marginibus superioribus spiniferis: ossiculis ovarialibus binis, in corporis lobos non productis.

Sp. *Pectinura vestita*, nov. sp., Forbes. TAB. XIII. fig. 1—7.

P. disco orbiculari, radiis convexiusculis; squamis superioribus rotundatis: lateralibus 8-spiniferis.

Lat. disc. ½ unc.

Of the genus *Ophiura*, three species inhabit the Ægean Sea, *O. texturata*, *O. albida*, and a very interesting species, which I propose to call *O. abyssicola*. The first of these has long been recorded as a native of the Mediterranean. In the Eastern Mediterranean it is exceedingly scarce, and I only met with two examples. The *Ophiura albida*, which was long confounded with it, is much more common, almost as much so as on the coasts of Britain. I dredged it in various depths, from 15 to 50 fathoms, in many localities, between Cerigo and Rhodes. The *Ophiura abyssicola* is remarkable as an inhabitant of deeper water than any recorded Starfish. It lives on a bottom of soft white mud abounding in *Foraminifera*, which animals probably constitute its food, in between 150 and 200 fathoms water. The disc is round and covered with rosulated scales, those in the centre largest, the others very small. Opposite the origin of each ray are two large plates or scales of the same form as those in *O. albida*. The rays are narrow and tapering, and are five and a half times as long as the body is broad: they are inserted into notches in the disc, but by no means so deeply as in the two former species. There are two pairs of pectinated scales clasping the origin of each ray, the upper having five teeth, the lower about nine. The upper arm-plates are quadrangular and carinate, those of the sides quadrangular, and uniting inferiorly, almost obliterating the lenticular inferior ray-plates: each lateral plate bears a tubercle and three spines, which are longer than the plates to which they are articulated. The colour of this pretty Starfish is pinkish-gray.

A comparison of the characters of this new *Ophiura* with those of its described allies enables us to revise the definition of the genus. The main character is the great size of the ovarian plates, which encroach upon the body beneath between the origins of the arms. This arises from the primary and accessory plates being soldered into one, and from the large development of the accessories. In the other genera they are very small, and quite separated from the primaries. Another character, which greatly conduces to the peculiar habit of the genus, is the form of the lateral ray-plates which lap over each other and over a part of the superior and inferior ray-plates, and bear spines on their superior margins. This character it shares with *Pectinura.* The pectinated scales clasping the origins of the rays are peculiar to this genus. The sources of specific character are, 1st, the number and disposition of the denticles of the pectinated scales; 2nd, the form of the ovarian plates; 3rd, the form of the rays; 4th, the form of the superior ray-plates; and 5th, the number of spines on the lateral ray-plates. The cirrhi in this genus are simple. The revised characters of *Ophiura* and of the three species inhabiting the Ægean Sea will stand as follows:—

Genus OPHIURA, *Lamarck, Agassiz.*

Corpus orbiculare, squamosum, læve, ad peripheriam radiatum; radiis simplicibus, squamosis in corporis discum prolongatis, ad origines squamis pectinatis adpressis; squamis lateralibus radiorum adpressis, in marginibus superioribus spiniferis: ossiculis ovarialibus marginis simplicibus, in corporis lobos productis.

1. *O. texturata*, Lamarck.

O. squamis pectinatis ad radiorum origines plusquam 20-dentatis, ossiculis ovarialibus lyratis, radiis carinatis; squamis superioribus transversè oblongis: lateralibus 7-spiniferis.

2. *O. albida*, Forbes.

O. squamis pectinatis ad radiorum origines 16-dentatis, ossiculis ovarialibus scutatis, radiis convexis; squamis superioribus triangularibus: lateralibus 4—5-spiniferis.

3. *O. abyssicola*, nov. sp., Forbes. TAB. XIII. fig. 8—14.

O. squamis pectinatis ad radiorum origines binis 5—9-dentatis, ossiculis ovarialibus pentagonis, radiis carinatis; squamis superioribus quadratis: lateralibus 3—4-spiniferis.

Lat. disc. $\frac{2}{10}$ unc.

Genus Ophioderma, *Müller and Troschel.*

Nearly allied to *Pectinura* is the genus *Ophioderma* of Müller and Troschel (Wiegmann's Archiv, 1840), founded on the *Ophiura lacertosa* of Lamarck, a species not uncommon in the Western Mediterranean, though rare in the Ægean, and with which many exotic forms have been confounded. The habit is that of *Ophiura,* the characters those of *Pectinura,* from which it materially differs in having four conspicuous genital pores in the inferior interspaces, two near the mouth, and two towards the margin. The fossil *Ophiura Egertoni* belongs to this genus. The Mediterranean species is prettily variegated with orange, white, black and gray, and has a disc which is sometimes nearly an inch broad, with rays nearly five times as long as the breadth of the disc. It lives in from 10 to 20 fathoms water on various kinds of bottom. The characters of the genus, revised, will stand thus:—

Corpus orbiculare, squamosum, granulosum, ad peripheriam radiatum; radiis simplicibus squamosis; disco in radiorum origines prolongato, infrà poris genitalibus viginti; squamis radiorum lateralibus adpressis, in marginibus superioribus spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus pectinatis.

Sp. *Ophioderma lacertosa.*

O. radiis convexiusculis; squamis superioribus transversè oblongis: lateralibus 8-spiniferis: inferioribus quadratis.

Ophioderma lacertosa, *Müll. & Tros.*
Ophiura lacertosa, *Lamarck.*
Ophiura squamata et Rondeletii, *Risso.*
Asterias ophiura, *Delle Chiaje.*

Diam. disci $\frac{6}{10}$ unc; long. radiorum 3 unc.

Genus Ophiomyxa, *Müller and Troschel.*

This genus was constituted for the reception of an unnamed species in the Paris and Vienna collections. The characters are remarkable. The skin of the discs and arms is smooth, and when recent, slimy, coriaceous, and unprovided with scales. There are but two genital pores in each interspace, and the papillæ, which form combs for the protection of the mouth, are serrate, or rather ciliate, on their margins, a character not met with in any of the other genera.

The skeleton has several peculiarities. The disc-skeleton consists only of the shields opposite the origins of the rays, which in the species I have taken are linear and nearly parallel. They are connected together and jointed to the framework of the rays by a band of small scales. Each of the disc-shields has a process consisting of four small imbricated scales projecting from its outer margin. Two long divaricating processes spring from each intermediate plate to join the disc-origin of the arms beneath : these may be considered as belonging to the genital-skeleton. The peculiarity of the splanchno-skeleton has already been noticed. The ray- or myo-skeleton differs from that of all other *Ophiuridæ.* The upper ray-scales are each formed of two triangular ossicula, each connected with the lateral ray-plates by two very small ones; the under ray-scales are directly articulated with the lateral ray-plates.

The species which inhabits the Ægean Sea has a pentagonal, flat, coriaceous and smooth disc, having two linear, nearly parallel, separate shields opposite the origin of each ray. The upper ray-scales are very narrow, longitudinally lenticular (each composed of two ossicula), and connected together by the skin of the arm : the lower ones are cordate, larger and closer. The lateral ray-plates bear four spines each, the uppermost spine longest. The spines are smooth towards their bases, but tapering and serrated above. The ridge on which they are placed enables them to lie rather close, but not quite. They are not so long as the ray is broad. The rays are nearly seven times as long as the disc is broad. The ovarian plates are small, and transversely subpentagonal. The colour when alive is olive. It lives in between 10 and 20 fathoms water, and several specimens were taken in the sea of the Cyclades.

The genus may be characterized thus :—

Corpus pentagonale, coriaceum, læve, ad peripheriam radiatum; radiis simplicibus interruptè squamosis; disco in radiorum origines prolongatis; squamis radiorum lateralibus spiniferis, spinis serrulatis; ossiculis ovarialibus binis parvis, oralibus spinis serrulatis armatis.

Sp. *O. lubrica,* nov. sp., Forbes. TAB. XIII. *fig.* 15—22.

Diam. disc. $\frac{3}{4}$ unc.; long. rad. 5 unc.

Note.—I unfortunately neglected to observe the form of the cirrhi in the living animal; but, judging from the formal analogy between those organs and the spines in other genera, I should expect to find them pinnate.

Genus OPHIOPSILA, *Forbes.* (ὄφις and ψιλὸς, *nudus.*)

I have thought it necessary to constitute a genus for the reception of a naked-bodied, long-armed *Ophiura,* which is not uncommon in the seas of the Archipelago. It combines some of the characters of *Ophiomyxa* with some of those of the following genus, and has a habit peculiar to itself.

But one species occurs. It has a round disc, sometimes lobed between the rays, flat, coriaceous and smooth. There are two linear nearly parallel separate shields opposite the origin of each ray. The upper ray-scales are square and minutely granulated; the lower ones are quadrangular, with lunate sides. Each lateral ray-plate bears six spathulate spines, the lowest but one of which is longer than the rest, and the lowest smaller. In dead specimens the last laps over the ray-plate, so that its apex meets that of its fellow on the opposite side. The spines can lap close to the rays, except the undermost ones. The longest spines do not quite equal in length the breadth of the ray. The rays are $6\frac{1}{2}$ times as long as the breadth of the disc. The ovarian plates are small and subpentagonal. When alive, the colours are brilliant shades of brown, morone, or orange: when dead, the creature is of a purplish brown. It inhabits various depths above 40 fathoms.

CHAR. GEN. Corpus orbiculare, coriaceum, læve, ad peripheriam radiatum; radiis simplicibus squamosis, infra discum insertis; squamis lateralibus subcarinatis, spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus ad latera nudis.

Sp. *Ophiopsila Aranea,* Forbes. TAB. XIV. fig. 1—7.

Lat. disc. $\frac{3}{10}$ unc.: long. rad. $3\frac{1}{2}$ unc.

Genus AMPHIURA, *Forbes.* (ἀμφὶ and οὐρά.)

I constitute this genus for the long-rayed scaly and smooth-bodied *Ophiuræ,* with simple tentacula and smooth spines. Müller and Troschel included them in their genus *Ophiolepis*, synonymous with the *Ophiura* of Agassiz, and in my History of British *Echinodermata* I united them with *Ophiocoma*, with which they have greater affinity, An investigation of many species has induced me to regard them as generically distinct, and to define the group as follows:

Corpus orbiculare, squamosum, læve, ad peripheriam radiatum; radiis simplicibus squamosis, infra discum insertis; squamis lateralibus subcarinatis spiniferis, spinis simplicibus; ossiculis ovarialibus parvis, oralibus ad latera nudis; cirrhis simplicibus.

Three species inhabit the Ægean Sea, one of which is undescribed, viz.:—

1. *Amphiura florifera*, nov. sp., Forbes. Tab. XIV. fig. 8—13.

A. disco squamis centralibus maximis rosulatis, scutellis ovatis disjunctis, squamis radiorum superioribus quadratis: inferioribus 3-lobatis: lateralibus 3-spiniferis spinis brevissimis linearibus simplicibus.

Diam. disc. $\frac{1}{12}$ unc.; long. rad. $\frac{3}{12}$ unc.

Disc round, flat, scaly, the central scales very large and rosulate, those between the shields small and imbricate. Two ovate shields parallel but not touching superiorly, diverging inferiorly opposite the origin of each ray. Upper ray-scales square, lower ones suddenly narrowed superiorly so as to appear trilobed: lateral ray-plates bearing 3 spines each, which are rather shorter than the breadth of the ray. Ovarian plates small and trilobed. Rays $2\frac{1}{2}$ to 3 times as long as the disc is broad. Colour gray, with a pale spot on the upper part of each shield; arms yellowish-pink.

This pretty little Starfish was dredged in 100 fathoms water, among corals and Terebratulæ, off Ananas Rocks, near the Island of Milo, in August 1842.

2. *Amphiura neglecta.*

A. disco squamis centralibus parvis rosulatis, scutellis oblongis conjunctis, squamis radiorum superioribus quadratis: inferioribus oblongis: lateralibus 4–5-spiniferis spinis brevibus simplicibus.

Ophiura neglecta, *Johnston.*

Ophiocoma neglecta, *Forbes, Brit. Starfishes.*

Ophiolepis, *Müller.*

Ophiura squamata, *Delle Chiaje* (not of *Lamarck*).

Diam. disc. $\frac{1}{10}$; long. rad. $\frac{4}{10}$.

Frequent among the islands of the Archipelago, in similar situations to those in which we find it in Britain. Most common among the rocks near the water's edge.

3. *Amphiura Chiajii,* Forbes. Tab. XIV. fig. 14—18.

A. disco squamis minutis rosulatis, scutellis cuneatis divergentibus apicibus approximatis, squamis radiorum superioribus lenticularibus: inferioribus quadratis sulcatis: lateralibus 4-spiniferis spinis longis, simplicibus.

Ophiura filiformis, *Delle Chiaje* (not of *Müller*).

Diam. disc. $\frac{2}{10}$ unc.; long. rad. $1\frac{3}{4}$ unc.

Disc pentagonal, flat, scaly, the scales very small; two wedge-shaped shields opposite the origin of each ray, superiorly touching, inferiorly diverging. Upper ray-scales lens-shaped, lower ones square and longitudinally sulcated: lateral ray-plates bearing 4 spines each, which are longer than the breadth of the ray, acute, simple, and all of one form, therein differing from those of *Amphiura filiformis,* to which species it bears a great resemblance and was very naturally referred by Delle Chiaje. The ovarian plates are subpentagonal and small. The rays are generally 7 or 8 times as long as the disc is broad, but their length varies in different specimens. The rays are yellowish, with an orange line down their centres; the disc is of a dull purplish-brown, with a bright yellow spot on each shield and a yellow margin. The cirrhi are long, simple and white.

It lives in soft mud, in various depths from 10 to 120 fathoms, throughout the Archipelago and on the coast of Asia Minor.

Genus Ophiothrix, *Müller and Troschel.*

This genus was constituted for the reception of *Ophiura rosula* and its allies, referred by Agassiz, and afterwards by myself, to *Ophiocoma,* which Müller and Troschel restrict to *Ophiura granulata* and some allied species. With this arrangement I entirely concur, and propose the following revised character for *Ophiothrix:*

Corpus orbiculare, spinosum, ad peripheriam radiatum; radiis simplicibus squamosis; squamis superioribus imbricatis; lateralibus carinatis spiniferis, spinis serrulatis; ossiculis ovarialibus parvis, oralibus ad latera nudis; cirrhis pinnatis.

Ophiothrix rosula.

Ophiura rosula and *Ophiocoma rosula* of authors.

The Mediterranean specimens are somewhat smaller than the British, but do not appear to differ in any essential point. *O. tricolor*, *pentagona*, *Ferussaci*, *Cuvieri*, and *quinquemaculata* of Delle Chiaje seem to be all varieties of this very variable species.

Common in the Ægean, and on the coast of Asia Minor, among rocks near sea-mark; not frequent in deep water.

EXPLANATION OF THE PLATES.

Tab. XIII.

Fig. 1. *Pectinura vestita*, of the natural size.
2. Diagram of the upper surface of the body.
3. Diagram of the lower surface of the body.
4. Ovarial plates.
5. Superior arm-scales.
6. Inferior arm-scales.
7. Lateral arm-scales, with spines.
8. *Ophiura abyssicola*, of the natural size.
9. Upper arm-scales and pectinated scales of the base of the arm.
10. Lower arm-scales.
11. Diagram of the upper surface of the body.
12. Diagram of the lower surface of the body.
13. Lateral arm-scales, with spines.
14. Ovarial plate.
15. *Ophiomyxa lubrica*; upper surface of the disc.
16. Under side of ray.
17. Upper side of ray.
18. Ovarial plates and mouth-defence.
19. A mouth-spine.
20. A ray-spine.
21. Lateral view of ray-spines.
22. The disc-shields and their articulations.

E.S. Weddell sc.

Tab. XIV.

Fig. 1. *Ophiopsila Aranea,* of the natural size.
2. Disc, seen from above.
3. Lateral ray-plates and spines.
4. Upper plates of ray.
5. Under plates of ray.
6. Genital plate and mouth-defence.
7. A ray-spine.
8. *Amphiura florifera,* of the natural size.
9. Disc magnified.
10. Under side of ray.
11. Lateral ray-plates and spines.
12. Genital plate.
13. Disc-shields.
14. *Amphiura Chiajii,* of the natural size.
15. Disc, seen from above.
16. Portion of disc and base of ray, seen from above.
17. Under ray-plates.
18. Lateral ray-plates and spines.

XIX. *Description of* Peltophyllum, *a new Genus of Plants allied to* Triuris *of Miers, with Remarks on their Affinities. By* GEORGE GARDNER, *Esq., F.L.S., &c.*

Read June 6th, 1843.

ABOUT two years ago, my friend Mr. Miers communicated to the Linnean Society the description of a new genus of plants from the Organ Mountains, to which he gave the name of *Triuris*. The affinities of the single species, of which he has given such excellent figures and details, appeared to him, as they well might, to be rather dubious, although at the same time he felt no hesitation in referring it to the Endogenous division of the vegetable kingdom. It is not a little curious, that, within a day or two of the time at which Mr. Miers presented his paper to be read, I should have found, at a distance of nearly 2000 miles from the Organ Mountains, a little plant closely allied to *Triuris*, and one whose structure enables us with little difficulty to refer them both to their true position among other plants.

The little plant found by me bears a very great resemblance in general appearance to that of Mr. Miers; but I think that there are sufficient grounds for considering it as belonging to a distinct genus. I unfortunately possess only pistilliferous plants. These, however, differ in their structure in several respects from that of *Triuris*. In the latter the perigonium has only three divisions, while in my plant there are six; and, moreover, they differ in their anatomical structure. I have before me, while I write, a segment of each, well moistened and placed side by side in the field of the microscope. They both terminate in a subulate tail-like extremity, and in æstivation these are in both instances involute, that is, folded up within the lower and broader portion of the segments. At the place where the folding in of the segment takes place in *Triuris*, there is externally an opening or pore, well represented by Mr. Miers at fig. 7. of the plate which illustrates his paper, and of the drawing which he has so obligingly executed to illustrate mine. This tube seems to be formed by the folding backwards of the margins of the acuminated portion of the perigonium, and their subsequent union. In my plant nothing of this structure is to be seen; the tails are perfectly plain and continuous with the broader part; there are no pores, and the entire segment forms one uniform mass of cellular tissue, which in the mesial line is a little more dense, but not so much so as in *Triuris*; and the cells, like those of *Triuris*, present those unabsorbed cytoblasts or nuclei which are so well seen in *Cacteæ* and *Orchideæ*. The pistilla, as in *Triuris*, are numerous; but in place of being subulate, are thickened a little towards their apices, and obliquely truncated.

Mr. Miers found no leaves in connexion with his plant. My specimens were found growing under some small trees, in a rather moist sandy situation, where there was but little herbaceous vegetation. Near each of the flower-bearing stems which were collected, I found also, within an inch or two of it, a most curious little leaf, the lamina of which is nearly orbicular, with an apiculus at what appears to be its apex, strongly reticulated, with the primary veins disposed very much like those of *Nelumbium speciosum*, or rather like those of some of the scandent species of *Cissampelos*, peltately borne upon a petiole about two inches long, or equal in height with the flowering stem; but from the hurried manner in which I was obliged to collect the few specimens I possess, I could not ascertain what was the underground connexion of the leaves and flower-stems, though it would have been a most important matter to have done so, if any such exists. These leaves are solitary, and arise excentrically from a small fleshy tube, from the base of which proceed a few rootlets, somewhat pellucid, either glabrous, or covered with short villi. Nearly the lower half of the petiole is enveloped in a membranous longitudinally striated sheath, and this is again surrounded by the remains of two or three others of a similar nature. Now, as there is no tube at the base of the scape, and as the lower part of it, that is, the underground portion of it, takes something of a horizontal direction, and as the tube connected with the leaf does so also, it is very probable that they are connected with each other: at least this is more likely than to suppose that both the scape and the leaf arise from the same point but at different times. The nature of the sheaths, moreover, which surround the base of the petiole, so different from the few scales which exist at the bottom of the scape, is quite against the latter supposition. The scapes of *Triuris*, also, which I possess, as well as the figures given by Mr. Miers, bear all the impress of the specimens having been broken from an underground rhizoma.

I shall now proceed to characterize this little plant more particularly, before making any remarks upon the affinities of it and *Triuris*. I have named it *Peltophyllum*, from the nature of its leaves.

Peltophyllum.

Char. Gen. *Flores* dioici. *Masc.* ignoti. *Fœm. Perigonium* 6-partitum, coloratum, patens, persistens; laciniis ovatis longè acuminatis; acumine plano. *Ovaria* plurima, in tori apice sessilia, adpressa, libera. *Styli* ad apicem incrassati, obliquè truncati. *Fructus* ignotus.

Herba *parvula Brasiliensis.* Folia *a scapo distantia, longè petiolata, peltata, valdè reticulata.* Radix *tuberosa, fibrosa.* Scapus *subramosus, basi squamosus;* pedunculis *basi bracteatis, unifloris;* floribus *luteis.*

1. *Peltophyllum luteum*, Gardn. Herb. Bras., n. 3570. Tab. XV.

Hab. In arenosis umbrosis humidis Provinciæ Goyazanæ, Brasiliæ. Martio florebat.

Descr. Herba dioica, subbipollicaris. Folia a scapo distantia, e tubere parvulo fibroso erumpentia, petiolata, peltata, orbiculata, mucronata, integerrima, glabra, peltivenia; venis primariis marginem versus arcuatis; 8 lin. circiter lata. Petioli subbipollicares, teretes, pellucidi, glabri, vaginis 3 membranaceis, acuminatis, glabris, 8–10 lin. longis, ad basin cincti. Scapi fœminei solitarii, subramosi, basi squamosi, subbipollicares. Pedunculi uniflori, 4 lin. longi, basi bracteati; bracteis ovatis, acutis, lineam longis. Perigonium 6-partitum, luteum, patens, persistens; laciniis ovatis longè acuminatis, æstivatione basi valvatis, acumine plano, ante anthesin gyrato incluso. Ovaria plurima, in tori apice sessilia, adpressa, libera. Styli sublaterales, ad apicem incrassati, obliquè truncati. Fructus ignotus.

I have already contrasted the female flowers of this plant with those of *Triuris*; my not having found male ones prevents me from doing the same with them. It would be interesting to know the nature of the stamens; but from the great similarity of the two genera in other respects, we may conclude that they are not very different, so far as regards structure. What their number may be admits of greater doubts. In *Triuris* the segments of the perigonium are three; and we find the anthers to be three also, placed opposite the segments, although at first sight they appear to be alternate with them, the great breadth of the connective separating the lobes of the one so much that they approximate those of the others in such a manner as to give them the appearance of belonging to the same anther. In *Peltophyllum*, the great probability is that there are six stamens, judging from the number of the divisions of the perigonium; as we generally find that in those natural orders in which this organ consists of six divisions, the stamens are six also. This is more particularly the case when the two whorls which constitute it are so closely united that they adhere by their margins, as, for example, in many of the genera of the natural order *Liliaceæ*. In *Pontederiaceæ* we find in the genus *Heteranthera* that the perigonium, although somewhat tubular, consists of two very distinct whorls, and there the stamens are three in number, placed opposite to the three inner segments; while in *Pontederia*, where the perigonium has the two whorls more blended into one, the six divisions have each a stamen placed opposite to them. Even in the same genus, where the whorls of the perigonium are upon the same plane, we find that the stamens follow the number of its divisions, as in *Paris*, where they both vary from eight to ten; and in *Smilacina*, where they vary from four to six.

Mr. Miers was inclined to place *Triuris* near to *Juncagineæ* or *Fluviales*, from some of the genera of these orders being occasionally diœcious; and from *Posidonia*, which belonged to the latter, having three approximate pairs of sessile anthers on a receptacle. In all other respects, however, these orders differ most essentially from *Triuris*. When I collected *Peltophyllum*, I was at that time inclined to consider it as nearly related to *Menispermaceæ*, from a hurried glance at the structure of its flowers, but more from the great resemblance which its leaves bear to those of some of the peltate-leaved species of *Cissampelos*. A more accurate examination of its structure, while it confirms the above analogy, inclines me to place it, and of course *Triuris*, along with *Smilaceæ*, and the other orders of that group, to which Dr. Lindley, in the second edition of his 'Introduction to the Natural System of Botany,' has given the name of *Retosæ*; and more recently, in his 'Elements of Botany,' that of *Dictyogens*. This group of plants forms evidently the bond of union between the *Endogenous* and *Exogenous* divisions of the vegetable kingdom; on the one hand, agreeing in their vegetation with the latter, and on the other, in their fructification with the former.

E. A. Weddell sc.

Menispermaceæ, among *Exogens*, is the order which most closely approximates to the *Dictyogenous* group. Dr. Lindley was the first to point out this affinity; and the more recent observations of himself and others have confirmed the relationship. To the group in which he places *Menispermaceæ*, he gives the name of *Homogens*. Besides this order, it contains *Aristolochiaceæ*, *Nepenthaceæ*, *Piperaceæ*, and some others, all of which agree in possessing a woody system of a remarkably homogeneous structure, having more the appearance of wedges than concentric circles. Formerly it was supposed that the Retose group, or *Dictyogens*, had no other character to separate them from the truly Endogenous orders than their reticulated leaves; but more recent observations have discovered characters to distinguish them, equal to those which separate the *Homogens* from the true *Cyclogens*, their rhizomas possessing a central pith, and their woody matter exhibiting the wedgelike bundles of *Homogens*. Among the truly Endogenous orders, we find that the *Dictyogens* claim closest kindred with *Liliaceæ* and *Amaryllidaceæ*.

If we compare the leaves of *Peltophyllum* with those of *Dioscoreaceæ* and *Smilaceæ*, we shall find that, like them, they are of a highly reticulated nature; and I have no doubt that *Triuris* will ultimately be found to possess leaves of a similar character: indeed, since Mr. Miers has seen my little plant, he feels satisfied that he had overlooked the leaves of his. The flowers of *Smilaceæ* and *Dioscoreaceæ* are diœcious like those of *Triuris* and *Peltophyllum*; and if we look at the stamens of *Ruscus*, they will be found to present considerable analogy to those of *Triuris*, as has already been pointed out by Mr. Miers in his paper. In *Ruscus* the stamens have their filaments connected into a cylindrical tube, while in *Triuris* they and the connective are so much enlarged and run together, that they form a large central fleshy mass.

Notwithstanding that the plants at present under consideration bear a greater resemblance to the orders of the *Dictyogenous* group than to those of any other, yet there are peculiarities of structure which forbid their being associated with either of them. Thus they are distinguished from *Smilaceæ* by their ovaries being free and numerous, not three and cohering; from *Dioscoreaceæ* by the same characters, and by their being inferior, not superior; from *Roxburghiaceæ* by their habit, diœcious flowers, and very numerous ovaries; while from all of them they are still further distinguished by their extrorse anthers. From these considerations I propose to constitute a distinct order for the reception of these two genera, which will hold the same relation to the Syncarpous orders of *Dictyogens*, as *Menispermaceæ* does to those of *Homogens*; and which, in the mean time, may be thus characterized:—

Triuraceæ.

Herbæ parvulæ, perennes, rhizomate repente? *Folia* solitaria, a scapo distantia, longè petiolata, nervosa, integerrima. *Vaginæ* ad basin petiolorum membranaceæ. *Scapus* subramosus, basi squamosus. *Flores* regulares, dioici; pedicellis unifloris, bracteatis. *Perigonium* corollinum, 3–6 partitum, patens, persistens, laciniis longè acuminatis, æstivatione basi valvatis, acumine interdum tubuloso, ante anthesin gyrato incluso. *Stamina* 3–6? *Antheræ* extrorsæ, loculis disjunctis, imo androphoro magno carnoso centrali insertæ. *Ovaria* plurima, in tori apice sessilia, adpressa, libera. *Ovula* in loculis solitaria? *Styli* sublaterales, subulati vel ad apicem incrassati et obliquè truncati. *Fructus* ignotus.

EXPLANATION OF TAB. XV.

Fig. 1 & 2. Scapes of *Peltophyllum luteum*, of the natural size.

3. A scape, magnified.

4. A leaf, of the natural size.

5. A carpel, magnified.

6. A segment of the flower, seen from without.

7. A representation of a segment of *Triuris hyalina*, in the expanded state, showing the entrance to the tube.

8. The same in its half-expanded state.

Glasgow, April 4th, 1843.

XX. *Contributions to Vegetable Embryology, from Observations on the Origin and Development of the Embryo in* Tropæolum majus. *By* Herbert Giraud, *M.D., F.B.S.E., &c. Communicated by the Secretary.*

Read February 1st, 1842.

In a paper published in the 'Annals of Natural History' (June 1840), I pointed out the state of the inquiry regarding the origin and development of the Vegetable Embryo, by presenting a view of the late researches which have been conducted on the Continent with reference to this subject; and I there showed that, from the conflicting nature of the results obtained by the observations of Schleiden* and Wydler†, and of Mirbel and Spach‡, taken in conjunction with certain morphological considerations, our opinions regarding the origin of the Embryo were still indeterminate; and that it yet remained for further observations and inquiries to establish a true theory of phanerogamic embryogeny. In a recent work by Auguste de Saint-Hilaire§, this subject is fully and most ably discussed; and after presenting a fair statement of the late observations of Schleiden and of Mirbel, and after showing the opposite views to which these observers would respectively conduct us, this author concludes by thus pointing out the necessity of further investigation: "Espérons que de nouvelles recherches achèveront de lever les doutes que l'on pourrait concevoir encore." The importance of forming a determinate conclusion regarding the origin of the embryo is greatly enhanced by the influence it must have in determining our notions of the nature and en-

* Schleiden, 'Sur la Formation de l'Ovule, et l'Origine de l'Embryon dans les Phanérogames.' Ann. des Sci. Nat., 2nde Série, Botan. Mars, 1839.

† Wydler, 'Note sur la Formation de l'Embryon.' (Extrait d'une lettre de M. Wydler, professeur à Berne, communiqué par M. A. de St. Hilaire à l'Académie des Sciences à Paris. Oct. 1838.)

‡ 'Notes pour servir à l'Histoire de l'Embryologie Végétale. Par MM. Mirbel et Spach.' Ann. des Sciences Nat., 2nde Série, Botan. Avril, 1839.

§ 'Leçons de Botanique, comprenant principalement la Morphologie Végétale. Par Auguste de St. Hilaire.' Paris 1841.

dowments of the sexual organs of plants, and of the offices which the two sets of generative organs respectively perform.

With the hope of removing some of the uncertainties which are still attached to this litigated question, and of gaining some determinate information on yet unsettled points, I have attempted a series of observations on the mode of development of the embryo in *Tropæolum majus*, the results of which will, I trust, contribute in some degree to furnish materials for a theory of phanerogamic reproduction.

The extreme simplicity of the ovarium of the *Tropæoleæ*, and the comparatively large size of their solitary ovules, render the individuals of this family peculiarly fitted for the kind of observations herein detailed; and in these respects their allies, the *Geraniaceæ*, are similarly circumstanced. The following are the essential characters of the so-called female organs of *Tropæolum majus*: "*Ovary* 1, 3-cornered, made up of 3 carpels; *style* 1; *stigmas* 3, acute; *ovules* solitary, pendulous; *fruit* indehiscent, separable into three pieces from a common axis; *seeds* large, without albumen, filling the cavity in which they lie; *embryo* large; *cotyledons* 2, straight, thick, consolidated together into a single body; *radicle* lying within projections of the cotyledons."

The following observations are arranged under seven general heads, corresponding with as many progressive periods in the growth of the so-called female organs, extending from the completion of the anatropous development of the ovule, to the perfect formation of the embryo; or from the commencement of the expansion of the bud, to the complete formation of the fruit*.

FIRST PERIOD.—On making a section of a carpel (just before the expansion of the bud), from its dorsum inwards towards the axis of the pistil, and in the direction of that axis, the solitary ovule is at the same time divided, and is found to have completed its anatropous development (Tab. XVI. fig. 1.). Continuous with that part of the columella which forms the placenta, is a portion of rather firm and dense cellular tissue, inclosing a bundle of vessels, and forming the so-called *umbilicus*: this, with the vessels it incloses, descends in apposition with the placenta to form the raphe (fig. 1, *a.*): and, near the point where it terminates in the base of the ovule, the vessels are gradually lost, or rather terminate in closed extremities. The nucleus has only one tegumentary

* The results, as here detailed, are collected from a great number of dissections.

membrane (*primine* ?), at the apex of which is presented the exostome, or micropyle (fig. 1, *b.*), opening close by, and to the outside of the umbilicus: so that the direction of the nucleus is exactly parallel with that of the axis of the pistil. The conducting tissue of the style may be traced between the columella (fig. 1, *c.*) and that prolongation of the carpellary leaf which forms the style (*d.*), into the carpellary cavity, as far as the exostome, with which it is brought in contact by the anatropous development of the ovule. The vessels which proceed along the placenta to form the raphe, are spiral vessels and annular ducts; and at the point at which they make a turn downwards towards the chalaza, many of them end in closed extremities (*e.*), while the vascular structure of the raphe usually terminates in a single vessel. These vessels, together with an analogous set which run along the dorsum of the carpel, proceed from a larger bundle of vessels, which in the receptacle bifurcates into these two sets.

SECOND PERIOD.—During the expansion of the bud, before the dehiscence of the anther, and therefore before impregnation, a small elliptical cavity (fig. 2, *f.*) appears near the apex of the nucleus, having a delicate lining membrane formed by the walls of the surrounding cells. This cavity is the embryo-sac ("*sac embryonnaire,*" Brongniart and F. G. F. Meyen; "*membrana amnii,*" Malpighi; "*quintine,*" Mirbel). From the exostome a minute canal (*g.*) may be traced in the apex of the nucleus, leading to the embryo-sac. The apex of the embryo-sac incloses, at this period, a quantity of organizable mucilage, containing many minute bodies having the appearance and character of *cytoblasts* (Schleiden) (*h.*).

THIRD PERIOD.—The apex of the nucleus, and of its tegumentary membrane, is now inclined and approximated towards the axis of the pistil. The embryo-sac is much enlarged and lengthened; its mucilage has disappeared; and in its place there is formed an elongated diaphanous utricle (fig. 3, *h.*) (*primary utricle*; "*utricule primordiale,*" Mirbel; "*vésicule embryonnaire,*" F. G. F. Meyen; "*l'extremité antérieure du boyau pollinique,*" Schleiden) containing a quantity of globular matter ("*globulo-cellular cambium,*" Mirbel; "*cytoblasts,*" Schleiden). This *primary utricle* is developed wholly within the embryo-sac, from which it can be clearly seen to be distinct.

FOURTH PERIOD (after impregnation has occurred).—The pollen tubes do not extend into the carpellary cavity; but the fovilla, with its granules, is found abundantly in the passage leading from the style to the exostome (fig. 4, *i.*)*. With the increased development of the embryo-sac, the primary utricle, as it elongates, becomes distinctly cellular, by the development of minute cells in its interior, while at the extremity, next the base of the nucleus, it is terminated by a spherical extremity, consisting of numerous globular cells (*k.*). The primary utricle, at this period, assumes the character of the *suspensor* (Mirbel); and its spherical extremity constitutes the first trace of the embryo.

FIFTH PERIOD.—At this stage the apex of the nucleus, with that of its tegumentary membrane, becomes directed more towards the axis of the pistil. The spherical extremity of the suspensor enlarges, and almost entirely fills the cavity of the embryo-sac; and it now becomes more evident that it constitutes the axis of the embryo (fig. 5, *k.*). The suspensor (*h.*) is, in a corresponding degree, lengthened by an increase in the number and size of its cells; while its upper extremity has now protruded through the apex of the embryo-sac, the apex of the nucleus, and through the micropyle. From this extremity there is a considerable development of cells, many of which (*l.*) hang loosely in the passage leading to the conducting tissue of the style, while others unite in forming a process which passes round the outside of the ovule into the carpellary cavity, and between the inner surface of the carpel and the outer surface of the ovule (*m.*). This process of cellular tissue is composed of from nine to twelve rows of cells; its extremity resembles, in appearance and in the anatomical condition of its cells, the spongiole of a root. When the ovule is removed from its carpel, and slight traction is made upon this cellular process, the suspensor, with the embryo, may be withdrawn from the embryo-sac, through the exostome and apex of the nucleus (fig. 6.); thus proving the perfect continuity of this cellular process with the suspensor, and through it with the embryo itself.

SIXTH PERIOD.—The suspensor is now more attenuated, consisting only, as

* Many other instances might be adduced in which the pollen tubes have not been found to penetrate so far as the micropyle. L. C. Treviranus mentions that there are whole families of plants in which he has never been able to discover any pollen tubes at all; and F. G. F. Meyen has never been able to trace them in *Urtica urens*.

at first, of two rows of cells; the cellular process, with which it is organically united, has reached the base of the ovule; the cells of its extremity abound in cytoblasts, showing it to be yet progressing in its development. With the increased growth of the embryo two lateral processes are observed proceeding, on opposite sides, from the axis, and evidently forming the first traces of the cotyledons (fig. 7, *k.*).

Seventh Period.—All distinction between the nucleus and its tegumentary membrane ceases, as they are now united in one envelope inclosing the embryo-sac. The cellular process connected with the suspensor has become so much developed, that its extremity has passed around the base of the ovule, and is directed towards the axis of the pistil. The lateral processes of the axis of the embryo have become distinct fleshy cotyledons (fig. 8, *n*, *n.*), extending backwards from their point of origin towards the radicle, as well as forwards in the direction of the plumule; both which organs they inclose in corresponding depressions in their opposed surfaces. With the development of the radicle (*o.*) towards the exostome, the opposite extremity of the axis of the embryo (in the form of the plumule) (*p.*) extends towards the base of the nucleus, but is still inclosed in the depression formed in the concavity of the cotyledons.

The subsequent changes consist chiefly in the great development of the cotyledons, which ultimately come to occupy the whole cavity of the nucleus, filling the space usually taken up by the albumen.

The physiological inferences deducible from the foregoing statements are of great interest, as contributing to the determination of many unsettled points involved in the theory of vegetable embryogeny, and also as serving to elucidate many obscurities relating to the morphology of the embryo.

It has been shown above, that the formation of the embryo-sac, and the development of cytoblasts within it, takes place at a period prior to the impregnation of the pistil; and that even the primary utricle itself makes its appearance before the emission of the pollen from the anther, and before the expansion of the stigma; so that the origin of the primary utricle must not be referred to the influence of impregnation, as has been already pointed out by Mirbel and Spach in the case of *Zea Mays.* At its first appearance, the primary utricle is seen to be quite distinct from the embryo-sac, even at its apex, with which, however, it is brought in contact at a subsequent period, and ultimately even penetrates that membrane; so that, in this instance at least, the primary utricle cannot result from a depression or involution of the embryo-sac, as is maintained by Adolphe Brongniart.

After the expansion of the lobes of the stigma and its impregnation, the pollen-tubes may be traced in the conducting tissue of the style, but not so far as the micropyle: in the channel, however, leading to this point, the pollen-granules are found in abundance, and are doubtless brought in contact with the outer surface of the embryo-sac through the exostome and the minute canal in the apex of the nucleus.

At this period the first trace of the embryo appears in the formation of the spherical body at the inferior extremity of the primary utricle, which has now assumed the character of the suspensor (*umbilical cord*). Hence, then, we are led to consider the origin of this simple spherical body, which is ultimately transformed into the embryo, as resulting from a peculiar process of nutrition, determined by the material or dynamic influence of the fovilla, conveyed through the medium of the primary utricle or suspensor. As it is through that organ that the embryo appears to derive its nourishment during the period of its development, we should from this function, as well as from its anatomical relations, consider the suspensor as the true umbilical cord; the medium of connexion, therefore, between the ovule and the columella (or so-called placenta) ought not to receive the name of umbilical cord or funiculus, which terms it would be well to confine to the suspensor alone; while the former might retain the appellation of *podosperm*, as referring to its relation to the ovule.

As it is necessary that an umbilical cord should be organically united with the embryo, the impropriety of considering the organ described by Malpighi in that light will become sufficiently obvious. This structure consists of a minute cellular process extending from the base of the embryo-sac to the base of the nucleus, and has been found chiefly in the *Cucurbitaceæ* and *Rosaceæ*. It appears, however, to be but a mere appendage of the embryo-sac, from which it takes its origin, and often never reaches the base of the nucleus, and therefore cannot be the medium of nutrition even to the embryo-sac. To this organ, therefore, it would be better to confine the term applied to it by Dutrochet, and name it the *hypostate,* as pointing out merely its anatomical relations.

The cellular process proceeding from the extremity of the suspensor, next the exostome, around the outer surface of the ovule into the carpellary cavity, is an organ of somewhat unusual occurrence; but from its mode of growth and structural relations, it may be inferred to be of very essential importance to the origin and development of the embryo. Now it has been recently pointed out by F. G. F. Meyen*, that in the great majority of instances the pollen-tube, after having penetrated the micropyle, is brought in contact with the apex of the embryo-sac, with which it there contracts an adhesion: from this period the changes consequent on impregnation date their commencement: and, under the direct influence of this immediate application of the fovilla to the embryo-sac, continue with uninterrupted regularity. But in the case of *Tropæolum majus,* as the pollen-tube never reaches the embryo-sac, some additional means are required to insure that influence of the fovilla on the primary utricle which is necessary for the development, at its extremity, of the spherical cellular body, which subsequently becomes the embryo. This action, then, is effected by the projection of this cellular process from the primary utricle, which, by being immersed (so to speak) in the fovilla, is made the medium for the transmission of the latter to the primary utricle, and through it to the embryo itself; for which office the structure of its extremity (so like a spongiole) renders it peculiarly fitted.

It may now be shown how far the foregoing observations bear upon the undetermined question of the origin of the embryo. That in this plant the primary utricle and the future embryo never have any structural connexion with the extremity of the pollen-tube at their first origin, or at any subsequent period of their development, is sufficiently obvious from the fact, that the pollen-tube is never brought into contact with the embryo-sac. As the primary utricle makes its appearance before impregnation has occurred, it cannot be possible that that organ has ever formed the extremity of the pollen-tube, as is believed to be the case by Schleiden and Wydler. Moreover, as the primary utricle takes its origin wholly within the embryo-sac, and at the earliest period of its formation is not in contact with that membrane, it

* F. G. F. Meyen, 'Neues System der Pflanzen-Physiologie.

cannot have been formed by the pollen-tube pressing before it a fold of the embryo-sac in its passage into the cavity of that structure, as Schleiden has maintained.

The researches of F. G. F. Meyen * sufficiently prove that the present is not a solitary exception to the mode of origin of the embryo, which Schleiden and Wydler have described; for that observer has shown, from a very extended series of researches, that in those instances in which the pollen-tube reaches the embryo-sac, it never penetrates, nor in any way enters the cavity of that structure; but that, after it has contracted an adhesion with the outer surface of the embryo-sac, the primary utricle (*vésicule embryonnaire*, F. G. F. Meyen) takes its origin within that cavity, so that the lining membrane of the embryo-sac always intervenes between the primary utricle and the extremity of the pollen-tube. It is evident that Schleiden and Wydler have been misled by not properly distinguishing this fact, nor being sufficiently careful to observe the relations of the primary utricle at its very first appearance. The point at which these observers believe the pollen-tube to lose its connexion with the primary utricle, is in fact its true extremity, which never has had any organic union with that body. The intimate nature of the impregnation of those plants in which the pollen-tube is brought in contact with the embryo-sac, is essentially the same as that of *Tropæolum majus*; but, in the latter, the fovilla is applied to the embryo-sac independently of the application of the pollen-tube to its outer surface; and its influence on the development of the embryo is sustained through the medium of the cellular process extending from the suspensor or true umbilical cord. The direction of the axis of the embryo (being opposed to that of the nucleus and its membrane) is such as would be anticipated from the fact of its commencing its development at the apex of the embryo-sac; therefore the views which we may entertain of the morphology of the ovule do not necessarily afford an argument in favour of the doctrines of Schleiden and Wydler, nor in any other way affect the question of the mode of origin of the embryo.

I have noticed in the preceding observations, that the first appearance of the cotyledons is accompanied by a corresponding elongation of the axis of the embryo, owing to an extension of its globular cells, so that the cotyledons

* F. G. F. Meyen. Opus cit.

necessarily arise from that axis. Hence the opinion held by many morphological writers, that the axis results from a union of the cotyledons, or of their petioles, is proved to be without foundation; for the foregoing observations show that the lateral projections, which constitute the first traces of the cotyledons, are composed of cellular tissue developed at these points of the axis, and are therefore new formations arising from determinate points, and deriving their nourishment from the substance of the axis.

EXPLANATION OF TAB. XVI.

Fig. 1. Section of a carpel of *Tropæolum majus*, before impregnation. *a.* Raphe. *b.* Apex of the nucleus and exostome. *c.* Columella. *d.* Prolongation of the carpellary leaf contributing to the formation of the style. *e.* Closed extremities of spiral vessels and annular ducts.

2. Section made at a more advanced period. *a, b, e.* As in fig. 1. *f.* Embryo-sac. *g.* Canal leading from the apex of the nucleus to the embryo-sac. *h.* Organizable mucilage with cytoblasts.

3. Section just before impregnation. *a, b, e.* As in fig. 1. *f. g.* As in fig. 2. *h.* Primary utricle filled with cytoblasts.

4. Section immediately after impregnation. *a, b, e. f. h.* As in fig. 3. *k.* Spherical body, forming the first trace of the embryo at the extremity of the primary utricle. *i.* Fovilla, with its granules, in the canal leading from the style to the micropyle.

5. Section, showing the embryo distinctly formed. *a, e, f.* As in fig. 4. *h.* Primary utricle, now become the suspensor or umbilical cord. *k.* Embryo. *l.* Cells connected with the suspensor. *m.* Cellular process proceeding from the suspensor into the carpellary cavity.

6. Embryo, suspensor and its cellular process removed from the ovule. *h.* Suspensor. *k.* Embryo. *l.* Cells connected with the suspensor. *m.* Cellular process of the suspensor.

7. Section, after the appearance of the first traces of the cotyledons. *h.* Suspensor. *k.* Embryo, with the first appearances of the cotyledons. *l.* Cells connected with the suspensor. *m.* Cellular process of the suspensor.

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Fig. 8. Section, after the development of the cotyledons. *n.* Cotyledons. *o.* Radicle. *p.* Plumule.

9. Embryo, removed from the ovule. *a.* Suspensor. *b.* Radicle. *c.* Cotyledon. *d.* Axis of the embryo. *e.* First traces of the plumular leaves. *f.* Surface left after the removal of the opposite cotyledon.

10. Cotyledon, removed from the embryo.

THE

TRANSACTIONS

OF

THE LINNEAN SOCIETY

OF

LONDON.

VOLUME XIX.

PART THE THIRD.

LONDON:

PRINTED BY RICHARD AND JOHN E. TAYLOR, RED LION COURT, FLEET STREET:

SOLD AT THE SOCIETY'S HOUSE, SOHO-SQUARE;

AND BY LONGMAN, BROWN, GREEN, AND LONGMANS, PATERNOSTER-ROW;

AND WILLIAM WOOD, TAVISTOCK-STREET, COVENT-GARDEN.

MDCCCXLIV.

CONTENTS.

Erratum in Vol. XIX., Part II.

At p. 103–4, it is stated that the Insects described "were obtained by purchase;" but this applies only to those from Silhet. For all those from the Himalayan Mountains, Captain Parry was indebted to the kindness of G. R. J. Meares, Esq., by whom they were presented to him, together with the two magnificent species of *Teinopalpus* described at p. 131, *Saturnia Zuleika*, p. 132, and *Lystra Westwoodii*, p. 133. These also are not from Silhet, but from the Himalayan Mountains in the neighbourhood of Darjeeling.

XXI. *On the Ovulum of* Santalum, Osyris, Loranthus *and* Viscum.

By William Griffith, *Esq., F.L.S. &c. &c.*

Read January 17th; March 7th and 21st; April 4th and 18th, 1843.

In two papers which have been honoured by places in the Transactions of the Society*, I detailed, as well as I was able, what appeared to me the most striking peculiarities presented by the ovula of *Santalum*, *Loranthus* and *Viscum*; and I was enabled to point out some novel and interesting facts connected with the ovulum, such as the protrusion of the embryonary sac beyond the apex of the nucleus, and the formation of the embryo outside the nucleus. I was also led to infer the possibility of the reduction of the ovulum to its innermost coat, the embryonary sac; and to state that the ovarium of *Loranthus* was solid, and that its ovulum, as well as that of *Viscum*, was formed subsequently to the occurrence of fecundation.

In the present attempt I have, I believe, been able to supply many of the large deficiencies of the papers alluded to; to correct, I trust, some important mistakes; and to extend my inquiries to another genus of the natural family *Santalaceæ*. In extenuation of so much addition and correction to *Santalum*, and especially to *Loranthus*, I consider it my duty to the Society to state that the original observations on *Loranthus* and *Viscum* were made by a very inexperienced observer, that those on *Santalum* were not only similarly defective, but were interrupted by severe illness, and that the manuscripts were prepared during a short period between convalescence and a hurried departure for Assam; so that the papers, as they now stand in the Transactions, must have been greatly cleared from obscurities and inaccuracies by the knowledge and friendly care of those who honoured me by superintending their printing.

It will be seen by referring to the sketches, that the materials from which

* Vol. xviii. p. 59 and p. 71.

this paper has been drawn up, have been, with the exception of *Viscum*, some months in my possession. But I wished particularly to re-examine that genus, and to examine other species of *Loranthus* than the two on which the remarks concerning that genus have been founded. I could now extend the inquiry to two or three species of a Santalaceous genus closely allied to *Osyris*, differing chiefly in its quinary flowers and lobed albumen; to a plant which would belong to the "Genera Santalaceis affinia; fructu supero diversa," of the great Mr. Brown's 'Prodromus'; and I believe to genera such as *Olax* and *Ximenia*, the affinities of which do not appear to me to have been precisely determined. But I am compelled to come to a temporary conclusion of the inquiry, which now requires a determinate knowledge of the origin of the ovulum, or rather of the placentæ; and I reserve the matters, above alluded to, to be added to an account of the *Santalaceæ* and the allied families existing in my herbarium.

§ 1. Santalum.

My subsequent observations on *Santalum* have been directed to the following points, viz. the origin, structure and limits of the embryonary sac; the relations of the *boyaux* with its apex; and the origin of the embryo.

With regard to the first, I find that the protrusion beyond the apex of the nucleus takes place long before the opening of the flowers or anthers; that at the earliest periods at which I have been able to ascertain its existence, it presents itself as a membranous tube of nearly equal diameter, the exserted part being rather longer than the ovulum; and the included part apparently originating from the base of the ovulum, beyond which it does not appear to be extended posteriorly.

When the flower-bud is half developed, the embryo-sacs will be generally found to have attained nearly their full length in regard to the outside of the placenta; and with reference to the inside of this organ, they have undergone a remarkable modification, consisting in their extension backwards and upwards beyond the base of the ovulum towards the axis of the placentæ. The apex of the sac appears up to this period to be quite simple. The enlargement of the part near the apex of the nucleus has commenced; this I have throughout called the bulb or bulbous portion.

The changes that occur in the sac antecedently to fecundation consist in the deflection of the posterior extension of the sac in the direction of the axis of the placenta, and in the appearance of cellularity and division of the apex. The contents likewise appear to undergo some changes, but these are limited to the apex, and seem to consist of a sort of condensation, and irregular and variable division, of the grumous matter.

At the period of expansion of the flower, the posterior extensions will be found to have reached nearly to the base of the placenta. Their terminations in this direction are in *culs de sac*; there is a tendency to division and irregularity of outline of all the included part, not even excepting that within the ovulum itself. The contents seem, with the exception of the part within the ovulum, to be chiefly grumous matter*, and this is again chiefly limited to the termination.

The apex appears at this period to have several (from 3 to 5) connivent tooth-shaped lobes, divided, as it were, from each other below the middle by rather conspicuous fissures. (Tab. XVII. fig. 1.) The contents, which are grumous matter and largish granules, in the more perfect examples occupy the whole of the apex, tapering below gradually into a line. The cavity of the sac is at this time continuous, the contents passing on pressure freely throughout. Iodine at this period causes the coagulation of the contents, which then appear like a brown club-shaped coagulum studded with granules, the upper end of which is partially or entirely divided from the lower, is much less or not at all granular, and is occasionally lobed and marked with a line down the centre.

At or about this time, if the bulb be examined, it will be found to present traces of a convex septum towards its lower part, and very soon afterwards traces of an additional septum, or perhaps cell of excessive fineness, are detectible above this.

The changes immediately incident on the application of the *boyaux*, which may be traced *upwards* to the stigmata, consist in the appearance of a vesicle within the apex, and the coagulation of the contents.

The tubes which descend from the stigmata, and which are fairly, I think,

* By grumous matter I mean that particular semi-opake, mucilaginous-looking matter, in which no granules are detected, and which under the microscope resembles the appearance of a solution of gamboge. It has no proper form or distinction of parts.

assumable to be pollen tubes, adhere most intimately to the apices of the sacs; generally one, sometimes more, will be found adhering. By varying the modes of examination, I acquired the conviction that the pollen tube passes down between the connivent teeth and enters the apex of the sac, when it expands into the vesicle just mentioned. (Tab. XVII. fig. 4, and especially fig. 6.)

This vesicle contains grumous molecular matter. On reaching its full amount of expansion, which is considerable, the free end will be found in direct communication with the coagulum, which forms an uninterrupted line as far as the convex septum; its upper end tapers into a neck, which corresponds with the axis of the teeth and with its sides; but to an unequal and incomplete extent, dense grumous matter will be seen to be in contact.

The coagulation of the contents is universal; it is most distinct in those that are to be abortive, in which it forms a flattened club-shaped line, studded here and there with a few large granules, almost all of which do not fail to disappear from the fertilized one.

The abortive tubes undergo no further change; the fertilized ones soon present cellularity of the bulb and nucleary aggregation of the contents of the neck, which subsequently also becomes cellular. (Tab. XVII. fig. 7.)

The cellularity of the bulb is always in advance, and even when it has attained a considerable size, the upper or tubular part presents only the first steps to cellularity, aggregation into nuclei, and then the division of these. The direction of the cellularity in this part appears irregular, but generally I have observed it to be most developed towards the vesicle and towards the bulb, and least in the intermediate part. If the bulb be examined about this period, it will be found that the cells have, as it were, extended downwards over that part of the sac beneath the septum, and that the whole of the bulb and tubular part is easily separable from this, which, when detached, presents an entire globular head strikingly similar to that of *Osyris*.

The cellularity continuing to increase, finally occupies the whole sac above the line of separation, and in the meantime the lower free end of the vesicle will be found to present traces of internal subdivision, preceded by the aggregation of its contents into nuclei. (Tab. XVII. fig. 9.) The next process consists in the development of cells from its lower free end, and from these again other cells are developed, forming a cylindrical mass of lax nucleary cellular tissue, which reaches to a considerable length before the more condensed structure of the embryo becomes visible.

As the cellularity of the original sac increases, all traces of its original structure disappear, and it becomes a cellular mass, divided completely into as many parts as there are component cells. (Tab. XVII. figs. 10 and 11.)

During these changes the posterior extensions of the sacs have become longer and more divided, and they penetrate to a considerable distance below the placenta into the white cellular substance constituting the ovarium, forming extensive relations of superficies with it. (Tab. XVII. fig. 8.)

It is perhaps unnecessary to trace the development further. I have ascertained the existence of the vesicle, in the state I have just mentioned, when the embryo is half-developed. It appears, perhaps, throughout to have relations to the lax cellular mass of the embryo a good deal similar to those it originally bore to the grumous molecular contents of the embryo-sac.

It will be seen from this that my present statements regarding *Santalum* differ considerably from my previous ones, with regard to the apex of the sac, its posterior extension, the subsequent separation of continuity, and its relations with the *boyaux*.

With regard to the first point of difference I have nothing to offer; that which I have now described as the appearance of the mature apex requiring no nicety of observation. To the extension posteriorly and the interruption of continuity I was led by *Osyris*; otherwise, from the parts remaining in contact, it is liable to be overlooked. The last correction has resulted from very extensive repetition (for the "blending" is occasionally apparent), and from improved means of observation*.

* I may here mention, that the observations on *Santalum, Loranthus* and *Viscum* were made almost exclusively with one of Mr. Ross's compound achromatic microscopes, the object-glasses of which were supplied to me in 1836, and have respectively $\frac{1}{4}$th and $\frac{1}{16}$th inch focal distances. Verification, when necessary, was made by excellent triplets of various powers by the same eminent optician. I have also had the advantage, as occasions offered, of examining some of the minuter points by the superb Russian microscope of Mr. Grant, to whom I am indebted for direct proof of the engagement of the pollen tubes in the apex of the embryo-sac.

My compound microscope, though now of some years' date, is fully equal to any triplet in my possession in defining and penetrating powers; and as I have from repeated comparison acquired confidence in it, and as it possesses such obvious advantages over any modification of the simple microscope, I seldom now use any other. The observations on *Osyris* were made almost entirely by simple microscopes; all the minuter points being observed under excellent triplets of $\frac{1}{20}$th and $\frac{1}{30}$th inch focal distances.

§ 2. Osyris Nepalensis.

The ovula of this plant are cellular productions from the lower part of a conical cellular placenta, imbedded in a small cavity a little above the centre of the ovarium; this cavity communicates freely with the stigmatic canal by a narrow line or slit. (Tab. XVIII. fig. 1.) Before the expansion of the flower the outlines of these ovula are continuous, and they present all the appearances characteristic of ovula reduced to nuclei; they are oblong, cellular, homogeneous bodies, curved upwards or laterally. (Tab. XVIII. fig. 2.)

At the period of expansion of the flower, but before any evident action of the pollen on the stigmata, an oblong sacciform body crowded with granules will be found protruding from the apex of the ovulum; this, which is very short, may be traced into the ovulum, within which it becomes narrowed, as far as its base. (Tab. XVIII. fig. 3.)

If, after the action of the pollen on the stigmata is apparent, the ovaria be carefully opened, very fine tubes will be seen in the canal of communication or stigmatic canal, which on reaching the apex of the placenta pass down over its surface, and establish immediate relations with the ovula; possibly with all, but generally, as it has appeared to me, with only one, or at most two. (Tab. XVIII. fig. 4.)

The relation established consists of a very firm adhesion with the apex of the protruded sac. No pressure or traction is sufficient to disunite them; occasionally the membrane of the descending tube or *boyau* appears blended with the protruded sac, occasionally appearing to expand upon it in a somewhat bulbiform mode. (Tab. XVIII. fig. 5.) At this period the protruded tube, which I consider to be the embryonary sac, will be found to present a continuation backwards beyond the base of the ovulum into the placenta, on reaching the central line of which it becomes deflexed, passing down to a considerable distance in the centre of the tissue which corresponds to the central line of the ovarium, and which contains the vascular supplies for the placenta?? (Tab. XVIII. fig. 4.)

The next stage of development has presented to me the appearance of a small cellular mass, apparently occupying the place of the exserted part of the embryonary sac, and generally, perhaps, presenting on its apex traces of very short filaments. This cellular appearance arises from the deposit, if I may be allowed the use of the expression, of minute and laxly-formed cells, crowded with molecular matter, on the surface of the protruded part of the embryonary sac, which may be freed by pressure from these cells, when it will be found to retain its original sacciform appearance. (Tab. XVIII. figs. 6, 7, 8 and 9.)

To this cellular body all the subsequent changes relating to the embryo and seed are confined. It continues to enlarge by the addition of cells *upwards*, and all traces of the filaments seem rapidly to disappear.

At the period of the appearance of the embryo itself, which takes place about the time when the cellular mass, now young albumen, equals in bulk the placenta, the embryonary sac will be found to present the appearance I have above attempted to describe, and except in the disappearance or coagulation of its molecular matter, it has undergone no change. (Tab. XVIII. fig. 10.) It is detectible unchanged in the placenta of the ripe fruits long after this body appears to exercise any function, at least judging from its withered and dried state.

I have not detected the embryo before the cellular mass has reached a considerable size. In the earliest stage at which I have seen it, it consists of from 3 to 5 cells growing from the surface of a single one a little within the apex of the cellular mass. (Tab. XVIII. figs. 10 and 11.)

The changes in the young fruit, besides mere increase of size, consist first in the dislocation or breaking up of that part of its cellular tissue immediately around the placenta; this goes on rapidly, the cells being found either quite freed from their original relations or grouped in small masses. (Tab. XVIII. fig. 12.) When it has reached to a considerable extent, it is accompanied by an induration of the circumference of the same tissue, the whole of which I imagine corresponds to the ovarium. The induration and dislocation go on increasing; they are followed at an advanced period by the baccation of the tissues between the cutis and the hardened portion or outer surface of the drupe, the whole of which baccate portion may be supposed, in accordance with generally received, but not improbably erroneous opinions, to represent the adherent tube of the calyx and staminal apparatus.

In the ripe fruit, the originally very thick cellular ovarium will be found to consist of an almost bony outer coat of some thickness, and an irregular lining of film, the *débris* of the dislocated tissue. The cavity of the drupe is occupied by a coniform mass of albumen, on one side of and beneath which will be found the remains of the placenta and its stalk, now reduced to a flattened body, covered with irregular cellular tissue. The embryo does not correspond exactly to the axis of the albumen. (Tab. XVIII. fig. 12*g*.) Minor changes consist in the growth of oblong, clavate cells from the surfaces of the barren ovula, and probably in the absorption or breaking up of the tissue of the nucleus of the fecundated ovulum.

§ 3. Loranthus.

The examination of several species of *Loranthus* has satisfied me that an ovarial cavity does exist throughout the earlier stages of development, however obscure it may become subsequently, and that the ovula do exist before fecundation has been effected.

For the appearance of that cavity I refer to Tab. XX. fig. 1. of *Loranthus bicolor*; and as the subject requires revision, more especially regarding the nipple-shaped process, represented as occupying the fundus, I shall content myself with describing the ovula*, their relations with the pollen tubes, and the changes consequent on the occurrence of these.

In all the species I have examined the ovula consist of closed membranous sacs, the upper extremity of which is rounded and generally dilated. Their contents are grumous matter and some fluid, the former being generally crowded in the head of the sac. (Tab. XX., *Loranthus bicolor*, figs. 4 and 5.) The extent of these sacs is in all cases considerable, but still varies remarkably; the variation appearing to be connected with a remarkable modification in the situation of the albumen and of the embryo throughout the earlier stages of its development. I have not in any instance hitherto been able to observe that they had any *definite* relations with the nipple-shaped process of the fundus. Their number is perhaps generally 6; and a transverse section shows them to be arranged regularly enough round the obscure cavity in the axis of the base of the flower.

In one of the modifications above alluded to, of which *Loranthus globosus*, Roxburgh, is an instance, these sacs are confined to the part which is de-

* Of the origin of these ovula or the direction of their development I have not ascertained anything sufficiently precise.

scribed as "ovarium" (Tab. XIX. fig. 1); in the other, exemplified by *Loranthus bicolor* of the same author, they extend a long way up the canal of the style, reaching not unfrequently to within a short distance from the stigmatic surface itself.

In both modifications, after obvious action of the pollen on the stigma, filaments will be found adhering to the heads of the sacs, into which they penetrate, becoming dilated within the dilated apex of the sac, and constricted in its constricted part; not, however, to their limits or diameters previous to their penetration (*L. bicolor*, Tab. XX. fig. 6; *L. globosus*, Tab. XIX. fig. 2): they run down throughout the whole length of the sac, being always, so far as I have seen, while within this organ, two in number and in close apposition to each other. In *L. bicolor* they appear to run without interruption of continuity (Tab. XXI. fig. 2) almost to the very end of the sac; in *L. globosus* they have generally appeared jointed immediately above that part of the sac in which the albumen becomes developed. I cannot state positively whether these tubes, or their *similar* continuations, pass out through the lower end of the sac, but growths from the ends of these, shorter, of larger diameter, and subsequently of increased number, certainly appear to do so.

In that modification of sac which does not extend beyond the so-called ovarium, the penetration of the tubes appears almost immediately associated with the appearance of grumous nuclei in a particular part of the sac, which nuclei, soon becoming invested with proper membranes, form the cellular tissue of the young albumen. But in the other modification this is not the case, but the analogous cellular tissue is developed *from* the ends of the sacs, and within the mass there formed the continuations of the pollen tubes will be found. (Tab. XXI. fig. 3.) And it is remarkable, that whereas in the first modification the sac retains its original simple membranous nature, unless pollen tubes have penetrated into it (*L. globosus*, Tab. XIX. fig. 4), yet in the second, each sac appears to have to some extent independent powers of growth, inasmuch as cellular tissue is often produced from their ends without any such penetration having taken place. (*L. bicolor*, Tab. XX. fig. 7; Tab. XXI. fig. 1.)

In *Loranthus bicolor* the continuations of, or growths from, the pollen tubes do not reach any great length before they pass, as it were, into the tissue of the young embryo, this never appearing to be altogether external to the albumen even in its very young state. But in *Loranthus globosus* the case is widely different; the continuations of the pollen tubes are greatly extended before the proper tissue of the embryo appears to be developed. (Tab. XIX. figs. 3 and 4.) In consequence of this extension, they assume a variously bent or even contorted appearance; for the sacs themselves being of the same length as the cavities in which they are inclosed, and the tissues of the base of the central part of the ovarium being dense and not admitting penetration, the growths alluded to are necessarily disturbed in direction. (Tab. XIX. fig. 4.)

At a variable distance in *L. globosus*, but almost immediately in *L. bicolor*, the growths from the pollen tubes meet and become united, forming either immediately or mediately the ground-work of one embryo (*L. bicolor*, Tab. XXI. fig. 3; *L. globosus*, Tab. XIX. figs. 4 and 7); but it is proper to observe, that in *L. globosus*, at least, a tendency towards separation of the growths of the pollen tubes after junction is not unfrequent. (Tab. XIX. fig. 4.) The same union affects the young albumina of both species, occurring however earlier in *L. bicolor*.

The embryo of *L. bicolor* presents nothing particularly worthy of notice in its further evolution; it presents throughout no great deviations from the ordinary relations existing between albumen and embryo. (Tab. XXI. fig. 7.) In *L. globosus* it is only at a late period that it becomes inclosed in the ordinary manner in the albumen (Tab. XIX. fig. 4), through the constant tendency of the embryo to be developed in a line with the axis, the pressure opposed to it by the density of the tissues of the base of the flower, and the extension downwards of the growth of the albumen. When mature, the embryo presents its huge radicle projecting beyond the upper surface of the albumen. (Tab. XIX. fig. 6.) I have to add, that in this species the development of the young albumen does not, for some time at least, affect the appearance of the pollen tubes; these may be seen, under pressure, in their original form even when the albumen has reached to a considerable size.

The above observations I consider as going no further than to establish the existence of an ovarial cavity and of the ovula, independently of fecundation;

the percursion of the ovula by the pollen tubes; the existence of at least two distinct types of development in the genus*; the formation of one mass of albumen from the albumina of several ovula; the *exteriority*, if I may so express myself, of the embryo from the ovulum; and its concentrated formation.

§ 4. Viscum.

I have not yet had an opportunity of re-examining a species of *Viscum*, presenting the organization of that from Mergui, on which my first remarks were founded. The examination, however, of two species of another type†, though remarkably different in habit from each other, has satisfied me not only that the reduction in the parts of the ovulum is of the same degree as that occurring in *Loranthus*, but that the ovulum equally exists before fecundation, and that the phenomena consequent on the occurrence of this present little if any peculiarity, even as regards a retardation of the usual effects.

The circumstances do not now appear to me to present sufficient variety to induce me to enter into detail, such as I have thought requisite with regard to *Loranthus*, *Santalum* and *Osyris*, particularly as I am not now able to enter into the question of the origin of the sac (ovulum) and the nature of the parts by which it is surrounded. I consider it, therefore, sufficient to state that the ovulum, which I consider to be reduced to an embryonary sac, exists before fecundation as a clavate membranous closed simple sac, containing fluid matter with some grume towards its apex (Tab. XXI. figs. 5 and 6); that after fecundation has occurred, its apex will be found to present traces of interruption of continuity, and to be occupied partly by a vesicle, which I assume to be derived from the inner membrane of the pollen, and to be the "anterior extremity" of the pollen tube; that the changes consequent on the penetration of this consist first in the development of cellular tissue in the sac, being the first step in the formation of albumen (Tab. XXI. figs. 7 and 8), and that this is subsequently accompanied with the occurrence of cellularity in the vesicle and its

* I am not yet certain whether these two types are so far connected with external form as may enable me to propose more natural subdivisions of the genus than those at present adopted.

† M. Decaisne in a letter alludes to the possibility of there being two distinct types of organization of the male flowers of *Viscum*. Reserving this, I can say that there certainly are as regards the female; and these, I hope, may be of some use in determining subdivisions and species. At present, nothing can be more inefficient than the characters of the species in Decandolle's 'Prodromus.'

conversion into the embryo. (TAB. XXI. fig. 9.) And this is I think its only anomaly, that is, comparing it with *Santalum*, and more especially with *Loranthus**.

In connexion with these details, I venture to remark on the following points:—

1. Solidity of the ovarium, and the appearance of the ovulum after fecun-

* My paper on *Viscum* appears, I am sorry to say, to have been generally misunderstood. In a letter dated April 1839, M. Decaisne states that the development of the ovula of *Viscum album* is like that I had described as occurring in *Loranthus*, and that the development of the same part in the Mergui *Viscum* appears identical with that of *Thesium*. In the translation of his memoir on Mistletoe, it is said that in that same species three ovula are detected in each cell on a central support.

These discrepancies are by no means confined to the ovulum; they extend to the fibrous covering of the seed.

It appears to me that the only similarity in our observations is to be found between *Santalum* and *Thesium*; for the whole of his observations on the female parts of *Viscum album* differ from those which I made on a tropical species of the same genus. Between M. Decaisne's inferences and my own there is little analogy; for while, according to him, *V. album* presents no anomaly in its ovulum beyond reduction to a nucleus, I was led to the conclusion that the anomalies, affecting this genus, at least as exemplified by the Mergui species, are of a more remarkable nature.

When I was occupied in 1834–35 by the structure of *Viscum*, the question of the nature of the part, which I called nipple-shaped process, had occurred to me, although in my account I did not enter into any detail regarding it. My assumption of its being rather analogous to a placenta was founded on the eccentricity of the sac, which I consider the sac of the embryo.

I knew of no instance in which the embryo sac had not a definite relation to the axis of the nucleus, or in which it arose from the surface of that body. I therefore described the part in question as a nipple-shaped process, avoiding, in the imperfect state of my knowledge, all speculation as to its nature. Although a good deal dismayed by my blunders regarding the solidity of the ovarium of *Loranthus*, I am still inclined to adhere to the other inferences therein contained: for although in the description of fig. 5. (by mistake 4.), TAB. X., vol. xviii., it is inadvertently stated that the ovulum is reduced to a nucleus, what I believe to be its true nature is elsewhere distinctly alluded to.

The structure of the Mergui *Viscum*, as there detailed, is an obvious approach to that of *Santalum*. And I should not be surprised, from my greater experience of *Santalum* and acquaintance with *Osyris*, if it be found to approach so closely as to differ in little except in the absence of a nucleus; the constant browning of the tissue of the placentæ along the line of the posterior extension of the embryonary sacs in those genera leading me to suspect that something of the same nature occurs in *Viscum*. The occurrence of two such dark lines with the development of only one sac still further points out the importance of studying every species of this genus: for this would seem to indicate the existence of the sacs or tubes in the placentæ prior to their exsertion; a fact of considerable importance, and one which, if established, would considerably modify my ideas of the nature of these particular placentæ.

dation, or rather, after the action of the pollen upon the stigmatic surfaces.

2. The reduction of an ovulum to the nucleus or to the embryonary sac.
3. The embryonary sac.
4. The origin of the embryo.

1. *Solidity of the Ovarium, &c.*

The only evidence in favour of the occurrence of a solid ovarium that remains uncontradicted is, so far as I know, that of M. Decaisne on *Viscum album*, and that derivable from some casual observations made by myself early in 1838 on a Himalayan species of the same genus; and the evidences in favour of the occasional appearance of the ovulum after the first parts of the process of fecundation have been accomplished, are drawn solely from my observations on the Mergui *Viscum*, and those of M. Decaisne on the European plant. For having erroneously stated the existence of so remarkable an anomaly in *Loranthus*, I cannot hope to escape censure on the grounds of the obscurity of the appearances; these, on the contrary, ought to have made me more than ordinarily careful in the manner and amount of investigation: for there is, perhaps, nothing more constant than the existence of a cavity in the pistillum, nor is its absence compatible *throughout* with the very general, and perhaps universal rule, regarding the composition of a pistillum from one or more involute carpellary leaves.

It is easy to conceive a pistillum without any very manifest cavity; for the space, which must exist from the disposition of its component parts, may be filled by an extension of the placentæ, or the margins of the laminæ of those component parts, and indeed by several other modes of extension of its inner surface. But the solidity which I so prematurely announced as existing in *Loranthus* was of a very different nature, and could not be reconciled to the idea of a pistillum, which I have been led to adopt. The anomalies of the mere pistillum of *Loranthus* I at present consider to be confined to the obscurity of the cavity, particularly as connected with obscurity of the placentæ. I have, however, seen in *Loranthus bicolor* appearances which lead me to suspect that much still remains to be observed, not only as regards the conical eminence from the fundus of the cavity, but as regards the true limits of the ovarium.

I have not been able to find any such ovarial cavity in the two species of *Viscum* I have lately examined; but my inquiries have not been made at a sufficiently early period, on which *Loranthus*, I think, shows so much depends. Further observations on *Viscum* will, I almost feel convinced, show that an obscure ovarial cavity similar to that of *Loranthus* exists: for in addition to the strong doubts that must arise from any apparent infraction of a general law, M. Schleiden has stated that in *Viscum album* there is a nucleus, and consequently an ovarial cavity.

The late appearance of the ovulum does not, I think, present so remarkable an anomaly as the solidity of the ovarium, unless it can be shown that the development of the ovulum results from the action of the pollen. For there are many instances, I think, of considerable irregularity in the degree of development of the ovulum at the period of expansion of the flower; and the rather later appearance of the ovula of *Loranthus* is, it appears to me, in exact accordance with the nature I have ventured to assign to them; the embryonary sac being the last part of the independent ovulum that is formed, not being evident, perhaps occasionally, until the action of the pollen on the stigma has taken place.

From M. Decaisne's description of the ovulum of *Viscum album*, which appears to agree tolerably well with that of an Himalayan species, it is, I think, evident that in the earlier stages of its development it may defy observation, since at one period it would seem to consist of nothing but a single cell, scarcely, if at all, distinguishable from the cells composing the surrounding cellular tissue.

The apparent determination of the development of the ovulum by fecundation, and the lapse of time mentioned by M. Decaisne as intervening between the two processes, appear to me very remarkable. The first would seem to infer the absence of any palpable pre-existing punctum on which the male influence is to be exercised. And if the development of the ovulum be really found to be the effect of the action of the pollen, it appears to me that considerable light will be thrown on those Acotyledonous plants, which, though apparently furnished with male organs, have no evident apparatus analogous to a pistillum; because, if the male influence of *Viscum album* be so exercised as to cause the development of the embryonary sac, followed by that of the seed from a cell of the parenchyma of a part of the ovarium, we need not be staggered by assuming that the male influence of *Anthoceros*, and possibly of Ferns, causes the development of the organs of reproduction from the parenchyma of the frond at a distance from the point to which the male influence is first applied. And this argument will, I think, be a good deal strengthened if the usually-adopted notions of an "*ovarium inferum*" be so explained by investigation as to refer the part of the ovarium of *Viscum*, in which the embryonary sac becomes developed, to the axis, which, I believe, is M. Schleiden's view of its nature.

The second, even if it be established as resulting from the excessively slow travelling of the end of the pollen tube, will tend to show that there need be nothing at all contemporaneous between the occurrence of fecundation, as shown by the stigmatic changes, and its results. And this, taken in conjunction with the fact that the ovulum of *Osyris* does not enter into the composition of the seed, and is unchanged by fecundation, may, I think, be legitimately made applicable to the explanation of the phenomena presented by Mosses subsequently to fecundation. I think also that it materially weakens the arguments which, in conformity with perhaps arbitrary notions of the necessity of immediate relations as to time in the fecundation of these plants, require the sexes to be sought for in the capsule*, and those which with more reason might have been urged from the ovulum itself suffering comparatively no change.

2. *Reduction of an Ovulum to the Nucleus.*

The non-development of either of the ordinary integuments of the ovulum, that is, the reduction of this to the nucleus, was, so far as I know, first observed by M. Adolphe Brongniart in *Thesium*; and this is the only point on which the observations of this distinguished botanist agree with the later ones of M. Decaisne†. This sort of reduction or suppression is now known not to be

* See Mr. Valentine "on the Development of the Theca and on the Sexes of Mosses," Linn. Trans. vol. xvii. p. 477.

† So different are these two accounts, both of which are illustrated, that it appears evident that two observers, having one and the same object *sub oculis*, may represent it in two very different, and indeed opposite manners, or that the sports of nature are not always confined to form. If this latter be the case, my ideas of structure will be almost as much shaken as my ideas of many of the usually adopted Orchideous generic forms have been by the celebrated variations of *Monacanthus*.

uncommon: it is usually, I believe, considered to be limited to antitropous ovula; but from the consideration of *Galium*, *Callipeltis* and *Osyris*, I am inclined to believe that changes in direction affect nucleary ovula similar to those affecting more complete ovula, so permanently established by M. Mirbel*. This suppression having first been made manifest in *Santalaceæ*, it naturally became a subject of consideration whether it did not exist in similar placentations of certain other natural families, of which *Olacineæ*, certain *Verbenaceæ* and *Avicennia* are marked examples. On this subject my direct observations are confined to *Congea*; and although these are incomplete, I am led to believe that there is not any connexion between this mode of placentation and this mode of suppression. It is curious, however, that the ovula of the above instances, so far as I am acquainted with them, simulate at the period of expansion of the flower in a sufficiently marked manner the ovula of *Santalaceæ*. Of the reduction of the same organ to the embryonary sac, I believe I was the first, and am the only advocate; my reasons will be found detailed in the following section.

3. *On the Embryonary Sac.*

There appears to be little definite about the sac of the embryo, either in period of development, situation or structure†; but ordinarily it may be recognized as the sac existing within the nucleus, and as that in which the embryo is developed. I know of no positive character that can be assigned to it; for I have reason to believe that in *Xanthium* a second sac is to be found; and to say nothing of it, *Osyris* shows that the embryo is occasionally developed outside it‡.

* M. Schleiden in his memoir "on the Organization of Phænogamous Plants," Lond. and Edinb. Phil. Mag., 1838, p. 185, appears to think that in *Santalaceæ* the ovulum is an "*ovulum anatropum*," and says that he had never met with an instance of reduction to a nucleus in any other modification of this organ, although he very justly observes, that there is no reason why such may not be the case.

† See Schleiden's Memoir, *op. cit.* p. 243.

‡ It has, I believe, been supposed by some, particularly by M. Brongniart, that the embryo of *Ceratophyllum* presents a similar anomaly. But I believe it will be found that in *Ceratophyllum* and certain *Naiades* the appearances are due to a particular development of the cells of the funicle or suspensor of the embryo, in conjunction with a great degree of tenuity of the sac itself and of rapidity in its development.

Very generally it is confined to the nucleus, and so far as I know, the first notice of its *continuous* exsertion was given in *Santalum*.

Various considerations induced me to pay considerable attention to the origin and subsequent relations of this sac in *Osyris* and *Santalum*, but I cannot say that the observations have appeared to me altogether satisfactory. I am inclined, however, to believe that in their earliest stages they do not differ from the ordinary fashion of sac; neither is the extension of a single cell a modification, so far as my experience goes, generally confined to albuminous seeds, nor its degree particularly remarkable; it is in the protrusion and extension backwards that the anomalies consist.

In *Osyris* none of the means at my disposal enabled me to detect the sac in the placenta before its presence in the ovulum was ascertainable; nor did I detect any such different degrees in its extension backwards as might have been expected.

In *Santalum* I believe the sac is developed from the interior of the nucleus, first in an anterior, subsequently in a posterior direction; and this, connected with its apparent limitation at a very early period to the nucleus, and the non-extension of the sacs of the ovula in *Osyris*, which are barren, point out, I think satisfactorily, that what I have called the nucleus is in reality the ovulum: otherwise it might have been, it appears to me, an open question whether the placenta itself was not the ovulum (analogous to those which contain more than one embryonary sac), to the nucleary forms of which it has considerable similarity in the cellularity of its apex. It must be confessed, however, that apparently formidable objections to this assumption would exist in the want of a common line or point of fecundation, and more importantly still, of correspondence in direction of the sac and supposed nucleus.

The extension backwards of this sac is also, I believe, now pointed out for the first time, unless the apparatus, to which M. Decaisne is said to attribute the function of a chalaza, be something of the same nature. It first passes upwards until it reaches the axis of the placenta, or nearly so; it is then deflexed: its presence appears always to be connected with a slight browning of the tissues, with which it is in contact: subsequently it reaches a considerable distance below the base of the placenta. In *Santalum* the extension, especially the placental portion, presents an irregular surface, and throughout, but most especially towards its termination, has a remarkable tendency to ramification. It is to be observed, also, that towards its point of growth it always seems to present minute molecular matter.

In *Osyris* this sac has presented to me uniform appearances, and is more satisfactorily observed from the extension backwards appearing to be generally confined to one ovulum.

In *Santalum*, whenever the protrusion is observed in the expanded flower, the extension backwards also presents itself. I have not observed any striking differences in length, size, &c., between those of the barren and fertile ovula. Its study is also obscured by its tendency to branching, which I have remarked within the nucleus itself; nor have appearances been altogether wanting to suggest to me the probability of the occasional union of two at least of the tubes into one.

In both genera the appearances of the protruded parts are uniform. Two striking exceptions were observed in *Santalum*, in which two tubular portions originated from one bulb; and in one case both were completely developed, suggesting the possibility, as is also pointed out by the posterior branching, that one embryonary sac may be so modified as to produce several comparatively independent embryos.

On the exact structure of the apex of the sac (in *Santalum*) in its mature state I have no direct observations to offer. I believe that the appearances are due to the presence of from 3 to 5 cells attached to the simple apex of the sac; but whether these cells are derived from the placenta, or whether they belong more properly to the sac itself, I am quite ignorant. The tendency to adhesion to the placenta, the appearance of these cellular teeth, and their not appearing to originate from the extreme apex, may perhaps be taken into consideration as arguing their placentary origin.

The contents of the sac in *Osyris* appeared to me minutely molecular, and to have agreed with the contents of the ends of the posterior extensions of *Santalum*. In *Santalum*, with similar minute molecular matter, granules of various sizes, often very large, occur, both being endowed with mobility. Iodine colours the mass of contents, before the application of the male influence, violet-blue; this is especially evident where there is any aggregation of granules, for there is even at this time a tendency to a fuscous colouring in the grumous matter. After fecundation has occurred the coagulum is coloured fuscous, the violet tinge occasionally, but not always, affecting such of the granules as have not disappeared.

The changes in the contents of the sacs consequent on fecundation are not marked in *Osyris*, or in that portion of the sac of *Santalum* below the septum. Above this, as I have mentioned, the first change consists in a sort of coagulation, which is very evident in those determined to be barren, in which they will be found to be changed into a grumous mass, in apposition above by a broad base with the free end of the vesicle, tapering thence into a flat, often undulated line, communicating with the vesicle and with the summit of the convex septum; the line of communication being often interrupted towards this point. To the broad part of this coagulum a few of the largest granules will generally be found adhering.

The coagulation is much less marked in the fertilized sacs, and is chiefly observable from a tendency to the aggregation of the grumous matter into masses, accompanied by the complete disappearance of the larger granules. This aggregation of grumous or minutely molecular matter seems to me to constitute the prelude to the appearance of cellularity. I have been particularly struck with it in following the development of the pollen of certain plants, with which the development of the cells of the young seed of *Santalum* would appear to present curious analogies. (Vide Tab. XVII. fig. 7.)

The cellularity is first manifest in the bulb above the septum, in which situation the nucleary aggregation is of earlier occurrence and more decided appearance. The strong tendency to the first appearance of the cellular tissue at the part alluded to, is shown by the occasional occurrence of a cellular bulb and an abortive tubular portion. The last direction in which it becomes evident is in the intermediate part of the tube, but there is perhaps some little variation in this respect.

It is in the appearance of the cellularity at such a comparatively great distance from the vesicle that one of the principal anomalies of *Santalum* appears to me to consist. On this singular point I can offer no explanation, the limits of the vesicle being distinct some time after the commencement of the cellularity of the bulb. I have not been able to ascertain any tendency to such elongation of the vesicle downwards as would enable me to refer the growth of the cells to it; neither would such an occurrence, perhaps, be consistent with the situation at which the embryo subsequently makes its appearance. In the barren sacs, appearances may often be seen of a sort of tubular communication between these remote points; but these are always partial, and always least evident close to the vesicle. This occurrence of the cellularity so remote from the end of the *boyau* is obviously analogous to what occurs in *Osyris,* if the situation of the embryo be kept in view, and perhaps may be taken into consideration in explanation of the origin of the first similar cellular tissue in that plant; and it appears to me to show that the sac in question is possessed, at least in certain instances, of higher functions than M. Schleiden seems disposed to allow.

Another remarkable anomaly in *Santalum* consists in the subsequent separation of the sac along the line of the septum, for such I believe to be the part at which the solution of continuity takes place. My observations on this point, and indeed as regards the actual structure of the bulb, when cellular, are by no means so decisive as I could have wished; this will be evident from inspection of the drawings. In general, appearances are perhaps in favour of the supposition of the formation of a globular cell from the septum, which cell forms the head of the lower part of the sac; if this is the case, it becomes completely identified with those parts of the septum from which it is supposed to originate.

This extraordinary separation is not the only manner in which a striking transition to the form of sac in *Osyris* is manifested; for the original tubular sac will at a certain, and not very late period, be found entirely incorporated with the cells, being divided into as many integral parts as there have been cells developed within it. This is remarkably different from what takes place in some other membranous embryo-sacs, in which, even in the ripe seed, the membrane continues to exist in its original entire state, forming a hyaline edge round the albumen.

At this period the similarity between *Santalum* and *Osyris* is highly remarkable, differing so much as they did in original structure; and were it not for the obvious continuity of the whole of the embryo-sac of *Santalum* at an earlier period, I should be tempted to consider the part above the septum to be of an intermediate nature, analogous to the process of the sac in *Cucurbitaceæ*, and more remotely to the processes of the stigmata of *Asclepiadeæ*.

Osyris, independently of the extension backwards of the sac, presents great anomalies in its functions, although, as will be seen, there is a tendency to the same in *Santalum*.

Embryo-sacs, whenever they exist, are generally supposed to contain the embryo, and it is in them that all the important changes consequent on fecundation take place. In *Osyris*, however, although the sac has direct relations with the *boyaux*, no penetration or inflection appears to occur; but the cellular growths are formed, or, as they appear to be, are deposited on its convex surface; and it undergoes no change, except, perhaps, a greater amount of protrusion, due, I think, to the disappearance of part of the nucleus, and a less amount of adhesion to the cellular mass. Elsewhere, whenever an embryo-sac exists, it enters into the composition at least partially, and very generally entirely, of the seed. In *Osyris* it does not appear to do so. *Osyris* is, I think, also very remarkable from the direction in which the embryo appears, which is *towards*, not, as in *Santalum* and *Loranthus*, *from* the pollen tube, and still more so in its apparent distance from the end of the pollen tube, when attached to the head of the embryo-sac.

Application of the *boyaux* is in *Santalum* of very general occurrence, but the fertilizing effects are almost invariably confined to one sac. So far as I have examined, there are no appreciable differences between the sacs before fecundation, or in the manner or degree of application of the *boyaux*: on this considerable stress may perhaps be laid, as it appears to me to be fatal to the hypothesis of M. Endlicher, who considers the moisture of the stigma as the fertilizing substance; to that of M. Schleiden, who attributes similar functions to the embryonary sac; and to that of M. Unger, who believes that the pollen grains, when they arrive on the stigma, are already fecundated*: all of which speculations truly deserve the name of hypotheses.

Although my numerous observations have had especial reference to the point, I have not been able to show by *direct* observations that the vesicle is the end of the pollen tube, but I have no doubt that this may be done. I rely on the evidence furnished me by my friend Mr. Grant as to the absolute

* Meyen's Report for 1839 on Physiol. Bot., Ann. and Mag. Nat. Hist., No. 43, May 1841.

engagement of the pollen tube between the cellular teeth of the apex of the sac; on the constantly associated presence of the vesicle with tubes adhering to the apex of the sac*; on the occasional indications of a direct passage between these; and on the changes the vesicle subsequently undergoes.

The appearance of this vesicle is almost always that of a rounded cell containing molecular matter, at first very mobile: very frequently a neck is obvious, which, however it may appear at first sight, always corresponds in direction with the opake line in the centre of the apex of the sac, and which is in my opinion the line of passage followed by the *boyaux*. The margins of this vesicle are almost always such as a simple sac would present; occasionally it has appeared to be lobed, and occasionally I have seen indications of another vesicle. Such appearances as these last I would endeavour to explain by supposing the penetration of two or even more *boyaux*, the application of more than one not being very uncommon.

The occasional appearances of inflection are such as would arise from the relations of a vesicle that has penetrated a grumous, often, as it appears, a bilobed mass, to that mass; and it was to explain those appearances, which are common, that I paid particular attention to the intimate structure of the apex of the sac before fecundation. And I beg distinctly to state that I have seen no appearances that would lead me to consider that the sac itself suffered any considerable or constant inflection before the *boyaux*.

The vesicle has appeared to me generally to remain unchanged until the nucleary aggregation of the molecular matter of the sac has reached to some extent; its free margin I have then found to present traces of internal division, first pointed out by nucleary aggregation, then by the shadowing out of as many cells as there are nuclei; the further changes it undergoes will be subsequently noticed.

In *Osyris* I was not able to detect any inflection or penetration of the sac of the embryo by the *boyau*. This seemed merely to expand upon the sac, occasionally causing indentations on its surface: indeed it appears to me that penetration would in this instance present an unexampled anomaly.

* To this I have only met with one exception, although I have examined some hundreds of sacs. Yet it would seem obvious that the *boyau* might be as liable to break off within the teeth of the apex of the sac as without.

It is probable that the curious form of embryo-sac, so conspicuous in *Santalum* and in *Osyris*, is of general occurrence in the natural family *Santalaceæ*. I find, on referring to notes made in 1836, that a sac resembling that of *Osyris* at its anterior, and that of *Santalum* at its posterior end, would appear to exist in a Santalaceous genus, probably allied to *Sphærocarya**.

On the functions of the anomalous extension backwards I am by no means inclined to advance any opinion. In establishing (or tending to do so) a direct communication between the young seed and the vascular supplies, as they diverge from the apex of the pedicel to their destinations, it may be considered as analogous to the raphe of an ordinary ovulum. In its structure, however, and more especially the direction of its development, it appears to be opposed to the usual form of raphe. It must also, I think, be remembered, that in *Loranthus*, in which the same necessity of communication may be assumed to exist, it does not appear to do so; and that instances are not, perhaps, uncommon of ovula of ordinary form having no vascular or tubular connexion with the vascular supplies. Neither must it be omitted, that in *Santalum*, at least, there would appear to be a want of communication between the ends of the extensions backwards and the vessels derived from the pedicel, and that those of the barren ovula are equally, or nearly so, developed with those of the fertile one.

It would appear that these functions, whatever in reality they may be, do not extend throughout the formation of the seed; for not only does the placenta seem to be torn up to a considerable extent from its original connexions, but the tissue around it becomes altogether broken and dried up.

From the consideration of *Santalum* and *Viscum*, I had been led to adopt the opinion that the embryonary sac was probably the only essential part of an ovulum. This opinion was formed on the apparent inutility of the nucleus of *Santalum*, so far as its later functions were concerned, on the apparent universality of existence of the embryo-sac, and on the structure of the Mergui *Viscum*†. And when I first examined the structure of *Loranthus bicolor*, I

* I would recommend the prolongation of a membranous tube from the base of the ovulum backwards as one test of the affinities of *Santalaceæ*.

† It is with reference to the determination of absolute *essentiality* that precise observations on the origin of the sacs of *Loranthus* and *Viscum* are so necessary. Analogy would lead me to suppose that some extent of nucleary base was indispensable.

was inclined to consider that a reduction of parts similar to that which constitutes in my opinion the second modification of *Viscum*, occurred in *Loranthus.* But the obvious continuation of the tubes or sacs high up the stigmatic canal seemed to present very obvious analogies with what is known of pollen tubes. Besides this, the growth of the great bulk of cellular tissue, constituting the first steps in the development of the embryo, could not be made to agree in direction or situation with the similar growths in any modification of this sac known to me. With the view of determining this point, I endeavoured in many instances to trace the tubes upwards to the stigma, and, if possible, to the pollen grains; but I did not succeed in tracing them more than half-way up the style, nor is this particular species well calculated to promise success from the length of the style.

Although I do not see any absolute theoretical objection to the attachment of an ovulum to any part of the stigmatic canal, the inner surface of which appears to me to have such direct relations with the placentæ; or to its being reduced to a simple membranous sac; yet the analogies were, I thought, in favour of the derivation of these tubes from the pollen grains. And yet, contradictory as it may seem, the arguments on which I founded this opinion were of a negative character, with the exception of that which regards the relation of an ovulum with the stigmatic canal, of which no instance was, I believed, known; for *Osyris* had rendered inapplicable a rule otherwise very general, and so far as I previously knew, perhaps universal, that when an embryonary sac exists, the embryo is developed within it.

I also adverted to the fact of the tubes not appearing to exist before the dehiscence of the anthers, and to their similarity in structure and appearance to *boyaux*. But the first point, otherwise of minor importance, is much weakened by *Viscum*, as detailed by M. Decaisne; and between that form of embryo-sac, which is derived from the extension of a single cell, and pollen tubes many things may be common. Both are membranous and extensible; both are generally the innermost membranes of their respective structure; and the contents of both appear to me to be much the same: and I need only allude to *Santalum* to point out the great similarity that may exist between a pollen tube and an embryo-sac. To these I added, that if they were embryo-sacs, there are grounds for supposing that to each sac there would be an embryo. I therefore inclined to the opinion, that in *Loranthus* there was nothing analogous to an ovulum, and that the cellular growths constituting the young albumen and young embryo took place from the ends of the pollen tubes themselves.

This view, which appeared in the 'Gardener's Chronicle,' No. 12, March 1841, p. 182, was not corroborated by subsequent observations, made first on *Loranthus globosus*, in which two of the greatest obscuring causes occurring in *Loranthus bicolor* do not exist; the embryo-sacs in the former being confined to the ovarium, and not appearing to be endowed with independent powers of growth. My present opinion regarding *Loranthus*, as exemplified by the two species I have endeavoured to illustrate, is, that its ovula are reduced to the simplest possible form which an ovulum can assume with reference to the present generally received opinions of this organ. They who follow M. Mirbel may imagine a simpler form still; but I believe that his quintine is the embryonary sac, or the fourth envelope of almost, and perhaps all, completely developed ovula. As, however, both M. Schleiden and M. Decaisne appear to consider the reduction as carried on to a minor extent, I shall mention the reasons which have induced me to adopt the opinion above stated.

Of the grounds on which M. Schleiden has based his opinion, that "the point of the nucleus (of *Loranthus*) is lengthened so as to assume the appearance of a style*," I regret I am ignorant, because this botanist has appeared to me, since the publication of his memoir "on the Development of the Organization in Phænogamous Plants," to be one of the greatest authorities on structural points.

With M. Decaisne's observations I am acquainted through the 'Comptes Rendus' of the Academy of Sciences of Paris, No. 6, Fevrier 11, 1839, and through a translation of his paper "on the Development of the Reproductive Organs of the Misletoe" in the 'Annals and Magazine of Natural History,' May 1841.

From not having found any opening in the ovulum, M. Decaisne comes to the conclusion that the ovulum of *Viscum album* is a naked nucleus, reduced to its simplest form,—a sac inclosing the embryo. As, however, M. Decaisne states previously a well-known fact, that an inner closed envelope is of general occurrence among ordinary ovula, it is evident, I think, that a simpler form

* These are, I believe, the words of M. Meyen in one of his Reports on the Progress of Physiological Botany, which I have not now by me.

than such an ovulum as he describes may exist, as appears to me to be pointed out by *Santalum* and *Thesium*. The nucleus of an ovulum is the part first formed: in the direction of its growth it obeys those laws that regulate all extensions of the axis, its apex being formed first, and once formed, always continuing to be the apex, and it is always as compound in its commencement as any direct extension of the axis is at its commencement. None of these conditions are fulfilled by the sacs in question; and in *Viscum album* the direction of growth appears to be quite reversed.

There are also two other circumstances, which, I think, are corroborative of my opinion, namely, the development of the albumen in the interior of the sacs of *Viscum* and *L. globosus*, and the absence of a sac surrounding the embryo; circumstances which, taken together, are, so far as I know, contrary to every analogy.

Considering, then, their late development, their structure, which is that of almost all albuminigerous embryo-sacs, and which is so unlike that of a nucleus, their similarity in the same respect to the embryonary sac of *Santalum*, *Thesium*, *Osyris**, &c., I have little doubt but that they are the analogues of ordinary embryo-sacs, although I am by no means certain, from not having seized on their first development, that the anomalies may not be so great as I have conjectured: for to each sac there may be a nucleary base, or indeed a common one; for I see no reason why exsertion should not occur in nuclei with several embryo-sacs as in those with only one.

With the exception of the structure of the sacs, and their perforation longitudinally by the pollen tubes, the sacs of the two species have not much in common; for while in *Loranthus globosus* they have not very extraordinary limits, in *L. bicolor* they are found a long way up the stigmatic canal; and while in the former species the albumen has its usual relations only partially interrupted, in *L. bicolor* these appear almost, if not quite, entirely destroyed; and what is very remarkable, the sacs have to a certain extent proper powers of productive growth. Cellular subdivisions likewise make their appearance in both species *above the albumen*; and consequently in *L. bicolor*, in the sac itself. I am unable to state whether these really enter into the composition of

* The sacs of *Viscum album* appear to disagree remarkably in not being simple extensions of a simple cell.

the albumen: if they do, it would appear to be, at least in *L. bicolor*, to an inconsiderable extent.

The relations between the pollen tubes and these sacs in both species appear to me very singular. In the first place, the point of entrance is in *L. bicolor* not always single or in the centre; in the second, the tubes have appeared almost invariably to be two; in the third they do not undergo the ordinary changes until they appear to have reached or passed beyond the posterior ends of the sacs. On these singular points my limited experience can bring nothing to bear.

4. *Origin of the Embryo.*

The first process in the development of the seed, subsequently to the penetration or application of the *boyau* to the embryo-sac, would in *Santalum*, *Osyris*, *Loranthus* and *Viscum* appear to consist of the formation of cellular tissue. This may be applied, I believe, to most if not to all instances. This cellular tissue appears to have two different origins; one, and this is the earliest in development, being perhaps referable to the embryo-sac, while the other appears directly referable to the anterior ends of the pollen tubes. The amount of both these tissues may vary considerably; and it may probably be found that whenever the first is developed in any quantity, the subsequent presence, or rather, perhaps, permanence, of albumen is determined*: the second may be limited to one or to a few cells, forming the funicle or "suspensor" of the embryonic mass; or it may be developed to a great extent, as in *Loranthus globosus* and certain Gymnospermous plants; or, as *Viscum* would seem to intimate, the pollinic vesicle or anterior end of the pollen tube may develope within its interior the proper tissues of the embryo.

In no instance, perhaps, where the embryo is developed from the ends of the pollen tubes, does it become developed so immediately that no cells intervene between it and the end of the pollen tube; this is particularly evident during the earlier stages of development.

That part of the embryo in which the condensed tissues occur, and which, from its appearance and frequent tendency to constriction round its base, I

* *Santalum* and *Loranthus*, but especially *L. bicolor*, seem to me to indicate that the albumen is probably derived from the embryo-sac, which would thus appear to be, at least in some measure, a potential organ.

at first suspected was the only part of the embryo (the rest being then funiculus), corresponds, I think, in situation with the *collet*; it is very evidently not the point of the radicle, for this will subsequently be found so close to the vesicle as to authorize me in assuming that the greater part of the soft cellular tissues becomes the body of the root.

Up to the appearance of the very original memoir of M. Schleiden "on the Development of the Organization in Phænogamous Plants," with which I am acquainted through a translation in the 'London and Edinburgh Philosophical Magazine' for 1838, our knowledge of the origin of the embryo was by no means definite. My own acquaintance with the subject did not extend beyond the penetration of the nucleus by the pollen tube or tubes to a considerable depth in many instances. So far as I can understand the translation, it would appear that the growth of the embryo must take place from the inflected end of the embryo-sac. But this certainly does not agree with a subsequent passage, which I have elsewhere quoted, relative to the entrance of the pollen tube into the sac of the embryo, and the gradual conversion of its end directly into the embryo. Nor does it agree with the plates, which correspond with the passage just referred to and with my observations on *Santalum*, and agree well with those on *Loranthus*.

If M. Schleiden is of opinion that in general the *boyau* penetrates into the embryonary sac, and that the embryo is derived from its intruded extremity, as indeed he has delineated it, *Santalum* and *Loranthus* become strong corroborations of so grand a doctrine, and *Osyris* an exception confirmative of the rule.

But none of my observations have tended to confirm his idea of the inflection of the embryo-sac before the pollen tube; and it appears to me sufficiently obvious, that if such were the case, the cylindrical bag constituting the "*embryo in its first stage of development*" would consist of three membranes or layers: viz. the first or outer, of the ordinary and uninflected membrane of the sac; the second, of its inflected portion; the third, of that of the pollen tube itself. It is also worthy of attention that M. Schleiden makes no mention of the ultimate fate of the inflected portion, which in his illustrations is only represented as partial, and precisely such as might be expected to occur during the *gradual*?? intrusion of a membranous tube into a membranous or membrano-cellular sac.

M. Schleiden assumes the applicability of his conclusions, drawn from direct observation in several plants, to all others in which direct observation is more difficult, on three distinct grounds; the first of which, regarding the diameter of the tube outside the sac and just within it, is, I cannot but think, of very minor importance, neither does it present itself in *Santalum*: the second, which would confine certain peculiar contents to the pollen tube, appears to me contradicted by *Santalum* and *Loranthus*; and the third, which positively refers plurality of embryos to a plurality of pollen tubes, is contradicted in a most marked manner by *Loranthus*.

I am unacquainted with any other observations on this most interesting point, except those of M. Mirbel, which were, in France, I have reason to believe, considered to carry a signal refutation of the views of M. Schleiden, but which certainly have not convinced me; and I cannot help imbibing the belief that the primordial utricle of M. Mirbel and M. Spach is the sac of the embryo, which no doubt often, and perhaps generally, exists before fecundation.

M. Mirbel has thus summed up the conclusions arrived at by M. Schleiden regarding the relations of the *boyau* and the sac of the embryo; and I quote it to show, that he has put on it a construction similar to that which I have previously ventured to do:—"Quand la cavité ovoide s'est accrue et en même temps le sac embryonnaire qui la tapisse, le boyau issu des grains du pollen pénètre jusqu'au sommet du nucelle, pousse en avant la paroi du sac embryonnaire, qui çède à sa pression, et forme un cæcum dans lequel il loge son extrémité antérieure.

"La partie du boyau pollinique logée dans le cæcum se renfle en massue et produit, dans sa cavité, un tissu utriculaire qui la remplit et se moule sur elle; tandis que la partie postérieure de ce même boyau reste en dehors sous sa forme primitive de tube membraneux. Cette partie ne tardera pas à disparaître; l'autre, métamorphosée en embryon, commencera une nouvelle génération*."

To that which regards the inflection of the sac of the embryo before the pollen tube I at least attach considerable importance, because it appears to me to weaken if possible the great merit of M. Schleiden's observations, and to

* Comptes Rendus, No. 12, March 25, 1839.

give my own a better claim perhaps to notice. With the exception of this, and such part of my own observations as would refer the embryo, for the greater part, or perhaps entirely, to a growth *from* the ends of the pollen tubes, except in *Viscum*, I cannot but hope that these present observations will be considered to be striking corroborations of the general views of M. Schleiden. Of M. Wydler's observations I have no knowledge but that very lately derived from an able summary by Dr. Giraud of the recent doctrines of vegetable embryology in the 'Annals of Natural History,' No. 31, June 1840, and which therein only go so far as to establish the points of non-inflection of the sac, and of the entrance of the pollen tubes into it. On the general subject of the vegetable ovulum I hope to enter into detail as soon as the proper opportunities offer, not so much in the hope of producing anything new on a subject on which Mr. R. Brown, and MM. Schleiden, Mirbel and Brongniart have been engaged, but to extend the application of the facts established by them to plants out of the reach of European *savans*.

The growth of a tissue from the ends of the pollen tubes, from which tissue the embryo of *Loranthus* is directly formed, appears to me to open to view glimpses of the most beautiful analogies.

In the sporula, so called, of the more developed Acotyledonous plants, we have organs consisting of two envelopes; the inner of which contains granular matter, has remarkable powers of growth, and, so far as function is concerned, appears to be alone essential. The proper stimulus calls this membrane into growth, and from the apex of its extension cells are developed; from these others again are produced; and from the centre of the mass thus formed, originates at a certain period the growth of the true axis.

Similar phænomena take place in the formation of the seed of Phænogamous plants, with this difference, that the albumen, unlike perhaps the *thallus** of the Acotyledonous plant, is not a direct growth from the pollen tube. Such other differences as appear to exist are of minor importance; they consist in the different nature of the stimulus calling forth the extension of the inner membrane, in the condensation of the growths forming the seed, which may be reasonably inferred to arise from the confined situation in which they

* Am I right in the use of the term thallus? by which I mean, the confervoid mass first formed in the germination of Acotyledonous plants, such, for instance, as *Equisetum*.

occur, and in the cells composing them containing fecula, not green globules, also apparently a consequence of the confinement alluded to. The functions of the intermediate growths are in both precisely the same, viz. that of nourishing the young axis until it is sufficiently matured to enable it to maintain an independent existence.

The germination of such Acotyledonous plants appears therefore to me to be analogous to the development of the seed of Cotyledonous plants*, and the perfect state of the lower is analogous to the imperfect state of the higher organization. And to a similar observance of the phases of development I am tempted to attribute the prevalence of albumen in Monocotyledonous plants, although this is apparently strongly contradicted by the occurrence of the most exalbuminous and perfect Monocotyledonous embryos in the least organized plants of the class, and perhaps equally so by its prevalence in the monopetalous division of Dicotyledons.

The analogy between the spore and the grain of pollen has long been remarked; and its extended application to the processes, constituting germination in the one instance, and the formation of the seed in the other, was given by Mr. Valentine in 1833†. I think I am correct in naming it analogy rather than affinity, from considerations derived both from development and functional powers. For the spore of these particular or more developed Acotyledons is not produced by a comparatively simple process as the pollen of Cotyledonous plants is, but is the result of a process as complicated, if not more so, than the development of the seed, and, in addition, presents in its first stages very curious similarities with the development of a true ovulum. Both agree in being set in action by the agency of a comparatively simple structure; but the early complication of the process in the higher Acotyledonous plants would at once lead me to suspect that the organs alluded to are not strictly similar; for the earlier we proceed in our investigations, the more marked should be the resemblance, and the more simple both structure and function. The powers of growth in the two are remarkably contrasted, and

* The confervoid growths of Acotyledones, which I thus speculate to be analogous to the albumen of Cotyledones, may be, for aught I know, considered by others to be analogous to their cotyledons; but their irregularity of growth appears to me an objection to this view.

† Linn. Trans. vol. xvii. p. 480, last parag.

will be still more so, if the albumen be ultimately found to be derived from the female.

M. Schleiden, on the contrary, is of opinion, that between the spore and the embryo there is an affinity amounting to fundamental unity; and Mr. Valentine not only holds the same opinion, but, overlooking the obvious difficulties to which M. Schleiden has adverted as presented by some of the higher Cryptogamic families, denies to these plants *entirely* a provision similar to that of the pistillum of Phanerogams*.

In the present state of our knowledge, I should be extremely unwilling to

* The question of the sexuality of Acotyledonous plants is so intimately connected with the subject of vegetable embryology, that I trust I shall be pardoned for hazarding a few observations derived from personal experience: it is a question which the hypothesis of M. Schleiden necessitates him, as it were, to disbelieve.

The more developed Acotyledonous plants, which I take to be *Filices*, *Lycopodineæ*, *Isoetes*, *Marsilea*, *Salvinia*, *Azolla*, *Hepaticæ* and *Musci*, appear to me to present two very distinct types of organization, at least as regards the female organ. In one type there is an evident pistillum containing an ovulum, and this appears to be generally connected with limited development of the organs of vegetation. In the other there is no evident pistillum, nor any palpable point on which analogy would indicate that the male influence would be exerted. That type is also remarkable for the development of the organs of vegetation.

In *Musci*, the evidence of the mutual action of the sexes appears to me very satisfactory; the usual discoloration of the stigma and canal of the style is distinctly observable, and is followed by changes, confined, however, to change of situation, affecting the cell pre-existing in the cavity of the ovarium, and which is analogous to a Phænogamous ovulum. In *Hepaticæ*, particularly the vaginulate species, the circumstances would appear to be the same: and in the evaginulate ones, and perhaps also in *Riccia*, still nearer approaches are made by the changes which the pre-existing cell undergoes to the ovulum of Phænogamous plants.

In the *Azolla* I have examined, which is the only other plant which appears to me pistilligerous, for I have no knowledge of the development of *Salvinia*, the pistilla in each involucre are two, and both present the appearance so generally characteristic of fertilization. The changes subsequent to this are however very different, giving rise in one pistillum to the supposed male, in the other, to a series of sporules derived from the characteristic dividing process.

On *Lycopodineæ* I have no observations, and on *Filices* merely a few surmises to offer. I believe that every species will be found to present a male apparatus, which, I think, was first pointed out by the great Hedwig, and subsequently by M. Link. I have lately alluded to it without having any previous knowledge of the labours of the two above-mentioned botanists. The fertilization of Ferns I believe to be interpreted by *Anthoceros*, provided my observations on that genus be found to be correct. The only difficulty exists in the anthers not appearing, in some cases at least, to dehisce; but I beseech botanists not to cast away the opinion of the very important nature of these bodies on a solitary objection; they will remember that until very lately an absorptive process was generally adopted to adopt the curious conclusions of M. Schleiden regarding the ordinary opinions of the distinction of sexes. Neither do I conceive that those opinions can be legitimately derived, until, *at least*, the total absence of an ovulum shall have been ascertained. The female organ is still the organ of gestation, if we assign the very lowest degree of value to it, which even the instance of *Viscum album*, as explained by M. Decaisne, does not at present authorize us to do. And this would still have been the case, even though my first version of the phænomena of *Loranthus bicolor* had proved to be correct. Neither am I at all willing to imagine that the analogies between the animal and vegetable

explain the fecundation of *Asclepiadeæ* and *Orchideæ*, and even adhered to, when a beautiful train of reasoning and observation had reconciled them, in all the essential points, to the ordinary plan[1].

With regard to *Marsilea*, I have to remark that the observations of M. Fabre, as given by M. Dunal (Ann. Sc. Nat., N. S., t. vii. p, 221), scarcely agree in one particular with some observations on a *Marsilea*, I believe *M. quadrifolia*, made by myself at Bamo on the Irrawaddi in 1837. In the species I then examined I found the organs to be of two distinct kinds, attached to the veins of the involucre. Of these two kinds, one only is subsequently subjected to the usual ternary or quaternary division, from which result bodies altogether similar to the acknowledged spore of other Acotyledonous families. The other body has no analogy in my opinion to the acotyledonous form of anther. In *M. Fabrei*, however, the females have been represented as having curious analogical resemblances to the Phænogamic pistillum; and what is, perhaps, more extraordinary, the anthers are said to be simple sacs containing granules and molecules, and apparently are similar to the pollen of certain *Naïades*, *Balanophoreæ*, *Rafflesiaceæ*, &c.

In *Isoetes* the males of authors are nothing but modifications of the spore; and in *I. capsularis*, Roxb., they seem to be merely temporary modifications. They have, in fact, so precisely a common development, that it is scarcely allowable to allot to them the performance of such opposite functions as those usually attributed to them. The true male may, perhaps, be found in the cordiform, fleshy lamina above the receptacle of the spores, from which it is separated by a lamina perhaps analogous to the indusium.

The transition between the two types exists in *Anthoceros*, which in the development of its anthers

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[1] Nothing has been more detrimental than the writings of those "mere theoretical botanists," who have advocated asexuality, as if it were the usual plan of Nature, and who have indignantly remonstrated against those who have attempted to reconcile glaring inconsistencies. What has been the consequence? Instances of each of the higher Acotyledonous orders exist within the limits of Europe, but any precise and comprehensive knowledge of them can scarcely be said to be within the limits of its natural science. With the exception of Mosses, *Hepaticæ* and *Pilulariæ*, nothing is absolutely known of the real structure of these particular plants. And nothing can be more mischievous than the adoption of such terms regarding these plants as *Antheridia* and *Sporangium*; they have answered their purpose of checking inquiry, by making believe that they are absolute or non-analogous organs.

kingdoms, so far as regards composition, growth and nature of the axis, and reproduction, will be found so inconstant, indistinct and uninstructive, as to merit the appellation of being "lame*," or to be considered as causes of embarrassment.

It follows from the consideration of *Santalum* and *Viscum*, and still more so from that of *Osyris* and *Loranthus*, that the expression of the law regulating the relation of the radicle of the embryo to the parts of the seed, and more especially to the apex of the nucleus, must undergo considerable modification. For in *Santalum* it is evident that the radicle points from, and not towards the apex of the nucleus; and this organ is, I think, at any rate not practically appreciable in *Viscum*. *Osyris* shows that the expression of the law cannot

and habits has much in common with the pistilligerous type. In this genus the male influence is first exerted on the surface of the frond, and thence is extended through the upper parenchyma to that part of the substance of the frond from which the reproductive organ is to originate. So far as I know, nothing like a pistillum appears to exist: and though there is a calyptra, it has nothing, except situation, in common with the calyptra of *Musci* and *Hepaticæ*, being only that portion of the parenchyma between the surface of the frond and the spot whence the young reproductive organ has originated[1].

I take it to be a valuable example, inasmuch as it shows, if my explanation be correct, that the male may not only act successfully without a pistillum or any similar co-existing body, but that it may act mediately. Consequently, Ferns are easily, and I think fairly, explainable, provided the glandular hairs are allowed to be the males. And in what do they differ from the anthers of certain *Musci* and *Hepaticæ*, or from the anthers of Phænogamous plants, when they are cellular, undivided bodies, containing grumous molecular matter? In regard to points like these, most botanists have, like some zoologists, pitched upon one standard of organization, and that at the wrong end of the scale. But those who look for a smaller degree of complication in low organizations, or for a greater degree of reduction to the elementary substances, will, I think, not only admit that the anthers of all the above families, so far as they have been well observed, have a marked correspondence with, but that they are also analogous to, very young anthers of Phanerogamous plants. I might ask, what have they in common with *gemmæ*? is the structure of a *gemma* compatible with a cellular sac containing a grumous matter? is the function of a *gemma* more compatible with such a sac, often inclosed in a cavity in the frond, from which it does not escape, and in which they are, *functi officiis*, to be found in the shape of withered empty sacs?

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[1] I advance this with some hesitation, as *Anthoceros* is, I believe, generally considered to be calyptrate. My own observations, which were only casual, were made in Assam early in 1836, and since then I have had no opportunity of revising them. From what I then noted, I think few plants would better repay the minutest investigation.

* Vide Schleiden's 'Memoir,' *op. cit.* p. 245, middle parag.

be made to refer even to the apex of the embryonary sac: and in *Loranthus*, if my explanation be correct, it is at once obvious that the radicle can have no primary relations to the ovulum, and, indeed, no secondary ones to those parts of the seed from which have been derived the expressions regarding its direction. To include all these anomalies, the wording of the law must perhaps be made to refer to the pollen tube.

I now pass to a recapitulation or summary of my ideas of the structure of *Santalum, Osyris, Loranthus* and *Viscum.*

In *Santalum* the ovulum consists of a nucleus and an embryonary sac, prolonged beyond both the apex and base of the nucleus: the albumen and embryo are developed in the part above the septum, the part below and the nucleus remaining unchanged. The embryo is developed from the pollinic vesicle. The seed has no actual proper covering, and no other theoretical covering than the incorporated upper separable part of the embryo-sac.

In *Osyris* the ovulum is reduced to a nucleus and an embryonary sac, which is prolonged in the same directions as *Santalum*, but not to such a degree beyond the apex of the nucleus. The seed is formed outside the embryo-sac, and is absolutely without proper tegument, or whatever covering it may have did not enter into the composition of the ovulum. The embryo appears to be developed at some distance from the anterior end of the pollen tube.

In *Viscum* the modifications appear to me to be two: in the one, an evident cavity exists in the ovarium; and the ovulum appears to be reduced to an embryonary sac hanging from one side of the base of a nipple-shaped or conical placenta; in the other, the ovulum is reduced to an embryonary sac, but this is erect, and has no such obviously distinct point of origin as in the first. In both, the albumen has no other proper covering than the incorporated embryonary sac; and, at least in the last, the embryo appears to be a direct transformation of the pollinic vesicle.

In *Loranthus*, each ovulum appears to be reduced to an embryonary sac; the albumen is developed either partly within the sac, or entirely, or almost entirely, without it. The embryo is a growth from the ends of the continuations of the pollen tubes *outside the anterior ends of the embryo-sacs*; and is, in one modification, exemplified by *L. globosus*, up to a certain period exterior even to the albumen. In *L. bicolor* the albumen has no proper tegument:

in *L. globosus* it may be supposed to have a partial one in the incorporated albuminous part of the embryo-sac.

The gradation of structure appears to me to be tolerably complete. One modification of *Viscum*, in my opinion, tends to show, that in *Santalum* the first steps towards the disappearance of the usual nucleus take place; *Osyris* seems to me to indicate that a similar tendency may affect the embryonary sac; and *Santalum* appears to me to allude to a reduction in the embryo-sac to the form of that of *Osyris*. Nor is this all: *Osyris* has its albumen and embryo developed outside that end of the sac to which the pollen tubes are applied; *Loranthus bicolor* has the same developed outside the opposite end of the sac; and the partial development of the albumen in the embryo-sac of *Loranthus globosus* may perhaps be a passage to its development outside that sac in *L. bicolor*.

The novel points of structure and development indicated in this paper are, so far as I know, the possibility of the separation of a continuous membranous embryo-sac into two distinct parts, of which the lower remains unchanged, though it would almost appear from *Osyris* to be the most permanent; the presence of the embryo-sac not being necessarily connected with its forming one of the constituent parts of the young or of the mature seed; the longitudinal percursion of the embryo-sac by the pollen tubes; the formation of the albumen, either only partially within the embryo-sac, or almost entirely, if not quite so, *without* it; the confluence of the albumina of several sacs into one albumen; the growth of the embryonic tissues from the continuations of the pollen tubes outside the embryo-sac; the possibility of one embryo resulting from a combination of several pollen tubes, and of its becoming interior to the albumen, although it may have been for some time entirely exterior to it. I make no mention of the posterior prolongations of the sacs, in doubt of the true nature or origin of the so-called chalazal apparatus of *Thesium*; or of the growth of the embryonic tissues from the ends of the pollen tubes, in doubt of my having misunderstood the observations of M. Schleiden, and in ignorance of those of M. Wydler.

To the observations on *Santalum* it may be objected, that the continuity of the vesicle within the apex of the embryo-sac with the tube adhering to its apex, and of the tube with the interior membrane of the pollen grain.

has not been shown; that the identity of the vesicle with the uppermost less cellular part of the whole mass of the embryo has not been ascertained; and further, that the frequent appearance of this as having on separation an entire margin, is an objection to its having been derived from the pollen tube.

To put beyond doubt these objections, and many others that will of course *generally* suggest themselves, would exceed my ability. I am satisfied if the results are considered to be not altogether unreasonably arrived at, and if they are found to agree with the aggregate results of others' experience.

In no instance has the structural investigation of any particular plant been pushed so far as to leave nothing to be desired by the observer, or to be observed by others. Actual observation of all the minuter points of structure is scarcely to be expected in any plant, for the advantages it may present in some respects will probably be counterbalanced by disadvantages affecting others; so that our knowledge of structure is more derived from numerous incomplete, than from a few complete observations.

Although few plants can be supposed to present such facilities for observing the circumstances attending the establishment of direct relations between the embryonary sac and the end of the pollen tube, the opacity and, so to say, the callosity of the apex of that sac present positive disadvantages. And the subsequent cellularity of the sac reduces again the facility of determining the identity of the original vesicle, and the upper less cellular parts of the embryonic mass.

From such experience as I have been able to collect, I have derived a conviction that, whenever filaments, *such as pollen tubes are known to be*, are found in the canal of the style *only after* obvious action of the pollen upon the stigmatic surface, and that these are traceable downwards directly into the ovula, it is legitimately assumable that those filaments are pollen tubes; and I proceed on this assumption to observe the consequences, as if I had actually ascertained the continuity of the filament with the inner membrane of the pollen grain.

With regard to the identity of the vesicle with the uppermost less cellular part of the mass of the embryo, I believe that few persons would have examined a numerous series of fecundated ovula without coming to the conclusion which I have ventured to advance; it occupies the situation that the vesicle did, and the circumstances I have detailed regarding it are not, I think, inconsonant with analogy.

The objection deducible from some parts appearing, when separated, to present an entire edge, may be waived on the score of the minuteness of the observation which would relate to a cicatrix or scar of separation of an undilated part of the pollen tube. Besides, I would be by no means disposed to deny that a plant may have the power of closing up such a solution of continuity, as must be admitted to have occurred, if my opinion of the origin of this vesicle be correct.

So far as the other instances which I have endeavoured to illustrate are concerned, more exact inquiries are very necessary, particularly as regards the origin of the albumen in *Osyris* and the relations of its young embryo to the pollen tubes. As regards *Loranthus*, further observations are required on the state of the pollen tubes intermediately between their penetration into the sac and continuation beyond it: on the state of the embryo-sacs at the time the pollen tubes are continued beyond them: on the degree to which the embryo-sacs of *L. bicolor* may develope albumen in their interior, and those of *L. globosus* above that part of the sac in which the albumen first makes its appearance. Lastly, as regards *Viscum*, especial inquiry is requisite concerning the origin of the ovulum—this holds good equally with those of *Loranthus*—and the direct conversion of the pollinic vesicle into the embryo.

The materials for all these, excepting *Santalum* itself, perhaps, exist in the immediate neighbourhood of Malacca.

Malacca, March 28, 1842.

EXPLANATION OF THE PLATES.

[The figures given in the five plates accompanying Mr. Griffith's Memoir have been selected from a very extensive series of drawings forwarded by him from Malacca, as those which appeared best calculated to illustrate the structure of the plants examined, and the views entertained by the author regarding them.]

In the following explanation of the plates I have to observe that no measurements have been given, because I found considerable variety in the state of the fruit, belonging, if size only were consulted, to one period. I have endeavoured to represent the development throughout, so as to give an intelligible idea of the phænomena with which it is accompanied. The dotted lines visible in several of the sketches exhibit what I conceive to be the situation of parts removed from direct vision, and supplied by actual dissection: so that these sketches approach partly to the nature of *plans*. As such I submit them with great deference; for however easy a tolerably accurate delineation of what is under the eye may be, the sources of error are much increased when minute internal parts are filled up from the ideas of their relative situation derived from dissection.

Tab. XVII.

Santalum album.

Fig. 1. Apex of an embryonary sac, of its perfect form; showing the apex to be apparently divided, with fissures between the divisions, which look (in this one instance) as if they originated from the membrane of the sac itself. The grumous nature and division of the contents of the upper part of the sac, and the grumo-molecular nature of that below, are distinctly seen.

Fig. 2. Apex of another sac, intended to show (at *a, a, a*) the limits of the originally simple sac.

Fig. 3. Placenta halved irregularly, from a fully-expanded flower. Generally there is no difference in length between the posterior extensions at this period.

Fig. 4. Apex of an embryonary sac. The tube, near its broken edge, looks as if incrusted with patches of grumous matter; these are the aggregations of the grumous granular matter, and form the prelude to the subsequent cellularity.

Fig. 5. Bulb of a more developed sac. *a.* The septum, which is invariably formed both in barren and fertilized sacs. *b.* Indications of another cell or septum of excessive tenuity.

Fig. 6. Apex of a sac, seen with an object-glass of $\frac{1}{4}$ of an inch focal distance. One of the clearest instances of continuity of vesicle and pollen tube.

Fig. 7. Ovulum, a little after fecundation. The hemispherical part of the bulb is now cellular; nucleary aggregation is distinct at both ends of the tubular portion. The vesicle in this instance was empty. The place of future separation seen at *a, a.*

Fig. 8. Placenta, with two fertilized ovula, one a good deal less advanced than the other. The course of the posterior extensions is traced out.

Fig. 9. Whole of the embryonary sac above the bulb. The cellularity of the vesicle is commencing by the usual nucleary aggregation, and its lower part appears as if cut off from the upper. This is, I think, the usual appearance. The pollen tube is still seen in adhesion.

Fig. 10. Apex of an ovulum, or young seed, more advanced. *a.* Vesicle. *b.* Lax embryonic tissue. *c.* Condensed apex of ditto.

Fig. 11. Embryo of the same detached. The upper portion of the vesicle is undivided; this is almost always the case. The letters have the same references as in fig. 10.

Fig. 12. Longitudinal section of young fruit.

Fig. 13. The entire embryonary sac, of this period, dissected from its surrounding tissues, with the exception of the apex of the nucleus.

TAB. XVIII.

Osyris Nepalensis.

Fig. 1. A longitudinal section of the flower, before expansion. *a.* The part which may be supposed to be derived from the adhering integuments of the flower. *b.* The part which I suppose to correspond to the ovarium. *c.* The placenta. *d, d.* Two ovula. *e.* The stigmata.

Fig. 2. The placenta of the same, detached. The ovulum to the right is somewhat displaced.

Fig. 3. Ovulum, during the expansion of the flower. *a.* Nucleus. *b.* Protruded mammilla of embryonary sac. *c, c.* Included portion of ditto. It does not appear to be prolonged downwards.

Fig. 4. Placenta, after impregnation, but before any considerable sphacelation of stigmata. One of the pollen tubes is accidentally ruptured; the other is seen in contact with the protruded apex of the embryonary sac. The dotted line *a, a, a, a,* is intended to show the course of the embryonary sac for some distance beyond the base of the placenta.

Fig. 5. Upper half of one of the ovula, intended to show the relation between the pollen tube and the apex of the embryonary sac. *a, a.* Apex of nucleus. *b.* Protruded end of embryonary sac.

Fig. 6. Placenta, about the period of the fall of the perianthium, detached.

Fig. 7. Ovulum from the same. *a.* Nucleus. *b.* Cellular growth on the protruded apex of the sac; to it a short filament is seen adhering, and in it are seen angular grumous bodies of considerable size. *c.* Part of the embryonary sac.

Fig. 8. A similar ovulum. The dotted line indicates the course of the embryonary sac.

Fig. 9. The apex of an embryonary sac and the cellular growth, from an ovulum of the same period, under pressure. It now appears as if the cells were confined to the margins of the tube. The embryonary sac is separable from the cells even at this stage. The cells are crowded with molecular matter, as is the case in all new cellular growths with which I am familiar.

Fig. 10. Portion of the placenta of a young fruit, with ovulum and young seed. The dotted line represents the course of the embryonary sac.

Fig. 11. Embryo.

Fig. 12. Longitudinal section of a fruit considerably advanced. *a*. Tegumentary tissue. *b*. Circumference of ovarium, now commencing to be indurated. *c*. Loose inner tissue, most dislocated round the seed and placenta. *d*. Communicating canal, still visible. *e*. Placenta and its stalk. *f*. Cellular mass, in which albumen is now deposited. *g*. Embryo.

Tab. XIX.

Loranthus globosus.

Fig. 1. Longitudinal section of an ovarium, $1\frac{1}{4}$ line long. The central tissue of the ovarium, which is (or ought to be) more transparent than the rest, is seen to be occupied by three sacs, the course of which is pointed out (especially in the upper $\frac{2}{3}$rds) by a profusion of granules. The sacs at this period are scarcely separable, nor is their membrane at all distinct: along their lines iodine causes a strong tinge of violet. The sacs extend up into the epigynous disc; some at this period even reaching pretty closely to the base of the style. The dense coniform base of the central tissue, which subsequently effects such changes in the situation of the embryo, now exists.

Fig. 2. Upper end of an embryonary sac, soon after the fall of the perianthium. Owing to the presence of grumous bodies in the apices of the sacs, I never traced the absolute continuity of the inclosed filaments with those projecting from their apices.

Fig. 3. Lower half of an embryonary sac at rather a later period. The limits of the sac are always difficult to ascertain, as there appears to be a tissue formed from their ends. In this instance the limit of the sac is perhaps at *a*, and that of the tissue subsequently formed at *b*. The more condensed tissues of the embryo have made their appearance at *c*.

Fig. 4. From a later period. Three sacs are seen, dissected out of the ovarium: that on the right hand has not been fertilized, and *remains unchanged*; within the others, one of which is broken, albumen is seen to be developed at *a*, *a*; and the albumina

are shown to be percursed by the pollen tubes. These passing out from the albumen at *b, b,* inclosed, as it were, in a cellular case, become confluent at *c,* and then form the funicle of the embryonic tissue, *d.* The green hook visible above this shows, I think, a tendency to the formation of a second embryo.

Fig. 5. A mass of albumen and embryo removed out of the ovarium of a young fruit $2\frac{1}{2}$ lines in length. The embryo is seen to project beyond the lower edge of the albumen.

Fig. 6. Longitudinal bisection of a young fruit, rather more advanced. The mass of albumen is seen to be hollow, the cavity being occupied by the embryo and its twisted funicle, the point of attachment of which to the embryo is shown at *a, a.* The dense obconical base at this period is nearly inclosed in the albumen (although this is not represented), and it does not now separate with the embryo, as it did previously.

Fig. 7. Represents an occasional occurrence of two young albumina remaining distinct to a tolerably late period.

TAB. XX.

Loranthus bicolor.

Fig. 1. Longitudinal section of the base of a bud $1\frac{3}{5}$ line long. *a, a.* Calyculus. *b, b.* Sepals. *c.* Cavity of the pistillum. *d.* Elevated fundus of the cavity. *e.* Dense sublunulate spot of tissue. *f, f.* Vascular supplies of perianthium and stamina.

Fig. 2. Longitudinal section of the base of a bud 12 lines long. *a, a.* Calyculus. *b, b.* Sepals. *c.* Cavity of the pistillum. *d.* Elevated fundus seen through the brownish tissue of base of ovarium. *e.* Dense sublunulate spot. *f, f.* Vascular supplies of perianthium and stamina.

Fig. 3. Longitudinal section of ovarium of a flower before expansion, but fully formed. *a.* Calyculus. *b.* Sepals. *c.* Centre of ovarium, now of brownish subamorphous tissue, occupied by four embryonary sacs, three of which are continued up the stigmatic canal (it is the brownish tissue which obscures so much the original elevated fundus or nipple). *d.* Dense lunulate spot. *e, e.* Vascular supplies.

Fig. 4. Lower part of embryonary sac of the same; the dilated part is that contained in the ovarium;—$\frac{1}{225}$ measured.

Fig. 5. Head and upper part of an embryonary sac, from the same period, found $1\frac{2}{10}$ inch up the stigmatic canal; it is crowded with grumous matter;—$\frac{1}{250}$ measured.

Fig. 6. Head of an embryonary sac, after fecundation. It contains two inner bags prolonged below into tubes, and yet only one pollen tube is seen to penetrate.

Fig. 7. Part of an ovarium from a flower shortly after the fall of the perianthium. The style is fuscous throughout the lower half, and tinged with red throughout the upper half. In the specimen dissected there were three sacs (only two, however, are

represented in the drawing), in none of which were inner tubes detected: two of these were cellular at their lower free ends, and one remained in its original state.

Fig. 8. An ovulum at a somewhat later period, partly dissected away from the closely-adhering tissue of the interior of the ovarium. The lower parts of two sacs are shown, of which one is torn up, disclosing the two inner tubes.

Fig. 9. The young seed, dissected out. In this instance, of three sacs two retained their original appearance, and did not even assist in the formation of the cellular mass, the subsequent albumen. This, as well as the embryo, which is of some size, belongs to the central sac, in which pollen tubes are visible. The young albumen, allowance being made for its having been dissected partly so as to expose the embryo, appears of somewhat confervoid growth.

Fig. 10. Portion of a seed, more advanced, with the albumen cut away except at the base. At this period the base of the albumen (the original cellular mass in which the young embryo was formed) is of a laxer nature than the rest, from which it is sufficiently distinct.

Tab. XXI.

Loranthus bicolor.

Fig. 1. The second cellular sac from the ovarium figured in Tab. XX. fig. 7, magnified about 200 times.

Fig. 2. A fertilized sac of another ovarium, about the same period. *a.* Its constricted upper end, where it becomes engaged in the canal of the style. *b.* What I take to be the situation of the original free end of the sac, beyond which the inner tubes extend very little. In this, as in most other instances examined, the articulations of the inner tubes become shorter and more frequent from the commencement of the cellularity of the sac.

Fig. 3. A young seed, somewhat more advanced than that figured in Tab. XX. fig. 9. Of the three sacs represented as assisting in its composition, two have inner tubes, the growths from which pass through the cellular body and reach its lower surface, which is obscured by adhering grumous tissue. The third sac, although cellularly subdivided to a considerable extent, remained unfertilized.

Fig. 4. Young seed more advanced than that figured in Tab. XX. fig. 9, with the albumen laid open to expose the embryo.

Viscum.

Fig. 5. Longitudinal section of a female flower before expansion. *a.* Outer or bracteal layer. *b.* Point of insertion of perianthium. *c.* Lageniform central tissue. *d.* Opake

submammillate base, from which the sac always seems to arise. *e*. Embryonary sac.

Fig. 6. Embryonary sac before fecundation from ovary before expansion of perianthium, surrounded at its attenuate base by nucellar cellular tissue, from one of the cells of which it may be supposed to have originated.

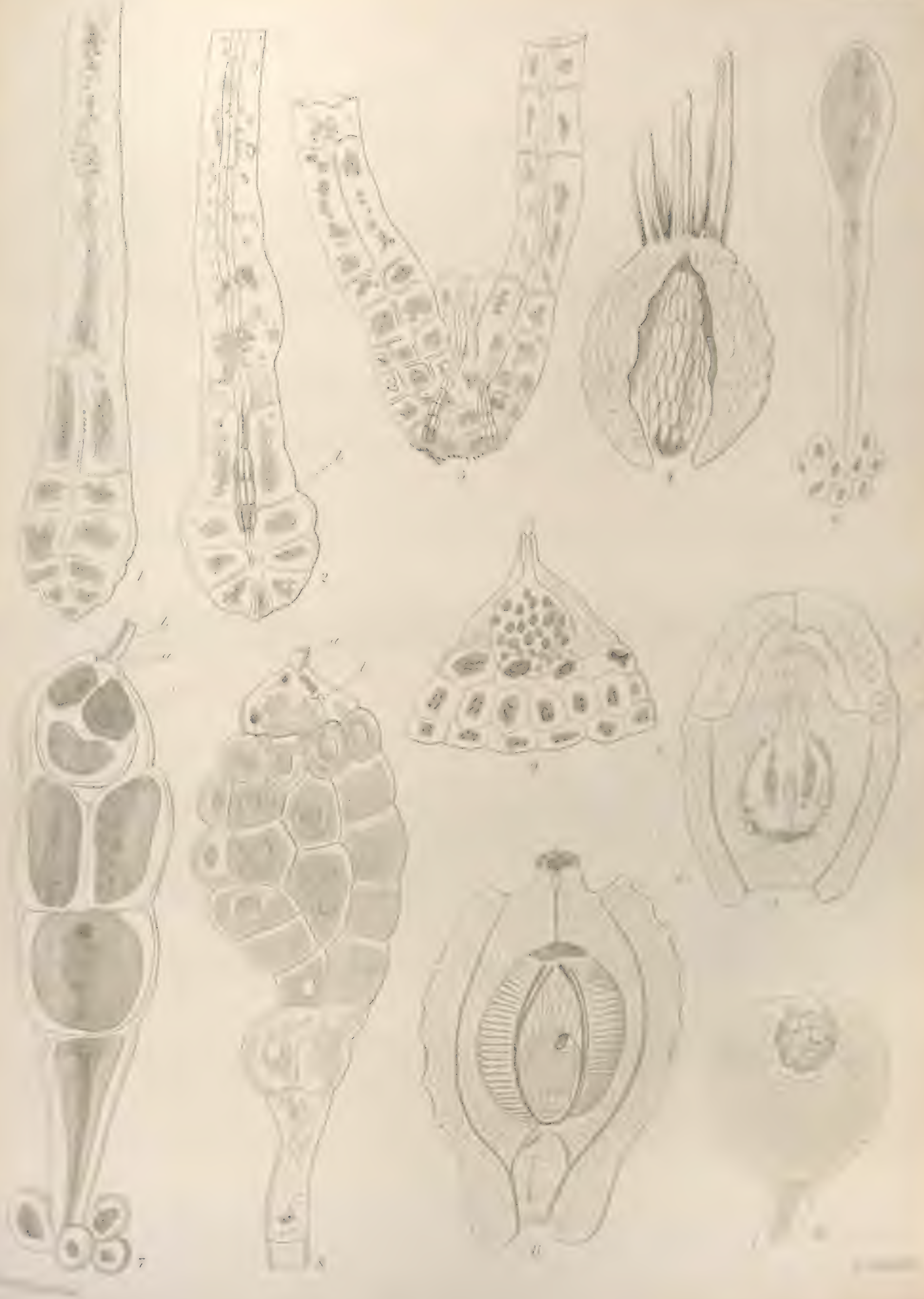
Fig. 7. Embryonary sac, some time after the fall of the perianthium, with considerable development in the cellularity of the sac, each of the cells of which are very large, and each for the most part occupied by single grumous masses. At *a*, the perforation of the sac by the filament *b*, and the continuity of this with the vesicle *c*, are shown. Two rather large grumous masses occupy partly the apex of the sac.

Fig. 8. Embryonary sac, a good deal more advanced. The upper part (except the apex itself) is now subdivided into a good many cells, almost all of which present a nucleus, all being crowded with grume and containing some granules, particularly those in which the nuclei are not evident. The formation of the cells is extending downwards, the base of the sac alone presenting its original membranous hyaline appearance. At *a*, the perforation of the sac is seen; the continuity of the vesicle *b* (which has undergone no change) with the filament *d* may also be observed. The peculiar manner by which the uppermost series of cells of the sac have commenced, extending, as it were, over the lower edge of the vesicle, is also observable.

Fig. 9. Apex of an embryonary sac, more advanced, after the action of nitric acid. The vesicle, which is plainly continuous with the protruding filament, now contains many nuclei.

Fig. 10. Seed from a young fruit $1\frac{1}{2}$ line long. The apex of the original embryonary sac is now nearly concealed by the encroachment of the cells or young albumen. The opake spot *a* represents the embryo, which would hence appear to occupy the situation of the original vesicle.

Fig. 11. Longitudinal section of a more advanced fruit. The viscous tissue does not yet extend around the central tissue and its *horns* or filaments. The embryo is now oblique.



XXII. *On a Species of* Carex *allied to* C. saxatilis, *Linn.*

By Francis Boott, *M.D., F.L.S. &c. &c.*

Read December 19th, 1843.

In 1832 a *Carex* was found in Glen Phee, Clova, by the party accompanying Dr. Graham of Edinburgh upon his annual botanical excursion to the Highlands of Scotland, which has been considered as a form of *C. saxatilis*, Linn. (*C. pulla*, Good.), and to which my attention was lately called by Mr. W. Wilson of Warrington, who in a letter of December 4th says:—"It differs from *C. saxatilis* in having distinctly ribbed fruit, in being much taller, and of a different colour."

I was led by this particular allusion to the plant to examine it minutely, and believing it to be a species, have named it after my excellent friend Dr. Graham; and I offer the following description of it, and the observations on *C. saxatilis*, Linn., which naturally arise out of the consideration of a plant hitherto associated with it.

Carex Grahami.

Spicis 4–5 cylindricis ferrugineis; masculis 2 (rariùs 1) gracilibus acutis: fœmineis 2–3 subremotis crassis obtusis inferioribus pedunculatis evaginatis subnutantibus, stigmatibus 2, perigyniis oblongo-ovatis rostratis bifurcatis inflatis nervosis suberectis ferrugineis (rariùs stramineis) basi pallidis squamâ ovatâ acutâ fuscâ apice albidâ nervo pallido duplo longioribus.

Hab. Glen Phee, Clova, in Scotiâ.

Radix fibris lignosis, repens? *Culmus* bipedalis, acutè triqueter, striatus, supernè scaber, strictus, firmus, basi foliorum rudimentis purpureis, margine sæpè filamentosis, foliisque vestientibus tectus. Pars spicas gerens 3–4½ pollices longa. *Folia* 2 lin. lata, culmo breviora, striata, carinata, scabra. *Bracteæ* foliaceæ, evaginatæ, planæ, auriculis 2, brevissimis, rotundatis, obtusis, ferrugineis, margine scariosis instructæ, culmo plerumque longiores. *Spicæ masculæ* 7–9 lin. longæ, 1–1½ lin. latæ, contiguæ, acutæ; suprema pedunculata, infima sessilis, e fœmineis intervallo 2–12 lin. longo remota. *Squamæ* arctè imbricatæ, obtusæ, ferrugineæ, margine albidæ, demùm sæpè pallidiores. *Spicæ fœmineæ* 3, rariùs 2, obtusæ, 7–12 lin. longæ, 4–5 lin. latæ; suprema sessilis, ovata vel oblonga, rariùs apice mascula; reliquæ cylindricæ, pedunculatæ, bracteatæ; infima remotior subnutans. *Spicæ* omnes rariùs abbreviatæ. *Squamæ* ovatæ, acutæ, nervo pallido, perigynio duplo breviores. *Perigynium* 2⅓ lin. longum, 1⅙ lin. latum, oblongo-ovatum, rostratum, bifurcatum, stipitatum, lucidum, utrinque nervis 3–5 e basi ad apicem instructum, plus minus fusco-ferrugineum, basi pallidum, rariùs stramineum. *Achenium* immaturum.

I am informed by Dr. Graham that this plant was found by Dr. Wight, July 30, 1832, " in a wet spot about half-way up the cliff, on the south side of Glen Phee, Clova; the station very circumscribed, being a circle of from twelve to twenty feet;" and that neither this nor any form of *C. saxatilis* has been met with elsewhere in Clova; the station Glen Dole, affixed to some specimens, being incorrect.

I subjoin a detailed description of *C. saxatilis*, Linn. (*C. pulla*, Good.), that the two plants may be more distinctly contrasted.

Carex saxatilis, *Linn.*

Spicis 2–3, atro-purpureis; masculâ 1 (rariùs 2) cylindricâ pedunculatâ: fœmineis 1–2, rotundatis ovatisve infimâ plus minus pedunculatâ evaginatâ bracteatâ erectâ, stigmatibus 2–3, perigyniis subglobosis ovatisve rostratis emarginatis stipitatis patentibus enerviis atro-purpureis basi pallidis squamâ ovatâ obtusiusculâ nigro-purpureâ apice albidâ nervo concolori longioribus.

C. saxatilis, Linn., Fl. Lap. 259 (1737).

C. pulla, Good., Linn. Trans. iii. t. 14 (1795).

Hab. In alpibus Scotiæ, Norvegiæ, Lapponiæ, Succiæ, Islandiæ, Insularum Fœroensium.

Radix fibris lignosis, repens. *Culmus* 5–9 pollicaris, triqueter, scaber, striatus, firmus, erectus, basi rudimentis foliorum purpureis, foliisque vestientibus tectus: pars spicas gerens plerumque 9 lin. ad 1½ poll. longa. *Folia* 1–2 lin. lata, culmum subæquantia, vel eo longiora, striata, scabra, apice triquetra, attenuata. *Bractea* infima subfoliacea, vix unquam culmum æquans, sæpè setacea, evaginata, auriculis 2, rotundatis, brevissimis, fuscis, margine scariosis, instructa; suprema squamæformis. Infra spicas sæpè adest folium auriculatum culmum æquans, vel eo longius. *Spica mascula* 6–8 lin. longa, lineam lata (rariùs ad basin alterâ sessili abbreviatâ auctâ), fœmineis contigua vel intervallo 4 lin. ad $1\frac{1}{2}$ poll. longo remota. *Squamæ* nigro-ferrugineæ, apice albidæ, nervo concolori, obtusæ, arctè imbricatæ. *Spicæ fœmineæ* 3–6 lin. longæ, 2–3 lin. latæ, 1 vel 2, approximatæ, vel intervallo 1–$1\frac{1}{2}$ poll. longo remotæ, nigro-purpureæ: suprema sessilis, rotundata, sæpè parva, pauciflora, rariùs apice flosculo masculo instructa: infima ovata, plus minus pedunculata. *Spicæ*, e stylo exserto, stigmatibusque longis, quasi comosæ. *Squamæ* ovatæ, obtusiusculæ, nigro-purpureæ, nervo concolori, apice albidæ. *Perigynium* $1\frac{6}{9}$ lin. longum, $\frac{7}{9}$ lin. latum, subglobosum ovatumve, rostratum, emarginatum, enervium (nisi nervis 2 marginalibus), stipitatum, patens, atro-purpureum, basi pallidum, lucidum, squamâ paululùm longius. *Achenium* immaturum.

That *C. pulla*, Good., is the *C. saxatilis*, Linn., is proved, I think, by the *original* description of that species in the 'Flora Lapponica,' "*facies eadem et statura est quam* 324" (*C. atrata*, Linn.) and "*spicæ fœmineæ ovatæ, magnæ*," applying to it rather than to *C. rigida*, Good.; and it is confirmed by the Lapland specimen of *C. saxatilis* in the Linnean herbarium (the name and country recorded in the hand-writing of Linnæus); by one, so named by Solander, from Lapland, in 'Herb. Banks.;' and by Gay (Ann. des Sc. Nat. xi. p. 189), who alludes to a specimen of Solander's, so called, as seen by Hartman.

It would be difficult to explain how Goodenough and Smith overlooked the evidence of this fact, especially as the last, in 'Eng. Fl.' iv. 116, admits that the *C. saxatilis*, Linn., is "*more allied*" to *C. pulla* than to *C. rigida*, Good.

In the 'Flora Suecica' (1745) Linnæus gives the habitat, "*in alpibus Lapponicis*;" but the observations there introduced, especially, perhaps, "*sub infimâ spicâ folium setaceum spicâ brevius*," would lead to the inference that he then confounded *C. rigida*, Good., with it. In the 'Sp. Plant.' (1753), when the specific name was first applied, the habitat is changed to "*in Alpibus Europæ*," which is too general for *C. saxatilis*, Linn., and can alone apply to *C. rigida*, Good., which consequently, since the time of Oeder (Fl. Danica. t. 159) (1764), has been generally received as the *C. saxatilis*, Linn.

Hartman appears to have first detected the error in 1832, and he has been followed by Koch (Syn. Fl. Germaniæ, 1837), who refers the *C. saxatilis* of the continental authors to *C. rigida*, Good.

I had observed the fact of *C. pulla*, Good., being the true *C. saxatilis*, Linn., by an examination of the Linnean and Banksian herbaria, and corrected the error of Goodenough in Hooker's 'Brit. Flora,' ed. 4. 1838, without having been aware of Hartman's observation, which I met with in the 'Ann. des Sc. Nat.' vol. xi., published in 1839.

I am informed by Mr. Robert Brown, that a single specimen of this species was discovered in Scotland first by the Rev. Mr. Stuart of Luss, and sent to Lightfoot, who declared it to be a Linnean species; but to what species he referred it, Mr. Stuart had forgotten, as he told Mr. Brown, who on August 11, 1793, showed Mr. Stuart, then at Killin, specimens which he had found that day on Ben Teskerney, a mountain at the head of Glenlochai, near Loch Tay, the station of Mr. Stuart's specimen.

Don, in his 'Herb. Brit.,' fasc. 8. 190, states that he found it on Ben Lomond in 1789 (the year after the death of Lightfoot), on Ben Lawers in 1793, and on Ben Nevis in 1794; and that he sent it that year to Dickson, who acknowledged it as an undescribed plant. The specimen figured in the 'Linn. Trans.' iii. t. 14. (1795) is in 'Herb. Smith,' recorded there by him as the plant so figured; it was received from Mr. J. Mackay as gathered on Ben Lawers in 1793, and is with two other specimens from the same mountain gathered by Mackay in 1796.

Linnæus, in the 'Sp. Plant.' 1753, quotes with a query under *C. saxatilis*, "Micheli, Gen. 63. t. 32. f. 4," which Lightfoot refers, perhaps correctly, to *C. montana*, Linn., and which, as Willdenow (Sp. Plant. iv. 274) remarks, cannot apply to *C. saxatilis* or *C. rigida*, as the character "*capsulis subhirsutis*" would prove.

The characters distinguishing *C. Grahami* from *C. saxatilis*, Linn., as will be seen on a comparison between them, are the greater height of the first; the more numerous and cylindrical spikes, of a ferruginous colour; the more inflated and elongated, bifurcate, nerved perigynium, twice the length of the scales; and the proportionately narrower leaves, which are shorter than the stem.

C. saxatilis, Linn., is described by all those who particularly notice the fruit as having a *nerveless* perigynium. Mr. Babington, it is true, in his 'Manual,' p. 342, says the fruit is "*slightly nerved*;" but he remarks, that the only specimens he had had an opportunity of examining belonged "*to the tall form, 2 feet high, from Clova*" (*C. Grahami*).

Schkuhr, t. c.c. (1801), figures the fruit *without nerves*. Smith, 'Fl. Brit.' iii. 988 (1804), says, "*fructus enerves*:" in the 'Eng. Bot.' xxix. t. 2045 (1809)' "*fruit without ribs*;" and in the 'Eng. Fl.' iv. 104 (1828), "*fruit without angles or ribs*;" and Kunth, 'Cyper.' 410 (1837), says, "*utriculi enervii*." Neither Goodenough, Willdenow nor Wahlenberg afford any information on this subject.

I regret that I have not met with any mature fruit in the Scotch specimens, the achenium in all being young and undeveloped: and the same is true of the fruit of *C. Grahami*; but while the nerves are palpable in the last, I cannot detect any in the first, except the two marginal ones. Considering, therefore, the two plants to differ in this respect, independently of the other characters noticed, which might imply merely a greater luxuriance in the growth of the one as compared with the other, I should have no doubt of the specific distinction between them but for the observations of the accurate and lamented Drejer, who in his 'Revisio critica Caricum Borealium,' Hafniæ, 56 (1841), which he sent to me a few months before his death, speaks of Greenland specimens of *C. pulla* as varying greatly in size. His form *α. picea*—"*Spicis femineis rotundatis piceis nitidis, perigyniis magis squarrosis, stigmatibus* 2, *rariùs* 3,"—agrees with *C. saxatilis*, Linn., from Scotland. I have observed 3 stigmata in one specimen in the herbarium of my friend Mr. Forster.

The var. *β. fusca* (excluding the synonym of 'Eng. Bot.') I should without hesitation, from the observations which follow it, refer to *C. Grahami*, but that Drejer does not say anything of the perigynium, whether at least it be with or without nerves; and I cannot easily believe so accurate an observer would have passed over so important a character as a distinctly nerved perigynium had it existed in the Greenland plant. He refers the form *β.* both to Iceland and Greenland, and says, "*Specimina Grœnlandica in universum duplò triplòve majora et robustiora quam Islandica; cæterum eximiè variabilia, ita ut vix crederes, ad unam eandemque speciem ea pertinere. Occurrit culmis semi et bipedalibus; spicis femineis* 1–2–3, *approximatis et valdè remotis, rotundatis, ovatis, acutiusculis, et elongato-cylindricis obtusis; squamis obtusis perigynio breviori-*

bus, et acutis ea superantibus, stigmatibus 2 *et* 3. *Stylus modò rectus, modò basi flexuosus.*"

In the absence of precise information respecting the perigynium of the larger Greenland specimens, I am inclined to refer them and the specimens from the Rocky Mountains, collected by Mr. Drummond, which I inserted in Hooker's 'Flora Boreali-Americana,' under the name of *C. saxatilis,* to *C. physocarpa,* Presl, a species native of Nootka Sound, of which I have no knowledge beyond that afforded by M. Kunth (Cyper. 420), where I find the following characters, differing from those of *C. Grahami*: "*spicis masculis* 2–3; *femineis erectis, glumis perigynio æquilongis, culmo foliis breviore.*"

In general habit the Rocky Mountain specimens are closely allied to *C. Grahami,* but they differ in more elongated male spikes with looser imbricate scales; narrower, subacute, more elongated and laxer female spikes; the perigynium less distinctly nerved and emarginate, scarcely longer than the scales.

Future observation must determine the value of the specific character which I have given to *C. Grahami*; whether it is to be considered a variety of *C. saxatilis,* Linn., as it has hitherto been looked upon, or referred to *C. physocarpa,* Presl, when that species shall be better known: but in the present state of our knowledge, I cannot but consider it, with Mr. Wilson, entitled to be received as a species. Those who have patiently studied the genus *Carex,* the largest perhaps in the vegetable kingdom, from an extensive suite of specimens collected from different countries, will frankly admit the difficulty of arriving always at satisfactory conclusions respecting the character and limits of species, even in the case of some of those the longest and most familiarly known.

December 15, 1843.

XXIII. *Description of the Female Flower and Fruit of* Rafflesia Arnoldi, *with Remarks on its Affinities; and an Illustration of the Structure of* Hydnora africana. *By* Robert Brown, *Esq., V.P.L.S.*

Read June 17th, 1834.

THE principal object of the present communication is to complete, as far as my materials enable me, the history of *Rafflesia Arnoldi*, the male flower of which is described and figured in the 13th volume of the Society's Transactions.

The specimens from which this additional information has been obtained, as well as those formerly described, were received from the late Sir Stamford Raffles; and for the drawings so beautifully representing their structure, I am indebted to the same distinguished botanical painter and naturalist, who obligingly supplied those already published.

In my former essay some observations were made on the affinities of *Rafflesia*, a subject on which I could not then speak with much confidence. From such knowledge as I possessed, however, I ventured to state that this genus appeared to be most nearly allied to *Asarinæ*, and especially to *Cytinus*, on the one hand, and on the other to *Aphyteia* or *Hydnora*, an equally remarkable parasite of South Africa, but the structure of which was at that time very imperfectly understood.

An examination of complete specimens of *Hydnora africana* has confirmed this view; and as there are points in its structure which seem to throw some light on one of the most difficult questions respecting *Rafflesia*, I have included an account of this genus in the present paper.

The accompanying drawings of *Hydnora africana*, which so admirably display its structure, were kindly made from these specimens by my lamented friend and fellow-traveller Mr. Ferdinand Bauer, when he revisited England in 1824; they were probably the last drawings he ever made of an equally interesting and difficult botanical subject, and I consider them his best*.

Since the publication of my former memoir, much light has been thrown on the structure and œconomy of *Rafflesia,* chiefly by Dr. Blume, who in his 'Flora Javæ' has given a very full history of a nearly related species, his *Rafflesia Patma*, as well as of *Brugmansia*, a parasite of similar œconomy, very distinct as a genus, but evidently belonging to the same natural family. Before, however, noticing more particularly what has been done by others, I shall resume the subject where I left it at the conclusion of my former memoir, in adverting to those points which I then regarded as the principal desiderata in the botanical history of this extraordinary plant.

The first of these related to the reticulate base, which I ventured to consider a production of an intermediate kind, or rather as one derived from the stock or root of the Vine, but excited and determined in its form and nature by the specific stimulus of the parasite. I expected, therefore, to find it existing in the form of a covering to the bracteæ in the early state, as in *Cytinus.* This point has been fully confirmed, and is well shown in Mr. Bauer's drawings of the very young buds†. From the same figures it appears that the parasite is occasionally found on the stems of the Vine, as Dr. Jack had stated, but which seemed to me to require confirmation.

* Since this paper was read, the Linnean Society have had to lament the loss of Francis Bauer, who died in 1841 at the advanced age of eighty-three. Like his brother Ferdinand, he continued, till within a short time of his death, to take the same interest in those scientific investigations which formed the constant occupation and the chief pleasure of a long life.

The figures of *Rafflesia* and *Hydnora*, which so admirably illustrate, and form the more valuable part of this communication, are among the best specimens of the unrivalled talent of the two brothers Francis and Ferdinand Bauer, who, as botanical painters, equally united the minute accuracy of the naturalist with the skill of the artist.

To this brief note I may be permitted to add how fortunate I consider myself in having so long enjoyed the friendship and so often been indebted for the important assistance of these two distinguished men, whose merits in the branch of art which they cultivated have never been equalled, and to both of whom the illustrations of the present paper, so happily connected, may form an appropriate monument, the work of their own hands.

† That the whole of this covering belongs to the stock, is proved by its containing those raphides or acicular crystals which are so abundant in the root of the *Vitis* or *Cissus*, and which are altogether wanting in the parasite.

Of the structure of the female flower of *Rafflesia* I judged entirely from Dr. Jack's account in his letter published in my former essay; and respecting this structure several important points, which even his subsequent description in the 'Malayan Miscellany' did not supply, were regarded as undetermined.

Whether the ovarium is wholly distinct from the calyx or cohering with it at the base, was the first of these points which required further examination. The specimens now prove it to be chiefly superior or free in the flowering state, and wholly so in the ripe fruit.

The internal structure of the ovarium, especially the origin and arrangement of the numerous ovuliferous surfaces or placentæ, I considered one of the principal desiderata. Dr. Jack's account of these placentæ, which, as far as it extends, is essentially correct, is confirmed by Dr. Blume's description and figures of *Rafflesia Patma*, as well as by the more complete drawings which accompany the present paper. The important question, however, namely the analogy of this apparently singular arrangement with ordinary structure, may be regarded as still in some degree obscure.

The transverse section of the ovarium presenting an indefinite number of cavities irregular in form, having no apparent order, and over the whole of whose surfaces the ovula are inserted, is hardly reconcileable to the generally received notions of the type of the female organ: and as these cavities exist to the same extent and with similar irregularity from centre to circumference, they may with equal probability be considered as originating from the axis or from the parietes of the ovarium. The vertical section too, if viewed without reference to the external development of the top of the column, exhibits a structure equally anomalous. If, however, the corniculate processes terminating the disc of the column be regarded as styles, which is surely the most obvious and not an improbable view, their arrangement would lead to the supposition that the ovarium is composed of several concentric, circular series of simple pistilla, each having its proper placenta, bearing ovula over its whole surface. But the structure is so much obscured by the complete confluence of the supposed component parts, that this view might not at once present itself. It is readily suggested, however, by the seemingly analogous structure of *Hydnora*, in which the cylindrical placentæ, whose number is considerable and apparently indefinite, are all pendulous from the top of the cavity, neither cohering with its sides or base, wholly distinct from each other, and uniformly and densely covered with ovula.

But although this is the most obvious view suggested by *Hydnora*, a more careful examination, especially as to the relation of stigmata to placentæ, leads to a very different notion of the composition of the ovarium in that genus: for as the placentæ correspond with, and may be said to be continuations of the subdivisions of the stigmata, and as these stigmata appear to be three in number, each with numerous subdivisions diverging from the circumference towards the centre of the ovarium, and each of these subdivisions bearing one or more placentæ pendulous from its internal surface, the ovarium of *Hydnora* may be regarded as composed of three confluent pistilla, having placentæ really parietal, but only produced at the top of the cavity; the sides of which, however, exhibit no indication whatever of composition.

Between this most remarkable structure of *Hydnora* and that of *Cytinus* there is some, though not perhaps a very obvious analogy, each of the strictly parietal placentæ in the latter being subdivided into distinct lobes, as in many *Orchideæ*, a family which *Cytinus* also resembles in the structure of the seed, and probably in the mode of impregnation, though so widely different in almost every other respect.

It would certainly be difficult to reduce *Rafflesia* to the view here taken of the formation of the compound ovarium in these two genera; and it may therefore, perhaps, be said, that although the structure of *Hydnora*, in one important particular, suggests or confirms the more probable notion of the composition of ovarium in *Rafflesia*, as already stated*, it is in other respects very distinct.

* My confidence in this hypothesis respecting *Rafflesia* is greatly lessened on considering the structure of the female flower of a lately discovered species of the genus, namely, *Rafflesia Cumingii* or *Manillana*, in which the style-like processes terminating the column are much fewer in number, and so arranged as to form a single circular series of about ten, not very distant from the limb, with only from one to three processes within it, which are placed near the centre, while the irregular cavities in the ovarium are evidently much more numerous, and in arrangement have no apparent relation to that of the supposed styles, there being as great complexity in the centre as towards the circumference. These relations between styles and ovarial cavities seem, according to the figures of *Rafflesia Patma*, to be reversed in that species, its styles being apparently more numerous than the cavities of the ovarium; and as even in *Rafflesia Arnoldi* their correspondence is far from obvious, it would seem that the number and arrangement of these processes afford no satisfactory evidence of the composition of the ovarium in any

Another point, which in my former paper I considered doubtful, namely the seat or limit of the stigmata, is not even now satisfactorily established; for the slender processes forming the hispid tips of the supposed styles, which have so much the appearance of the ultimate divisions of stigma, are merely hairs of a very simple structure, and exactly resembling those found in other parts of the column; though in several of the specimens examined they were greatly altered in appearance, from a coating of mucous matter taken up and again deposited by the spirit in which the specimens were preserved*. A slight difference, indeed, seems to exist between the tissue of the apices of the styles and the other parts of their surface; hardly sufficient, however, to prove it to be stigma, though this is no doubt the probable seat of that organ.

The next point of importance in the female flower of *Rafflesia* is the structure and gradual development of the ovula. These, in the earliest state observed, consist of merely conical or subcylindrical papillæ, having a perfectly smooth surface as well as uniform internal substance.

The first perceptible change taking place in the papilla is a slight contraction at its summit, the upper minute contracted apex being the rudiment of the nucleus. Immediately below this contracted portion a dilatation is soon observable, which, gradually enlarging and becoming slightly hollowed, forms a cup in which the nucleus, also proportionally increased in size, is partly immersed. This cup, the rudiment of the future integument, continues gradually to enlarge, until it completely covers and extends considerably beyond the nucleus, but without cohering with it. If a transverse section is made near the slightly-depressed apex of this integument, an extremely minute perfora-

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known species of the genus. But if the placentation of *Rafflesia Arnoldi* and *Cumingii*, notwithstanding the objections stated in the text (p. 223), be considered parietal, as Blume has described it in *R. Patma*, and as from his figures it seems actually to be in *Brugmansia*, there would still be no means of determining the exact degree of composition of ovarium in *Rafflesia*: for in no species of the genus is there the slightest indication afforded by the arrangement of cavities or ramification of the assumed placentæ, to mark any definite number of component parts. Similar objections apply with equal force to the adoption of that opinion which regards placentation as in all cases central or derived from the axis.

In conclusion, therefore, it may perhaps be said that *Rafflesia*, in the structure both of ovarium and antheræ, is not obviously reconcileable to any hypothesis hitherto proposed to account either for the origin or for a common type of the sexual organs of Phænogamous plants.

* See Mr. Bauer's representation of the hairs in this state, Tab. XXIII. figs. 3, 4, 5, 6 & 7.

tion or capillary channel, extending to the free apex of the included nucleus, may be observed.

This account of the gradual development of the ovulum of *Rafflesia*, I believe, is in every essential point applicable to Phænogamous plants generally, except that here one coat only is developed. It is, however, in some important points different from the description given by M. Mirbel, who considers the nucleus in its earliest state as included in the integuments, which in the next stage open and dilate so as to leave it entirely exposed; they then, as he supposes, remain quiescent until the nucleus has considerably enlarged, when they again become active and increase in size until they once more completely cover it.

While the development, as I have here described it, of the nucleus and its integument in *Rafflesia* is going on, another change is at the same time gradually taking place, namely, at first a slight bending, which at last ends in a complete inversion, in the direction of the nucleus and its integument in regard to the placenta, with which, in this advanced stage, the perforated apex of the latter is nearly or absolutely in contact.

In this change of direction, the ovulum of *Rafflesia* resembles that of the far greater part of Phænogamous plants: the change, however, is effected in a way which is much less common, the curvature in *Rafflesia* taking place solely in the upper part of the funiculus, the direction of the inverted ovulum being parallel with, but distinct from, the portion below the curvature; whereas in Phænogamous plants generally, the curvature is produced in that part of the funiculus which is connate with the testa or outer integument. For this difference a reason, perhaps, may be assigned; the integument which generally forms the testa or outer coat being in *Rafflesia* entirely wanting, or only indicated by the remarkable dilatation of the apex of the funiculus*.

In the more essential points of structure, the ovula of *Hydnora* and *Cytinus* agree with that of *Rafflesia*. They differ, however, in both these genera in retaining their original direction.

In *Hydnora* I have ascertained the perforation of the single integument and

* The earlier production of the inner of the two coats generally present in the ovula of Phænogamous plants, and the absence of the outer in this and several other cases, will probably be considered a valid objection to the terminology of M. Mirbel.

the position of the included nucleus, but the very earliest stages I have not yet distinctly seen; while in *Cytinus*, in addition to the coat analogous to that of *Rafflesia* and *Hydnora*, a two-lobed or bipartite membrane is observable.

Of these three genera, I have hitherto observed the pollen or mucous tubes only in *Cytinus*, in which they pass along the surfaces of a definite number of cylindrical cords existing in the style until they reach the cavity of the ovarium, when they follow the direction of the placentæ and become mixed with the ovula, to which I have not yet, however, found them actually attached*.

The structure of the pericarpium and the ripe seed of *Rafflesia* have been satisfactorily ascertained from the examination of a single fruit found among the numerous flower-buds in various states which were received from Sumatra by Sir Stamford Raffles long after his return to England. In this fruit, which is very accurately represented of the natural size in Mr. Bauer's figure, the column, deprived entirely of its style-like processes, had become a compact fleshy mass, having deep fissures on its surface dividing it into nearly square lobes, somewhat resembling the surface of the dilated base of *Testudinaria*, and within, like the ovarium, exhibiting irregular cavities, whose surfaces were thickly covered with minute seeds.

These seeds, which are also beautifully shown in Mr. Bauer's figures, differ but little in form from the ovula of the expanded but unimpregnated flower: they are considerably larger, however, and the apex of the funiculus is still more dilated. From their great hardness, as well as from their internal structure, they appear to be quite ripe; and it is worthy of remark, that of the many thousands contained in the fruit, the very considerable portion seen were of uniform size and appearance.

The testa or outer integument, which is evidently that existing in the unimpregnated ovarium, is of such hardness and thickness that it may be termed a nut; it is of a chestnut colour, its surface regularly reticulate and deeply pitted, a depression occupying the centre of each areola.

The inner integument is a thin light-coloured membrane, very slightly

* In a few cases where the supposed pollen tubes were present I found them applied to the apices of the enlarged ovula. In some instances I have met with only a very loose tissue, consisting of elongated cells mixed with mucus, forming cords descending from the stigmata, and reaching to, but not extending beyond, the origin of the placentæ.

areolated, and of uniform surface. Within this the nucleus, of similar form and dimensions, seems to be more firmly attached at its upper extremity to the coat by a short and very slender funiculus.

The nucleus separated from its coat has an areolated surface, and at first appears to be entirely composed of a loose and uniform cellular tissue. But on a more careful examination this substance is found to contain another cellular body, of nearly cylindrical form, adhering with some firmness to the upper extremity of the including cellular mass, whose vertical axis it occupies for nearly three-fourths of its length.

This inner body, which I regard as the *embryo*, consists of large cells, disposed nearly, but not with absolute regularity, in two longitudinal series, and so transparent, that it may be safely affirmed that there is no included body nor any perceptible difference in the contents of any of the component cells.

This account of the embryo differs in some respects from Mr. Bauer's representation of it, especially as to the point of attachment, and in the distinct appearance and transparency of cells*.

The seed of *Hydnora* in many essential points resembles that of *Rafflesia.* Its nucleus consists of a dense albumen, the cells of which are so disposed as to exhibit, when slightly magnified, a kind of radiation in whatever direction it is cut. This albumen is much denser than that of *Rafflesia*, the greater density arising, perhaps, from the unusual thickness of the walls of each cell, its cavity bearing so small a proportion to the supposed external dimensions of the cell as to give it the appearance of a nucleus or more opake central body†.

Enclosed in the albumen a perfectly spherical embryo is found, consisting entirely of a more minute and much less dense cellular tissue. On the surface of this embryo I have observed no point marking original attachment, nor any

* I have therefore added to Tab. XXV. a circumscribed figure, marked R. Br., in which I have endeavoured to represent (but not very successfully) the structure as I have seen it.

† But these supposed cells with thickened walls, admitting them to have been originally distinct, are in the ripe seed nearly or entirely obliterated, so that the substance of the cartilaginous albumen consists of a uniform, semitransparent mass, in which the more opake nuclei or cells, containing minute granular matter, are as it were immersed,

indication of a channel connecting it with the surface of the albumen, in the centre of which it is seated.

In *Cytinus*, in which I believe I have at length found ripe fruits, the seeds are extremely minute, and generally retain at their base the bipartite membrane more distinctly observable in the unimpregnated ovulum. To this membrane the name of arillus may be given; but it may also, and, perhaps, with greater probability, be considered the imperfect production of the testa or outer membrane.

The seed itself is elliptical, with a slight inequality at top indicating the depression or perforation observable in the ovulum. The single integument of the seed is easily separable from the nucleus, and by moderate pressure splits longitudinally and with great regularity into two equal portions; in texture it is a crustaceous membrane, indistinctly reticulate, the areolæ, when very highly magnified, appearing to be minutely dotted with a semi-opake centre.

The nucleus, corresponding exactly in size and form with the integument, has its surface also reticulate, but the areolæ are not dotted; and it appears, as far as I can ascertain in so minute a body, to consist of a uniform cellular tissue, very exactly resembling the nucleus of an Orchideous plant.

The result of the comparison now made, and which might be extended to other points of structure of *Rafflesia, Brugmansia, Hydnora* and *Cytinus*, seems to be, that these four genera, notwithstanding several important differences, form a natural family to which the name of Rafflesiaceæ may be given; and that this family is again divisible into three tribes or sections:

The first, *Rafflesieæ*, consisting of *Rafflesia* and *Brugmansia*, is distinguishable by the ovarium being either in part or wholly superior to the origin of the calyx, in its composition or internal structure, in the placentation and direction of the ovula, in the structure of the seed and in that of the antheræ.

The second section, *Hydnoreæ*, formed of *Hydnora* alone, is characterized by its completely adherent ovarium, singularly divided stigmata, the peculiar origin and structure of its pendulous placentæ, its embryo inclosed and seated in the centre of a dense albumen, and by the arrangement and structure of its antheræ.

In the third section, or *Cytineæ*, the placentæ are parietal, the ovarium is connate with the calyx, and the cellular undivided embryo forms the whole mass of the seed, or is apparently destitute of albumen*.

That this third section is nearly related to *Asarinæ* seems to me unquestionable: if, therefore, its affinity to *Hydnora* and *Rafflesia* be admitted, the place of this singular family would be nearly established.

That *Rafflesia*, *Hydnora* and *Cytinus* do not essentially differ from many of the more perfectly developed Phænogamous plants in their vascular structure, I have satisfactorily ascertained, and there is no sufficient reason to doubt that the same observation may be extended to *Brugmansia*.

In my former paper, in treating of the composition of the vascular bundles existing in various parts of *Rafflesia*, I too hastily assumed the absence of spiral vessels, the expression used evidently implying that I had satisfied myself of their non-existence in the fasciculi or bundles examined; instead of which I should only have stated that I had not been able to find them.

The absence of spiral vessels has since been affirmed by Dr. Blume with respect to his *Rhizantheæ*, consisting of *Rafflesia* and *Brugmansia*; and still more recently by Messrs. Endlicher and Lindley, who, overlooking probably the very positive statement of Dr. von Martius respecting *Langsdorfia*, have equally denied the existence of spiral vessels in *Balanophoreæ*; and partly, perhaps chiefly, determined by this supposed conformity and peculiarity of structure, have referred *Rafflesiaceæ* and *Balanophoreæ* to the same natural class.

* To the third section of *Rafflesiaceæ*, *Apodanthes* and *Pilostyles* may perhaps be referred. These genera indeed agree with *Cytinus* in their unilocular ovarium with parietal placentation, in their cellular undivided embryo forming the whole mass of the seed, and in their adherent or semi-adherent ovarium, whose cavity in *Pilostyles* extends even below the insertion of the bracteæ. The existence of petals, however, in both, and especially in *Apodanthes*, will probably be considered as an objection of some weight to their absolute union with *Cytineæ*; and there is even an important difference in their placentation, the ovula being produced equally over the whole surface of the ovarial cavity, while in *Cytinus* the placentæ are distinct, definite in number, and subdivided into numerous lobes, nearly as in *Orchideæ*.

Whether *Apodanthes* and *Pilostyles* are to be included in the same genus, as Professor Endlicher (in Gen. p. 76) first conjectured, and as Mr. Gardner has more recently (in Hooker Ic., new ser., vol. iii. tab. 644) endeavoured to prove, though not improbable, must, I think, remain somewhat doubtful so long as we are unacquainted with the male flower of *Apodanthes*. In the mean time this genus may be distinguished from *Pilostyles* by the singular insertion of its petals, which also differ remarkably in texture from the quadrifid persistent calyx, and by the two bracteæ of the flower being seated below the origin of an angular ovarial cavity, and which, after the falling off of the parasite, remain attached to the stock.

I have in the first place to correct my own error respecting *Rafflesia*, in various parts of the female flower of which I have found spiral vessels of the ordinary structure, consisting of a single, easily unrolled fibre: and on re-examining the same specimen of the male flower respecting which my former assertion was made, I found these vessels equally distinct. Professor Meyer has already stated their existence in the procumbent stems or rhizomata of *Hydnora triceps*; in which I have also found them in *Hydnora africana*, as well as in other parts of the same species: and in *Cytinus* they are still more obvious.

I may also add, that wherever I have had specimens of *Balanophoreæ* in a fit state for minute examination, I have never failed to find spiral vessels in various parts of their tissue, particularly in *Cynomorium coccineum* and *Helosis guianensis**.

* Although in *Rafflesiaceæ* and in the genera at present referred to *Balanophoreæ*, spiral vessels undoubtedly exist, in the greater number, indeed, sparingly, but in some cases in hardly reduced proportion, it may still perhaps be alleged, by those botanists who have proposed to unite both families into one natural class, that the vascular system of all these parasites is uniform and more simple than that of the far greater part of Phænogamous plants; that the spiral or slight modifications of it is the only form of vessel hitherto observed in any of them; and that the large tubes or vessels, with frequent contractions, corresponding imperfect diaphragms, and variously marked surface, which have received several names, as vasa porosa, punctata, vasiform cellular tissue, dotted ducts, &c., and which are so conspicuous in the majority of arborescent Phænogamous plants, have never been observed in any part strictly belonging to these parasites. But even admitting the non-existence of the large vessels here referred to, their absence will hardly be regarded as a sufficient reason for the union into one class of the two families in question, especially when it is considered,

First, That conformity in vascular structure, even when accompanied by peculiarity of tissue, does not always indicate, much less determine, botanical affinity. This is strikingly exemplified in *Coniferæ* and *Winteraneæ*, two families which, though so nearly agreeing in the uniformity and peculiarity of their vessels, and in both of which the large tubes referred to are wanting, yet differ so widely from each other in their organs of reproduction and in their leaves, that they may be regarded as placed at opposite extremities of the scale of *Dicotyledones*.

Secondly, That uniformity of vascular structure is not always found in strictly natural families. Thus many *tropical woody climbers* exhibit remarkable peculiarities of vascular arrangement not existing in the greater part of the families to which they respectively belong, but which peculiarities appear to have no influence whatever in modifying their reproductive organs.

Thus also in *Myzodendron*[1] the whole woody tissue consists of vasa scalariformia, a peculiar struc-

[1] *Myzodendron* of Banks and Solander, from μυζάω or μύζω *sugo*, and δένδρον, has been changed to *Misodendron* by DeCandolle and all following systematic writers; no doubt merely from a mistake as to the intended derivation. *Myzodendron*, hitherto referred to *Loranthaceæ*, to which it is certainly

I may hereafter have an opportunity of entering fully into the question whether *Rafflesiaceæ* and *Balanophoreæ* form merely different orders of the

ture, and very different from that of all the other genera belonging to *Loranthaceæ*, to which this genus has been referred, and to which, though it does not absolutely belong, it is nearly related. Even this peculiar structure of the stems of *Myzodendron* admits of considerable modifications in the different species of the genus, which is strikingly exemplified in comparing the loose vascular tissue with large and singularly-constructed medullary rays of *M. brachystachyum* and *quadriflorum* with the more minute vessels and extremely narrow rays of *M. punctulatum*.

I may also notice that in *Tillandsia usneoides*, as well as in the nearly-related species of that genus, the capillary stems are destitute even of spiral vessels, though in *Bromeliaceæ* generally the ordinary vascular system is found.

Whatever may be the state of vessels in the fully-developed parasites belonging to *Rafflesiaceæ*, it appears to me that at least *Rafflesia* in its very early stages is entirely cellular, and that this continues to be the case not only until that mutual adaptation of parasite and stock which enables the former to complete its development has taken place, but until the first indications of its future structure have become perceptible. It may also be remarked, that even after the formation of vessels in the parasite is obvious, the direct union between *Rafflesia* and the *Vitis* continues to be chiefly if not entirely cellular, the connexion consisting in a slight mutual penetration or indentation of the two substances, whose cells are easily distinguishable.

I may here advert to one of the most difficult points in the œconomy of *Rafflesiaceæ*, namely, by what means their minute embryos, which are at the same time of an extremely loose texture, are enabled to penetrate through the bark of the plants on which they vegetate, so as to account for such appearances as those exhibited in the nascent *Rafflesia Arnoldi* represented in TAB. XXVI. A., in which I have been unable to trace any perceptible communication with the surface, and where the parasite seems rather to grow out of than into the stock.

Connected with this point a question may also arise, whether the earliest effort of the seed after its deposition in the proper nidus, by whatever means this is effected, may not consist in the formation of a cellular tissue extending laterally under the bark of the stock and capable of producing the fully-developed parasite.

This question might not occur in regard to *Rafflesia* and *Brugmansia*, in both of which the individual plants are in general sufficiently distant on the root of the *Vitis* to make it probable that each developed parasite is produced from a distinct seed. But in *Pilostyles*, and even *Cytinus*, where they are closely

closely allied, especially through *Antidaphne* of Pœppig, appears to me to have characters sufficient to distinguish it as, at least, a subordo or tribe (*Myzodendreæ*), namely, the structure of its ovarium, in which it approaches to *Santalaceæ*, having three ovula suspended from the apex of a central placenta, only one of which ripens; the entire absence of floral envelope in the male; the singular feathery appendages of the female flower and fruit compensating in the dispersion and subsequent adhesion of its seeds, which are destitute of that viscidity existing in those of the parasitic *Loranthaceæ*; and lastly, the embryo being undivided, with its dilated and exserted radicle inclosed in a semitransparent covering, a continuation of the membrane lining the cavity of the albumen in which the embryo is lodged.

same natural class, in giving an account of a new and remarkable genus of the latter family*.

At present I shall only remark, that the sole remaining character employed to unite these two families and supposed to distinguish them from all others, namely the simple or acotyledonous embryo, exists equally in *Orchideæ*. And if it be employed along with those characters connected with their peculiar œconomy, namely the imperfect development of leaves, the want of stomata and absence of green colour, the class cannot be limited to *Rafflesiaceæ* and *Balanophoreæ*, for an embryo of exactly the same kind exists in *Orobanche*, and other, perhaps all other, genera parasitic on roots, a remark which I made, though not with sufficient precision, in my former essay. But such a classification, though founded on seemingly very important technical characters, would hardly be received in a strictly natural arrangement, and it seems to me quite as paradoxical to approximate two such genera as *Rafflesia* and *Balanophora*.

RAFFLESIA ARNOLDI.

Rafflesia Arnoldi, *R. B. in Linn. Soc. Transact.* vol. xiii. p. 201. tabs. 15–22. Mas.

Rafflesia Titan, *Jack in Malayan Miscell., Append. to* vol. i.

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approximated, their possible origin from one common basis or thallus is more readily suggested, especially on considering that in the former genus, which is diœcious, each group of parasites is generally, perhaps always, exclusively of one sex; and that these groups, often of great density, not unfrequently surround completely the branch of the stock. But although this view did occur to me as not very improbable, and as tending to remove some of the apparent difficulties, I have never been able to trace any substance decidedly distinct from the proper tissue of the stock: there are, however, some appearances favouring the hypothesis in both genera, especially in *Pilostyles*, but which require careful examination in the living plants.

* This genus, which was first found by Francis Masson, is the *Mystropetalon* of Mr. Harvey (in South Afr. Gen. p. 418), who has described two species, from both of which Masson's plant is perhaps distinct.

I may here advert to a note at p. 225 of my former memoir (in Linn. Soc. Trans. vol. xiii.), in which I thought it not improbable that a parasite briefly noticed by Isert (in Reise nach Guinea, p. 283) might be related to *Rafflesia*. I have now, however, reason to believe that Isert's plant is the *Thonningia sanguinea* of Vahl (in Act. Soc. Hist. Nat. Hafn. t. vi. p. 124, t. 6, and Schumacher, Guineische Plant. p. 431), a genus nearly related to, if really distinct from *Balanophora*.

Desc.—Planta feminea masculæ omninò similis insertione, bracteis et perianthio.

Columna quæ figura, stylis disci et limbo elevato indiviso apicis, necnon annulo duplici baseos cum mascula per singula puncta convenit; ab eadem differt *externè* rudimentis solum minutis papillæformibus polline destitutis antherarum, et loco cavitatum antheris maris respondentium sulci tantum lineares angusti nec profundi: *internè* ovario processibus indefinitè numerosis irregulariter confluentibus in cavitatibus labyrinthi speciem formantibus divisa.

Ovula numerosissima parietibus cavitatum ovarii sine ordine sparsa, primò nucleo papilliformi sessili nudo, mox basi attenuato in funiculum rectum, apice incrassatum primordium annulare integumenti simplicis quod sensim auctum demum nucleum omninò includit apice perforato, funiculoque simul elongato extra medium arctè recurvato et incrassato.

Pericarpium, bracteis, calyce, apiceque patelliformi styligero columnæ delapsis, denudatum, omninò superum vel liberum, subovatum carnosum crassum altè rimosum indehiscens, cavitatibus sicut in ovario indefinitè numerosis inordinatis amorphis polyspermis.

Semina pedicellata, funiculi dimidio *inferiore* cylindraceo cellulari molli pallido: *superiore* maximè incrassato arctè recurvato subovato castaneo lacunoso solido duro. *Semen ipsum* ovatum vix diametro apicis dilatati funiculi, castaneum altè lacunosum.

Integumentum exterius crasso-crustaceum subnucamentaceum; *interius* membranaceum pallidum lacunis exterioris leviter impressum.

Albumen magnitudine integumenti interioris laxè cellulosum aqueo pallidum.

Embryo e cellulis subduplici serie ordinatis iis albuminis majoribus constans, ex apice albuminis ortus, ejusque dimidio longior.

HYDNORA AFRICANA.

Hydnora africana, *Thunb. in Act. Holm.* (1775), vol. xxxvi. p. 69. tab. 2. *E. Meyer in Nov. Act. Acad. Cæsar. Nat. Curios.* vol. xvi. par. 2. p. 775. tab. 58.

Planta Aphyteja, *Resp. Achar. cum tab.* (1776). *Amœn. Acad.* vol. viii. p. 310.

Aphyteia Hydnora, *Harv. Gen. South Afr.* p. 299.

Loc. Nat. Africa Australis parasitica in radicibus Euphorbiæ succulentæ cujusdam secundum Thunberg et Drege; et quandoque Cotyledonis orbiculatæ auct. D. Mundt *in Harvey, South Afr. Gen.* p. 299. Nuperrimè etiam in Africa boreali detecta, fid. sp. asserv. in Museo Parisiensi.

Desc. Primordia sunt Caules e dilatata radice plantæ sustinentis orti, humifusi v. sæpius semisepulti, angulati (4–5–6-goni) digitum crassi simplices v. sæpius ramosi, solidi angulis tuberculatis, tuberculis approximatis obtusis, apice sæpe rimoso, quasi dehiscenti sed nunquam fibras exserenti; intra corticem strato paulo laxiore magisque colorato, centro densiore e cellulis præsertim conflato et fasciculis tenuibus parcis vasorum instructo.

E tuberculo plurimum aucto exsertus est *Flos* erectus basi in pedunculum abbreviatum, intùs vasculosum sensim paulo angustatus, penitus ebracteatus.

Perianthium monophyllum, tubulosum subinfundibuliforme, carnosum extùs (uti pedunculus) rimis plurimis superficialibus in areolis subrotundis, plus minus angulatis squamas primò intuitu quodammodo referentibus divisum et quasi leprosum. *Tubus* intus glaberrimus sed sæpe transversim subrugosus. *Limbus* tubum subæquans tripartitus (rarissimè 4-partitus) æqualis, æstivatione induplicato-valvata; laciniis primum latere hiantibus, apicibus diutius cohærentibus demum distinctis, modicè patentibus ovalibus oblongisve obtusiusculis, marginibus veris latè et obliquè induplicatis majorem partem disci apicemque omninò occultantibus extùs ramentis numerosis subulatis conspersis marginalibusque elongatis ciliatis; singulis disco lævi e majore parte tecto *pulvinulo* adnato oblongo carnoso, sæpè longitudinaliter striato, apice marginibus laciniarum ibi coalitis occultato acutiusculo, basi obtusa subcordata.

Columna staminea infra medium tubi orta, brevissima annulum efformans altè trilobum, lobis laciniis limbi oppositis rotundatis obtusis. *Antheris* indefinitè numerosis, connectivo communi crasso carnoso penitus adnatis, parallelo-approximatis, elongato-linearibus, bicruribus, crure altero plurimarum postico altero antico, nonnullis quasi pressione reliquarum et præcipuè iis ad ortum loborum columnæ sitis abbreviatis sæpiùs in dorso, rariùs in ventre lobi obviis; omnibus primum bilocularibus sed sulco unico longitudinali dehiscentibus.

Pollen simplex sphæroideum læve.

Ovarium totum adherens, parietibus cavitatis lævibus.

Stigma discum apicis ovarii occupans, sessile depressum trilobum; lobis iis annuli staminei et laciniis limbi perianthii oppositis; singulis striis linearibus numerosis, e peripheria cordata lobi centrum versus plus minus divergentibus, respondentibus totidem lamellis planis arctè approximatis sed ad cavitatem ovarii usque distinctis, ibique manifestiùs separatis et placentiferis.

Placentæ indefinitè numerosæ, una pluresve e superficie interiore lamellæ singulæ stigmatis ortæ, ideoque omnes ex apice ovarii pendulæ, cylindraceæ, dimidium cavitatis, cujus parietes læves omninò steriles, superantes, undique ovulis densè tectæ.

Ovula primum sessilia papillæformia uniformia, dein subcylindracea, brevè pedicellata, apice obtuso depresso, v. perforato v. membrana semitransparente tecto, nucleo incluso manifesto.

Pericarpium perianthio toto supero et annulo stamineo delapsis denudatum, stigmate persistenti apice clausum, sphæroideum magnitudine pomi minoris, areolis squamas æmulantibus inæquale quasi leprosum, carnosum crassum indehiscens, cavitate placentis undique seminiferis densè repleta.

Semina subglobosa, pedicello brevi quandoque subnullo insidentia.

Integumentum exterius crasso-membranaceum subpulposum areolatum cellulis minutè granulatis: *interius* albumine arctè adherens.

Albumen densum, subcartilagineum, aqueo-pallidum, per lentem modicè augentem structura quasi radiata, sed magis auctum constare videtur substantia denso semitransparenti alba nec in cellulas manifestè divisa, sed undique farcta corpusculis celluliformibus figura variis, in serie extima majoribus oblongo-obovatis, reliquis minoribus vix symmetricè positis, omnibus semiopacis e membrana materia minutè granulosa repleta formatis.

Substantia densa Albuminis uniformis forsan e cellulis parietibus incrassatis et obliteratis singulis, nucleo (corpusculo) semiopaco fœtis.

Embryo in centro albuminis parvus subglobosus aqueo-pallidus e cellulis numerosis parvis mollibus, materia minutè granuloso repletis, ab albumine facilè separabilis, et absque ulla manifesta communicatione cum ejusdem peripheria vel ope suspensorii, v. canalis intermedio.

EXPLANATION OF THE PLATES.

Rafflesia Arnoldi.

Tab. XXII.

Fig. 1. A female flower-bud, with the roots of the *Vitis* (or *Cissus*) vertically divided, which shows the numerous irregular cavities of the ovarium chiefly if not entirely above the insertion of bracteæ and calyx, and the vascular lines continued from the walls of the cavities through the upper solid part of the column into the axes of the style-like processes:—natural size.

Fig. 2. A female flower-bud in the same stage of development, the bracteæ and calyx entirely removed, to show its outward resemblance to the male flower-bud (figured in Linn. Trans. vol. xiii. Tab. XXI.):—natural size.

Tab. XXIII.

Fig. 1. A small segment of the column, of which part of the elevated undivided limb is removed, to show the narrow furrows of the sides of the column corresponding in number with the rudiments of antheræ, seen in

Fig. 2, which is the portion of the limb removed from fig. 1 :—natural size.

Fig. 3. The upper half of one of the styles of the disc, with its terminating hairs :—magnified 10 diameters.

Fig. 4. A portion of fig. 3, somewhat more highly magnified (20 diameters), vertically divided.

Figs. 5, 6 & 7. Some of the hairs still more highly magnified, which, according to Mr. Bauer, have a secreting surface seen in fig. 7, and which in figs. 5 and 6 is covered with the secretion, consisting of spherical particles enveloped in mucus at fig. 8 :—magnified 100 diameters (but see observations respecting them in page 225).

Figs. 9 & 10. Longitudinal and transverse sections of a style :—magnified 50 diameters.

Fig. 11. A transverse section of half the ovarium, to show the numerous irregularly ramified cavities, and the arrangement of vascular cords belonging to the bracteæ and calyx :—natural size.

Fig. 12. A small portion of the ovarium, with the ovula covering the surface of the cavities, and the vascular lines passing through the axes of the parietes :—magnified 20 diameters.

Figs. 13—18. Ovula in various stages (the earliest observed are not represented) :—magnified 100 diameters.

Tab. XXIV.

Fig. 1. A ripe pericarpium, of the natural size, the calyx, bracteæ and apex of the column being deciduous.

Fig. 2. The same divided vertically, and showing the thickness of the densely-fleshy and deeply-furrowed covering, and also that the whole of the ovarial cavity is above the insertion of bracteæ and calyx.

Tab. XXV.

Fig. 1. A small portion of the wall of two adjoining cavities, the surfaces covered with numerous seeds, all of equal size :—magnified 20 diameters.

Fig. 2. A seed with its funiculus, of which the lower erect portion is filiform, the recurved upper half being of the same texture, colour and surface with the seed, which it somewhat exceeds in thickness :—magnified 100 diameters.

Fig. 3. The same divided longitudinally, to show the structure of the seed (according to Mr. Bauer), and that the enlarged apex of the funiculus is solid :—magnified 100 diameters.

Fig. 4. The nucleus of the seed taken out of its thick nut-like outer covering :—magnified 100 diameters.

Fig. 5. The same nucleus, whose membranous coat is separated by pressure, to show the albumen:—magnified 100 diameters.

Fig. 6. The denuded loosely-cellular albumen.

Fig. 7. A portion of the albumen, exhibiting the embryo, its surface and lateral origin, according to Mr. Bauer:—magnified 100 diameters.

Fig. R. Br. is a longitudinal section of the albumen, exhibiting R. Brown's view of the origin, form and surface of the embryo.

Tab. XXVI.

Fig. 1. A branch of the *Vitis*, on which are four very young buds of *Rafflesia Arnoldi*:—natural size. Of these,

a. (not separately figured) is merely a very slight swelling, caused by the nascent parasite, but before its parts are distinguishable.

A. (also separately figured, vertically divided and moderately magnified), the youngest parasite whose parts are distinguishable, deeply seated, entirely enclosed, and before its cortical covering corresponds with it in form.

B. (in like manner separately figured, divided and magnified), in which the parasite is entirely enclosed in its reticular covering.

C. In which the reticular covering has burst, vertically divided and magnified.

Hydnora africana.

Tab. XXVII.

Fig. 1. A flower of *Hydnora africana*, with its very short base.

Fig. 2. The same longitudinally divided:—both of the natural size.

Tab. XXVIII.

Fig. 1. Transverse section of a part of the tube of the perianthium, to show the three-lobed columna staminea:—moderately magnified.

Fig. 2. The inner surface of one of the three lobes of the column or antheral annulus.

Fig. 3. Outer surface of the same:—both magnified in the same degree with fig. 1.

Fig. 4. Vertical section of a portion of one of the lobes of the columna staminea, to show the thickness and texture of the common connective.

Fig. 5. Transverse section of the same, which shows the original bilocularity of each anthera:—both more highly magnified.

Fig. 6. Grains of pollen, still more highly magnified.

Ferdinand Bauer del.

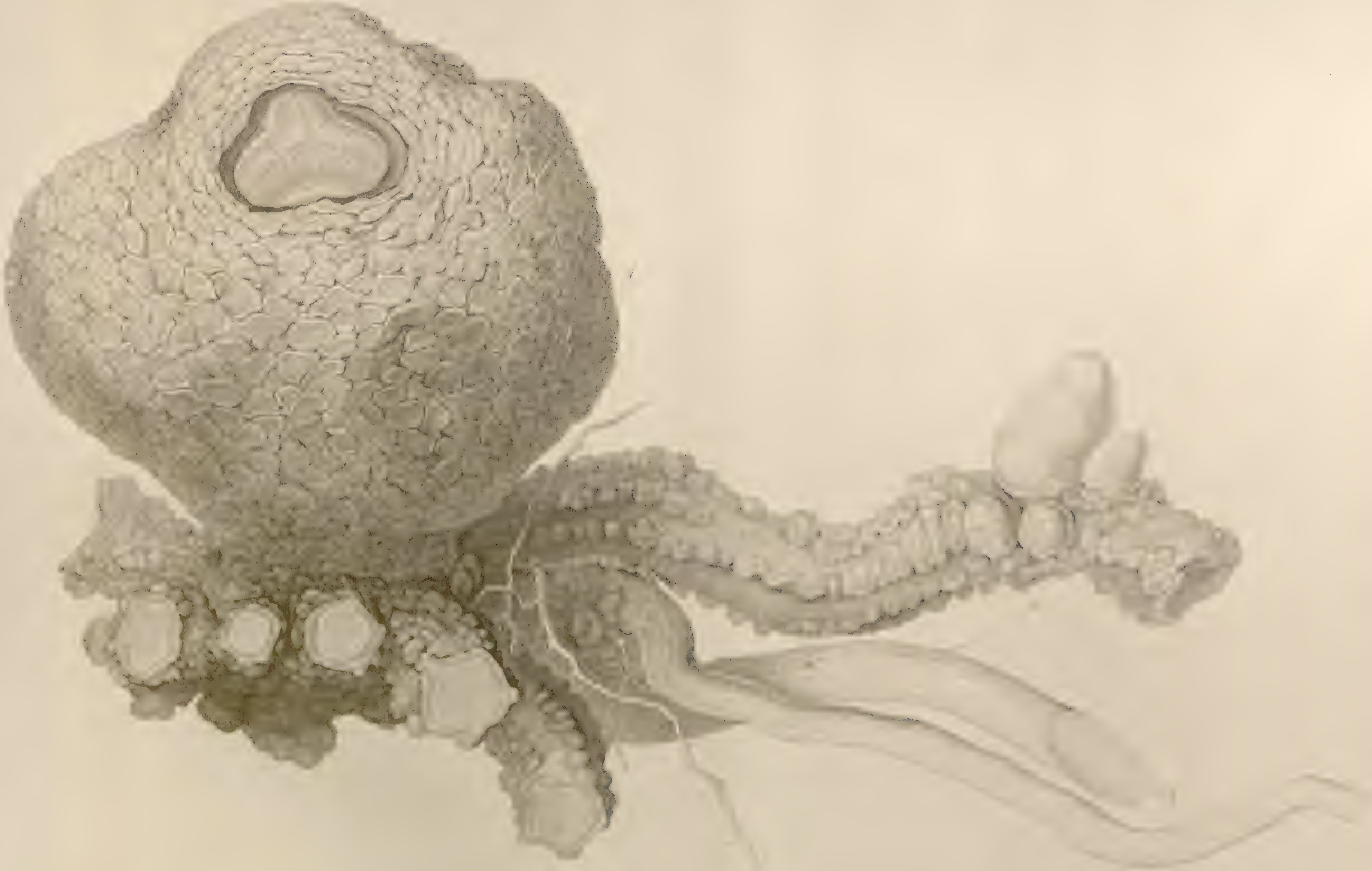

Fig. 7. Transverse section of the flower, to show the form and surface of the stigma (of which the three primary divisions are opposite to the lobes of the columna staminea):—magnified in the same degree with fig. 1.

Fig. 8. A portion of the stigma, which shows its composition.

Fig. 9. A transverse section about the middle of the same:—both magnified somewhat more than figs. 2 and 3.

Fig. 10. A vertical section of the stigma, showing that the divisions of its surface extend quite through to the cavity of the ovarium, separating it into an equal number of lamellæ, from the inner terminations of which the placentæ are pendulous:—more highly magnified than the preceding figures.

Fig. 11. A small portion of the same, still more highly magnified.

Fig. 12. A transverse section, more highly magnified than fig. 11, with its densely crowded ovula arising from every part of its surface.

Fig. 13. Three ovula more highly magnified than fig. 12, to show the pedicellus or attenuated base and depressed or perforated apex.

Tab. XXIX.

A ripe fruit (fig. 1.), with the stock (the root of the supposed *Euphorbia*, fig. 3.) and the decumbent angular branched stems of the parasite, from the thickened trunk of which the ripe fruit originates at fig. 2, and from a branch of which a very young flower-bud proceeds:—natural size.

Tab. XXX.

Fig. 1. The same ripe fruit vertically divided, with the prostrate thickened stem of the parasite and the root of the supposed *Euphorbia*, whose woody fibres and vessels appear to penetrate deeply into the substance of the thickened stem:—natural size.

Fig. 2. A portion of the fruit transversely divided.

Fig. 3. A transverse section of one of the placentæ, with the ripe seeds:—slightly magnified.

Fig. 4. Two seeds, more highly magnified than fig. 3.

Fig. 5. A seed, magnified in the same degree as fig. 4, and vertically divided, which exhibits the albumen more distinctly radiating than I have ever found it.

Fig. 6. A seed deprived of its outer coat.

Fig. 7. The same transversely divided, which, as well as fig. 5, shows the central globular embryo.

SUPPLEMENT.

To render the account of *Rafflesia Arnoldi* more complete, I shall add the distinguishing characters of the order, tribes, genera and species of *Rafflesiaceæ* with which I am acquainted. These characters, which form the chief part of the present supplement, as well as the notes to the original communication, have been written since November last.

The paper itself is printed as it was read in June 1834, a few very slight alterations, and those chiefly verbal, excepted*.

* The following brief abstract was published in the Philosophical Magazine for July 1834:—

"Linnean Society.

"June 17.—A paper was read 'On the Female Flower and Fruit of *Rafflesia*, with Observations on its Affinities, and on the Structure of *Hydnora*.' By Robert Brown, Esq., V.P.L.S.

"The author's principal object in this paper is to complete his account of *Rafflesia Arnoldi*, the male flower of which he described in a former communication, published in the 13th volume of the Society's Transactions; and, in connection with the question of its place in a natural arrangement, he introduces a more detailed description and figures of *Hydnora africana*, than have hitherto been given. The drawings of *Rafflesia* which accompany the paper are by Francis Bauer, Esq., and those of *Hydnora* by the late Mr. Ferdinand Bauer.

"From a comparison of *Rafflesia* with *Hydnora* and *Cytinus*, he is confirmed in the opinion expressed in his former paper, but founded on less satisfactory evidence, that these three genera, (to which *Brugmansia* of Blume is now to be added,) notwithstanding several remarkable peculiarities in each, may all be referred to the same natural family; and this family, named by him *Rafflesiaceæ*, he continues to regard as being most nearly allied to *Asarinæ*.

"He does not, however, admit an arrangement lately proposed by M. Endlicher, and adopted by Mr. Lindley, by whom these genera are included in the same natural class with *Balanophoreæ* of Richard; an approximation founded on their agreement in the structure of embryo, and on the assumed absence of spiral vessels. On this subject he remarks, that in having a homogeneous or acotyledonous embryo, they essentially accord, not only with many other plants, parasitical on roots, which it has never been proposed to unite with them, as *Orobanche*, &c., but also with *Orchideæ*, their association with which would be still more paradoxical. And with respect to the supposed peculiarity in their vascular structure, he states that he has found spiral vessels not only in *Rafflesia*, (in which he had formerly denied their existence,) and in *Hydnora* and *Cytinus*, but likewise in all the *Balanophoreæ* examined by him, particularly *Cynomorium* and *Helosis*, as Dr. von Martius had long since done in *Langsdorfia*, and Professor Meyer very recently in *Hydnora*.

"In his observations on the ovulum of *Rafflesia*, he gives a view of its early stages of development, I have also to state, that an extensive and highly important essay, entitled "An Attempt to analyse *Rhizantheæ*," by Mr. William Griffith, has been read during the present season before the Linnean Society, of which an abstract is given in the Proceedings. From this essay I have here introduced the character of *Sapria*, a new genus belonging to *Rafflesiaceæ*; and have ventured to propose an alteration of the trivial name from *Himalayana* to *Griffithii*, in honour of the discoverer of this interesting addition to the tribe *Rafflesieæ*, whose species, with one exception, have names similarly derived.

RAFFLESIACEÆ.

Char. Diff. Ord. *Perianthium* monophyllum regulare.

Corolla nulla.

Stamina: Antheræ numerosæ, simplici serie.

Ovarium: placentis pluribus polyspermis, ovulis orthotropis (sed in quibusdam recurvatione apicis, penitus vel partim, liberi funiculi quasi anatropis).

Pericarpium indehiscens polyspermum.

Embryo indivisus (cum v. absque albumine).

Parasiticæ *radicibus rariusve in ramis plantarum dicotyledonearum.*

Obs. Huic ordini appendendæ *Apodanthes* et *Pilostyles*, quæ a Rafflesiaceis Corolla tetrapetala et Antheris 2–3-seriatis diversæ; necnon quod in caule aut ramis solum nec unquam in radicibus parasiticæ: attamen pluribus notis *Cytineis* conveniunt.

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and which he extends to Phænogamous plants generally, in some respects different from that taken by M. Mirbel, who considers the nucleus of the ovulum, in its earliest state, as inclosed in its coats which gradually open until they have attained their maximum of expansion, when they again contract around the nucleus, and, at the same time, by elongating, completely enclose it. Mr. Brown, on the other hand, regards the earliest stage of the nucleus as merely a contraction taking place in the apex of a pre-existing papilla, whose surface, as well as substance, is originally uniform, and that its coats are of subsequent formation, each coat consisting, at first, merely of an annular thickening at the base of the nucleus, which, by gradual elongation, it entirely covers before impregnation takes place.

"But this mode of development of the ovulum, he remarks, though very general, is not without exception; for in many, perhaps in all, *Asclepiadeæ* and *Apocineæ*, the ovulum continues a uniform cellular tissue, exhibiting no distinction of parts until after the application of the pollen tube to a definite part of its surface, when an internal separation or included nucleus first becomes visible."—See a translation of this abstract in *Annal. des Sc. Nat.* ser. 2de, tom. i. p. 362.

RAFFLESIEÆ.

Char. Diff. Trib. *Perianthium* 5–10-fidum.

Antheræ sub apice dilatato columnæ simplici serie adnatæ, distinctæ, poro unico v. duplici dehiscentes.

Ovarium placentis confluentibus v. distinctis undique ovuliferis.

Pericarpium (semiadherens v. liberum) carnosum.

Semina recurvata funiculo apice dilatato.

Embryo albumine inclusus axilis, albumine brevior.

Parasiticæ *in radicibus specierum* Vitis *v.* Cissi. Flos *subsessilis bracteis imbricatis, venosis.*

Rafflesia, *R. Br.*

Char. Diff. Gen. *Perianthium* 5-fidum, æstivatione imbricata, corona faucis annulari indivisa.

Columna genitalium apice dilatato patelliformi: disco processibus (stylis?) numerosis styliformibus!; limbo elevato indiviso.

Antheræ multicellulosæ, poro unico dehiscentes.

Rafflesia (Patma) hermaphrodita, antheris viginti pluribus, stylis indefinitè numerosis confertis, perianthii tubo intus lævi (diametro floris sesquipedali–bipedali).

Rafflesia Patma, *Blume, Flor. Jav.* p. 8. tabb. 1–3.

Loc. Nat. Crescit in umbrosis Insulæ parvæ *Nusa Kambangan*, Javæ ab austro vicinæ. *Blume.*

R. (Arnoldi) dioica, antheris viginti pluribus, stylis indefinitè numerosis confertis, annulo baseos columnæ duplici, perianthii tubo intus ramentaceo (diametro floris bi–tripedali).

Rafflesia Arnoldi, *R. B. in Linn. Soc. Trans.* vol. xiii. p. 201.

Loc. Nat. In sylvis umbrosis Sumatræ, anno 1818 detexit b. J. Arnold, M.D.

R. (Horsfieldii) dioica? stylis indefinitè numerosis: centralibus confertis (diametro floris semipedali).

Loc. Nat. Java, D. Horsfield, qui Alabastra solum detexit et depingi curavit.

Obs. Species dubia a sequente diversa numero et ordinatione stylorum (fid. ic. ined. D. Horsfield).

R. (CUMINGII) dioica, antheris 10–12, stylis antheras numero vix superantibus abbreviatis: exterioribus (sæpius 10) simplici serie; interioribus (1–3) invicem subæquidistantibus, annulo baseos columnæ unico, perianthii tubo intus ramentaceo (diametro floris semipedali).

Rafflesia Manillana, *Teschem. in Boston Journ. Nat. Hist.* vol. iv. p. 63. tab. 6 *mas.*

Loc. Nat. In Samar, Insula Philippinarum; ubi primum legit *D. Cuming.* v. s. et in sp. vin. asserv.

DESC. Planta dioica *R. Arnoldi* multoties minor, diametro floris expansi sexpollicari, cæterum ante expansionem *externè* similis ut ovum ovo, indusio e cortice *Vitis* aut *Cissi* formato rugoso sed vix reticulato; *internè* convenit corona faucis indivisa tubo intus ramentaceo: differt annulo baseos columnæ unico (exteriore *R. Arnoldi* deficiente), antheris maris paucioribus (10–12), stylis utrinsque sexus vix antheras numero superantibus, haud confertis sed subsimplici serie circulari propiùs limbo quam centro dispositis, cum nonnullis (1–3) centralibus invicem distinctis et fere æquidistantibus, omnibus abbreviatis crassitie dimidium longitudinis subæquante, apice pilis brevibus acutis rigidulis barbato: femina absque antherarum rudimentis: ovarii cavitatibus stylos manifestè superantibus et tam numerosis in centro ac versus peripheriam ut in *R. Arnoldi*.

OBS. I. The trivial name *Manillana*, given to this species by Mr. Teschemacher, who has described and figured the male flower, can hardly be retained for a plant not known to grow in Luzon, of which Manilla is the capital, but in the island of Samar, where it was first found by Mr. Hugh Cuming. I have named it, therefore, in honour of the discoverer,—a change which is not likely to be objected to, as Mr. Teschemacher (*loc. cit.*) expresses his readiness to adopt any name Mr. Cuming may wish it to retain.

OBS. II. In the general tissue of this species each cell has an extremely small, round, opake nucleus. In a transverse section of the column both of the male and female flower, the central part appears to be somewhat more solid; and each of the cells, of which it seems to be entirely formed, contains a large nucleus easily separable, of a somewhat oval shape, and apparently consisting of a membrane including minute granular matter, which renders it opake. In the surrounding somewhat looser substance of the column, there seems to be an oval cell within each outer or mother cell, occupying the greater part of its cavity with less granular matter, and having frequently a minute round nucleus. The parietes of the placentæ have in each simple cell a small nucleus like that of the general tissue and of the outer portion of the column.

Sapria, *Griffith in Proceed. Linn. Soc.* p. 217.

Char. Diff. Gen. *Flores* dioici. *Perianthium* 10-fidum! duplici serie imbricatum, corona faucis indivisa.

Columna apice dilatato concavo e centro conum indivisum exserenti.

Antheræ sub apice dilatato columnæ, simplici serie adnatæ, 2–3-cellulosæ, poro unico dehiscentes.

Ovarium inferum, placentis indefinitè numerosis (parietalibus, ovulis anatropis, *Griffith*).

Sapria Griffithii.

Sapria Himalayana, *Griffith, loc. cit.*

Loc. Nat. In radicibus *Vitis* v. *Cissi* cujusdam in sylvis umbrosis Montium Mishmee jugi Himalayani, anno 1836 detexit *D. Griffith.*

Brugmansia, *Blume, Flor. Jav.*

Char. Diff. Gen. *Flores* hermaphroditi.

Perianthium 5-fidum, laciniis bi–trifidis, æstivatione valvata apicibus arctè inflexis.

Columna supernè dilatata apice excavato indiviso.

Antheræ sub apice dilatato simplici serie adnatæ, poro duplici dehiscentes!

Ovarium adherens, placentis indefinitè numerosis (parietalibus *Blume*).

Brugmansia Zippelii, *Blume, Flor. Javæ*, p. 15. tabb. 3–6.

Loc. Nat. In provinciâ Buitenzorg Javæ occidentalis, primus reperit Hortulanus Zippel. *Blume, loc. cit.*

HYDNOREÆ.

Char. Trib. *Perianthium* trifidum, æstivatione valvata.

Stamina tubo perianthii inserta.

Antheræ numerosæ, longitudinaliter dehiscentes, connatæ in *annulum* trilobum cujus lobi perianthii laciniis oppositi.

Ovarium inferum: *Stigma* sessile depressum trilobum, lobis singulis formatis e lamellis pluribus appositis ad ovarii cavitatem usque distinctis ibique placentiferis! *Placentæ* ab apice ovarii (stigmatis lamellis) pendulæ, subcylindraceæ, undique ovulis numerosissimis orthotropis tectæ.

Pericarpium calvum, carnosum, cavitate placentis undique seminiferis pleno.

Semina: *Embryo* globosus in centro! albuminis cartilaginei.

Hydnora, *Thunb.*

Char. Gen. idem ac tribus.

Hydnora (africana) hermaphrodita, perianthii laciniis latè induplicatis margine (angulo induplicationis) ciliatis apicibus demùm liberis, antheris bicruribus aversis (crure altero postico altero antico).

Hydnora africana, *Thunb. in Act. Holm.* vol. xxxvi. p. 69. tab. 2.

Loc. Nat. In Africâ australi primum detexit *Thunberg.*

H. (triceps) hermaphrodita, perianthii laciniis supernè dilatatis connatisque infernè hiantibus margine nudis, antheris omninò posticis.

Hydnora triceps, *Meyer in Nov. Act. Acad. Nat. Curios.* vol. xvi. par. 2. p. 779.

Loc. Nat. In Africâ australi. *D. Drege.*

H. (americana) dioica, perianthii laciniis liberis nudis: marginibus induplicatis angustissimis, antheris posticis.

Loc. Nat. Exemplar unicum in Herb. D. Hooker in Americâ australi lectum vidi.

CYTINEÆ.

Char. Diff. Trib. *Flores* diclines. *Perianthium* 4–8-fidum, æstivatione imbricata.

Mas. *Antheræ* in apice columnæ simplici serie, definitæ, biloculares loculis parallelo-appositis longitudinaliter dehiscentibus.

Fem. *Ovarium* totum adherens uniloculare, placentis parietalibus definitis (8–16) distinctis, per paria approximatis, lobatis. *Stylus* 1. *Stigma* radiato-lobatum. *Embryo* exalbuminosus, indivisus, homogeneus.

Cytinus, *Linn.*

Char. Gen. id. ac tribus.

Cytinus (Hypocistis) spica androgyna, perianthio quadrifido: laciniis extus tenuissimè pubescentibus.

Cytinus Hypocistis, *Linn.*

Thyrsine, *Gledit. verm. Abhand.* i. p. 199. tab. 2.

Loc. Nat. Europa australis et Africa borealis.

C. (dioicus) spicis dioicis paucifloris, floribus bibracteatis pedunculatis, perianthio sexfido: laciniis extus hispidulis.

Cytinus dioicus, *Juss. in Annal. du Mus.* xii. p. 443. *Hook. Ic.* vol. iv. tab. 336.

Phelypæa sanguinea, *Thunb. Nov. Gen.* pars 5ta, p. 93.

Aphyteia multiceps, *Burch. Trav.* vol. i. p. 213. fid. exempl. in herb. auctoris visi.

Loc. Nat. Africa australis.

C. (americanus) spicis dioicis multifloris, floribus sessilibus absque bracteis lateralibus, perianthio octofido patentissimo.

Loc. Nat. America æquinoctialis. *D. Barclay*, v. exemplaria mas. pl. in sp. vin. asserv.

Obs. Mascula planta solum visa. *Spicæ* densæ. *Perianthia* sessilia sæpius octo- quandoque novem-fida, laciniis patentissimis. *Columna* staminea teres. *Antheræ* 8–9, biloculares posticæ, loculis appositis longitudinaliter dehiscentibus, connectivis basi connatis extra medium distinctis singulisque in cuspidem subulatam productis. *Pollen* simplex. Nulla vestigia ovarii.

APODANTHEÆ.

Char. Trib. *Flores* dioici. *Perianthium* 4-fidum v. 4-partitum, æstivatione imbricatum persistens.

Corolla 4-petala! decidua.

Mas. *Antheræ* infra apicem dilatatum indivisum columnæ bi–triseriatæ! sessiles uniloculares.

Fem. *Ovarium* adherens, uniloculare, ovulis orthotropis, per totam superficiem cavitatis sparsis. *Stigma* capitatum.

Pericarpium baccatum, inferum v. semisuperum.

Embryo exalbuminosus, indivisus, homogeneus.

Parasiticæ *in caulibus et ramis* (*nunquam in radicibus*) *plantarum dicotyledonearum.*

Apodanthes, *Poiteau.*

Char. Gen. *Perianthium* monophyllum 4-fidum, bibracteatum.

Petala ipso ovario (altius quam perianthium quod textura diversum) inserta.

Mas. . . . .

Fem. *Ovarium* semisuperum.

Pericarpium carnosum, cavitate tetragona.

Semina: testa nucamentacea lacunosa (funiculo nucleum æquante v. superante).

Apodanthes Caseariæ, *Poiteau in Annal. des Sc. Nat.* iii. p. 422. tab. 26. fig. 1.

Loc. Nat. Guiana gallica, in caulibus Caseariæ spec. macrophyllæ, *Vahl.* proximæ. *Poiteau*, v. in sp. vin. asserv. in Mus. Paris.

Pilostyles, *Guillemin.* Frostia, *Bert. ined. et Endl. gen.* n. 725.

Char. Gen. *Perianthium* 4-partitum, superum.

Petala textura ferè perianthii et bractearum.

Ovarium cavitate infra insertionem bractearum superiorum producta.

Pericarpium cavitate absque angulis.

Pilostyles (Berterii) bracteis sepalisque ovato-oblongis margine nudis, stigmate papuloso apice depresso-umbilicato!

Pilostyles Berterii, *Guillem. in Annal. Sc. Nat.* ser. 2. vol. ii. p. 21. tab. 1.

Apodanthes Berterii, *Gardn. in Hook. Ic.* new ser. vol. iii. tab. 665, A.

Loc. Nat. Chili, *Bertero* et *Bridges*, in Adesmiis parasitica. v. s.

P. (Blanchetii) bracteis sepalisque subrotundis margine ciliatis! stigmate apice convexo.

Apodanthes Blanchetii, *Gardn. loc. cit.* B.

Loc. Nat. Brasilia, *Blanchet* in Bauhiniæ sp. parasitica. v. s.

Obs. Mas hujusce v. maxime affinis speciei vidi in Museo Vindobonensi a. b. *Pohl* in Brasiliâ lecta, in ramis Bauhiniæ cujusdam parasitica.

P. (Calliandræ) bracteis sepalisque ovatis margine nudis, stigmate ovato-conico apice convexo.

Apodanthes Calliandræ, *Gardn. in Hook. Ic.* new ser. vol. iii. tab. 644.

Loc. Nat. In provinciâ Goyaz Brasiliæ, in caulibus Calliandræ sp. *D. Gardner.* v. s.

XXIV. *Descriptions of the Nests of two Hymenopterous Insects inhabiting Brazil, and of the Species by which they were constructed.* By John Curtis, *Esq., F.L.S. &c. &c.*

Read February 6th, 1844.

OF the various departments in natural history which engage the attention of man, none are more interesting or more calculated to elevate his mind and to furnish him with a pure and endless source of amusement than the economy of insects. Every one who supplies any data bearing upon this subject contributes in no small degree to the advancement of natural history by augmenting the store of materials upon which true science and philosophy are based. It is the record of facts which has rendered the works of Reaumur and De Geer so interesting and invaluable.

If we look to those insects which furnish the greatest variety, sagacity, and even design in their economy, the orders of *Hymenoptera* and *Lepidoptera* will perhaps be the most highly estimated. This, however, is a subject which I will not enlarge upon here; but I am happy in the opportunity of making known to the Linnean Society two insects, whose nests are highly interesting, the one being a structure of nidus perfectly novel in the family to which the insect belongs; and the other, although similar to that of a congenerous species, differing from those which had been previously described.

For these materials I am indebted to my esteemed friend Lord Goderich, to whom they were presented, with many other curious insects, by the Right Honourable Henry Ellis on his return from a special mission to Brazil.

On looking over this collection, I saw two insects which were stated to be the two sexes, taken from a nest in an accompanying box, in which also I found a female fly: these I will forthwith describe, and afterwards enter upon the history of this remarkable animal. It is of the

Ord. Hymenoptera, Fam. Tenthredinidæ, and Gen. Hylotoma of *Klug*:

but as I consider the singular furcate structure of the masculine antennæ, combined with the variations in the palpi and neuration of the wings, sufficient grounds for dividing this extensive group into genera, I have already adopted the genus *Schizocerus* of Latreille*, to which our insect is most nearly related. If, however, the form of the palpi be of any value in generic characters, it will be impossible to include it in that genus, which is strictly the European type; I am, therefore, constrained to distinguish it by a new appellation, and I propose calling it

DIELOCERUS, *Curt.*

Antennæ articulo 3tio in mare furcato, piloso; in fœminâ simplici. *Tibiæ* ante apicem espinosæ. *Clypeus* profunde emarginatus. *Labrum* orbiculare (fig. *a*). *Mandibulæ* graciles acutæ, altera denticulo interno minuto (*b*). *Maxillæ* subæqualiter bilobæ (*c*). *Palpi* mediocres, 6-articulati, articulis tribus basalibus æqualibus, secundo tertioque crassis, quarto paulò minore, quinto omnium minimo quadrato, sexto gracili, haud reliquis longiore (*d*). *Mentum* subsemiovatum (*e*). *Palpi* tuberculis prominentibus affixi, breves, crassi, 4-articulati, articulo secundo latiore, tertio omnium gracillimo longitudine primi (*f*). *Labium* latum, trilobum (*g*).

If the above characters be compared with those of *Schizocerus furcatus*, the typical species of that division†, they will be found to differ so essentially, that it is scarcely possible to include them in the same genus.

1. DIELOCERUS ELLISII, n. s.

Mas nigro-violaceus, antennis furcatis; articulis basalibus collari facie pedibusque rufis, tarsis posterioribus fuscis; articulis basalibus albidis, alis hyalinis.

Femina rufa, abdomine nigro-violaceo, alis hyalinis, basi fasciâ mediâ apiceque nigris, tibiis tarsisque posticis fuscis basi albidis.

Description.—Violaceous-black; face, the entire pectus, including the collar, ferruginous-orange: abdomen with the centre of the segments rugose from being deeply striated: basal joint of antennæ and legs ochreous; hinder tarsi blackish, the basal joint whitish,

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* *Cryptus*, Leach and in Curtis's Brit. Ent., fol. and pl. 58.

† Curtis's Brit. Ent., fol. and pl. 58.

the extremities of the other tarsi fuscous: wings entirely transparent, with a piceous stigma, an appendiculated marginal cell and three submarginal; the 1st very long, and receiving two recurrent nervures; 2nd cell small, slightly rhomboidal (fig. 1). *Female* rufous; 2nd joint of antennæ brown, 3rd violaceous-black; abdomen violaceous, two basal segments rough and black: wings transparent; superior with the base, a fascia across the middle including the stigma, the tip and the interior margin piceous with a chalybeous shade; inferior pitchy and chalybeous at the base and external margin and transparent round the disc: hinder tibiæ black, ochreous at the base, with a stripe of the same colour and silky on the inside: 4 hinder tarsi fuscous, excepting the basal joint, which is yellowish-white tipped with fuscous (fig. 2). The insects are drawn a trifle larger than life, but the relative proportions of the sexes are preserved.

I have dedicated this species to the gentleman to whom we are indebted for this valuable addition to the economy of insects. I considered it at first to be the *Hylotoma formosa* of Klug, whose essential character of the female is "*coccinea, abdomine nigro-violaceo, alis hyalinis, basi fasciâ mediâ apiceque nigris**:" but in his German description he says, the two basal joints of the antennæ are red, the posterior legs black with red trochanters and thighs, and the basal portion of the abdomen is red beneath: now in *D. Ellisii* the abdomen is entirely blue beneath in the female, the base and inside of the hinder tibiæ are ochraceous, and the basal joint of their tarsi is whitish: the 2nd joint of the antennæ is also brown above. The male of Klug's species was unknown to him.

Different as the sexes are, this is not an isolated example amongst the *Tenthredinidæ*, for an equal dissimilarity is exhibited both in form and colour in *Lophyrus*†; it is, however, very remarkable that the neuration of the wings is not always precisely the same in the two sexes of *D. Ellisii*, the female not unfrequently having a transverse nervure forming an additional cell next the stigma, which increases the number of submarginal cells to four. The males seem to be rare, for amongst upwards of twenty specimens three only were of that sex.

The economy of this insect is so totally different from that of any other known species, as far as my researches extend, that if there were not the best

* Jahrb. der Insect. vol. i. p. 248.

† Vide L. testaceus, *Klug*, and L. Pini, *Linn.*, Curt. Brit. Ent. pl. 54.

evidence of the fact, I should be fearful to lay the present materials before the Linnean Society. The Bees and Wasps are well known for the skill and instinct which they exhibit in the structure of their hexagonal cells, one forming them of wax, the others of wood, and resembling coarse paper or pasteboard; but in this Saw-fly is a union of the woolly cocoon of the *Bombyx* and the cells of the Wasps. I think it has been intimated that the *Tenthredinidæ* might form a distinct order from the *Hymenoptera*; and those who entertained such a view, based on the ground that the larvæ were totally different in structure from the rest of the *Hymenoptera*, and feed, like those of the *Lepidoptera*, upon the leaves of plants, might perhaps with justice have considered the present as additional evidence of the connexion which this family holds between those orders. Caterpillars of the solitary Saw-flies, especially the larger ones, form singly oval cocoons of a very tough and leathery material upon the twigs of bushes and trees; and those which are gregarious, as the *Lophyri*, do the same, placing them irregularly, and having no common and united design, each one, as it becomes full-fed, forming an oval case of silk and gum, in which it undergoes its transformations; and it is the same with the social species of *Nemati*: but *D. Ellisii* is evidently gregarious, and the caterpillars unite and form upon the branch of a tree an oval or elliptical case (fig. 3), which is narrowed at the top, and four or five inches long. It is very uneven and roughish outside, of a dirty whitish-ochre colour, resembling in texture the gummed side of the cotton wadding employed in ladies' dresses; but it does not shine, yet I doubt not it is impervious to wet. The side next the tree (fig. 4) partakes of the form of the bark or portion to which it is strongly attached, being sometimes concave, at others flat; this surface is woolly, so much so, that it looks precisely like the coat from our sheep (*h*); along the centre of this are indistinctly defined the cells (*i*), placed transversely, and amounting to 13 in the smaller specimen examined; there were, however, 38 in all, as shown in fig. 5, which is a longitudinal section divided at right angles with the branch of the tree. These cells were piled one upon another, but all placed horizontally; they were unequal in size and irregular in form, those next the tree being quinquangular, the central ones hexagonal, and the outer ones the most irregular, some of them being nearly round or oval. In one of these cells I found a dead female saw-fly, and most of them had the exuviæ of the caterpillar compressed at the bottom, but no shroud of the pupæ. The inequality in the size of the cells may be attributed to the smaller ones having been the residence of the males. After this examination I divided the same portion of the nest transversely at the line *k* and *l*, fig. 5, to exhibit the length of the cells, their longitudinal form and their position (fig. 6). By this section it is also ascertained in what way the saw-flies escape from their cells when they are hatched; for at the end of each cell, sometimes at one side, and as often on the other, is a circular lid (fig. *m*), formed of the same leathery material as the entire comb, the outside being crossed with the hairs, the inside smoothish, with the edge whitish and powdery, from the liquid probably secreted by the animal to soften the material during the operation of cutting, which it performs with its two sharp mandibles (fig. *h*). Through this aperture (fig. *n*) the saw-flies make their way into the woolly wall which surrounds them, forcing themselves to the side next the bark, and then crawling out into the open air. In two of the cells I found dead caterpillars (fig. 7), which considerably resemble those of the genus *Hylotoma*: they are ochreous, the head is large and horny, with a black eye-like dot on each side: the body is covered with irregular transverse rows of black warts, the hinder segments have short black spiny appendages on their sides, and the tail is surrounded by ten shining black obtuse conical spines: they have six pectoral, eight abdominal and two anal feet; at least I could discover no more in the dried specimens; but it is possible that others might be contracted and concealed, or the lateral appendages may be employed instead of them*.

The more we reflect upon this singular nest, the more dissimilar will it appear to be from anything of the kind hitherto discovered, whether we consider its structure, or the period of the animal's existence when it is constructed; for the compound nidus is generally the work of the parents, to protect their eggs and feed their larvæ, at once affording them an asylum during three stages of their existence. Thus the bee forms its comb and the wasp its nest; the social ants also labour to form a dwelling; but in this Tenthredinous nest we find the *larvæ* uniting and forming cells in which to

* In *Hylotoma* the number of feet in the larvæ is 20; those of *Schizocerus* are unknown.

undergo their metamorphoses. The only approach to this economy, as far as I can remember, is the nidus formed by the maggots of some of the *Ichneumones adsciti**, whose silken cells are placed regularly in rows. The larvæ of the saw-flies do not appear to be such skilful workmen as the bees and wasps; and it is not improbable that insects, when arrived at their perfect or imago state, may possess a greater degree of intelligence or a superior instinct than the grovelling worm, whose business it is to eat until it has arrived at a certain stage, and after various moultings as it increases in stature, when its only care is to find a secure place suited to its transformation into a chrysalis. The irregular forms of the cells will corroborate my remarks; and their outline does not appear to be the effect of design, the necessary angles which the pressure of the sides has naturally produced varying in degree and number, and this is the more evident from the partitions being much thicker in some places than in others. In a climate like Brazil, this nest is not constructed to defend the animals from a low temperature, but it may be to protect them from heavy rains, for it seems to be a covering impervious to wet; the main object, however, is in all probability to prevent the attacks of the parasitic *Ichneumonidæ*, of which there appear to be vast numbers in South America, some of them with very strong oviducts. The slightly gummy outside covering of the nest would resist a long flexible aculeus, and a short one could not reach the cells through the woolly wall which encloses them, and even if it did, the cell itself at that distance from the Ichneumon could not be penetrated by the delicate ovipositor. It may therefore be considered as one of the innumerable instances of the protection which the Author of Nature provides for the least, and what are improperly termed the most insignificant, of his creatures.

Having in my collection two species of *Schizocerus* which appear to be undescribed, I shall take this opportunity of making their characters known.

2. Schizocerus nasicornis, *Curt.*

Mas niger, abdomine pallidè ochraceo apice nigro, alis nebulosis, pedibus fuscis; femoribus quatuor posticis ochraceis, capite in medio dentato.

* *Microgaster alvearius*, Curt. Brit. Ent., fol. and pl. 321.

Description.—Antennæ black, longer than the head and thorax, 3rd joint furcate, piceous, the rays slender, serrated and plumose, being densely ciliated on both sides: palpi long, slender and fuscous: head and thorax black and shining, the former with two elevated lines arising at the outer ocelli and forming an elongated triangle, which terminates in a little tooth or horn between the antennæ: abdomen deep yellow, margin of the 7th and two apical segments black: wings clouded with pale brown, costa, stigma and nervures piceous; superior with a large marginal cell and a small elongated apical one; three submarginal cells, the 1st and 2nd receiving each a recurrent nervure, 1st cell not very long, 2nd with the outer nervure sinuated, 3rd cell very broad; two transparent patches on the disc, leaving the base, a broad fimbria and an undefined band across the middle, brown; inferior with the centre transparent: legs lurid ochreous, four posterior thighs pale ferruginous; hinder tibiæ without spines above the apex, and piceous as well as the tarsi. Length 4 lines; horns 2; expanse 9 lines. From Brazil.

3. Schizocerus ochrostigma, *Curt.*

Mas fusco-niger, alis obscurè hyalinis costâ stigmateque flavis, pedibus ochraceis; tibiis tarsisque posticis fuscis.

Description.—Antennæ black, 2nd joint straw-colour, 3rd furcate and densely ciliated on both sides: palpi long, slender and straw-coloured: head and thorax black; collar, except behind the head, ochreous as well as the hinder margin of the scutel: abdomen brown, pale at the base, black at the apex: wings yellowish, posterior margins fuscous, darkest on the costa, nervures brown, with one marginal cell terminated by a triangular one; three submarginal cells, 1st not very long, 2nd quadrate, each receiving a recurrent nervure, 3rd short and broad; costa and stigma ochreous and yellow: legs ochreous; tibiæ simple; tarsi, excepting the base of the 1st pair, and hinder tibiæ, excepting at the base, brown. Length of antennæ 2 lines; body 3½; expanse 8 lines. From Brazil.

I supposed this to be the *Hylotoma fusca* of Klug*; but he describes the middle of the thighs as black, and his specimen being from Mexico, I am inclined to think them distinct.

Mr. Ellis having also brought home a nest constructed by a wasp, which does not appear to belong to any of the species hitherto recorded as forming similar habitations, it will prove an interesting addition to our knowledge of this remarkable family. I am led to conclude that the nest of this wasp has

* Jahrb. der Insect. vol. i. p. 247.

not yet been noticed, from the fact that the insect inhabiting it does not answer to the descriptions of those South American species recorded by Fabricius, Latreille and other writers. The *Vespa nidulans**, an inhabitant of Cayenne, is not only different in colour, but it does not belong to the same section as the species before us, having the hinder portion of the thorax as well as the base of the abdomen abruptly truncated, with a very short simple pedicel: neither can it be the *Polistes morio*†, another species from Cayenne, which is entirely shining black, with the metathorax abruptly truncated behind, and the pedicel narrow and clavate. Mr. White has also described a species under the name of *Myraptera scutellaris*‡, but that species is black with an orange scutellum.

The nest also of our Brazilian wasp differs from all the others; it is most like that of *Polistes nidulans* in form; but the entrance is in the centre of the nest in the Fabrician species, and the portion by which it is suspended is three inches broad and embraces the branch, whilst ours is attached by a twig only§. By Latreille's description of the nest of *P. morio*, it seems to be very similar to ours in form and texture, but it is represented as a foot and a half in length, and as the insects are so different, it is probable that on comparing the nests other variations would be exhibited; unfortunately there is no figure I believe to guide us. The nidus of Mr. White's insect is similar in form, but it is exceedingly rugose externally, being tuberculated and covered with large excrescences. I will now describe the wasp, which may be named

4. Myraptera brunnea, *Curt.*

Sericeo-fusca, pedibus ochraceis; femoribus genubus tibiisque quatuor posticis (nisi basi) fuscis, maculis duabus in genis flavis.

Description.—Neuter; silky brown, face shining, a long yellow spot on each cheek; mandibles ochreous, except at the base, the apex quadridentate, the teeth castaneous: inside of the antennæ orange beyond the middle; metathorax oval and sloping; petiole elongated, turbinate, slender at the base, the extremity not half the width of the abdomen, with a channel down the back: abdomen ovate-conic, not larger than the thorax, the edges of the segments obscurely edged with lurid yellow, more visible on the sides, and

* Fab. Syst. Piez. p. 266. no. 68.

† Ibid. p. 279. no. 45.

‡ Ann. and Mag. Nat. Hist. vol. vii. p. 315.

§ Reaum. vol. vi. pl. 20.

forming four fasciæ on the belly: wings yellowish at the base, deepest on the costa: stigma bright ochreous; nervures pale brown: knees, anterior tibiæ, tips of the others and all the tarsi ochreous. Length $5\frac{1}{2}$ lines; expanse 11.

The nest of this wasp (fig. 8) appears to have been suspended from a tree by a twig not much more than $\frac{1}{8}$th of an inch in diameter (*o*); it is 8 inches long and 15 in circumference at the broadest part (fig. 9), and weighs 19 ounces. It is pear-shaped, being ovate at the top and truncated, but convex at the bottom, and on the outer margin is a hemispheric tubercle pierced with a circular hole a little more than half an inch in diameter, the margin being thickened and rounded; the entire surface is rough and coated with fine reddish earth and sand, and there are various dark spots, possibly from some liquor exuding from the cells, or it may have been occasioned by berries falling upon it or other casualties. This nest is composed of such substantial materials that no wet could penetrate it, neither would it break if it were to fall from the branch; and the position of the entrance and its form are admirably adapted to protect the inmates, to keep off the wet and sun, as well as for the egress and ingress of the community. By the external undulations I can trace four layers of comb; and on shaking the nest numbers of the neuters, perfect and imperfect, have fallen out; but I cannot detect either males or females. I doubt not, from its external form and appearance, that its internal structure is very like that of *P. nidulans* figured by Reaumur. As the nest is a unique example, I have not ventured to divide it lest it should fall to pieces and be destroyed.

I will now proceed to characterize a nearly allied species, of which there were a multitude of neuters contained in the same collection. It is related to *M. brunnea*, and very probably builds a similar nest, but I can nowhere find it described.

5. Myraptera elegans, *Curt.*

Sericeo-nigra, capite thorace abdomineque lineis cingulisque fulvis, tibiis tarsisque ochraceis.

Description.—Silky black; mandibles quadridentate: antennæ ferruginous beneath towards the apex; edge of clypeus and inner margin of eyes, also the outer margin extending round the base of the head, yellow; edge of collar and of thorax, two parallel lines down the back, a line across the scutel, four long spots on the metathorax, and an oblique spot under each wing, bright yellow: petiole elongated, turbinate, slender at the base, with a minute tubercle on each side at the middle, the extremity only $\frac{1}{3}$rd as broad as the abdomen, the margin yellow as well as that of all the abdominal segments, the basal one the brightest: wings yellowish; costal and subcostal cells yellow; stigma ochreous, with a fuscous streak extending to the apex: tips of thighs and of all the tibiæ and tarsi bright ochre. Length $4\frac{3}{4}$ lines; expanse $9\frac{1}{4}$.

This wasp is more elegant in form than *M. brunnea*, and its head, thorax and abdomen are prettily and neatly marked with slender yellow lines; its abdomen is more pointed, and the stings are often exserted. It appears to be related to the *P. pygmæa*, Fab.*, but I expect the legs of that insect are black.

In order to facilitate the study of these curious creatures, I will add a list of the nine species I have found described, now forming four genera, which must be established upon the structure of the trophi, for no assistance can be derived from the form of the antennæ or the neuration of the wings.

1. Abdomen with the petiole short and gradually increasing.

1. Polistes Gallica, *Linn.*, Panz. 49. 22. Europe.
2. P. Actæon, *Hal.*, Linn. Trans. vol. xvii. p. 323: the nest is similar to the foregoing. Brazil.
3. P. Africana, *Pal. de Beauv.* pl. 8. f. 4. Kingdom of Oware.

2. Petiole very short and abruptly increasing: thorax truncated behind.

4. Epipone nidulans, *Fab.* Guêpe cartonnière, *Reaum.* vol. vi. pl. 20–24. E. chartaria, *Lat.*—*Coq. Icon.* t. 6. f. 3. *Guer. Icon.* pl. 72. f. 7. Cayenne.
5. E. Lecheguana, *Lat.* Brachygaster analis, *Perty*, in Spix and Martius, Delectus, pl. 28. f. 6. The Honey-bee of Brazil and Mexico.

3. Petiole elongated and clavate: thorax abruptly truncated.

6. Chartergus (*St. Farg.*) morio, *Fab.* G. Tatua, *Cuv.* Cayenne.

4. Petiole elongated and clavate: thorax sloping behind.

7. Myraptera scutellaris, *White, Ann. & Mag. Nat. Hist.* vol. vii. p. 315. pl. 4. f. 4–7. Brazil.
8. M. elegans, *Curt.* suprà, p. 257. Brazil.
9. M. brunnea, *Curt.* suprà, p. 256. Brazil.

* Syst. Piez. p. 280. no. 53.

EXPLANATION OF THE PLATE.

Tab. XXXI.

Fig. 1. *Dielocerus Ellisii*, mas.
Fig. 2. Ditto fem.
a. The labrum of the female.
b. The mandible.
c. The maxilla.
d. The palpus.
e. The mentum.
f. The palpus.
g. The labium.
Fig. 3. Nidus formed by the caterpillar.
Fig. 4. Interior surface of a portion of ditto.
h. The woolly covering.
i. The cells lying horizontally.
Fig. 5. Longitudinal section of a nest, exhibiting the cells with the exuviæ of the caterpillars.
k. The surface next the tree.
Fig. 6. Transverse section of the last, divided at *k*, *l*.
m. An operculum removed from
n, which shows where the imago escapes.
Fig. 7. The caterpillar.
Fig. 8. The nest of *Myraptera brunnea*, Curt., figured $\frac{1}{4}$th of the natural size.
o. The twig by which it is suspended.
p. The entrance.
Fig. 9. The bottom of the nest.
Fig. 10. *Myraptera brunnea*, neuter magnified,
q, the natural dimensions.

XXV. *On the* Neottia gemmipara *of Smith.* *By* Charles C. Babington, *Esq., M.A., F.L.S., F.G.S. &c.*

Read March 5th, 1844.

THE good fortune having occurred to me of being one of the very few botanists who have seen the rare Irish plant called *Neottia gemmipara* by Sir J. E. Smith, I have drawn up the following description of fresh specimens: and Mr. Sowerby has kindly presented me with the beautiful drawing represented on the accompanying plate.

Root of two thick fleshy cylindrical blunt tubers, of about an inch long. At the top of the tubers a bud is usually to be found (not a hybernaculum as represented in Eng. Bot. Suppl.), but it is not remarkable or constant enough to require particular notice. Stalk erect, 5 or 6 inches high, glandular above, bearing two or three smooth triangular-lanceolate attenuated sheathing small adpressed leaves. The radical leaves linear-lanceolate, acute, shorter than the stem, about 4 in number, covering the lower half of the stalk, 2 or 3 inches long; the outermost narrowed considerably below and clasping; the others with a long sheathing base, broadest at the top of the sheath. Spike 1 to 1½ inch long, oblong, dense, erect; of from 20 to 30 rather large milk-white flowers closely placed in three spirally-twisted rows, and each accompanied by a smooth triangular-lanceolate bract, the one or two lowermost of which slightly exceed the length of the flowers, but the rest scarcely equal them. Sepals and two upper petals adhering together and connected through a considerable space from their base in front, their tops free, linear, blunt. Lip spathulate, blunt, crenate; its base very broad, thick, glandular externally, channelled by the inflexion of the sides, and almost inclosing the shortly-stalked column, equalling the sepals. Operculum ovate, acute, dark brown, springing from within the hollowed extremity of the column. Rostellum of the stigma deeply bifid with flattened subulate very acute points, having an elongate linear bluntish dark brown appendage (proscolla) between and extending beyond them. There is a slight blunt projection between the operculum and the rostellum, which seems to represent the intermediate processes which are found in *Spiranthes autumnalis* and *S. æstivalis*.

It will be seen from the above description that the plant under consideration may fairly be referred to the genus *Spiranthes* (included in *Neottia* by Smith), although differing from the other European species in some particulars; the most remarkable of these is the connection of all the sepals with the two upper petals. In appearance it differs greatly, owing to its very dense spike and the arrangement of the flowers in three spiral lines. The idea of its forming a new genus, suggested by Mr. Sowerby from the examination of the dried specimen in the Smithian herbarium, is now proved to be erroneous.

It now becomes necessary to endeavour to determine the identity or otherwise of Smith's *N. gemmipara* with the published species included in the genus *Spiranthes*; and for the opportunity of doing this I have to acknowledge my great obligations to Sir W. J. Hooker, who most kindly allowed me free access to his extensive herbarium.

In his 'Genera and Species of Orchideous Plants' Dr. Lindley points out the affinity of this plant with the *Sp. Romanzoffiana*, Cham., from which it is now found to differ by its much shorter bracts; its blunt, linear and equally broad sepals; and its longer spathulate lip. If, however, we examine another allied species, the *Sp. cernua*, Rich. (*Ophrys cernua*, L.), we find a plant agreeing most exactly with the Irish *N. gemmipara*; indeed, after a careful examination of Drummond's Rocky Mountain specimens of *Sp. cernua*, I am unable to detect the slightest difference. Smith's name must therefore become a synonym. I venture to offer the following specific character for the species.

Spiranthes cernua, Rich.; tuberibus elongato-cylindricis, foliis radicalibus lineari-lanceolatis vaginantibus: exteriori amplexicaule; caulinis triangulari-lanceolatis vaginantibus, bracteis floribus brevioribus, spicâ densâ, floribus trifariis, sepalis petalisque æqualibus obtusis cohærentibus; labello oblongo medio nonnihil constricto apice rotundato crenato.

Ophrys cernua, *L. Sp. Pl.* 1340.

Neottia gemmipara, *Sm. Engl. Flor.* iv. p. 36.

Spiranthes cernua et Sp. gemmipara, *Lindl. Gen. et Sp. Orch.* 467.

Hab. America Borealis e Terrâ Novâ ad Fort Vancouver usque; etiam apud Bearhaven in Co. Cork Hiberniæ, florens in Augusto Septembrique.

By the favour of the Rev. William Hincks I am enabled to give the follow-

L. S. Weddell sc.

ing extract from Mr. J. Drummond's original journal, where it appears under the date of August the 3rd; no year is stated, but it must have been, in Mr. Hincks's opinion, 1809 or 1810:—" The following day I spent on Bear Island. I found nothing new upon it, but I found a very curious species of *Ophrys*, which I believe to be new, upon the main land opposite the western redoubt, growing in a salt marsh near the shore; it was in very small quantity. I only found two specimens." One of these two is probably the specimen now preserved in Sir J. E. Smith's Herbarium. From that time until recently the plant was not noticed by any botanist; but within the last few years it has been again discovered near to, but probably not in exactly, the original spot by Dr. P. A. Armstrong, a physician resident at Castleton Bearhaven, in the county of Cork, growing in small quantity within less than a mile of that town. He kindly conducted Mr. E. Winterbottom and myself to its station on the 30th of September 1843. We there saw about twelve specimens, several of which had been destroyed by cattle, and all the remainder were in rather an advanced state of flowering. This plant seems to be confined to a very few spots near to the sea-shore of that district, occupying the drier parts of rather boggy fields.

EXPLANATION OF THE PLATE.

Tab. XXXII.

Fig. 1. *Spiranthes cernua*, natural size.

Fig. 2. A flower and bract, magnified.

Fig. 3. A flower with the sepals and petals removed, to show the column.

Fig. 4. The column of *Spiranthes autumnalis*, to show the difference.

XXVI. *Monograph of the Class* Myriapoda, *Order* Chilopoda; *with Observations on the General Arrangement of the* Articulata. *By* George Newport, *Esq., Fellow of the Royal College of Surgeons, President of the Entomological Society, &c. Communicated by the Secretary.*

Read March 19th, April 2nd and 16th, 1844.

It has been well remarked by Gervais, in his essay on the *Myriapoda*, that of all the *Articulata* this class has been less carefully studied than any other. So few and general are the details respecting the *Myriapoda*, even in the works of those who have paid most attention to them, that it has been almost impossible to identify any one species from the descriptions that have heretofore been given. The species formerly described by Leach, few as they were, have from this circumstance remained up to the present time almost entirely unknown to the continental naturalists, and, as recently remarked by Brandt, it still remains for the English naturalists to supply these deficiencies. Many new species have lately been described by Brandt himself; and the multitude of specimens that are now brought to this country from every part of the world, prove that the number of species that exist is very considerable, although their distinct identification is exceedingly difficult, owing to their great similarity of form, and often of colour; and also to the great variableness in the markings and colour in the same species. It was the total inability I experienced from these causes to identify specimens that I wished to examine anatomically, that led me to attempt to characterise what seemed to be new to science, and to re-examine those formerly described by Leach, and still preserved in the cabinets of the British Museum. In this endeavour my views have been most kindly forwarded by my friend the Rev. F. W. Hope, who in the most handsome manner placed his whole collection at my entire command, for the purpose both of internal anatomical investigation of structure as well as for the description of species. I have also to acknowledge a like unrestricted access to the cabinets in the British Museum, through the liberality of the head of the department, J. E. Gray, Esq., to that of the Museum of the gentlemen of the United Service, of the Zoological Society, and also to the Linnean and Banksian cabinets. These means of research have enabled me not only to identify many of the species originally described by Linnæus and Dr. Leach, and to add considerably to the number of new species, but also to deduce conclusions respecting the whole class. Part of these results, which refer to the *Chilopoda*, I now propose to do myself the honour of submitting to the Linnean Society.

The *Myriapoda* may be characterized as an osculant class of invertebrated apterous animals, that typify, as a permanent condition, the transitory form of the larva state of insects. One division of these animals has relation to the rapacious and active *Arachnida*, and the other to the strong-bodied, lignivorous *Crustacea*. In each division the head of the Myriapod is distinct from the body, and is furnished with a pair of antennæ; and the body is elongated, and divided into many uniform, moveable segments, of which, in the adult state, there are usually more than fifteen, and never less than twelve. Each of these moveable segments gives origin to one, and sometimes to two pairs of legs. The *Myriapoda* respire atmospheric air by means of spiracles and ramified tracheæ. They leave the ovum in an incompletely developed embryonic form, and afterwards undergo many changes of tegument or pseudo-metamorphoses, at each of which the body acquires an addition of segments and legs, until the animal has obtained its adult number; after which it merely continues to increase in size at each change.

Linnæus and the older naturalists arranged the *Myriapoda* with apterous insects, and even now* they are regarded by some as constituting only a division of the great class *Insecta*. But although they approach very closely in their general appearance, internal anatomy and modes of life to the larva state of insects, they nevertheless differ quite as much as the *Crustacea* and *Arachnida*, which almost every modern naturalist has separated from the true Hexapods. The manner in which the *Myriapoda* acquire their perfect state, by an extension of, and an addition to, rather than by a shortening of the body, is so dissimilar to the changes in insects that it fully entitles them to be

* Brandt.

considered as a distinct class, notwithstanding the opinions that have recently been urged by some naturalists in regard to their supposed identity with true insects.

The place assigned to the *Myriapoda* by Linnæus was at the end of his order *Aptera*, immediately before the true *Vermes*. This arrangement is in full accordance with the facts now ascertained respecting their metamorphoses and mode of growth, which indicate their close affinity to the latter class. Fabricius allied them to some of the true Crustaceans, the *Oniscidæ* or Woodlice, with which he formed them into the order *Mitosata*, and interposed them between his order *Odonata* and the *Arachnida*, a situation, assuredly, as unnatural as the objects themselves are dissimilar in habits and structure. Lamarck arranged them in his third class of invertebrated animals with the *Arachnida*, and associated them with some true Hexapods, the *Thysanoura*, to form his second order, *Arachnides Antennistes*; thus collecting together in the same group, as Gervais has well remarked *, animals that belong to three very distinct classes. Our own countryman, Dr. Leach †, was the first naturalist that appears to have carefully examined these animals, which, following to a certain extent the views of Fabricius, he grouped together as a distinct class by the name of *Myriapoda*. But although Leach avoided the error of Fabricius in approximating them to the winged insects, *Libellulidæ*, the *Odonata*, and connected them more naturally, on the one hand, with the *Crustacea*, by means of the genera *Armadillo* and *Glomeris*, he united them, on the other, to the *Arachnida* by means of the *Geophilidæ* and *Nymphons*, and thus placed them between two classes, the *Crustacea* and *Arachnida*, which certainly are more nearly related to each other than to the *Myriapoda*.

The class *Myriapoda*, as established by Leach, has been adopted by many eminent naturalists, but there still exists as great a diversity of opinion in regard to its relation to the other classes as before its separate establishment. De Blainville first connected the *Myriapoda* with the *Annelida* by means of the bristly genera, the *Annelida errantia*; but subsequently remarked a closer connexion between the two classes in the singular Iuliform genus *Peripatus*, Guild., which genus he afterwards established as a separate class. Latreille

* Annales des Sciences Naturelles, Janvier 1837.

† Linnean Transactions, vol. xi. p. 376, 1814.

regarded the *Myriapoda* as closely connected with the *Thysanoura* *, to which he joined them by means of the genus *Forbicina*, Geoff.; while Strauss agrees with De Blainville in opinion respecting the affinity which exists between the *Myriapoda* and *Annelida* †, but conceives the transition to be found in *Pollyxenus* on the one hand, and *Eunice* and its affinities on the other; and he has also remarked, with Latreille and Dugès, that the *Myriapoda* have some close relations with the *Thysanoura*. A more recent authority, M. Brandt ‡, who has paid very close attention to these animals, regards them as connected directly with true insects; and in this opinion he is supported, as he remarks, by the Committee appointed to examine a work recently presented by M. Gervais to the Institute of France.

After an attentive examination of the *Myriapoda*, as compared with other *Articulata*, I have been unable entirely to adopt the views of any one of the distinguished naturalists above noticed, either in regard to the situation which they ought to occupy in the arrangement of the *Invertebrata*, or to the affinities by which they are connected with the other classes. They certainly have many close relations to the larva state of true insects in the elongated form of the body, in their mode of respiration, in the structure of the organs of circulation and nutrition, and also in the arrangement of their nervous system; but they differ from them entirely in their mode of growth and development.

The *Myriapoda*, as just stated, acquire a periodical addition of segments and legs, with their separate ganglia, nerves and other structures. This addition of new parts, at each change of tegument, takes place in all the *Myriapoda* up to a certain period of their growth, which period varies in different genera. But this addition of parts never occurs in Insects, even in the lowest forms of the class, or even in their earliest stages, after leaving the ovum. Every entomologist is aware that when an insect bursts from the egg it is furnished with the whole number of segments and legs it is ever to possess; and in no instance does the number of segments exceed fifteen. The usual number, thirteen, as naturalists are well aware, is very rarely exceeded; although

* Nouvelles Annales du Muséum, i. p. 175.

† Considérations Générales sur l'Anatomie des Animaux articulés, 4to, 1828, p. 16.

‡ Recueil de Mémoires relatifs à l'ordre des Insectes Myriapodes, 1841.

in some of the *Hymenoptera* Mr. Westwood* and myself† have observed fifteen. During the changes of the insect this number is gradually reduced by the aggregation and anchylosis of some of the segments to form particular divisions or regions of the body, in the construction of which some of the segments become enlarged, and others are atrophied or almost obliterated. In the *Myriapoda*, on the contrary, the young animal invariably comes from the ovum with its smallest number of segments, and in most of the genera this seldom exceeds *nine*; although before the Myriapod has arrived at its full growth, it acquires, in some species, nearly eight times the original number; a definite number of new segments being constantly in the course of formation between the antepenultimate and penultimate segments of the body. This is the great characteristic of the class, which distinguishes the *Myriapoda* from *Insecta*, *Arachnida* and *Crustacea*, and approximates them to the *Annelida*, in which a similar addition of parts takes place. The *Myriapoda* are also distinguished from Insects by a permanent anatomical character, the number of segments and legs in the adult animal. There are never fewer than twelve segments and eleven pairs of legs in any genus of *Myriapoda*. In some genera the latter even amount to one hundred and sixty; while no insect, even in the larva state, has more than eight pairs, five of which are rudimentary, and disappear as soon as the four anterior segments have acquired their full growth, and the insect undergoes its metamorphosis, when its legs are reduced to three pairs, and the insect passes into a higher state of development. These are the considerations which have led me, with Leach, Latreille, and others, in opposition to the high authority of M. Brandt, to separate the *Myriapoda* from the true Insects, and to place them as a class immediately before the *Annelida*.

It has been customary with most zoologists to make the organs of nutrition the basis of classification in the *Invertebrata*, because these are more distinctly marked in the lowest organized species. This is the view adopted by Cuvier, Owen, and some other anatomists and zoologists. But although I hesitate to differ from these high authorities, I cannot help regarding the organs of

* Transactions of the Entomological Society of London, vol. ii. p. 124.

† Article Insecta in Cyclopædia of Practical and Comparative Anatomy, part 17. vol. ii. October 1838.

nutrition as not so peculiarly characteristic of animal life as necessarily to be adopted as the basis of arrangement; and I rather prefer, with De Blainville and some others, to take, in the arrangement of the *Invertebrata*, those parts of the body which seem more especially to distinguish the animal from the vegetable creation, and which have obtained the preference in the classification of the *Vertebrata*, viz. the skeleton and organs of locomotion, together with the nervous system, that peculiar structure by which the animal functions are governed, and the being elevated by its greater instinct or intelligence. The organs of nutrition certainly are more of a vegetative than of a truly animal character, and as compared with those by which the functions of all the organs of the body are excited and controlled and the acts of the being itself are regulated, seem to deserve but secondary consideration in any attempt to assign to that being its proper position in the scale of creation. Every naturalist is aware that we are unable satisfactorily to trace a direct continuity of form or structure from the lowest of one class to the most perfect of that next below it; because in each class there is a gradual convergence to some rudimentary condition, in which the animal is of very inferior grade, and its principal organs are those of the vegetative character. This, as is well known, is in a marked degree the case even in some of the *Vertebrata*, as in Fishes, in which there is a gradual transition from the perfect cartilaginous species, the Sturgeons, Sharks and Rays, to the imperfect vermiform Lampreys and Lancelet, of which last naturalists at first doubted whether it belonged even to the *Vertebrata*, or whether it was not one of the *Mollusca* or the *Vermes*. In like manner the *Mollusca*, which, in consequence of their highly developed organs of nutrition, were placed by Cuvier at the head of the *Invertebrata*, pass to the *Salpæ* and *Pyrosomæ*, some of the most imperfectly organized beings. These facts have induced me to pay less consideration to what otherwise might be regarded as objections to the arrangement I am about to propose. On this account I have adopted the skeleton and organs of locomotion, together with the nervous system, as the foundation of an arrangement, and as affording the most distinctive marks of the higher development of animals. I propose to place the subkingdom *Articulata* at the head of the *Invertebrata*, and, following in the steps of our distinguished countrymen Kirby and Spence, to commence with the Hexapods, the true *Insects*, and after these the Octopods, the

Arachnida, and the Decapods, the *Crustacea*, to be followed by the *Myriapoda*, the *Annelida*, and the remainder of the *Articulata*.

It may be urged against this mode of arrangement that it is not entirely in accordance with some parts of the internal anatomy of these classes, especially in the supposed inferiority of structure of the circulatory and digestive organs in true Hexapods. But I have elsewhere shown* that this supposed inferiority is not correct, and that a circulation in distinct vessels does really exist in perfect insects, as in the *Arachnida* and *Crustacea*, although the vascular structures are less easily detected in insects, on account of their smaller size and greater delicacy, in consequence of the much smaller size of the animals themselves; while a distinct arrangement of circulatory vessels distributed over the internal organs, as well as to the muscular structures, exists also in the *Myriapoda*. As regards the anatomy of the digestive organs, many insects have these parts more perfect than the *Crustacea*, or even the higher *Mollusca*, as, for instance, the *Orthoptera*. The supposed superiority of structure of the digestive apparatus in the *Arachnida* and *Crustacea* is chiefly in the more perfect development of some of the glandular appendages, as the liver, which, as an excretory organ designed to separate from the circulatory fluids a greater quantity of carbonaceous matter† than could be thrown off readily by the branchiæ or pulmono-branchiæ, may be rendered necessary in these classes on account of their peculiar habits. In regard to their nervous system, Insects appear to be much superior to the *Crustacea* and to the *Arachnida*, although the contrary has usually been supposed. I do not regard the mere accumulation of nervous matter in any portion of the cord on the thoracic or ventral region of the body as indicatory of a higher development of the animal, because such accumulation is necessarily consequent on the size and number of the organs of locomotion which are collected more or less nearly together in some portion of that region; and because the ventral cord with its ganglia is the analogue only of the medulla spinalis with its enlargements in the *Vertebrata*. But I am inclined to believe that the supra-œsophageal ganglia, which recent experiments, elsewhere detailed‡, have convinced me are alone endowed with the functions of a true brain, and consequently are the true analogues of the

* Phil. Trans. 1843, part 2. p. 243, &c.

† Dr. Willis.

‡ Phil. Trans. 1843, part 2. p. 264, &c.

brain of *Vertebrata*, are those parts of the nervous system which indicate high development. The relatively greater development of these parts, as compared with that of the other portions of the nervous system in the different classes of the *Articulata*, seems to indicate that Insects, as a class, are superior to the other classes. In support of this view I need but refer to the great development of the cerebral portion of the nervous system in the gregarious *Hymenoptera*, so remarkable for their half-reasoning intelligence. In these insects the development of the brain, as compared with that of the other parts of the nervous system and of the body, exceeds that of any of the other *Articulata*. The perfection of organization, as seen in the most perfect forms of the *Vertebrata*, is the performance of the voluntary functions of the body by the most concentrated means. A relatively inferior size of the cerebral portion of the nervous system, and an increased number of organs of locomotion, may thence be regarded as proofs of a lower type of development. This view is supported by the small size of the cerebral ganglia and by the existence of abdominal legs for locomotion in the larvæ of Insects. These cerebral ganglia are always increased in size, and the abdominal legs have entirely disappeared when the insect has arrived at its perfect state, in which its voluntary powers are greatly augmented, and its organs of locomotion are concentrated in the thoracic region of the body. It may be urged, in opposition to this view, that an accumulation of nervous matter on the ventral surface of the body exists also in the *Arachnida* and *Crustacea*; but there is no correspondent enlargement in these classes of those portions of the nervous system, the supra-œsophageal ganglia, on which the instinct and intelligence of the animal seem entirely to depend, while the increased number of organs of locomotion indicates in them a lower type of formation.

These are the considerations which induce me to place the *Articulata* at the head of the *Invertebrata*, and the hexapod Insects above the *Arachnida* and *Crustacea*. The many analogies that exist between the *Crustacea* and the *Myriapoda*, both in external form and in the structure of some of their internal organs, show the close affinity of these two classes. On the other hand, the manner in which the *Myriapoda* are developed on their leaving the ovum, and the periodical formation of new segments to the body, show their near approach to the *Annelida*.

The division of the *Myriapoda* into tribes and genera has been subject to as much difference of opinion as their establishment as a distinct class, and the assignment of their position in the animal kingdom. Lamarck, who arranged them with the *Arachnida*, divided them at first into three genera, *Scolopendra*, *Scutigera* and *Iulus*, and subsequently added a fourth genus, *Pollyxenus*. Latreille in his later works removed them from true Insects, among which he had originally placed them, and constituted them into an order of the *Arachnida*, dividing them into two families, *Chilognatha* and *Syngnatha*. Dr. Leach adopted these families as distinct orders. He divided the first into three families, *Glomeridæ*, *Iulidæ* and *Polydesmidæ*; and the second into two, *Scolopendridæ* and *Geophilidæ*. Subsequently to this Latreille* divided the class into the orders *Chilognatha* and *Chilopoda*. These were adopted by Gervais†, but were redivided by that naturalist, the former into the *Oniscoideæ* and *Iulideæ*, and the latter into *Scutigerideæ* and *Scolopendrideæ*. But before the production of Gervais' arrangement M. Brandt had begun to rearrange the class‡, and had proposed to divide the *Chilognatha* into sections, which were again divided into families and genera. Subsequently to this, on finding that the organs of nutrition in some species were especially adapted for taking liquid food, he proposed to divide the class into the *Myriapoda manducantia* and *Myriapoda sugentia*, and he has recently republished his valuable observations on this subject§. Still more recently M. Lucas|| has published an arrangement of the class, and has followed the views adopted by Gervais, with a slight alteration of the names of the families. The arrangement proposed by Brandt is by far the most natural that has yet appeared, and is of great value so far as regards the division into families and genera. But I fully agree with Lucas, in his late observations¶, that the existence of a genus of siphonophorous Myriapods closely allied to *Scolopendra* necessarily tends greatly to modify the views of Brandt in regard to the division of the class in the manner proposed by him. Added to this, it

* Cours d'Entomologie, 1831. † *Loc. cit.*

‡ Bulletin de la Soc. Impériale des Nat. de Moscou, tom. vi., 1833, p. 194, &c.

§ Recueil de Mémoires, &c.

|| Hist. Nat. des Crustacés, des Arachnides et des Myriapodes, tom. iv., 1840.

¶ Annales de la Société Entomologique de France, deuxième série, t. i., 1843, p. 50.

may be remarked, that the structure of the internal parts of the mouth in the *Scolopendridæ* and *Geophilidæ* seems equally fitted for taking liquid as well as solid aliment. On this account I have been unable to adopt his primary division into masticating and sucking *Myriapoda* in my arrangement of this class, but have followed his plan closely in the formation of the families, sections and genera and in the characters assigned to them. His tribes I have considered, with Latreille, as distinct orders, and his families as tribes. The alterations made in the arrangement of the genera are those which Brandt himself would have followed, had he assigned to this class a position below the *Crustacea* instead of above them, a situation which the close affinities they bear to the *Annelida* fully justify me in proposing. The circumstance which led Brandt to place his *Pentazonia* at the bottom of the order *Chilognatha* was their close affinity with the Crustacean family *Oniscidæ*; and it is this very circumstance which now leads me to place them at the top. Those genera which seem to have the closest connexion with the *Annelida* are the vermiform *Iulidæ*. These not only have an affinity with the *Annelida* in the situation of their respiratory organs near the median line on the ventral surface of the body, but also in their multitude of segments, and in the number of new segments periodically acquired. Of this family the *Spirostrepti* seem to occupy the lowest position, on account both of the number and simplicity of their segments. The *Pentazonia*, which have the smallest number of segments, appear on that account to connect the *Chilognatha* with the *Chilopoda*. These are the views adopted in the following synoptic table of arrangement and characters of the genera.

Synopsis Generum.

Ord. 1. CHILOPODA, *Latr.*—Caput latum, prominens. Corporis segmenta inæqualia; singula par unicum pedum ad latera segmentorum insertorum gerentia. Mandibulæ prominentes, acutæ, falciformes. Organorum sexualium apertura ad extremitatem analem.

Trib. 1. Schizotarsia, *Brandt.*—Antennæ pluri-articulatæ, graciles, corpore longiores. Tarsi longi, pluri-articulati, inæquales. Oculi compositi, prominentes, globosi.

Fam. 1. *Cermatiidæ*, Leach.—Scuta dorsalia 8; singula segmenta 2 ventralia obtegentia. Stigmata mediana.

Gen. 1. Cermatia, *Illig.*—Oculi prominentes. Caput transversum. Scuta dorsalia emarginata. Stomatum latera incrassata.

Trib. 2. HOLOTARSIA, *Brandt.*—Tarsi 3-articulati. Caput e segmentis 2 mobilibus efformatum. Antennæ corpore haud longiores, setaceæ vel filiformes, 14–60-articulatæ. Oculi stemmatosi, aggregati, simplices vel nulli.

Fam. 2. *Lithobiidæ*, Newp.—Scuta dorsalia 15, subquadrata, inæqualia: angulis elongatis, acutis. Coxarum paria posteriora excavationibus ovatis.

Gen. 2. Lithobius, *Leach.*—Ocelli numerosi. Caput latum, depressum. Labrum denticulatum.

Gen. 3. Henicops, *Newp.*—Segmentum cephalicum latum. Ocellorum par unicum.

Fam. 3. *Scolopendridæ*, Leach.—Segmenta podophora 21 vel 23. Pedes posteriores incrassatæ; articulo primo vel secundo spinoso.

Gen. 4. Scolopendra, *L.*—Segmentum cephalicum cordatum, imbricatum. Ocellorum paria 4. Spiracula valvularia.

Gen. 5. Cormocephalus, *Newp.*—Segmentum cephalicum posticè truncatum. Spiracula valvularia.

Gen. 6. Rhombocephalus, *Newp.*—Segmentum cephalicum basilareque rhomboidea. Labium angustatum.

Gen. 7. Heterostoma, *Newp.*—Segmentum cephalicum truncatum. Dentes magni. Spiracula cribriformia, in paribus 10.

Gen. 8. Scolopendropsis, *Brandt.*—Segmentum cephalicum truncatum. Pedum paria 23.

Gen. 9. Theatops, *Newp.*—Ocelli distincti. Antennæ 17-articulatæ subulatæ. Pedes posteriores clavati. Labium dentatum.

Gen. 10. Scolopocryptops, *Newp.*—Segmenta podophora 23. Segmentum cephalicum cordatum, imbricatum. Labium haud denticulatum. Antennæ 17-articulatæ.

Gen. 11. Cryptops, *Leach.*—Segmenta podophora 21. Ocelli nulli vel absconditi. Antennæ 17-articulatæ. Labium haud denticulatum.

Fam. 4. *Geophilidæ,* Leach.—Segmenta subæqualia, singula e subsegmentis 2 completis sed inæqualibus efformata. Segmentum anale pedibus brevibus styliformibus.

Subfam. 1. *Scolopendrellinæ,* Newp.—Corpus breve, crassum. Antennæ 14–20-articulatæ.

Gen. 12. Scolopendrella, *Gervais.*—Pedum paria 10. Antennæ moniliformes, 14–20-articulatæ.

Subfam. 2. *Geophilinæ,* Newp.—Segmenta numerosa. Antennæ 14-articulatæ.

Gen. 13. Mecistocephalus, *Newp.*—Segmentum cephalicum angustissimum, elongatum. Corpus attenuatum. Labium latum, integrum.

Gen. 14. Arthronomalus, *Newp.*—Segmentum cephalicum subquadratum. Antennarum articuli inæquales. Labium angustum, emarginatum.

Gen. 15. Gonibregmatus, *Newp.*—Segmentum cephalicum cordiforme, acutum. Antennæ filiformes. Corpus lineare.

Gen. 16. Geophilus, *Leach.*—Caput subtriangulare. Corpus depressum, gradatim incrassatum. Segmenta pedesque numerosi.

Ord. 2. CHILOGNATHA, *Latr.*—Caput verticale, rotundatum. Mandibulæ crassæ, robustæ, vel cum labio coalitæ et elongatæ. Segmenta numerosa. Corporis segmenta inæqualia. Pedes superficiei ventrali affixi. Organorum sexualium aperturæ in segmenti 4^{ti} et 7^{mi} superficie ventrali.

Trib. 3. Pentazonia, *Brandt.*—Corpus ovale, in globum contractile, dorso valdè convexo, ventre complanato. Pedes laminis liberis mobilibus affixi.

Fam. 5. *Glomeridæ,* Leach.—Corpus læve, in globum contractile. Oculi distincti.

Gen. 17. Glomeris, *Latr.*—Ocelli 8, in lineâ laterali curvatâ. Segmenta 13. Pedum paria 17.

Gen. 18. Zephronia, *Gray.*—Ocelli numerosi, aggregati. Antennæ 6–7-articulatæ, clavatæ. Pedum paria 21.

Gen. 19. Sphærotherium, *Brandt.*—Ocelli aggregati. Antennæ 7-articulatæ, clavatæ. Pedum paria 21.

Trib. 4. Monozonia, *Brandt.*—Corpus vermiforme, elongatum. Segmenti singuli dimidia pars anterior cylindrica, posterior lateribus dilatata; laminâ duplici coalitâ ventrali pedum paria 2 gerenti.

Fam. 6. *Polyxenidæ*, Newp.—Caput arcuatum, prominens. Corpus latum. Pedes attenuati; *coxis maximis*. Segmentum anale fasciculis longis.

Gen. 20. Polyxenus, *Latr.*—Corpus breve, squamis parvis penicillatis vestitum. Pedum paria 13.

Fam. 7. *Polydesmidæ*, Leach.

Subfam. 1. Oculi nulli vel obscuri.

Gen. 21. Fontaria, *Gray.*—Corpus convexum. Segmenta imbricata; laminis lateralibus deflexis.

Gen. 22. Polydesmus, *Latr.*—Corpus depressum, subconvexum; laminis lateralibus horizontalibus.

Gen. 23. Strongylosoma, *Brandt.*—Corpus cylindricum. Segmenta tumida; laminis lateralibus rotundatis subnullis.

Subfam. 2. Oculi distincti.

Gen. 24. Craspedosoma, *Leach.*—Ocelli numerosi, aggregati. Corpus depressum; laminis lateralibus prominentibus.

Gen. 25. Platydesmus, *Lucas.*—Ocelli duo, magni, prominentes. Corpus depressum; laminis lateralibus prominentibus.

Gen. 26. Cambala, *Gray.*—Ocelli serie simplici curvatâ. Corpus cylindricum; laminis lateralibus brevissimis, in porcam simplicem desinentibus.

Trib. 5. Bizonia, *Newp.*—Corpus subcylindricum; laminis nullis marginalibus. Antennæ 7-articulatæ, clavatæ. Segmenta numerosa; singula e subsegmentis 2 coalitis efformata, pedumque paria 2 gerentia.

Fam. 8. *Iulidæ*, Leach.—Corpus cylindricum; laminis lateralibus nullis. Segmenta e subsegmentis 2 coalitis efformata.

Subfam. 1. *Synpodopetalinæ*, Newp.—Pedes laminis immobilibus affixi.

Gen. 27. Iulus, *L.*—Caput convexum. Corpus cylindricum. Prothoracis latera triangularia. Antennæ elongatæ.

Gen. 28. Unciger, *Brandt.*—Squama inferior analis mucronata. Corpus cylindricum.

Gen. 29. Spirobolus, *Brandt.*—Caput convexum. Oculi subtetragoni. Corpus subpyramidale. Prothoracis latera triangularia. Antennæ breves.

Gen. 30. Spiropœus, *Brandt.*

Gen. 31. Spirocyclistus, *Brandt.*—Antennæ breves. Oculi elongati, triangulares. Thoracis latera brevia, triangularia.

Gen. 32. Spirostreptus, *Brandt.*—Antennæ breves, articulis infundibulatis. Oculi transversi. Prothoracis latera elongata vel dilatata.

Subfam. 2. *Lysiopetalinæ*, Newp.—Pedes laminis mobilibus affixi.

Gen. 33. Platops, *Newp.*—Caput parvum, complanatum vel concavum. Pedes graciles, elongati. Corpus pyramidale, elongatum.

Gen. 34. Lysiopetalum, *Brandt.*—Frons dilatata. Pedes laminis liberis mobilibus affixi.

Fam. 9. *Polyzonidæ*, Newp. (Ommatophora, *Brandt*).—Ocelli conspicui, fronti inter antennas in seriebus transversis inserti.

Gen. 35. Polyzonium, *Brandt.*—Ocelli 6 parvi, in seriebus 2 transversis. Corpus depressum.

Gen. 36. Siphonotus, *Brandt.*—Ocelli 2, in serie simplici transversâ.

Fam. 10. *Siphonophoridæ*, Newp. (Typhlogena, *Brandt*).—Oculi nulli.

Gen. 37. Siphonophora, *Brandt.*—Caput conicum, elongatum. Nutritionis organa rostriformia, elongata.

External Anatomy.

Before I proceed to describe the species of *Myriapoda,* it is necessary that some notice should be taken of the general external anatomy of the class, in order that we may be enabled better to understand the analogies and to trace the origin of the structures which enter into the composition of the head, that portion of the animal from which most of the characters of the genera are derived. The laws which govern the development of this region of the body in the *Myriapoda* regulate not only the whole form of body in all the *Articulata,* and the changes from that of the elongated, cylindrical, segmented larva, to the compact, highly organized and complicated body of the perfect insect, but they regulate also the form of body and development of every structure in the *Vertebrata,* even including those of our own system.

It is on the varied extent to which some entire segments, or certain portions of some of the segments, are developed in the embryo or in the larva,—more especially those in the anterior part of the body,—that the peculiar form of every articulated animal depends.

Every segment of an articulated animal is a compound structure. The identity of those parts which enter into the composition of the segments of the thorax of hexapod Insects has already been admirably pointed out by Professor Audouin. The principles on which the changes take place, and the analogies which the appendages of the head bear to those of the other regions of the body, had previously been shown in the excellent researches of Savigny. My object, therefore, is now to develope still further the principles already laid down by these authorities, and to point out the existence of parts in the skeleton of the *Myriapoda* analogous to those which have been shown in Insects; and also to offer some additional proofs of the universality of the great laws of development by the aggregation and coalescence of contiguous structures, as shown most distinctly in the aberrant class, *Myriapoda.*

Naturalists are aware that in all the *Articulata* the organs of support are on the exterior surface of the body, and consist entirely of certain portions of the tegument in which earthy matter is deposited and consolidated. This *dermo-skeleton* affords an unyielding surface of attachment for the muscles, and more or less completely encases the whole body. In the higher *Articu-*

lata the original division of the skeleton into segments is less apparent than in the *Myriapoda*, in which each segment remains distinct throughout life. First, then,

Of the Structure of the Segments.

Every segment of the body, in its normal state, is formed of two arched surfaces, a *dorsal* and a *ventral*. Each of these surfaces is originally developed in *four* parts, two of which are situated on each side of the median line. The two middle ones of the four portions on the ventral surface (Tab. XXXIII. figs. 1 and 2) unite very early to form the single middle portion of the ventral plate (*a*), and together constitute the single median portion or true *sternum*. The two lateral pieces (*b*) are united to the *sternal* at nearly the same period, and constitute the *episternal* plates, and the whole form one large, broad, shield-shaped, abdominal plate to each segment, as is well seen in *Scolopendra*, in which genus the two arches of each segment are more uniformly developed than in any other. The longitudinal line of union of the two sternal pieces (*a a*) entirely disappears, but that of the episternal (*b*) with the sternal remains permanent throughout life as a longitudinal sulcus. This is more especially marked at the anterior border of each plate.

The dorsal arc (fig. 4.), composed like the ventral of four pieces, is less early completed. The two median plates are the last to be united. They form the *scutum* (*d*) or upper surface of each segment, along the middle of which there is usually an indication of its original longitudinal line of separation. This longitudinal line, or depression, corresponds internally to a longitudinal line of attachment for the median suspensory muscles of the heart, or so-called *dorsal vessel*, in each segment. The two lateral portions of the dorsal arc are united longitudinally with the middle ones, and form the *episcuta* (*e*), the whole together constituting one large dorsal plate or shield. The relative development of the two arcs of each segment is carried to the greatest extent in all the *Myriapoda* in the dorsal region, the episcutal plates being always more extensively developed than the episternal.

These are the normal structures in each segment. But the order in which the individual parts are completed on the dorsal surface is the reverse of those on the ventral. This difference appears to have some reference to the relative position of the nervous and vascular systems. The nervous cord in the

Invertebrata is extended along the ventral surface of the body, and it is that portion in each segment which is first completed; while in the *Vertebrata* it is extended along the dorsal surface, which in like manner first acquires its definite form. The dorsal surface of the *Invertebrata* is occupied by the vascular system, and, like the abdominal surface, at which the nutrient vessels of the embryo enter, in the *Vertebrata*, is the last portion of the external surface of the body that is completed, as may be readily seen in the development of the animal in the ovum. Consequently the dorsal portion of the tegument in the *Myriapoda*, and other *Articulata*, is less early completed than the ventral, although often developed to a much greater extent.

Before proceeding further, I ought to state that the mode and order of development of the dorsal and ventral surfaces, as now indicated, refer especially to what takes place in the original formation of the segments which constitute the whole animal in the ovum. Before quitting the egg and the condition of an embryo, the body, in most of the *Myriapoda*, is composed of only nine segments; although before the animal arrives at its adult state, as first indicated by De Geer, it acquires a periodical addition of new segments. In this *post-embryonic* development each new segment makes its appearance as a whole structure, immediately beneath the reduplicature of the segment that precedes it; and its composition of definite parts does not become evident until it has nearly attained its full size as a finite part of the body.

The dorsal and ventral arches of each segment are united at their sides by a portion of tegument, in which the appendages of the segments are always developed. One portion of this tegument appears to be subsidiary to each arc. The legs, and their basilar plates, are developed in that portion which belongs to the ventral arch; while the branchial tufts in the *Annelida*, as already shown by my friend Professor Milne Edwards, the spiracles and organs of respiration in the higher *Myriapoda*, and the spiracles and supernumerary organs of locomotion, the wings, which are always connected with the respiratory structures, in Insects, make their appearance in that portion which belongs to the dorsal.

Of these subsidiary structures, only those which belong to the ventral arch are developed to any extent in the *Myriapoda*. Those which belong to the dorsal surface, and which, as I have elsewhere* pointed out, acquire in Insects some importance as the *paraptera*, exist in the *Myriapoda* only as minute osseous points a little anterior to each spiracle. But those which belong to the ventral arch, and which in Insects are so extensively developed, and are so closely connected with the true ventral plates as to constitute important portions of the skeleton, are also well developed in some of the *Myriapoda.* These are the *epimeral* plates on each side (figs. 1 and 2, *c c*). In *Scolopendra* they consist of one or more ossified plates, which together form a triangular surface at the side of each segment, anterior to the insertion of the coxæ (*f*) of the legs. They are in reality subsidiary to these organs of locomotion, and afford attachment internally to the retractor muscles of the limbs.

These are the structures which enter into the composition of each segment. They afford a very precise analogy in the *Chilopoda* with the parts indicated by Audouin as entering into the composition of the segments in true Insects; in which their actual position in regard to each other varies greatly in different species, but their relative position is always the same as in the more rudimentary form of body in the *Myriapoda.* It is necessary to state, however, that although the structure of the ventral surface in Insects, as described by Audouin, and that of the *Myriapoda,* as now pointed out by myself, agrees very closely in every particular, yet there is some difference in the identification of the parts of the dorsal surface. This arises from the circumstance that, in Insects, each segment or division of the thorax is believed to be a compound structure, and was regarded as such by Audouin himself, who conceived that each thoracic segment is in reality formed of four segments of one of the lowest types of development of the *Articulata.* My own investigations are entirely in accordance with this opinion of Audouin, which I am enabled to bear out by an examination of the segments in *Myriapoda.* In this class of animals the gradual disappearance of some of these *subsegments,* as I shall now designate them, is fully apparent, as I shall presently endeavour to show. The names applied by Audouin refer to the whole dorsal plate of each compound segment, and not to the three normal pieces of the subsegments, all which in Insects have completely coalesced into one plate to each distinct segment. Consequently the terms *præ-scutum, scutum, scutellum* and *post-*

* Article INSECTA in Cyclopædia of Practical and Comparative Anatomy, vol. ii. p. 915, 1838.

scutellum refer to the dorsal portion of the first, second, third and fourth subsegments in each division of the thorax. Each of these portions of the segments is originally composed, as now shown in the Myriapod, of a *scutum* and two *episcuta* corresponding to the *sternal* and *episternal* plates.

Of the Appendages of the Segments.

The analogy that exists in the anatomy of the segments of the *Myriapoda*, as compared with other *Articulata*, is found also in the structure of the appendages,—the organs of locomotion. Each primary segment gives origin to a single pair of legs. These are its normal appendages, and seem, as it were, to complete its development, and to constitute it an integral structure in each animal, the multiple of which constitutes a living body.

The primary parts of each limb (fig. 1.) are the *coxa* (*f*), the *femur* (*g*), the *tibia* (*h*), the *tarsus* (*i*, *k*, *l*) and the *claw* (*m*). These exist in all the *Myriapoda*, but are less perfectly developed than in Insects. The *coxa* (*f*) is developed to a greater extent in the *Chilognatha* than in the *Chilopoda*. In the latter order it is a short annular joint, closely connected with the tegument, and inserted immediately above the middle of the episternal plate (*b*) on each side. It is attached in front to a narrow elongated plate, the *trochantin* (*n*) of Audouin, which exists in all the *Chilopoda*, but which is found only in a very few hexapod insects. Immediately anterior to, and connected with this structure, on each side, are the two *epimeral plates* (*c c*), which give attachment to some of the retractor muscles of the leg. These, therefore, are the structures which may be correctly regarded as the basilar portions of the limb. The *femur* (*g*) is the strongest, and is usually the longest portion of the organ, and is attached to the coxa at its proximal, and to the tibia at its distal extremity. As my object at present is only to point out those parts in the *Myriapoda* which correspond to others well known in Insects, I shall merely state that the *tibia* (*h*) is a short, subcylindrical articulation, similar in almost every respect to the femur. The *tarsus* (*i*, *k*, *l*) is composed of at least three articulations besides the *claw* (*m*). Each of these is rounded, and somewhat tapering towards its distal extremity. The basilar one (*i*) that articulates with the tibia I regard as a true *metatarsus*, a structure that is very distinctly developed in all hexapod Insects. The third, or distal articulation, is very short and small, and gives attachment to a minute joint for the claw, and also to two spines. These parts are subject to much variation of form. In the *Cermatiidæ* the metatarsus is developed to its maximum extent, and the proper tarsal joints are exceedingly numerous, although the primary divisions of the limbs remain the same. In the *Scolopendridæ* they are rounded, smooth and uniform; but in some *Chilognatha*, as in some species of *Spirostrepti*, the tarsal joints are enlarged at their distal extremity, and the under surface of one or more of them is often developed into a soft cushion or pad, as in many insects.

Of the Development of the Segments.

I have already stated that the two arches of the segments are developed more uniformly in the *Chilopoda* than in any other *Articulata*. Although I regard this order of *Myriapoda* as higher in general development than the *Chilognatha*, yet the latter have the dorsal surface of the body developed to a much greater, and the ventral to a much less extent. In the *Chilopoda* we have seen that the ventral region of the body, in which the principal animal structures are situated, is broad and powerful, and indicatory of the great strength and activity of the individual. In the *Chilognatha*, on the contrary, the ventral surface is almost completely atrophied or greatly retarded in its development; while the dorsal surface—the region in which the circulatory and secretory organs, that minister chiefly to the vegetative functions of life, are placed,—is developed to its maximum extent.

We are already aware that it is by a gradual approximation and union of two or more segments, that have acquired their full growth, that the body is divided into separate regions in hexapod Insects. In like manner it is on the union of two segments, or the gradual disappearance of one, and its coalescence with another, that the different but more rudimentary forms of body in the *Myriapoda* entirely depend. In the *Chilognatha* the normal segments produced at each change of tegument remain perfectly distinct throughout life, and only acquire their full size by that increment which I have elsewhere described* as the first mode of development,—simple growth. But even in the lowest forms of *Chilognatha*, in which this first mode is chiefly predominant,

* Philosophical Transactions, 1843, part 2. p. 244.

the second mode also, the coalescence, or anchylosis of two approximated normal segments, takes place almost at the period of their formation. But the original distinctness of the two continues marked throughout the whole life of the animal, so that each moveable segment of the body is formed of two distinct normal *subsegments*. Each of these subsegments retains its pair of legs, both pairs being equally developed. This is the condition of the body in the lowest or *Iuliform Chilognatha*.

In the lower forms of the *Chilopoda*, the *Geophilidæ*, there is a progressive change in the mode of development. This takes place in the ovum. The two subsegments of which each moveable division of the body of the perfect animal (fig. 10.) is composed, and which subsegments are at first equally developed, not only become anchylosed together before the embryo bursts from the fœtal coverings, but the posterior (8) of the two (7, 8) exhibits a marked superiority of size. This difference continues to increase at each change of tegument, after the animal has left the ovum, until each anterior subsegment has scarcely more than one-half the extent of the posterior. This difference is greatest on the ventral surface (fig. 16.), where the sternal plate of the posterior subsegment covers nearly the whole. Coincident with the beginning of this change and union of each pair of subsegments in the ovum, only one pair of legs is developed to each compound segment, and these have their origin in the posterior of the two subsegments. Notwithstanding this difference in the extent of their development, the rudimentary portions of the anterior segment still exist in the form of minute, partially detached plates at the front of the posterior segment, the dorsal arc being represented by a very short transverse portion.

In the higher genera of *Chilopoda*, as in *Scolopendra* (figs. 1 to 4.) the number of compound, moveable segments to the body is greatly reduced, and a further union of the original subsegments has taken place. The upper surface of each moveable segment in this genus is covered by a single plate (*d*, *e*), on the anterior part of which there is only a slight indication of the original existence of the first subsegment, in the form of an elevated, narrow, transverse band. But there are still some remains of this subsegment on the ventral surface (figs. 1 and 2.). At the anterior margin of the large ventral plate of each segment, there are on each side of the median line three very short, minute, closely approximated, horny plates, disposed transversely across the under surface of each segment (*a*, *b*, *c*). These together form an elongated, triangular surface on each side, the apex of which is directed to the median line. The two pieces that form the apices of these plates, and lie nearest the median line, are the two ununited sternal pieces, which represent the middle portion of the segment that has almost disappeared,—the true *sternum* (*a*). Those which are external to these, on each side, in like manner represent the *episternal* pieces (*b*), and those on the outside, which form the base of the triangular plates, are the *epimeral* (*c*). In these parts we distinctly recognize the atrophied first subsegment. But although the epimeral plates exist, not even the rudiments of lateral appendages are developed, because, as I have distinctly found, in every instance it is necessary that a primary structure should be moulded in its general proportions before it gives origin to its appendages. It is in this way, by changes that take place in the relative development of the rudimentary segments of the embryo in the ovum, that each animal is originally formed on a comparatively higher or lower type, according to the greater or less extent of change which the embryo undergoes in its earliest stages. The form impressed on the future animal, when these changes in the ovum begin to be arrested, usually is that by which its further development is to be regulated; and which it may retain either as a permanent condition, or only as a form that requires to be further matured in *post-embryonic* life before it is fitted to take that which it is ultimately to assume. It is in this way that the coalescing segments of *Geophilus* become further united in *Scolopendra*, and are completely lost in single structures in *Lithobius* and *Cermatia*, in each instance the union of the rudimentary segments taking place in the ovum, and the type of formation then impressed on the animal being afterwards uniformly repeated at each change of tegument and production of new segments.

The mode in which development takes place, by a union of similar parts, is always *centripetal*. When any portion of the body has acquired its fullest extent by the *first* mode, that of simple growth or enlargement, it acquires a tendency to coalesce or become united with similar adjoining structures, either by simple anchylosis of the two, or by a greater or less extent of direct union or coalescence, and the two parts which thus become joined tend to one common centre.

What takes place in regard to individual structures takes place also in the whole body, as is shown in the transformations of Insects. While some segments of the body of an insect become more or less completely approximated in sections, and divide the body into regions, the whole exhibit the same tendency to approach each other, the head is applied more closely to the thorax, and the thorax is approached by the abdomen.

These, then, are the principles on which the body of an articulated animal is developed, and acquires its proper form and dimensions, and which are carried to their greatest extent in hexapod Insects. They seem to prepare the way for a higher type of development at a much earlier period of the ovum, of the *Vertebrata*, and to lead to the permanent division of the body, in the more perfect animals, into important regions,—the head, thorax and abdomen.

This view of the principles of development of the body, and of the segments individually, will enable us better to understand the manner in which the most important region of the whole animal,—the head, is constructed, to the examination of which I shall now proceed.

Structure and Development of the Head.

The *Chilopoda*, which have the head less completely formed than the *Chilognatha*, apparently in consequence of their carnivorous habits, afford the best means of tracing the construction of this part, and of observing the changes and gradual approximation of the segments which enter into its composition. The number of segments that form the head of an articulated animal has long been a matter of inquiry. Many attempts have been made to ascertain the fact by examining the head in hexapod Insects, but in consequence of its higher type of development and more compact form in that class, the results arrived at by numerous inquirers are by no means uniform. The different conclusions have, perhaps, arisen as much from the number of segments that enter into its composition, as from the different species that have been examined, in some of which every trace of some of the segments has disappeared; while some portions are developed to excess in one genus, but are almost entirely atrophied in another. On this inequality depends the form of the organ. Thus Burmeister recognises but *two* segments; Carus and

Audouin *three*; MacLeay and Newman *four*; myself, on a former occasion, *five*; and Strauss Duckheim even so many as *seven*. After an attentive examination of the head in *Myriapoda*, I am now constrained to believe that there are not fewer than *eight*.

I shall attempt to demonstrate the existence of these parts by taking for my guide the appendages of the head and organs of nutrition.

The head of the *Chilopoda* is formed of two moveable portions (fig. 4.),—the *cephalic* (A) and the *basilar* (B, C) segments, as is well seen in *Scolopendra*. Each of these segments is originally composed of *four* subsegments. In the inferior genera of *Chilopoda*, the *Geophilidæ*, I have been able to trace most distinctly the number of segments that enter into the structure of the head of this class.

At the moment of bursting the egg-shell*, and before the rupture of the proper fœtal coverings, the young *Geophilus longicornis* (fig. 3.) of Leach has the cephalic segment (A) formed of four very distinct parts (1, 2, 3, 4), which at that period are in the act of uniting to form the single cephalic segment of the perfect animal (fig. 15.). The anterior of these parts (1) gives origin to the *antennæ*, while the second (2), which has no distinct appendages, is afterwards found to be that in which the minute eyes of the *Geophilus* are situated. The third (3) and fourth (4) have for appendages the maxillæ and internal parts of the mouth. The whole of these four segments become completely united at this period, more especially the two posterior ones, which afterwards are more enlarged than the anterior, within which the brain of the animal is situated. The anterior always continue very minute, and do not increase in size in proportion to that of any other part of the body.

The parts which constitute the basilar segment of *Scolopendra* are never all united in the true *Geophili*. In one of the higher forms of this family, *Mecistocephalus*, Newp. (figs. 17, 18 and 19.), the basilar segment closely resembles that of *Scolopendra*; but in the other genera (figs. 10 and 15.) it consists of two separate portions (B, C), the posterior of which (C) I have distinguished in this family as the *sub-basilar* segment. The original composition of the basilar

* For the purpose of better demonstrating the analogies of the appendages of the cephalic segments, as well as the existence of the segments, I have delineated the head of a young *Geophilus* at an advanced period after the bursting of the egg.

segment of four parts is more clearly indicated than that of the cephalic. We have already seen that every normal segment of the body is an integral structure; that it has its separate ganglion of nervous matter; and that it developes *one* pair of appendages. When one segment becomes atrophied by the enlargement of another, or disappears by uniting with it, the appendages of the atrophied segment either are not developed at all, or are arrested in their further development. If this arrest takes place in the whole structure, the result is merely a diminished size of the organ; but if it be partial, as regards a portion of the structure, the result invariably is an alteration of form. On the other hand, the appendages of the segment that becomes enlarged are always fully developed, and perhaps also are hypertrophied. Now this is exactly what takes place in the development of the segments that form the basilar portion of the head in *Geophilus* (fig. 3.) and *Scolopendra*. At the moment of bursting the shell the whole of the segments that form the basilar region of the head are all equally developed (5, 6, 7, 8), and each one has the rudiments of its appendages, a pair of minute tubercles, at its sides. This also is the case with the other segments of the body, the tubercles of which are afterwards developed into legs. During the very few minutes that elapse while the shell and membranes are being fissured, a change takes place in the basilar segments and tubercles. The first and second segments (5, 6) become less distinct from each other, and, like the cephalic segments, unite; and the tubercles of the second are considerably enlarged. These are the structures which afterwards become the immense forcipated foot-jaws (*f*, *g*, *h*, *i*), the true mandibles of the perfect animal, and which are the analogues of the strong mandibles of Insects. The tubercles of the first segment (5) also are further developed, and form the elongated palpi. But the third of these segments (7) is more and more encroached on by the second (6), and its tubercles, which at first are arrested in their development, gradually disappear. The second segment (6) and its appendages continue to enlarge; in consequence of which the first segment (5) also becomes partially atrophied, and the further development of its appendages is arrested. The third and fourth segments unite, like the first and second; the third (7) becoming almost entirely obliterated by the encroachment backwards of the second, and its union posteriorly with the fourth. This latter segment is that which remains distinct in *Geophilus,* the *sub-basilar* segment (c), that gives origin to a diminutive pair of appendages,—the first pair of legs (figs. 16 and 19.). In *Scolopendra* the whole of these parts form one structure (fig. 4. B, C). The second of the original basilar segments has not only encroached on the first, which is reduced to a narrow lunated fold on the upper surface, but the third segment has entirely disappeared, and the fourth, or sub-basilar of *Geophilus,* is also united with it on its upper surface, but retains its original distinction, with its diminutive first pair of legs on the under surface (fig. 5.).

These are the parts that constitute the head and organs of nutrition in *Myriapoda,* analogous to those which form the head of true Insects.

It has been objected by some naturalists that the foot-jaws of *Myriapoda* do not properly constitute part of the organs of nutrition; but on tracing the development of the parts, as just described, their perfect identity with the mandibles of Insects is clearly indicated. The basilar region, which in *Geophilus* and *Scolopendra* is of great extent, is very much reduced, and the cephalic enlarged, in *Lithobius* (fig. 29.); and this change is carried still further in *Cermatia* (fig. 36.). In *Lithobius* the distinction between the anterior and the two posterior subsegments is marked by a deeply-impressed, lunated sulcus, and the posterior part of the cephalic region of the head is greatly enlarged (A), while the basilar region is reduced to a narrow transverse ring (B, C), and the minute first pair of legs attached to this region in *Scolopendra* have entirely disappeared. This change is carried still further in *Cermatia,* in which the cephalic region (A) of the head is enormously developed, as also are the organs of sense, and the whole approaches nearer to that of Insects. The basilar region also has united with the cephalic, leaving only its narrow ventral plates, as we shall hereafter find in *Iulus,* while the mandibles also (*g*, *h*, *i*, *m*) are enormously developed.

Thus, then, by tracing the changes of the *Myriapod* from the ovum, and comparing the adult forms of different genera, we are enabled to ascertain the number of the rings that enter into the composition of the head, and also to confirm the original views of Savigny, that the parts of the mouth are the analogues of the organs of locomotion, and acquire their various forms in consequence of the different extent to which their individual parts are developed.

Comparative Anatomy of the Head.

We will now compare the anatomy of the head in the different families of *Chilopoda*, in demonstration of the views I have advanced, respecting the number and order of the segments which enter into its composition in all the higher *Articulata*.

First, then, of the *Geophilidæ*. The four subsegments observed in the embryo of *Geophilus*, at the bursting of the shell, and then in the act of uniting to form the future cephalic segment, are faintly indicated in the perfect animal (fig. 15.). They are numbered on the accompanying drawings, in their proper order, from *one* to *four*. The first or *antennal subsegment* has almost disappeared in this genus, and its boundary is indicated only by a very faint transverse line; but its appendages, the antennæ, are developed to a greater extent than those of any other segment of the body, and their divisions are multiplied in the exact ratio of the number of parts which usually enter into the composition of the appendages of other segments in *Geophilus*. This number is exactly doubled in the antennæ, so that the formative principle developed in the first segment of the head is expended on the appendages, which become hypertrophied; while the segment from which they originate, is, in a corresponding ratio, arrested in its development. This change commences at an early period of the embryo, since at the bursting of the shell, when the appendages of all the other segments exist but as very minute tubercles, the antennæ are of great size, and are equal in length to the whole of the four cephalic segments.

The *second subsegment* does not give origin to moveable appendages, but is the seat of the important function,—*vision*. This segment is always more developed in *Geophilus* than the first, and is almost entirely occupied by the great centre of the animal functions and instincts,—the brain.

The *third subsegment* is developed to a greater extent than the second, and gives origin to appendages which are the first moveable parts of the organs of nutrition,—the *internal maxillæ*.

The *fourth subsegment* is enlarged to a much greater extent than either of the others, and is equal in length to the whole of the three anterior segments. This greater size appears to have some reference to the development and importance of its appendages, which are large, three-jointed and palpiform, and seem to represent the external or maxillary palpi of Insects. They are situated one on each side of what has heretofore been described as the internal labium, but which, I conceive, may be regarded as the lingua. This structure, which is well seen in *Scolopendra* (fig. 7.), is formed of two elongated, delicate plates (*c, c*), situated between the palpi, and forming the floor of the entrance to the pharynx, which they close in below. They seem to be the proper episternal portions of this segment of the head.

Although these subsegments are all clearly indicated in the perfect state of *Arthronomalus* (*Geophilus*) *longicornis*, Leach, some of them only are distinguishable in other species, as in the true *Geophili* (fig. 10.) and *Gonibregmati* (fig. 4.), in which the head has assumed a more compact form, and the antennal subsegment is alone distinguished; while all trace of the divisions is entirely obliterated in the narrowed and elongated cephalic segment of *Mecistocephalus* (fig. 18.). In *Cryptops* (fig. 20.) and *Scolopendra* (fig. 4.) there is an indication of the extent of the antennal subsegment, but, as in *Geophilus*, an entire obliteration of the others. This also is the case in *Lithobius* (fig. 27 and 29.), in which the boundary of the antennal segment is marked by a deep curved suture. In *Cermatia* (fig. 36.) the whole cephalic region has assumed a new form; the antennal and optic segments being now extensively developed, and occupying the larger portion of the head, and the organs of vision have encroached backwards on the third subsegment.

The four subsegments that form the posterior part of the head are more slowly united in the basilar region. In *Geophilus* this union is only commenced. The *fifth* and *sixth* segments of the young animal, each, as we shall presently see, developing a pair of large appendages, unite at a much later period than the cephalic subsegments. The fifth unites with the sixth, but not until the primary divisions of its appendages are modelled, and not without leaving a portion of its dorsal surface attached to the sixth, indicating its original separation. This is most distinctly shown in *Mecistocephalus* (fig. 17 and 18.), in which it remains as a small quadrangular plate (5.). It exists also in *Scolopendra* in the form of a raised lunated fold, on the anterior margin of the great basilar segment (fig. 4, B). But in the higher genera this also has disappeared.

The *seventh* and *eighth* segments, which together form the *sub-basilar* segment (fig. 15, c) in *Arthronomalus*, unite at a very early period, even before any appendages are developed. But a trace of the seventh subsegment exists in all the true *Geophili* (fig. 10.), and even in *Arthronomalus longicornis.* Although the sub-basilar segment itself remains distinct, and supports the first pair of legs in the true *Geophili*, it becomes united to the basilar in the higher genus of this family, *Mecistocephalus* (fig. 17.), and forms with it one large segment (6, 7, 8.), that bears a pair of atrophied legs posterior to the proper organs of nutrition. These atrophied legs indicate the original distinctness of the sub-segments in all the *Geophilidæ* and *Scolopendridæ* ; but these also are lost in the *Lithobiidæ*, in which the whole basilar region of the head is reduced on the dorsal surface to a narrow ring (figs. 27 and 29, B, C), and the cephalic region (A) is enormously developed.

To trace the manner in which these changes in the structure of the head are effected, we must return again to the young *Geophilus.* We have seen that shortly after the animal has left the ovum, the cephalic segments are nearly all of the same size, but that the fourth is soon enlarged, so as to equal in extent the whole of the others; while the first is more and more retarded in its development. The enlargement of the cephalic region of the head in *Chilopoda* thus takes place in a *backward,* as we shall presently find the basilar region does in a *forward* direction; the two regions thus tending to one common centre. This fact is proved by a comparison of the head in the different families of *Chilopoda.* In *Cryptops* (fig. 20.) the cephalic region has acquired a large extent, as compared with the *Geophili*, and this increased size is maintained in most of the *Scolopendridæ* (fig. 4.), until, in *Lithobius* (fig. 29.), we find the cephalic region constituting nearly the whole head. It has been developed backwards, not only so as to cover the greater portion of the united basilar and sub-basilar segments, but also to occasion them to become atrophied to a simple short segment (B, C). In *Cermatia* (fig. 36, A) this change has been carried to its maximum extent. The cephalic region now forms the whole upper surface of the head, and entirely covers the basilar region, which, in consequence, is so completely atrophied as to leave but a trace of its existence on the upper surface, covered by the cephalic portion; while the formative powers have been expended in the development forwards of the remaining ventral portion of this region, and in its enormous appendages (*f* to *m*),—the articulated *foot-jaws*,—the analogues of the mandibles of Insects.

This mode of tracing the formation of the head in the *Chilopoda* may enable us to understand the principles on which the more complicated organ in the higher *Articulata*, the hexapod Insects, is developed in the ovum: first, by an aggregation of the normal constituents of the part into distinct regions; and then by the anchylosis, or the coalescence of these into one structure; by the extension backwards of the cephalic, and forwards of the basilar portions; the different configuration of the whole being dependent on the greater or less extent to which individual parts are enlarged.

Organs of Nutrition.

To trace the analogies of these parts we must compare them with the simple appendages of the segments—the legs, all the divisions of which exist, almost in their relative proportions, in the mandible of the young *Geophilus* (fig. 3.) at that stage of growth which I have elsewhere described * as the *fourth period* in *Iulus*. The mandible, at the bursting of the egg, is only a simple tubercle to the sixth segment of the head, precisely similar in every respect, of form and size, to the tubercles of other segments of the body, which afterwards become organs of locomotion, &c. But during the short space of time that elapses while the embryo is escaping from the egg, and before it has rid itself of the fœtal membrane, this little tubercle is enlarged to twice the size of the others, and continues to increase, and undergoes a change in the relative development of its parts, which so modifies its whole form as to adapt it for the function of prehension and manducation, instead of locomotion. The tubercles of the other segments have all their parts developed equally; but those which are to become the mandibles, and be fitted for a different function, are not only more rapidly enlarged, but have the coxa and femur more advanced than the other articulations. In the appendages, then, as we have already seen in the segments, the configuration of the whole organ, and the special adaptation of its structure to a peculiar function, consist in the greater or less development of its original parts, and not in the introduction of a new element into its composition. The coxal articulation of the mandible (*f*) always exists

* Phil. Trans., 1841, part ii. p. 121.

throughout life, and it is by means of this that we are enabled to determine with precision the identity of the different parts of the organ. Even so early as the *fifth* period of growth it becomes in part consolidated with the episternal plates of its segment, in the formation of the broad under surface of the head. The femur (*g*) continues to enlarge, and forms the chief portion of the mandible; while the tibial (*h*), metatarsal (*i*) and tarsal joints (*k*) are all more and more arrested in development, and at length remain but simple rings, that support and bend the prehensile extremity of the organ,—the enormously developed *claw* (*m*). An additional proof of the identity of the chief portion of the mandible with the femur of the legs is afforded in its armature. The internal angle of the distal extremity of this part in the *Scolopendridæ* is usually developed into a long process or spine (fig. 22, *s*), which is sometimes furnished with one or more tubercles. I have designated this process in the mandible the *mandibular tooth*, and have employed it in the description of species. The femur of the posterior legs is also developed into a long process, precisely similar to that of the mandibles. The identity of these parts is even more strongly marked in *Cermatia*, in which the under surface of the femur of all the legs is armed with a strong spine, while a similar spine exists at precisely the same place on the corresponding portion of the mandibles. In *Scolopendra*, *Lithobius* and *Cermatia* one of the tarsal articulations has disappeared, and the others with the tibia are reduced to their minimum. In *Mecistocephalus*, *Cryptops* and *Geophilus* the coxa becomes in part united with the episternal plates by simple anchylosis, but remains entire in *Scolopendra* and *Lithobius*. The sternal and episternal plates are largely developed and consolidated together, to form the broad inferior labium, at a very early period in the young *Geophilus*, and are enlarged to their fullest extent in *Mecistocephalus*. The original distinction of these parts is clearly indicated in *Cryptops anomolans* (fig. 26.), and more decidedly in some *Scolopendræ*. In *Lithobius* and *Cermatia* the sternal plates are almost entirely atrophied, but the episternal and epimeral are expanded to form the whole of the broad labium. They are perfectly distinct from, but articulated with the narrow sternal portion of the segment. In the very young *Lithobius* (fig. 30.) the episternal plates of the basilar segment are two curved, elongated laminæ (*b*), perfectly distinct, and widely separated from each other in their middle portion, with a broad interspace between them; but approximated together at their inner anterior margin, which, united with the epimeral plates (*c*), forms the denticulated front of the labium. The space between the plates is gradually filled up in the young animal, partly by a widening of the plates themselves, and partly by the consolidation with them in the middle line of the remnant of the atrophied sternal plate of the preceding segment, that has given origin to the posterior pair of palpi (fig. 6.). The deep sulcus in the middle of the labium of the perfect animal is the indication of these unions. In *Cermatia* the close approximation of the episternal plates in the middle line does not take place, but the two remain distinct throughout life; while the epimeral plates, that form the border of the lip, have their denticulations elongated into spines. These epimeral plates are well developed in *Scolopendra* (fig. 5*), and are indicated by sutures, although they are absent in *Geophilus*; are developed without marginal teeth in *Cryptops*; and are small, and consolidated with the episternal plates in *Lithobius* (fig. 31, *d*) and *Cermatia*. In *Scolopendra* they are often formed each of two pieces, analogous to those on the segments. I have distinguished these as the *dental* and *subdental* plates (*d*, *e*). The latter are very minute and without denticulations, but are marked by sutures, which distinguish them from the episternal pieces, as other transverse sutures divide the latter from the sternal (fig. 5.).

The chief parts which we have traced in the mandibles and inferior surface of the basilar segment, exist also in the other organs of nutrition and their segments. Thus, in the part which has been described by Savigny and others as the *first auxiliary lip* (fig. 6, *b*, *f*), which is situated anterior to the structures we have just examined, and is the sternal portion of the fifth segment of the head,—the true sternum is atrophied, and united in the middle line with the episternal plates of the succeeding segment, the great basilar region, as we have seen in *Lithobius*. But the episternal plates remain as broad irregular laminæ (fig. 6, *b*), articulating on their front with two transversely elongated plates, the analogues of the coxæ (*f*), which form the margin of this auxiliary lip. Both these plates articulate conjointly at their sides with the third joint of the palpus, which may be regarded as the analogue of the labial palpus of Insects. This third joint represents the femur, and the two remaining joints the tibia and tarsus, with the minute claw. Precisely the same structure exists in *Lithobius* as in *Scolopendra*, excepting only that the femoral portion of the palpus is more elongated. In *Cermatia* also the same analogies are preserved: the coxa exists on the front of the episternum, but receives the whole articulation of the femur. This joint, like the chief portion of the mandibles, is armed with its spines, as also is the tibia. A considerable elongation has also taken place in these parts, and the tarsus is formed of two joints.

These are the analogies of the most developed and important parts of the basilar region of the head, and the like exist in those of the cephalic region; but it is only by remembering, and by taking for our guide the important fact that the coxal joint of the limb constantly exists, and is never entirely lost, although often in part united with the episternum, with which it always articulates, that we are enabled with certainty to trace these analogies.

The cephalic region of the head, like the basilar, gives origin to two pairs of moveable organs of nutrition. These are the appendages of the third and fourth segments. The posterior pair (fig. 7.) are connected transversely at their base with a pair of soft appendages (*c*, *c*), that are situated between them, and which, as I have already stated, I regard as the proper *lingua*, as they form the floor of the entrance to the pharynx. These appendages are the remains of the episternal plates, while the coxæ are represented by the large basal joint of the palpus (*f*), the external maxillary palpus of Insects. The remaining pair of appendages are the most anterior and internal of the moveable organs of the mouth, and are the true maxillæ (fig. 8.*). They are the appendages of the third cephalic segment. They are formed each of three corneous triangular plates (*g*, *h*, *i*) that articulate freely with each other, and represent the femur, the tibia and the tarsus. They perform the office of comminuting the food before it is passed on to the pharynx.

Besides these moveable parts there are others that are articulated together, and are united at their extremities in the middle line, and form an arch in front of the entrance to the mouth anterior to the moveable organs. These seem to constitute the anterior lip (fig. 8.), and belong to the second segment. They are composed each of two subquadrate horny plates (*h*, *h*), articulated together, and united in the middle line by a sharp triangular tooth (*i*). Although it is difficult to trace with certainty the analogies of these parts, they seem to represent the appendages of the second segment; and there is a very precise agreement in their structure and mode of union to form the lip in *Scolopendra*, *Lithobius* and *Cermatia*.

This is the comparative anatomy of the head in *Chilopoda*; and I trust that I shall hereafter be able to demonstrate a precise agreement in the parts, and their mode of union, in the *Chilognatha* and in the highest of the *Articulata*, the hexapod Insects.

Although it is not my intention at present to trace the union of the segments of the body through the genera of *Chilopoda* to the more perfect Hexapods, I may simply remark that this union is based on precisely the same laws in the body as in the cephalic region,—*union in pairs*.

Generic and Specific Characters.

The parts of the skeleton that afford generic or specific descriptions are the antennæ, the ocelli, the dental plates and teeth in the head, the number and form of the segments and legs, the number, form and arrangement of the spines on the femora of the posterior pair of legs, and the form of the anal plates. But so similar are these parts in the different groups, that although they distinctly indicate the different genera, it is only by minute peculiarities of their structure that they assist us in identifying the species. The number and form of the dorsal plates at once characterise the *Cermatiidæ* and *Lithobiidæ*. The number of legs and ocelli mark the *Scolopendridæ*. The definite number of joints to the antennæ and the form of the labium indicate the genus *Cryptops*; and the multiplicity of segments to the body and the definite number of joints to the antennæ the whole of the *Geophilidæ*. The parts that serve for subdivisions and also for specific descriptions in the extensive genus *Scolopendra* are the denticulations of the labium, the number and character of the spiracles, and of the spines on the posterior pair of legs.

The *dental plates* have not heretofore been employed by naturalists in identifying the species of *Myriapoda*; but they nevertheless afford good, and the most permanent characters, especially when taken in conjunction with other parts. The denticles on their anterior margin I have called for convenience, *labial teeth*. They vary in number and size, and are most distinctly marked, as in *Lithobius* and *Scolopendra*, and are sometimes, as in some of the latter genus, themselves armed with other denticuli. In *Lithobius* and

Scolopendra the full number of teeth is acquired at an early period, usually after the third or fourth change of tegument, when the individual is very small, and before it has gained its full complement of legs. Hence the number and form of the teeth are good characters of species in all that have assumed the adult form. These are, perhaps, the best structural characters in the adult *Lithobius* when taken in connexion with the number of ocelli. In *Cermatia* they are uniform in their appearance, and consequently afford only generic characters; but in the great genus *Scolopendra* the dental plates and the teeth are so developed as to afford both characters for the division of the genus into groups and for the identification of species. Thus in the first division, which seems to be nearest allied to *Lithobius*, the *Parvidentatæ*, the plates are very short, transverse, and almost quadrangular, and the teeth are very small and more numerous than in the other divisions of the genus. In the second division, the *Latidentatæ*, the plates assume a more peculiar character: they are large, distinctly divided from the lip by a deep suture, and often have the posterior external angle elongated. The teeth on their anterior margin are usually very large and fewer in number than in the preceding division, and are more adapted for cutting and tearing. The internal one on each plate is usually broad and spatulate, and the external triangular and acute. In *Rhombocephalus* the plates are very much narrowed at their anterior border and widened at their posterior, and are less distinct from the labium than in the other section, and the teeth are fewer or smaller. In *Heterostoma* the teeth are elongated, and are triangular, larger, and more acute than in either of the others. In *Cryptops* the plates exist, but the teeth are absent; while in *Geophilus* the plates also are undeveloped.

The *spines on the posterior legs*, and the form of the *anal plates*, as pointed out by Brandt, afford the next best characters for the species and subdivisions of *Scolopendra*. The spines are not developed on any part of the leg in *Scolopendra* but the femur, and perhaps also the coxa. The posterior internal angle of the femur is always more or less elongated into a spine, even when spines on other parts of the joint are entirely absent. But the characters derived from this part of the body can only be depended on when the organ is one of the original members, and is not a reproduced limb, since if it happen to be the latter,—which may be known by comparison with the limb of the opposite side, when it will always be found to be a little smaller,—the spines of the reproduced limb are imperfectly developed, are often entirely wanting, and are seldom or ever arranged in their normal regularity. The character derived from the spines must, therefore, be taken in conjunction with others derived from parts that are rarely or ever reproduced; as, for instance, the *dental plates*, and also the form of the præ-anal plate, and the *lateral appendages*, or epimeral plates of the posterior pair of legs. These latter parts occasionally offer good characters; they are usually consolidated with the coxæ, the spines being developed from the epimeral plates.

The *dorsal plates* of the segments sometimes afford generic characters. The existence of the stomata, and the emargination of the posterior border peculiarly characterize the *Cermatiidæ*, as the alternation of long and short segments with the angles of the latter elongated and pointed do the *Lithobiidæ*.

The *ocelli* afford secondary characters of species in *Lithobius*; since, although their number varies at different periods of growth in the same individual, as first pointed out by Gervais, and confirmed by my own observations, it generally differs in the adult state of different species. When the young *Lithobius* comes from the egg, it has but a single ocellus on each side of the head, but this is increased to three on each side at its next change. This number is further increased at the subsequent changes, but not until after the animal has acquired its full complement of legs, and then the number is increased in a certain ratio at each change of skin. But it does not obtain its full complement until it has very nearly approached its adult size, so that the organs of vision, as in the true Hexapods, are among the last of the external organs that are completed. Even in the adult state the number varies slightly, so that this character cannot be depended on alone, but must be taken in connexion with the number of labial teeth. In the other genera of *Chilopoda* the number of ocelli is fixed in each genus.

The *number of joints* to the antennæ is a distinct generic character in *Cryptops* and *Geophilus*. It has sometimes been employed, as by Gervais, to assist in indicating the species of *Scolopendra*, but it is very little to be depended on. In *Cryptops* and *Geophilus* the full number is acquired at a very early period; in the latter even soon after leaving the ovum. But this is not the case in *Lithobius*; and probably also not in *Scolopendra*. In *Litho-*

bius there are usually more than thirty-eight, and in one species even so many as sixty joints in the antenna. In *Scolopendra* there are seldom more than twenty, or fewer than seventeen. But although I have little doubt that the number is in reality fixed in each species of the latter genus, it cannot be taken as a good character, as it is often found to vary not only in the antennæ of different individuals of the same species, but even in the two antennæ of the same individual. It can only be received as a secondary character, and when the number corresponds in both antennæ.

DESCRIPTION OF TAB. XXXIII.

Figs. 1 and 2. The ventral surface of one segment of the body of *Scolopendra Hopei*, Newp. *a*. The two united sternal plates. *b*. The episternal. *c*, *c*. The epimeral. *f*. The coxa. *g*. The femur. *h*. The tibia. *i*. The metatarsus. *k*, *l*. The tarsus. *m*. The claw.

Fig. 3. The lateral view of the head of a very young Geophilus, *Arthronomalus* (*Geophilus*) *longicornis*, Leach. A. The cephalic segment formed of its four subsegments 1 to 4. B. The basilar segment. C. The sub-basilar segment. *f* to *m*. The great mandible in the progress of development.

Fig. 4. Head of *Scolopendra Hopei*, Newp. A. Cephalic segment. B, C. The united basilar and sub-basilar segments. *d*. The scutum. *e*. The episcuta on each side. *g*. The femoral joint of the great mandibles or foot-jaws.

Fig. 5. The under surface of the head of the same species. 5* *d*. The dental plates. *e*. The subdental plates.

Fig. 6. The labrum and palpi: the letters as in fig. 1.

Fig. 7. The maxillary palpi. *c*, *c*. The lingua.

Fig. 8. The labrum or anterior lip. *c*, *c*. The lingua: the other letters analogous to parts in fig. 1. 8*. The maxilla.

Fig. 9. The inferior surface of the cephalic region of the head, showing the labrum and maxilla *in situ*.

Fig. 10. Head of *Geophilus subterraneus*. A. The cephalic segment. B. The basilar segment. C. The sub-basilar segment.

Fig. 11. Head of *Gonibregmatus Cumingii*, Newp.

Fig. 12. Under surface of the same.

Fig. 13. Superior surface of the extremity of the body in the same.

Fig. 14. Inferior surface.

Fig. 15. Superior surface of head of *Arthronomalus longicornis,* Newp. A. Cephalic segment. B. Basilar ditto. C. Sub-basilar ditto.

Fig. 16. Inferior surface of the same. *g, m.* The mandible.

Fig. 17. Head of *Mecistocephalus punctifrons.* Newp.

Fig. 18. Head of *Mecistocephalus punctilabratus,* Newp.

Fig. 19. Inferior surface.

Fig. 20. Head of *Cryptops sexspinosus,* Say.

Fig. 21. Superior surface of termination of body in the same.

Fig. 22. Inferior surface. *q.* The preanal scale. *r.* The lateral anal appendages, or united coxa and epimeral plates. *s.* The femoral spines.

Fig. 23. Labium of *Cryptops.*

Fig. 24. Inferior surface of head of ditto.

Fig. 25. Head of *Cryptops anomalans.*

Fig. 26. Inferior surface of head of the same.

Fig. 27. Head of *Henicops.*

Fig. 28. Under surface of the head of the same. *b, c.* Labrum. *f, g.* Mandibles. A. Cephalic; B, C. Basilar segment.

Fig. 29. Lateral view of the head of *Lithobius americanus,* Newp.

Fig. 30. Under surface of the head of a very young individual of *Lithobius Leachii,* showing the two halves of the labium not yet united.

Fig. 31. Labium of *Lithobius.*

Fig. 32. Labium of *Lithobius.*

Fig. 33. Dorsal surface of the body in the family *Lithobiidæ.*

Fig. 34. Ventral surface of the terminal segments and legs in *Lithobius.* *a.* The transverse excavations in the coxæ.

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THE TRANSACTIONS OF THE LINNEAN SOCIETY OF LONDON.

VOLUME XIX.
PART THE FOURTH.

LONDON:

PRINTED BY RICHARD AND JOHN E. TAYLOR, RED LION COURT, FLEET STREET:

SOLD AT THE SOCIETY'S HOUSE, SOHO-SQUARE;

AND BY LONGMAN, BROWN, GREEN, AND LONGMANS, PATERNOSTER-ROW;

AND WILLIAM WOOD, TAVISTOCK-STREET, COVENT-GARDEN.

MDCCCXLV.

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XXVII. *On the Root-Parasites referred by Authors to* Rhizantheæ; *and on various Plants related to them.* *By* William Griffith, *Esq., F.L.S. &c. &c.*

Read November 7th and 21st, and December 5th, 1843; February 20th, March 5th, June 4th and 18th, 1844.

§ 1. *An attempt to analyse Rhizantheæ.*

I HAVE been urged to present this paper to the Society by the hope of placing before the eyes of botanists evidence that, in the construction of the group called *Rhizantheæ*, whatever its rank may be, 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.

For this reason I have multiplied, perhaps unnecessarily, the details; the same reason will I hope excuse me for having considered, in one article, plants belonging in my opinion to widely different series.

Whether the evidence herein given is sufficient to cause the dismemberment of the group in question is a matter that must be determined by others; but every botanist must at least bear in mind, that the *Magister Scientiæ* has unequivocally declared that *Rafflesiaceæ* and *Cytineæ* are closely related to *Asarineæ*, and that the whole bearing of his observations on the female flower and fruit of *Rafflesia** is strongly subversive of the two principal points on which *Rhizantheæ* have been founded. Moreover, in none of his writings, that I have access to, has Mr. Robert Brown alluded to any affinity, beyond such as may arise from parasitical attachments, between *Rafflesiaceæ* and any other family of *Rhizanths*†, except *Cytineæ*.

I have no knowledge of the writings of any other botanists who may have objected to the adoption of the group in question. Messrs. Wight and Arnott

* Annales des Sciences Naturelles, 2nde série, Juin 1834, p. 369.

† Linn. Trans. vol. xiii. p. 224.

indeed, in the preface to their 'Prodromus Floræ Peninsulæ Indiæ Orientalis,' p. xxxi, mention an objection, founded on certain instances of conferrumination of those parts of an embryo that are usually distinct. But this, in my opinion, by no means constitutes a "perfectly simple seed like that of *Acotyledones*," and cannot be brought to bear upon a question, which has a very especial reference to the absolute absence of the usual form of the vegetable embryo.

I have frequently been tempted to make the paper more complete, or at any rate more pleasing to myself, by giving the characters of the undescribed natural families contained in the *Rhizantheæ* of Endlicher and Lindley, and which I might have taken to be represented by *Thismia*, *Sarcophyte*, and perhaps *Mystropetalum*; and though these might not have been adopted, I at least might have always abided by them and quoted them. But, independently of my not having had opportunities of examining many of the genera thrust into *Rhizantheæ*, it appears to me that such an attempt would have been very premature in the absence of information regarding the important physiological functions of impregnation and germination. I would in all cases rather be the doubtful, questioning indicator, than the confident fabricator of a group, of which we have but very imperfect knowledge.

Obs. I.—The points in which the plants constituting the *Rhizantheæ* are said to agree, are:

1. Parasitism.
2. Defective vascularity.
3. Homogeneous or anembryous sporuliferous seeds.

They are also generally unisexual, and of a fungoid or volvuloid mode of evolution (development).

M. Endlicher and Dr. Lindley appear to place most reliance on the second and third points of resemblance: yet it appears to me that there is not one which does not present important structural variations.

1. The *parasitism* can only be said to be constant in its effects, which are similar to those observed to occur (almost) constantly in all Phænogamous plants parasitic on roots. For there is a wide difference, it appears to me, between the parasitism of *Sapria*, *Cytinus*, and very probably of *Rafflesia*, and that of *Balanophora* and *Phæocordylis*, which appears to me to be of a

peculiar nature. I have but little doubt that a third variation in manner of parasitism will be found to exist in *Thismia*. A fourth variation, and one of a very important nature, is said to occur in *Pilostyles** (*Frostia*, Bertero), which is represented as parasitic on the branches of *Adesmia arborea* and certain *Bauhiniæ*, and which is admitted without any hesitation by M. Endlicher into *Rafflesiaceæ*. The exception that this plant offers to the almost invariable nature of plants parasitic on stems or their prolongations, might perhaps renew certain doubts as to its true nature; and in connexion with this I may observe, that it was to be remarked of *Sapria Cissi*, that when it happened to have germinated upon what appeared to be the true stem, the young plants did not make any considerable advances towards maturity.

On the other hand, in addition to any argument deducible from *Cuscuta*, which is, however, scarcely an analogous case, it may be urged that the real part of the plants to which *Rafflesia*, *Sapria* and *Brugmansia* are attached, requires more positive determination than it has yet received. For M. Blume, who appears to have seen *Rafflesia Patma* in its natural state, speaks of it (as quoted by Dr. Lindley, Introd. Nat. Syst., ed. 2. p. 391) as taking place on the creeping roots or stems of *Cissus scariosa*. Curious speculations might be indulged in respecting the parasitism of *Rafflesia*, *Brugmansia* and *Sapria*. Such might be founded (however slightly) on the difficulty of conceiving by what process a body like a seed can become so internal to the substance of the stock as to become surrounded by a wrapper, through which it subsequently bursts; on the fondness of these genera for the genus *Vitis*; and on the fact that accidental productions of certain parts of a vegetable may assume a definite form to a considerable extent.

2. *Defective vascularity*.—The once-asserted absence of any vascular system has been so amply contradicted by Mr. Brown, who has re-examined *Rafflesia*, and extended his inquiries to *Hydnora*, *Cytinus*, and all the *Balanophoreæ* he had access to, especially *Cynomorium* and *Helosis*; by Dr. Martius, who found vessels in *Langsdorffia*; and by M. Meyer, who also found them in *Hydnora*, that the question may now be considered to regard their quantity. Indeed M. Endlicher allows *Rhizantheæ* an imperfect vascular system; Dr Lindley allows them, in his 'Introduction to the Natural Orders,' a vascular system in

* Annales des Sciences Naturelles, 2nde série, Juillet 1834, p. 19.

the smallest conceivable degree. In all those I have examined with especial reference to this point, I have found vascular fascicles to exist to by no means an inconsiderable amount: in these fascicles, vessels with a spiral or annular fibre are to be found, extending in *Cytinus* and *Mystropetalum* into the segments of the perianthium.

Dr. Lindley's converse argument, that in "Endogens or Exogens equally developed spiral vessels would be most copious, and would exist in all the foliaceous organs," is perhaps scarcely admissible, while such conflicting ideas of relative perfection appear to prevail*. It is, however, a question that I do not pretend to be competent to handle: leaving it aside altogether, I would not be inclined to lay any great stress upon the total want of spiral vessels, or ducts or their modifications, while we are in possession of such instances as *Podostemon*, certain *Naïades*, and at least one *Lemnacea*. Dr. Lindley rids himself of this objection, which he founds, I believe erroneously†, on *Lemna*, by assuming that the small degree of development of these plants may be considered to account for the absence of spiral vessels. But this, however applicable to any plant in its earlier stages of development, can scarcely be so extended as to include plants sufficiently matured to present specific form, and perfect, and indeed complicated embryos.

3. *Homogeneous or anembryous sporuliferous Seeds.*—This, I believe, expresses the ideas of M. Endlicher and Dr. Lindley; but I must distinctly observe, that the last botanist does not make use of the term homogeneous by itself, which would be correct, but as connected with the want of an embryo and with a sporuliferous mass. And in a later work, the 'Elements of Botany‡,' he says, that the issue of fertilization of these plants is a mass of sporules analogous to those of Acotyledons.

Such a character as that adopted by these botanists is open to the gravest objections. It is not founded on observation, but on a hypothesis deduced from the structure of the seeds of *Scybalium fungiforme* and *Brugmansia Zippellii*, which I have not observed to exist in any of the subjects of this

* See also the preface to Lindley and Hutton's 'Fossil Flora,' in which Monocotyledons are stated to be as perfect, if not more so, than Dicotyledons. I have not the book by me.

† I have some recollection of having been shown spiral vessels in one of the English Lemnas by that unrivalled phytotomist Mr. Valentine.

‡ Page 226.

paper. And even granting that in all, the seeds did consist of cellular tissue and entangled connecting threads, my impression is that the germination should have been properly observed before the very important foundation of a subkingdom or even of a class should have been laid.

I have not found the appearances presented by the seeds to be uniform; and the only plants I have examined that would apparently bear such a hypothesis as that of being composed of a sporuliferous mass, are *Mystropetalum* and *Sarcophyte*.

In all the others, *Balanophora*, *Phæocordylis*, *Hydnora*, *Thismia*, and I believe *Sapria*, the seed contains or consists of a densely cellular homogeneous body, each cell containing granules and globules of an apparently oleaginous fluid; the appearance being that of some forms of albumen. These bodies are, I have no doubt, the embryos described by Mr. Brown as homogeneous and acotyledonous. Such he describes to exist in *many* other plants parasitic on roots, such as *Orobanche*, &c., and also in *Orchideæ*. To these I can add another very marked instance in *Burmannia*.

To the observations of Mr. Brown regarding the existence of similar embryos in *many* plants parasitic on roots, Dr. Lindley objects, *limiting himself however to* Orobanche; and to *Orchideæ* he applies an argument founded on our limited knowledge of their structure, which seems to me exactly applicable to *Rhizantheæ*, and which, if it had been kept in view, would have retained the various component parts of that class in what appear to me, at least, to be their proper and subordinate places.

It is also proper to observe here, that the celebrated L. C. Richard* has represented the existence of an embryo in *Cynomorium*. This observation of a botanist, who is considered by the first authorities as generally very accurate†, is contradicted by M. Endlicher, who attributes M. Richard's error to his having reasoned from analogy‡. But is the reasoning from analogy more liable to error than that of an opposite tendency, on which M. Endlicher's ideas of *Rhizantheæ* appear to me chiefly founded?

I have before alluded to a deformity in appearance of the seeds of *Sarco-*

* Mémoires du Muséum, viii. p. 423. t. 21. f. O, P.

† R. Brown, Linn. Trans. vol. xiii. p. 224, in the *note*.

‡ Meletemata Botanica, fasc. 11. p 9, line 19 &c.

phyte and *Mystropetalum* from that I have given above as the general characteristic. However much the component parts of these may be considered to resemble the spores of Acotyledonous plants, I do not attach any particular importance to it. For independently of errors of observation, from a defective series of specimens or other causes, the two genera are of widely different organization; and though one of them has appeared to me deficient in an ovulum, the other (*Sarcophyte*) has appeared to me in this respect analogous to *Balanophora*, which yet presented a decided form of the homogeneous acotyledonous embryo.

Again, such terms as "semina aëmbrya polyspora," and "seeds having no embryo, but consisting of a homogeneous sporuliferous mass*," are in another and a more important view not applicable to all these so-called *Rhizantheæ*. They cannot, for instance, be applied with any accuracy to the seeds of *Rafflesia*, *Sapria*, *Cytinus* and *Hydnora*, which throughout their earlier periods are altogether similar to ordinary ovula. So much so, that from his observations on the ovulum of *Rafflesia*, extended generally to Phænogamous plants, Mr. Brown deduced his curious remarks upon a most minute point, the origin of the integuments†.

To come properly, if definitions are to be trusted, under the term spore, it is required that germination take place from an indeterminate point. And to attach this condition to development from true ovula, is to negative one of the most constant rules connected with seeds, viz. the relation of particular and *definite* parts of the embryo to particular parts of the seed.

Such of the plants referred to *Rhizantheæ* that I have been able to examine which do not present this, as it appears to me, insurmountable objection, are *Balanophora*, *Sarcophyte* and *Mystropetalum*; in the two former of which the ovula may be assumed as consisting of simple sacs, without any integument or definable *punctum*, presenting perhaps something analogous to the reduction of the parts of the ovulum of *Loranthaceæ*.

Thus it may I think be stated, that in the *Rhizantheæ* of Endlicher and Lindley there are, so far as we yet know, two types of formation of the embryo;

* Both these definitions include contradictory terms. Compare definitions 464, 568, 581 and 590, of Lindley's 'Elements.'

† Note sur la fleur femelle etc. du Rafflesia, Ann. des Sc. Nat., 2nde série, vol. i. p. 370.

in the one it is developed from an ordinary ovulum ; in the other from a sac or body, of which the analogy is by no means so evident. And it is to this that the sedulous attention of observers should be directed : for in the first type we may expect to find the same mode of fecundation, and germination from a definite and producible point. In the other, in the absence of knowledge of the early nature and attachments of the sac, all at present must be conjecture : the only analogy we can found thereon is the analogy of the protecting organ with an ordinary phænogamous pistillum ; and even this may be considered as beginning to fail in *Balanophora*.

There is another point of view in which the absence of an ordinary form of embryo may be considered, and which is suggested by the resemblance the body, which I take to be embryo, has to some forms of albumen. It is easily, I think, conceivable that the existence of a particular form of embryo may be beyond the means of investigation not founded on the study of germination. For if there are all sorts of degrees of development of the vegetable embryo, of which *Tacca* and *Houttuynia* may be taken, perhaps, as the greatest extremes known in one direction, it is not altogether unreasonable to imagine the occurrence of a greater amount of reduction. And although so minute a form might not escape a practised observer occupied by a full series of specimens, it may easily escape one occupied by the ripe seed alone, and this for the most part derived from dried specimens.

It is also known, that the detection of the very first appearances of the embryo of ordinary Phænogamous plants demands higher appliances than have been hitherto bestowed on the study of *Rhizanths* generally. And it is I think to be expected that cases may occur in which the development of the embryo ceases at a point corresponding to its earliest degrees of development in ordinary instances. Granting such, its observation may easily be obscured in casual examinations.

Obs. II.—There are also theoretical arguments which, I venture to think, may be made to bear upon this question.

Against the arrangement of these plants into one group it may be urged, that the principles of variation, by which almost all the peculiarities of the three subkingdoms are mutually represented, are nowhere so limited ; but, on the contrary, occur among plants possessed, so far as we can judge, of very different organizations. Thus the venation characteristic of *Dicotyledons* is not limited to one particular group of *Monocotyledons*, but is presented to us at the three different points of *Smilacineæ* and *Dioscoreæ* ; *Tacceæ* ; and *Aroideæ*.

The occurrence among *Dicotyledons* of the characteristic number of *Monocotyledons* is much more diffused, for it is found in *Anonaceæ*, *Berberideæ*, *Menispermeæ*, &c.; in *Aurantiaceæ*, *Olacineæ*, *Limnantheæ*, *Meliaceæ*, *Ebenaceæ*, *Asarineæ*, *Loranthaceæ*, &c.

It may also be urged, and especially with reference to the situation of *Rhizantheæ* as a single group, that there is not, perhaps, a variation in form or in structure of primary importance in *Dicotyledons* that may not be met with in *Monocotyledons* and *Acotyledons*, and *vice versâ*. Thus the conical trunk of *Dicotyledons* is imitated by *Bambusa*, and in a very marked degree by some *Dracænæ**. The cylindrical trunk of *Monocotyledons* is imitated by *Cycadeæ*, by *Tree-Ferns*, and these again are sometimes beautifully imitated by the stem of *Carica Papaya*. The frondose form of growth of *Hepaticæ* appears in *Podostemon*. The dichotomy of *Fuci* is of common occurrence among *Naïades*, and *Fungi* are curiously imitated by some of the plants grouped among *Rhizanths*. And this interchange is in some form or other so general, that it may perhaps be said, that the existence of a peculiar structure in one subkingdom predicates its existence or its representation in the two others.

It therefore appears to me consistent with the order of nature, that the analogue of the reproductive organ of Acotyledonous plants (at least of those which appear to have sexes) will, whenever it be found†, be found both among

* I was first struck with the resemblance certain *Dracænæ* have to Dicotyledonous trees in the forest of Pulo Bissar near Malacca, in which there is a large arborescent species not to be distinguished from an ordinary Dicotyledonous tree, except by inspection of the leaves. On arriving here, in the progress of clearing, &c., so as to form a botanical garden, I examined casually several shrubby species of the same genus, and was surprised to find that the resemblance was not confined either to the mode of branching or the exterior of the trunk. The mixture of Endogenous and Exogenous characters is indeed remarkable; and I am disposed to coincide with Mr. Grant, who has set up several specimens in his usual beautiful style, that apparently, and very probably partially, the new formations of woody tissue are added to the outside. The figure of the remarkable Exogenous stem in Lindley's 'Introduction to Botany,' 2nd edition, f. 42. p. 100, resembles at first sight that of a *Dracæna*.

† I do not feel myself competent to enter on the question whether these homogeneous acotyledonous forms of embryo do constitute the required representations of the spores of *Acotyledones*. The study of their development and of their germination is an essential requisite in the settlement of this point.

Monocotyledonous and Dicotyledonous plants. This will allow for gradations in structure and for a number of independent points of contact. The grouping of these plants in either of the modes proposed does not do this, but, on the contrary, isolates *Dicotyledons*.

Obs. III.—If I consider *Rhizantheæ* in a mere systematic point of view, I find that the opinions regarding its *value* vary very considerably. This I take to be an objection to its being really founded in nature.

M. Blume in his 'Flora Javæ'* appears to limit the group to *Rafflesia* and *Brugmansia*, with a reservation, perhaps, in favour of *Cytinus*, *Apodanthes* and *Aphyteia*. So that Blume's *Rhizantheæ*, as therein defined, is somewhat equivalent to a natural group of two families, *i. e.* to an alliance of Dr. Lindley†.

M. Blume considers (*loc. cit.*) that *Rhizantheæ* are closely allied to *Fungi*, but he adds, "*altiori tamen evolutionis gradu ab iisdem recedunt plantarum perfectiorum magis absolutam mutuando formam*"; and although he notices that Mr. Robert Brown had referred them without doubt to *Dicotyledones*, yet he himself is inclined to adhere to his original opinion, published in the Batavian 'Ephemeris,' that *Rhizantheæ* or *Rafflesiaceæ* are in nowise to be associated with *Phanerogamæ*, but are to be ranked among the more perfect *Cryptogamæ*, close to *Marsileaceæ*. And he appears to have been so guided by these views, that in his description he makes no mention of the ovula, but disguising their true nature by the terms *pseudocarpium*, *peridium*, or *sporangium*, applied to a true ovarium, passes at once to the spores, although the identity of the earlier state of these with most ordinary ovula is plainly enough represented in the illustrations‡. He even apologises for calling the integuments of the flower perianthium, owing, he says, to their close resemblance to those of cotyledonary plants!

In M. Endlicher's 'Genera Plantarum,' which gives, I imagine, his latest opinions regarding these plants, *Rhizantheæ* form the class of a "*regio*" divided into three cohorts, and which, commencing with *Hepaticæ*, ascends through *Filices* to *Cycadeæ*, and thence to *Rhizantheæ*. The next division, a "*subregio*," commences with *Gramineæ*!

* Flora Javæ, *Rhizantheæ*, p. 2.

† The synonomy of M. Endlicher in his 'Genera Plantarum,' pp. 72 and 75, and that of Dr. Lindley in his 'Introduction to the Natural System,' ed. 2. pp. 389 and 392, appear to me on this score very faulty.

‡ Flora Java, *Bragmansia Zippellii*, t. 5. f. 16.

The classes of M. Endlicher, of which *Rhizantheæ* form the tenth (or perhaps the eleventh, as *Selagineæ* and *Zamiæ* are both numbered ix.), are equivalent to the alliances of Dr. Lindley. But the classes of the last distinguished botanist, of which *Rhizantheæ* form the fourth, appear to be equivalent to the *regiones* of M. Endlicher; so that in whatever measure these botanists may agree in the adoption of *Rhizantheæ*, it is evident that their ideas of its value as a natural group have no common measure of agreement. I may be also allowed to remark, that a more recent classification of *Rhizantheæ* as *Sporogens**, a division of the natural subkingdom *Monocotyledones*, shows that Dr. Lindley does not entertain that fixedness of opinion which I cannot help thinking would exist regarding any division, more especially one of so high a value, approaching to the true order of nature.

In making *Rhizantheæ* a class, M. Endlicher appears to have lost sight of the principles of system on which his other classes are founded, the orders or families of which have generally sufficiently close relations†. The same may be said of its situation between *Cycadeæ*, and, "*longo intervallo*" indeed, *Gramineæ*.

Dr. Lindley, in elevating the same group to the rank of a primary division of the vegetable kingdom, has avoided this more immediate consociation of dissimilar plants. For a class, as he constitutes one, must have wide differences in organization, just as *Monocotyledones* include *Orchideæ* and *Naïades*; or *Dicotyledones*, *Compositæ* and *Ceratophyllum*. And it might be assumed, that the hiatus between its constituent parts would be supplied by future discoveries. But he has not kept in view the incongruity of *Rhizantheæ* (and his second additional class *Gymnospermæ*) in stamp of peculiarity and variety of form, in number of species and general importance, with the other three natural classes (or subkingdoms); and he has placed the class in question after‡ or in§ *Monocotyledones*, as though such a transition could only take

* Lindley, Elements of Botany, pp. 227, 229, 237.

† Compare this class *Rhizantheæ* with the classes indicated by Mr. Robert Brown here and there, as that comprising *Rubiaceæ*, *Apocyneæ*, *Asclepiadeæ* and certain *Gentianeæ*; or that of *Malvaceæ*, *Sterculiaceæ*, *Chlenaceæ*, *Tiliaceæ* and *Byttneriaceæ*; or that of *Labiatæ* and *Verbenaceæ*; or *Dilleniaceæ* and *Magnoliaceæ*.

‡ Introduction to the Natural System, ed. 2. p. 389.

§ Elements, p. 227–230.

place between *Monocotyledones* and *Acotyledones*, and in neglect of the structure of *Rafflesiaceæ*, and perhaps of some others. Lastly, he has separated two classes not marked by any sufficient absolute particularity of form or of structure; while he has allowed to remain undisturbed the third great sub-kingdom, in which several peculiar natural types exist, and in which, if there be any truth in the MacLeayian zoological system, they are to be found.

Obs. IV.—The line of argument I have endeavoured to follow has been drawn with especial reference to three points.

In the first, 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 the moiety 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, it seems to me, by such a group as *Rhizantheæ* to the system of nature, a chief part 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, 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* form 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, and in direct opposition to those rules on which the standard divisions and families of the vegetable kingdom have been hitherto based, and I think in most cases not unsuccessfully. "*Vera autem scientia ex præmissis integræ organisationis studio dedita, non hæret in pauciorum signorum delibatione, sed omnes omnium organorum modos tenetur perpendere, præpositâ eorum structuræ et actionis accuratâ expositione.*" Jussieu.

"*Nulla hic valet regula à priori, nec una nec altera pars fructificationis, sed solùm simplex symmetria omnium partium.*" Linnæus.

§ 2. *Description of a new Genus of* Rafflesiaceæ.

Sapria.

Char. Gen. *Flores* dioici. *Perianthium* duplici serie 5-partitum, æstivatione imbricativum; faux coronâ foratâ clausa; tubus intus 20-carinatus. Mas. *Antheræ* 20, uniseriatim infra caput columnæ fungiforme verticillatæ, discretæ, bi-triloculares, apice porosæ. *Ovarii* cavitas nulla. Fœm. *Antheræ* castratæ. *Ovarium* uniloculare; 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.

Descr. Planta radicum *Cissi* parasitica, constans ex axi brevissimâ, squamis imbricatâ, uniflorâ. Discus annulusve (extensio corticis) orbicularis, extùs verrucosulus, margine irregularis, interdùm subdentatus, sæpiùs integer, axeos basin circumdat. Squamæ imbricatæ oppositæ, (ut in *Brugmansia**,) magnitudine variæ, exteriores minores rotundatæ ferè omninò sphacelatæ, interiores erecto-adpressæ, subovales, albido-carneæ, apicibus marginibusque plus minus sphacelatæ. Flos dioicus, quantùm vidi fœmineus e masculo segregatus, rariùs ex eâdem radice oriens; diametro 5–5½ uncialis, odore putrido. Perianthium superum, carnosum, campanulatum, biseriatim 10-partitum; laciniæ reflexæ, oblongæ, verrucosæ, interiores paullò minores: verrucæ plurimæ, sparsæ, formâ irregulares, sæpiùs oblongæ vel rotundatæ, raro lobatæ, iis faucis elongatis; colore (in alabastro) pulchrè luteo, floris expansi ochroleuco. Faux semiclausa annulo (vel coronâ) carnoso, insigni, horizontali, atro-purpureo, centro foramine magno irregulari vel subpentagono forato, suprà processubus filiformibus (cujus capita rugosula conspicua), creberrimis quasi ramentacea, foraminis margine excepto. Æstivatio biseriatim imbricata. Tubus perianthii intùs papilloso-pubescens, multotiès (20-) carinatus, carinis annulum versus obsoletis, fundum tubi versus dilatatis et conniventibus in annulum, floris masculi multò magìs evolutis et cum sulcis totidem columnæ continuis. Color tubi extùs albidus, intùs sanguineus; carinæ annulusque saturatè purpureo-sanguineæ; laciniæ intùs coloris carnis, extùs carneæ margine lutescentes. Columna robusta, brevis, parcè papilloso-pubescens, sursùm discoideo-dilatata in caput fungiforme; discus margine elevatus; fundus exserens conum verrucosulum (præsertim in flore fœmineo), utrinque pilis longis adspersus: color sanguineus, capite pulchrè rosaceo. Antheræ 20, simplici serie verticillatæ infra caput columnæ, bi-triloculares, sessiles, basi obliquæ, oblongæ, apice

* Blume, Flora Javæ, *Rhizantheæ*, tab. 4.

umbilicatæ, poro deorsùm spectante dehiscentes, floris fœminei castratæ et demissiùs circa columnam verticillatæ. Pollen viscosum, glabrum, læve. Ovarium uniloculare, floris masculi solidum; placentæ plures parietales, ovulis innumeris tectæ; ovula anatropa, tegumento uno, nuclei apice prominulo.

Hab. Jugi Himalayani montes Mishmeenses, in sylvis umbrosissimis, humidis, ripæ fluminis Brahmapoutræ apud Ghalooms, et torrentis Paieen Panee apud Khoshas: alt. circiter 3000-5000 ped. Lat. Bor. 27° 57′; Long. Or. 96° 27′.

Obs. I.—I met with this plant in 1836, while on a visit to the Mishmee hills to the extreme east of Upper Assam: in both the localities mentioned it occurred in abundance in every stage. Sketches and a description of the bud and flower were made upon the spot; but I reserved the fruit for subsequent leisure examination. However, of all the specimens brought away in spirits, I have now only three fragments of the base of the male flower.

The species of *Cissus* on which it was found is a large climber with flattened stems, quinate or septenately pedate leaves, remotely and coarsely serrate, and large subedible white fruits. This plant is common enough in the forests of Assam, but in that country does not, so far as I could learn, present the parasite.

Obs. II.—The attachment of this plant to the *Cissus* takes place by a cone, which is in apposition with the bark of the disc (an extension of that of the root), and also with the woody system. If care be taken to procure a central section of the parasite and stock, it will be found that the bark, which forms the outer part of the disc, comes into contact with the parasite a short distance below the bases of its outermost scales. As the bark however follows the curve of the disc, and as the parasite is tapered downwards and inwards into an inverted cone, there is necessarily a rather large mass interposed between the two, especially at the lower part. This is filled up by cellular tissue, the cells of which have a linear, slightly curved direction. In this occur several series of a tissue, which, except in its oblique direction, is evidently part of the woody system of the stock. The lowermost of these oblique lines passes down under the apex of the cone of the parasite, and is in fact the outer fascicle or bundle of the main body of the wood of the root.

Under this occurs the general bulk of the wood, consisting of fascicles of vessels and fibres, divided from each other by cellular tissue, having the same direction with that chiefly forming the interposed mass above alluded to, and like it and the bark abounding in fascicles of *raphides.*

The cone of the parasite chiefly consists of cellular tissue; it is traversed by somewhat irregular vascular fascicles: of the origin of these, as also of the nature of their relations with the stock, I am quite ignorant.

Obs. III.—This plant cannot with any exactness be said to be scantily provided with vessels, both ducts and spiral vessels being easily detected in the longitudinal fascicles of the cone of insertion. Similar longitudinal fascicles exist in the scales in the simple form, in which respect it would appear to agree with *Rafflesia.* Of the nature of the vascular supplies of the perianth I can say nothing; the base of the tube, however, presents on a transverse section a well-marked simple series of vascular bundles.

The column of the male flower is well supplied, the outer series appearing to belong to the staminal apparatus.

Obs. IV.—The plicæ or carinæ of the inside of the tube have seemed to me to be cellular. From their appearing to alternate with the anthers, and from their colour resembling that of the surface of the column below the anthers, they may perhaps be considered to represent a second series of stamina, a circumstance that occurs in one instance in *Asarineæ.* Their disposition likewise suggests the probability of their exerting some mechanical action on the annulus.

Obs. V.—The inner membrane of the cells of the anthers appears, at least after maceration in spirits, to have little or no connexion with the cavity which it lines; a cross section, indeed, often presents the *loculi* as divided by two or more *septa,* which is found to be due to the partial separation of the lining membrane from the walls, with which previously it may be supposed to have been in contact.

Of the nature and situation of the stigmatic surface I can say nothing, in default of female specimens. The whole surface of the concave part of the fungoid head of the column of the male flower is minutely cellular, and not stigmatic in appearance. The cells of the outer surface above are much the same, but towards the base they have a peculiar appearance.

Great obstacles to independent impregnation would appear to be presented by the separation of the sexes, by the viscidity of the pollen, and the limited and inelastic dehiscence of the anthers. And their situations in the above circumstances, under that part of the column which may perhaps be considered as stigmatic, would I think be a great obstacle, even supposing the flowers were hermaphrodite.

The presence of an annulus or corona, again, unless it be found to possess some power of closing, (which, judging from the elevated border of that of *Thismia* and that of the flower-bud of *Sapria*, may not be improbable,) does not, to say the least, add to the facility of impregnation by such foreign agents as insects. However, if the firmness and nature of the attachment of the plant, its short, robust stature and closeness to the ground, and the protected situations in which it is found be taken into consideration, it is scarcely possible to suppose that any agency but that of insects would be likely to carry through the first parts of the process of fecundation. To such agency it appears beautifully adapted by its fleshy appearance and odour, viscid pollen*, and probably immense stigmatic surface.

Obs. VI.—The fruit, to the best of my recollection, was somewhat larger than the flower, and crowned with the brown, erect or connivent, hardened segments of the perianth. Its structure was much the same as that of the ovarium, and the seeds appeared to me, in the hard waxy nature of the embryo, very like those of *Thismia*.

Obs. VII.—The genus appears to be intermediate between *Rafflesia* and *Brugmansia*. From the former, to one species of which, *R. Manillana*†, it approaches in size, it differs in the 10-partite perianth, the nature of the *corona faucis*, the non-immersion of the anthers in cavities, their internal structure, and the absence of the remarkable processes of the discoid apex of the column.

From *Brugmansia* it differs in the imbricated æstivation of the 10-partite perianth, the presence of a well-developed *corona faucis*, the definite anthers opening by a single pore, and somewhat also in the shape of the head of the column.

* Although viscidity might conjecturally be an impediment, practically it does not appear to be so. Every one who has dissected Asclepiadeous, or particularly Orchideous flowers, must be aware of the tenacity with which the pollen apparatus generally adheres to the knife: so that it would appear more likely to remain sticking to the legs or body of the insects than to separate from them, on coming into contact with the comparatively lax viscid secretion of the stigma.

† Annals of Natural History, vol. ix. No. 59, for July 1842.

With *Pilostyles*, granting that plant to belong to the family, it is not likely to be confounded.

§ 3. CYTINEÆ.

I have nothing to offer on the affinities of this family, to which the two succeeding genera are referred. Mr. Brown, in a note on the female flower and fruit of *Rafflesia* in the 'Annales des Sciences Naturelles,' n. s. p. 369, is represented as being of opinion that both *Hydnora* and *Cytinus* may be grouped in the same family with *Rafflesia* and *Brugmansia* (Bl.), and that this family is intimately allied to *Asarineæ*. The same great authority had previously pointed out the affinities of *Rafflesiaceæ* with *Nepentheæ*.

The difference in the direction of the nuclei of the ovula in *Cytineæ* and *Rafflesiaceæ* may perhaps be of some use in discriminating them: on this point, however, it may be 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. This curious conjunction of forms of ovula, usually so distinct at the period of fecundation, is probably the cause of the discrepancies in the accounts of the direction of the radicle of the ripe seed of that genus.

Cytineæ and *Rafflesiaceæ* appear to me completely misplaced in Endlicher's 'Genera'* and Lindley's 'Introduction to the Natural System'†, and equally so in Reichenbach's 'Conspectus Regni Vegetabilis'‡. Batsch § formed *Cytinus* into a family, *Asarineæ*, with *Aristolochia*, *Asarum*, *Pistia* and *Tacca*. Bartling || places them with *Asarineæ*, *Tacca* and *Balanophoreæ* in a class called *Aristolochieæ*, with which he commences his 'Vegetabilia Dicotyledonea.' It is remarkable that he places "*ad calcem Cytinearum*," *Gonyanthes* (Bl.), now I believe referred to *Burmannieæ*.

To the account of the two genera of *Cytineæ* I have added an account of two Asarineous plants.

* Genera Plantarum, p. 75.
† Page 392.
‡ Page 78.
§ Tabula Affinitatum Regni Vegetabilis (1802), p. 244.
|| Ordines Naturales, p. 79.

HYDNORA, *Thunb. Act. Holm.* 1775, p. 69. t. 2; 1777, p. 144. t. 4. f. 1. (fide Endlicher). *Meyer, Nov. Act. Nat. Cur.* xvi. 773. t. 58, 59. *Endlicher, Gen. Pl.* 75. no. 724.

Aphyteia, Linn. Amœn. Acad. viii. 312. Gen. Plant. (Schreber) ii. no. 1104. p. 452. Jussieu, Gen. Pl. 436. Harvey, Gen. S. Afric. Pl. 299.

CHAR. GEN. *Flos* hermaphroditus. *Perianthium* tubulosum, 3-partitum, laciniis induplicato-valvatis. *Columna* staminea 3-loba. *Antheræ* indefinitæ, hippocrepicè curvatæ insuper lobos columnæ. *Pollen* simplex. *Ovarium* inferum, uniloculare; stylus subnullus; stigma discoideum, 3-lobum, e lamellis plurimis in placentas totidem pendulas, undique ovuliferas, productis. *Fructus* (granatiformis) baccatus, 1-locularis, placentis undique seminiferis pendulis repletus.

Plantæ *Capenses, e solo flore et axi brevi constantes, radicum* Euphorbiarum et Cotyledonis orbiculatæ *parasiticæ*. Flos *amplus, roseo-sanguineus, odore carnis putrescentis.* Perianthii *laciniæ secus induplicationes, præsertim versus margines, ramentacei, apice sæpè cohærentes, intùs supra medium (saltèm in alabastro) lobo pulvinato sessili auctæ.* Columnæ stamineæ *et* stigmatis *lobi perianthii laciniis oppositi.* Stigma *oculo nudo striatum.* Seminum *tegumenta bina; exterius tenuissimum albidum cellulosum: interius subcrustaceum, brunneum.* Embryo *liber, semini conformis, albuminiformis, cereo-cellulosus, cellulis e centro (cavo) (an semper?) radiantibus, farctis moleculis et materie oleaginosâ.*

Hydnora Africana, Thunb. Meyer, Nov. Act. Natur. Curios. vol. xvi. p. 775. t. 58. (mala).

Aphyteia Hydnora, *Linn. Amœn. Academ.* viii. 310. *Harvey, Genera South African Pl.* p. 299.

OBS. I.—I have examined specimens of *Hydnora africana*, both in the dry state and preserved in pyroligneous acid, communicated by Mr. Harvey.

As *Hydnora africana* appears tolerably well known, I have not given a detailed description; and it is with some hesitation that I have ventured on laying before the Society my views of a plant, which has formed part of a subject treated by Mr. Brown, and illustrated by one of the incomparable Bauers.

As all the flowers and buds were detached from the stems, I have not remarked upon the latter, more particularly as they appeared to me too perfectly organized for the plants, and besides presented curious resemblances to what might be, perhaps, supposed to be the structure of the *Euphorbiæ*, on which they grow.

Obs. II.—Of the few descriptions I have been able to consult, that of Mr. Harvey, who has noticed the relations of the placentæ with the lamellæ of the stigma, agrees best with the appearances presented by my specimens.

M. Endlicher's account, which is much the same as that of Sprengel*, who referred the genus to *Monadelphia Triandria*, and doubtfully to *Cacti*! of Jussieu, who took his from Linnæus's Supplement, adding one of his extraordinary sagacious questions regarding its affinity to *Cytineæ*, differs considerably. He considers the male apparatus as consisting of three stamina with multilocular anthers, a structure, as it appears to me, quite at variance with the appearances in my specimens. It is also, I think, contrary to analogy, no instance being I believe known of a single anther consisting of an indefinite number of regular cells, each of which has its own distinct superficies and dehiscence. In all cases, not arising from the union of two or more stamina, in which the number of loculi is increased, it arises, or appears to do so, from the subdivision of the ordinary quadrilocellar theca; and in all such the dehiscence appears to become more or less disturbed, in some being contracted to a common point, as in *Rafflesia*; in others being partially extended, so that each *locellus* has its proper dehiscence, as in *Viscum*; in others being generally extended, so as to cause the separation of the whole or greater part of the superficies of the body of the anther, as in *Rhizophora*. The indefiniteness of the anthers is likewise, I think, to be inferred from the occasional existence of what may be termed supplemental anthers, and also from the structure of *Cytinus*. It must however be kept in mind, that Mr. Brown may be supposed to have entertained a similar view from the nature of his remarks on the affinity of *Aphyteia* with *Curcubitaceæ*. It appears to me, nevertheless, that to constitute an affinity in structure between the anthers of *Hydnora* and of some *Cucurbitaceæ*, a certain amount of continuity of some of the cells of each lobe of the column of *Hydnora* would be requisite†. The structure of

* Genera Plantarum, ii. 526. no. 2585.

† On such a point as this I would express myself with the greatest diffidence, being quite aware of the immense knowledge required to be able to thoroughly understand the remarks of Mr. Robert Brown.

the anthers suggests the probability that the mechanical means for promoting dehiscence are confined to the middle, not as they very generally are, to the inner tissue.

Neither Mr. Harvey nor M. Endlicher has noticed the remarkable structure of the stigma, either as regards its striate appearance, arising from its lamellate composition, or the very evident definite grouping of the lamellæ. Possibly in the state of nature both of these are concealed by stigmatic secretion, or by a particular state of the tissue disappearing on maceration. The apparent opposition of its lobes to the lobes of the staminal column does not appear to have been noticed.

The observations I have made on the placentation do not entirely agree with those of M. Endlicher, who has described the placentæ as being parietal in the unfecundated state of the ovarium*. In my specimens, which embrace a considerable range of development, they have always appeared to me to be free and pendulous, bearing ovula over their whole surface; and this agrees with the observations of Mr. Harvey. The determination of this is of some importance, since if the placentæ are free and pendulous throughout, another objection appears to me presented to the placentary hypothesis of M. Schleiden.

The antitropous nature of the ovula, although sufficiently obvious in the earlier stages of their development, soon ceases to be discernible even under pressure.

Obs. III.—So far as my experience goes, the vegetable kingdom does not present a more complex or anomalous instance of the structure of the pistillum. Considered as an instance of multicarpellary structure, the stigma appears to admit of satisfactory explanation, and to be analogous to the stigmata of *Papaver* and *Nymphæa*; the space between each lamella corresponding with a carpellary leaf, and each lamella itself being compound, as almost always happens in such instances. This would be in my opinion the obvious structure, should M. Endlicher's observations regarding the placentæ of the unimpregnated ovarium being parietal prove to be correct†. But the evident

* Genera Plantarum, p. 75, in the observation.

† It may be gathered, perhaps, from Mr. Brown's remarks on the occasional limitation of the placenta to the apex of the cell of the carpellary leaf, that he thinks it probable that *Hydnora* is multicarpellary.—See 'Plantæ Javanicæ Rariores,' part ii. p. 109.

ternary grouping of the plates of the stigma, the evident, though in a much smaller degree, ternary division of the inner surface of the ovarium, and the general structure of the flower and its affinities, all militate in a greater or less degree against this supposition; and if Mr. Harvey's and my own observations be found to be correct, we are compelled, I think, to admit that the composition of the pistillum is definite. In this case the hypothetical explanation becomes exceedingly complex, and perhaps paradoxical, when I consider the simple state in which the vegetable leaf is generally presented to us in the pistillum.

Hydnora appears to me much more perfect (complex) in its organization than *Cytinus*. It is also remarkable for being hermaphrodite, and for presenting, excepting those parts of the anthers on the outer face of the *columna staminea*, perhaps the greatest known facilities for impregnation*.

CYTINUS, *Jussieu, Gen. Plant.* p. 73. *Endl. Gen. Pl.* p. 75, 723.

Hypolepis, Spr. Gen. Pl. 11. no. (38.) (char. pessimo). Harv. Gen. S. African Plants, 300. Brongniart, Ann. Sc. Nat. i. p. 40. t. 4.

CHAR. GEN. *Flores* monoici vel dioici. Mas. *Perianthium* duplici serie 4–6-partitum, æstivatione imbricatum. *Stamina* monadelpha 7–8 (vel 14–16); antheræ lineares, rectæ, adnatæ, coronulâ lobatâ dentatâ terminatæ. Rudimentum *Pistilli* nullum. Fœm. *Perianthium* maris. *Ovarium* inferum, 1-loculare; placentæ plures parietales; ovula

* On my arrival at the Botanic Gardens several months after the above, with the exception of one or two of the notes, was written, I had an opportunity of consulting M. Meyer's description of *Hydnora africana* and *H. triceps* in the 'Nova Acta Physico-Medica,' &c., vol. xvi. p. 773. M. Meyer describes the stamina as indefinite, the anthers as dithecous, the stigma as trilobed, as having a striate appearance, and as opposite to the lobes of the *columna staminea* and to the segments of the perianth, and the placentæ as being pendulous from the stigma-bearing disc. He also seems to be of opinion that three ovaria enter into the composition of its pistillum. He alludes to Mr. Brown's remarks on the affinity in the structure of the anthers of *Hydnora* and those of *Cucurbitaceæ*, and appears to think that Mr. Brown may have been misled by Thunberg's description, since he finds the structure of the anthers of *Hydnora* extremely different from the flexuose ones of *Cucurbitaceæ*. He suggests the probability of the processes on the inner faces of the laciniæ of the perianth (*pulvini*), the petals of Thunberg, being the rudiments of an inner series: this, it appears to me, would either increase the degree of opposition, or require a paradoxical hypothesis regarding the composition of the outer laciniæ. Lastly, M. Meyer denies that it has any affinity with *Fungi*, and places it among *Asarineæ*, believing it to have albuminous, embryonate seeds.

antitropa; stylus columnaris; stigma globoso-capitatum (e lamellis liberis tot quot placentæ parietales formatum). *Fructus . . . .*

Herbæ *parasiticæ; squamis imbricatis loco foliorum.* Flores *solitarii, congesti, colorati, tribracteati; bracteis* 2 *interioribus perianthii basi adnatis.* Pollen *compositum.*

Cytinus dioicus, Jussieu, Ann. du Muséum, xii. 443.

Phelypæa sanguinea, *Thunberg, Nov. Gen. Plant.* v. pp. 91–93?

Hypolepis sanguinea, *Pers. Syn. Plant.* ii. 598? *Harv. Gen. S. African Plants*, 300.

Descr. Caulis brevis, 4 6-uncialis; squamæ (folia) oblongæ, laxiusculè imbricatæ, margine membranaceæ, denticulatæ, interdùm subcarinatæ. Ramuli congesti, uniflori, squamis similibus imbricati. Bracteæ cujuscunque floris 3, duæ interiores laterales et oppositæ. Flores dioici, terminales, majusculi. Masculi infundibuliformes; tubus profundè 6-sulcatus, sulcis cum laciniis alternantibus; lamina erecto-connivens imbricata, 6-partita; laciniæ concavæ, oblongæ, margine membranaceæ, fimbriatulæ, basi tubi exceptâ processubus papillosis extùs vestitæ. Adsunt aliquando lacinulæ lineari-lanceolatæ ad latus unum alterumve laciniarum. Tubus infra basin columnæ intùs quasi 6-locularis (ob inflexuram et coalitionem laciniarum sepalorumve cum columnâ), circa basin partis liberæ columnæ processubus magìs evolutis densè vestitus. Columna (libera) brevis, e fauce quasi exserta, sulcis tot quot loculi exarata, glabra. Antheræ 7–8 (vel 14–16), terminales, lineares, adnatæ, biloculares; extrorsæ; connectiva in dentes mucronesve subpatentes, in formâ coronulæ dispositos, producta. Pollen ter- vel quater-narium. Rudimentum fœminæ nullum. *Fœm.* Perianthium maris, sed minùs infundibuliforme; tubus latior magìsque costatus, laciniæque latiores at breviores. Columna (libera) masculinæ satis similis, lævis, basin versus pubescens, terminata stigmate magno, globoso-capitato, e lamellis 12–14 cuneato-subulatis, densè papillosis. Ovarium omninò interum, 1-loculare, compressum, extùs, basi exceptâ, (ob costas perianthii) 6-costatum vel 6-angulatum. Placentæ parietales 12–14, tot quot stigmatis lamellæ. Ovula innumera, minuta, antitropa, placentis undique affixa. Fructus non visus.

Hab. "Parasitica in *Eriocephali racemosi* radicibus, ad C. B. S." *D. Harvey**.

Obs. I.—The axis of this plant consists chiefly of roundish cellular tissue, towards the middle of which there is a simple series of vascular fascicles; the transverse section of these is cuneate or subovate, the narrow end, and this is

* Mr. Harvey tells me he has always found this plant on the above Syngenesious species, which does not appear to suffer from being preyed upon. The same innocuousness has, I believe, been remarked of *C. Hypocistis*.

the most opake part, being next the axis. There is no distinction of pith, medulla or bark.

In the fascicles vessels are very abundant, preponderating over the fibres; they are ducts, and are here and there unrollable. Vessels of a similar nature, but smaller and with a less approximate fibre, occur in the fascicles of the laciniæ of the perianth, which have a dicotyledonous venation. The parasitism appears to be analogous to that of some species of *Orobanche*.

Obs. II.—The specimens I have examined do not agree very well with the character of *Cytinus* given by Endlicher*, who has adopted the suggestion of Jussieu regarding the generic identity of Thunberg's *Phelypæa* with *Cytinus*. In this combination of the Cape and European plants, Mr. Harvey is fully disposed to concur. M. Endlicher describes the genus as monoicous, as having the stamina double in number to the laciniæ of the perianth, and the placentæ as eight in number.

Other differences depend upon the opinion formed of the nature of the parts. M. Endlicher, following Jussieu and M. Brongniart†, considers the filaments (or *synema*) as being connate with the rudiments of the styles, and the anthers as connate "*in capitulum stigmatum rudimentis superatum*." This view agrees at first sight with the appearances presented by the column of *Thottea* and *Asiphonia*, and perhaps with those presented by the vascular apparatus of the male column. Nevertheless, I would rather consider the terminal teeth or lobes of the staminal column, as Mr. Harvey indeed has done, to be productions of the *connectiva* beyond the *loculi* of the anthers, with which they have, so far as I have been able to judge, a determinate relation both as to number and continuity. And perhaps the complete separation of the sexes is further pointed out by the absence of rudimentary stamina from the female column, a circumstance which does not obtain in *Sapria* or *Brugmansia*. To this however the obvious hermaphroditism of the flowers of *Hydnora* may, perhaps, be opposed.

Obs. III.—This is one of those instances in which there is, I think, difficulty

* *Loc. cit.*

† Ann. Sc. Nat. i. 29. t. 4. The figure by M. Brongniart certainly presents an appearance as if the apex of the staminal column was crowned by irregular teeth in two series. On the other hand, in Hooker's illustrations of *C. Hypocistis* (Exotic Flora, t. 153.) each anther is clearly represented as terminated by a tooth, without any appearance of a crown, as suggested by the description of M. Brongniart.

in determining from mature specimens whether the anthers are uni- or bilocular, admitting the term bilocularity as it is commonly used. For, though the appearance of the apex of the male column, especially of the inner faces of its teeth or lobes (which are by no means always emarginate), is in favour of the anthers being bilocular, yet the furrows visible on the column are equal in number to the loculi; and the disposition of the vessels that appear to belong more directly to the stamina is also that which ordinarily, I think, obtains with unilocular anthers. The same, perhaps, may be said of the appearances presented by a transverse section of the antheriferous part of the column.

Obs. IV.—The stigmatic tissues are highly developed, consisting of very long, nucleary cells, arranged over the whole surface of each lobe of the framework, as it may be called, each of which communicates freely with the canal of communication. In this part of its organization this species presents curious analogies with *Euhalus*. Jussieu suggests an affinity with *Hydrocharideæ*, op. cit. p. 73. in observ.

The structure of the ovula with reference to the direction of the apex of the nucleus is only determinable in my specimens at a very early period, when the prominence of the nucleus on the same line with the ovulum and funiculus is easily observable. This prominence soon disappears, the mature ovula looking like clavate truncate bodies. Of their internal structure I ascertained nothing; nor was I able to satisfy myself of any separation whatever of parts.

§ 4. Asarineæ.

Thottea, *Rottb. in Dansk. Vidensk. Selsk. Schrift. nye Saml.* ii. 530. t. 2. *ex Endl. Gen. Plant.* 345. no. 2164.

Perianthium campanulatum, æquale, 3-partitum. *Stamina* circiter 35, biseriatim circa columnam verticillata. *Ovarium* 4-loculare; stigma discoideum stellato-lobatum. *Fructus* siliquiformis, 4-valvis, filis repliformibus totidem interjectis. *Placenta* libera, tetragona. *Sèmina* uniseriata, rugoso-papillosa.

Frutex *humilis, aromate et habitu Anonaceo.* Folia *magna, oblonga.* Racemi *e caulis parte inferiore foliis denudatâ.* Flores *amplissimi, penduli, conspicuè venosi, extùs hamoso-strigosi, intùs arachnoidei.*

Thottea grandiflora, Rottb., *loc. cit.*

Descr. Frutex 3–4-pedalis, satis robustus, apice parcè ramosus; ramulis pubescentibus.

Folia magna, alterna, exstipulata, oblonga, vel obovato-oblonga, subdisticha, ob dispositionem et magnitudinem racemos sæpè omninò ferè obtegentia, coriacea, obtusè et brevè cuspidata, brevè petiolata, subtùs densè pubescenti-hirta (venulis ultimis etiam subtùs elevatis), superiora majora. Racemi pauciflori, ex axillis foliorum lapsorum, 2–3-unciales, nutantes, pubescenti-hirti. Bracteæ distichæ, lineari-oblongæ, subcarinatæ. Flores amplissimi, penduli, longitudine ferè 5-unciales, latitudine extremâ 4-unciales, extùs insigniter costato-venosi, hamoso-strigosi; colore luridè purpureo, interveniis irregulariter albo maculatis; intùs purpurei, indumentó arachnoideo azureo flocculenti. Perianthium campanulatum, submembranaceum, ad medium vix 3-partitum; laciniæ margine revolutæ, æstivatione valvatæ, apice subintroflexæ. Alabastra inflata. Genitalia in fundo imo perianthii nidulantia. Columna brevissima, seriebus binis staminum verticillatorum circumdata, apice radiatim vel stellatim lobata. Staminum filamenta brevissima; antheræ adnatæ, extrorsæ, biloculares, longitudinaliter dehiscentes, seriei inferioris circiter 18, superioris et suboppositæ circiter 16. Pollen oblongum, in aquâ punctulatum. Ovarium rotundatè 4-angulatum, densè hispidum, 4-loculare; placenta cruciata, cruribus cum angulis ovarii alternis; ovula pauca pendula. Stylus liber subnullus. Stigma (vel apex radiato-lobatus columnæ) sub 13-partitum, convexiusculum, radiis (primariis) fundi quatuor cruciatim dispositis. Fructus siliquiformis, 4–6-uncialis, utrinque subattenuatus, breviter pedicellatus, subtortus, subtorulosus, 4-angulatus, pube brunneâ asper, 4-valvis; valvis canaliculatis, extùs carinato-costatis, leviter tortis; interjectis filamentis totidem repliformibus. Placenta carnosa, 4-gona, libera. Semina anatropa, pauca, oblongo-ovata, in concavitatibus placentæ liberæ seminidulantia, pendula, uniseriata, angulis placentæ affixa. Tegumentum exterius spongioso-cellulosum, superficie irregulari; internum induratum, subosseum, superficie undulatum, brunneum, intùs nitidum. Albumen carnosum, copiosum, cavitati tegumenti interioris conforme. Embryo minimus, basilaris, ovatus, dicotyledoneus; radicula versus hilum.

Obs. I.—My first acquaintance with this plant is due to Lady Norris, to whom it was brought at Ayer Punnus, while Sir William Norris and myself were absent at Mount Ophir. The first European however who seems to have met with it since Kœnig is the Rev. Mr. White, chaplain at Singâpore, whose specimens, consisting of a leaf, a flower, and portion of a stem with racemes, had been seen by Dr. Wallich; the envelope bearing the following in that botanist's hand-writing:—"Perhaps an *Anonacea*. Can it be one of the superb *Magnoliaceæ* to which Blume refers?" Subsequently I ascertained it to be abundant throughout the Great Forest of the Malacca district, to which however it is not confined, occurring abundantly in the smaller jungle about Pringitt, the place from which Kœnig seems to have obtained his specimens*.

It is a remarkable as well as an ornamental plant, although the flowers are in a great measure concealed by the leaves. I refer it without doubt to *Thottea grandiflora*, Rottb., from one of its localities, and from the descriptions contained in M. Meyer's account of *Hydnora*†, and in Endlicher's 'Genera'‡.

Obs. II.—There is no genus of *Asarineæ* with which it is likely to be confounded while in flower, it being the only one with indefinite biseriate stamina. In the structure of its stigma it essentially agrees with *Asiphonia*, as well as in that of the fruit and seeds. It is the only species with a regular perianthium that has a tendency to rival in size the flowers of some Aristolochias. The stigma preserves in a great degree the remarkable disposition, characteristic of part of the family, to show little correspondence in number of divisions with the component parts of the ovarium; a subject on which I propose to enter at some length.

In connexion with the stigma of this plant and that of *Asiphonia*, a few remarks upon that organ may perhaps not be misplaced.

All the definitions of this organ, in the works quoted in the note§, the only ones I have access to, refer to its papillose or glandular nature, and regard it as forming part of the style, of which also most regard it as the termination.

The constant referring of the stigma to the style has caused certain contradictions, inasmuch as none of the authors of the definitions consider the style to be an essential organ. In like manner, its being constantly considered as of a papillose or secretory nature may be considered as contradicted when it is referred to the apex of the midrib||, which may be assumed as belonging to the densest part of the whole structure of the leaf, and which besides has no

* Pl. Jav. Rarior. part 1. p. 45. in a note.

† Nov. Act. Acad. Nat. Curios. tom. xvi. p. 785. ‡ *Loc. cit.*

§ Link, Philos. Bot. p. 306. DeCand., Théorie Élém. p. 401; Organographie, i. 479. Lindley. Outlines, no. 345; Key, p. 27. nos. 345–350, p. 28. no. 358; Introd., 2nd ed. p. 196.

|| This origin, from the assumption of the accuracy of which the opposition of the stigmata to the placentæ has been so much insisted on, is disproved by *Nymphæa*, *Apocyneæ*, *Asclepiadeæ*, *Linaria purpurea*, some *Thunbergiæ*, &c.

necessary relation with the cavity of the ovarium, or in the great generality of cases with the placentæ.

Although that definition which regards its secretory nature is the most correct, it is not sufficiently so; that which regards it as terminating the style is often contradicted; and even setting aside such exceptions as must arise from the not unfrequent absence of a style, it would not by any means be always correct when that part of the pistillum does exist.

M. Schleiden* has made an improvement in defining this organ, and, taken with the context, his definition appears to me to be tolerably complete both as regards situation and function. Nevertheless, in the actual definition the stigma is still referred to the style.

In my opinion the stigma is better defined as 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. To this Dr. Lindley would appear to have approached in some remarks on *Fabiana imbricata*†, but he has considered it a special, not a general structure. If the expression I have made use of above as describing in general terms the stigma be correct, its situation may be totally independent of the style, even when it exists, or what may be considered as such. This I believe will be found to be the case.

Of the theoretical origin of the stigma‡ I would speak with caution. In

* "On the Development of the Organization in Phænogamous Plants," Lond. and Edinb. Phil. Mag. vol. xii. p. 182.

† Bot. Register, vol. xxv. t. 59. Dr. Lindley is correct in stating the indusium to belong to the style, as I have ascertained from studying its development in *Scævola Taccada*.

‡ In a memoir on *Cyrtandraceæ* by Mr. Robert Brown[1], with which I became acquainted several months after this was written, the following opinions regarding the stigma are given :—

"Each simple pistillum or carpel has necessarily two stigmata, which are to be regarded not as terminal, but lateral."

"In the compound but unilocular ovarium, while the placentæ of the adjoining carpels are united, the stigmata of each carpel are generally confluent. But this rule admits of exceptions, as in *Parnassia*, in many *Cruciferæ* and in *Papaveraceæ*; in all these cases the stigmata as well as the placentæ of the adjoining carpels are confluent."

"Characters dependent on the various modifications of stigmata are of less value, both in a systematic

[1] Pl. Javan. Rarior. part 11. p. 106, under *Loxonia acuminata*.

two distinct cases of monstrosities affecting two Leguminous plants, both, I believe, species of *Melilotus*, the stigmatic surface is evidently a continuation

point of view, as determining the limits of families, and theoretically, in ascertaining the true composition of organs, than those derived from the analogous differences in the ovaria or placentæ."

This paper I may be permitted to consider as of the highest importance, more particularly as it advocates the opinion that "ovula belong to the transformed leaf or carpel, and are not derived from processes of the axis united with it, as several eminent botanists have lately supposed;" which opinion M. Schleiden, with whom the hypothesis of the origin from the axis commenced, has stated to be an "extravagant view founded on the weakest possible grounds."

Forcible arguments are added to those formerly published by the same great master in opposition to the hypothesis now chiefly supported by Dr. Lindley of the carpellary structure of *Orchideæ*, which hypothesis is clearly shown to be contrary to *every* analogy.

The only argument in favour of the existence of six carpella in *Orchideæ*, but by no means in favour of the above hypothesis, seems to me that presented by *Vanilla planifolia*, as represented by Mr. Francis Bauer[1], in which the appearances seem to me those of an unilocular pistillum composed of six carpella with marginal ordinarily compound placentæ. This structure however does not exist in a Malayan undescribed species, the only one I have been able to examine[2], in which there are six simple placentæ, with a tendency to approximation by pairs. This separation of the placentæ, so generally combined in compound pairs, I would explain by assuming a certain amount of growth of the interplacentar parts of the compound ovarium, an assumption perhaps derivable from the consideration of *Euhalus* and certain *Orobancheæ*. Among the drawings in the Botanic Garden, I find a sketch of an Orobancheous plant (without name or any clue to what it may be), in which the appearances are exactly those of an unilocular quadricarpellary ovarium.

Mr. Brown's paper may be considered as disposing finally of many of the apparently anomalous cases, whether the supposed anomaly has been suggested by the examination of the stigma or ovarium. His explanation of *Cruciferæ* is, in accordance with his previous ideas, extended to the stigma, perhaps to account for its opposition to the placentæ, on which great stress had been laid. The few observations I have made on one genus only of this family appear to me to indicate the probability, that in some genera, at least, the pistillum is composed of four carpella: the stigmata of each of the anterior and posterior carpella (which subsequently are much the smallest) being confluent, and also cohering with the stigmata of the lateral carpella, which are individually otherwise distinct. This structure, so far as the pistillum is concerned, is analogous in a considerable degree to that of *Chryseis*. The above explanation, founded on a solitary instance, is independent of that by Professor Lindley, suggested by the plant just mentioned[3], in which the anomaly is assumed to exist from the opposition of the stigmata to the placentæ, which is, I believe, their true theoretical situation.

The apparently anomalous structure of *Cucurbitaceæ*, to which notice has been lately directed by

[1] Gen. Sp. Orchid. part 3. t. 10.

[2] I have since examined one ovarium of *Vanilla planifolia*, and this specimen did not present to me appearances different in any important degree from those of the Malacca plants.

[3] Bot. Register, t. 1168, sub *Eschscholtzia californica*.

of the placental margins of the carpellum. Such an origin is very compatible with the appearances of many linear stigmata, which present a sulcus along the centre; with those of some monocarpellary *Urticeæ*, which have two obvious stigmata; and indeed, admitting degrees of cohesion by no means unusual in other parts of the flower, may be extended perhaps to all the stigmata I have examined.

M. Schleiden* would appear to refer the origin of the conducting tissue to the epidermis of the upper surface of the leaf.

From the stigma having been generally found to present definite relations with the style of its carpellum, has arisen its importance in determining the composition of the compound ovarium. But these ordinary relations, from which alone its practical character arises, may be obscured by several causes; as the separation of parts usually cohering; the cohesion of parts ordinarily distinct; the division of the merely stigmatic part of each style; the 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 carpella. The only strong tendency to this, I know of, occurs in *Euhalus*, in which the distinction of the stigmata is accompanied by a distinction of the placentæ. The result is obvious if applied to a multilocular compound pistillum.

Many botanists appear to me to have lost sight of the possibility of an adhesion taking place between stigmatic surfaces ordinarily distinct, similar to that which is considered to cause the loculicidal dehiscence of fruits; whereby the stigmata, so resulting, instead of having an obvious correspondence with the dorsa of the styles, appear actually to alternate with them. Such an ex-

Dr. Wight[1], is not alluded to by Mr. Brown. Dr. Wight's hypothesis does not appear to me to be tenable; for it reverses, without any ascribed cause, the very general law regarding the relations of the surface of the lamina of the leaf to the axis. It is also, I think, contradicted by the examination of the very young states of the ovarium of *Coccinea indica*, in which there are evidently three ordinarily compound parietal placentæ, and also by the placentation of the fully-formed ovarium of *Zanonia*, the structure of which appears to me to be conclusive on this point.

* *Op. cit.* p. 183.

[1] Madras Journal of Literature and Science, no. 28, 1840, p. 43.

ample occurs in *Orobanche**, as may be ascertained by the examination of the stigma at very early periods, and of the situation of the vascular bundles of the style, which are anterior and posterior, as in all the allied genera I have examined. A similar sort of cohesion occurs 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. On this point, the stigmata of *Linaria purpurea* and *Thunbergia alata* (*alba*), bear with considerable force†.

The stigmatic surfaces may be divided without any particular reference to the state of the styles or composition of the ovarium. Of this, *Acalypha* and the two genera which have induced these observations are instances in excess. Some species of *Bragantia*, on the contrary, appear to present only three styles to four carpella. And I think it may be said, that the stigma, being an extension of or continuation from cellular surfaces, frequently of very irregular growth, is not to be expected to present a constantly definable form‡.

* Regarding this I can speak with such confidence as I may, when Dr. Lindley has expressed himself positively to the contrary; and has, from the consideration of *Orobancheæ*, so extended the possible origin of the placentæ, that he conceives these organs to arise from no definite portion of the carpellum, but to vary in origin according to specific organization. (Introd. to Botany, 2nd ed. p. 203.)

† These instances also bear on Dr. Lindley's supposition regarding the composition of the "intervening web or membrane" of the stigmatic apparatus of *Habenaria*, *Bonatea*, &c. (Gen. Sp. Orchid. Pl. Preface, xi.)

‡ In all cases in which stigmata are to be observed with reference to the composition of the ovarium, I have, I think, derived advantage from the examination of their surfaces, their vascular supply, and its connexion with that of the style and ovarium. If the stigmatic divisions have both surfaces uniformly stigmatic, still more if they present no vascular fascicle, I take them to be stigmata alone.

On the contrary, the circumstances of their outer surfaces or dorsa not being entirely stigmatic, and the presence of vessels, which, so far as I have seen, have a clavate termination, applied to cases described as *stigma bifidum*, *bilamellatum*, &c., will show that these terms of division have reference to the style. They will also I think show, that many of the *Euphorbiaceæ* cited by Schleiden as having stigmata only, possess bipartite styles; that styles exist in some *Gramineæ* at least; and that in *Compositæ* the term *rami styli* is more correct than that of *stigma bilobum*.

In those cases in which the stigmatic surfaces are simple and really confined to the style of the same carpellary leaf, the form of the stigma will generally depend in a great measure upon the extent to which the convolution of that part of the carpellary leaf (generally a cuspis) which forms the style is carried. If the convolution be complete, presenting an equal margin, we have a terminal stigma without any sinus, as in many *Leguminosæ*, *Mirabilis*, &c. If the convolution is less complete, we may have a reniform stigma or one of any discoid form with at least an anterior or inferior sinus, and according as

The styles of a compound pistillum may be themselves divided, as in *Cordia*, some *Verbenaceæ*, and many *Euphorbiaceæ*. In these instances, if the stigmata were taken as guides, the ovarium would be considered as composed of twice the real number of parts. In such cases regard should be paid, in my opinion, to the primary divisions or indications of division of the style, the situation of the vascular fascicles and their relations with those of the ovarium, and also to the relative situation of the secondary divisions. This last, which is very applicable to *Cordia*, is, I think, negatived by one species at least of *Artocarpus*, in which however the opposition of the two stigmata may perhaps not improperly be referred to mechanical causes.

Further obscurities may arise from the stigmata, instead of having their usual relations with the styles of a compound ovarium, being confined to a part of these lower than usual, and from these partial stigmata coalescing, as in many *Apocyneæ*, in which an annulus of stigmatic surface is exhibited surmounted by an *apiculus*. Something of the same kind, though in a much more obscure degree, is presented by the stigma of most *Asclepiadeæ*, whether it be described as *apiculatum* or *muticum*. It is also to be met with in some *Meliaceæ* and in *Heliotropium*.

The sources of obscurity affecting the stigma not unfrequently affect the style, so that no absolute rule applicable to the style of a compound ovarium drawn from its perfect state can be opposed to the speculations of the theoretical botanist regarding certain anomalies. In all such the examination must be carried back to that early period when the disc or mass of cellular tissue, from which the various parts are first moulded, presents the carpella in the shape of so many distinct points.

It rarely happens however that the obscuring causes, existing in the mature flower, affect equally all the component parts of a pistillum, each of which should be examined in detail. The examination should be extended to the allied genera. Such rules applied to *Punica* go far enough to invalidate the

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the convolution becomes less we shall have corresponding varieties of elongated, linear or spathulate stigmata.

Although the convolution by which the style is formed is generally most complete in the direction of the ovarium itself, yet in compound styles the reverse is sometimes the case, as in *Gmelina*, in which the branches of the style are perfectly convolute, while the style itself presents one common canal.

hypothesis of Dr. Lindley regarding the structure of its pistillum, and to establish, perhaps, the fact that the pistillum of *Punica* is, at least in its early stages, as definitely compound as that of *Sonneratia* and *Duabanga*, with which it appears to me to form a natural family intermediate between *Lythrarieæ* and *Myrtaceæ*. Its anomalies, which are remarkable, may probably be explained by due consideration of the empty space found in the axis of the ovarium of *Duabanga*, and by the placentation of *Pternandra*.

I believe that simplicity and precision would be attained by abandoning the use of the term stigma, and by describing it as the stigmatic surface or surfaces. No term is at present more frequently misapplied; see, for instance, *Tacca*; and even amended descriptions, as that of Mr. Bentham* regarding the stigma of *Labiatæ*, are not always as correct as they might be.

Obs. III.—I am not aware whether in the original description of this plant any mention is made of the repliform lines; nor am I sure that these become constantly separated. They alternate with the valves, and correspond in situation with the vascular bundles of the angles of the cruciform placenta of the ovarium, a body very different in appearance from the rest of that organ.

Asiphonia.

Char. Gen. *Perianthium* æquale, rotatum, tripartitum, tubo nullo. *Stamina* 8–10, uniseriata (filamentis nullis). *Stigma* discoideum, sinuoso-lobatum. *Pericarpium* siliquiforme, 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.

Descr. Frutex vagus, subscandens, odore piperaceo. Rami articulati, ad articulos incrassati. Folia alterna, vel distichè subpatentia, vel sæpiùs subpendula, brevè petiolata, e basi ovata vel subcordata oblonga, acuminatissima, integra, subtùs pubescentia, basi 5-venia; venæ 2 laterales evanidæ, cum lateralibus exterioribus venarum intermediarum citò confluentes: 2 intermediæ apicem versus cum secundariis venæ primariæ (costæ) arcuato-anastomosantes: interveniæ cæterùm transversè venulosæ, interstitiis reticulatis. Inflorescentia cymoso-corymbosa, terminalis et ex axillâ folii ultimi. Spicæ incrassatæ. Flores subspicati, sursùm subsecundi, erecti, inconspicui, initio viridescentes, demùm

* Lindley, Introd. Nat. Syst. p. 196.

purpurascentes vel livido-plumbei, bracteis 2 minutis linearibus setaceis lateralibus stipati. Perianthium carnosum, rotatum; tubus nullus, perianthii basi nempè planissimâ, laciniæ (vel sepala) 3, cordata, acuta, intùs subreticulata, extùs pubescentia. Alabastrum vertice depresso-concavum, ambitu obsoletè 3-gonum. Stamina 8–10, uniseriata. Filamenta nulla. Antheræ biloculares, extrorsæ, subcordatæ, connectivo magno glanduloso-pubescente, quasi conduplicato; loculi distantes, lineares, longitudinaliter dehiscentes. Pollen granulosum, granulis in aquâ deciduis. Ovarium breviter pedicellatum, rotundato-tetragonum, densè pubescenti-hirtum, 4-loculare; loculi minuti cum angulis respondentes; placentæ cruciatæ, in centro cohærentes; ovula indefinitè numerosa, anatropa, biseriata, minuta; stylus nullus; stigma centrum genitalium disci implens, lobato-sinuosum. Fructus siliquiformis, 4–6-uncialis, pendulus, subtorulosus, stipitatus, 4-valvis, pubescenti-velutinus. Placenta libera, centralis, 4-gona. Semina vel valvis adhærentia, vel inter angulos placentæ ferè immersa, sæpè monile instar leviter cohærentia, uniseriata, trigona, apice et basi et secus angulum tertium internum sæpè membranaceo-alata, rugosa, papillosa, grisea, imperfecta tantum observata. Tegumentum exterius crassiusculum, crustaceum; superficies utraque saltem rugosa: interius (sacculus embryonarius?) membranaceo-cellulosum, tenuissimum. Albumen ob imperfectionem? mancum, oleosum, carnosum. Embryo non observatus.

Hab. In provinciâ Malacca peninsulæ Malayanæ, ad margines sylvarum primævarum; copiosè versus Ayer Punnus Rhim. Floret per menses calidiores.

OBS. I.—The wood consists of a largish pith, and narrow, wedge-shaped radiating masses of wood, separated by conspicuous medullary rays. The fibres of the woody system are not unfrequently punctate; the vessels present coniferous markings, often rendered less obscure by the enlargement of the central disc. The flowers are probably terminal, as there is no anticous bractea, and the two lateral ones often alternate.

OBS. II.—The flowers at first sight have a remarkable resemblance to the male flowers of *Knema*, a curious circumstance if combined with the Anonaceous habit of *Thottea*; and still more singular, perhaps, from the resemblance it presents in its own habit to certain forms of *Piper*.

OBS. III.—It is with some hesitation that I venture on proposing this as a genus distinct from *Bragantia*; for however different it may appear to be from *Bragantia tomentosa* and *B. Khasiyana*, it appears to have the closest affinities with the *Alpam* of the 'Hortus Malabaricus*,' which Mr. Bennett,

* *Op. cit.* vi. 51. t. 28.

in his excellent account of *Bragantia tomentosa**, states to be the *Bragantia Wallichii* of Mr. Brown. In default of intimate knowledge regarding this plant and the original species of Loureiro†, the stigma of which is described as "concavum, integrum, erectum," I have attempted to distinguish this plant by the absence of any tube to the perianth, the cordate sessile anthers, and the discoid sinuate-lobed stigma, in which it presents some agreement with *Thottea*. But whatever importance such a structure might be considered as having with reference to *Bragantia tomentosa* and *B. Khasiyana*, the circumstance of these species having only 3 stigmata to 4 cells of the ovarium argues a great tendency to variation, of which *Asiphonia* is only, perhaps, a maximum instance. On the form of the anthers I am not disposed to place any great reliance; and from Mr. Bennett's remarks, regarding the presence or absence of the annular corona of the faux, some tendency to variation would appear to occur in the perianthia of the several species, with which its state in this plant may not be incompatible.

In case it should be determined that *Asiphonia* is a subordinate modification of *Bragantia*, the character of the genus given by Mr. Bennett will require some modification, particularly as regards the stigma. The species might then be conveniently arranged as follows:

SECT. I.—*Frutices. Folia seriatim alternantia, spicæ axillares vel terminales, stamina* 6–9: to which should be added, if true of all, *Stigma discoideum, multi-lobatum.*

1. *Bragantia racemosa*, foliis latè lanceolatis, spicis axillaribus, tubo perianthii 10-sulcato, antheris sex.
   B. racemosa, *Lour. Fl. Cochin.* p. 508.
2. *B. Wallichii*, foliis elongato-lanceolatis, spicis axillaribus, floribus diclinibus, staminibus 9 subtriadelphis.
   B. Wallichii, *Br. in Wallich's List*, no. 7415. *Bennett, Pl. Jav. Rar.*, part 1. p. 44. Trimeriza piperina, *Lindl.* (*auct. Arnott ex Bennett*).
3. *B. corymbosa*, foliis e basi cordatâ acuminatissimis, spicis in corymbum terminalem dispositis, perianthii tubo nullo, antheris 8–10 obcordatis glanduloso-pubescentibus.
   Asiphonia piperiformis, *Griff.*

* Pl. Jav. Rarior. part 1. p. 44.

† Fl. Cochin. p. 508. ed. Willd. 645.

Sect. II.—*Herbæ vel suffrutices. Folia 2–3 ad apicem caulis conferta, spicæ in inferiori caulis parte laterales, stamina 6, stigmata 3.*

4. *B. tomentosa*, "foliis ovatis vel oblongo-ovatis, fauce perianthii annulo elevato cinctâ."

B. tomentosa, *Bl. Bennett, Pl. Jav. Rar.* part 1. p. 43.

5. *B. Khasiyana*, foliis cordatis vel cordato-oblongis, spicis subrecurvis, perianthii laciniis dorso triveniis, fauce perianthii nudâ.

Trichopus? piperifolius, *Wall.* (sine charactere).

B. latifolia, *Lindl. Bot. Reg.*, n.s., vol. v. t. 1543, in text?

My only knowledge of this species is from a drawing in the Honourable Company's Library; the plant, I am told, came from the Khasiya Hills, but no dried specimens are to be found, nor any information.

§ 5. Mystropetalon.

Mystropetalon, *Harvey, Gen. S. Afr. Pl.* 418. *Ann. Nat. Hist.* no. 12. vol. ii. p. 385. *Endl. Gen. Pl. Suppl.* 717.

Char. Gen.—Mas. *Perianthium* trisepalum, sepala longè unguiculata, imâ basi connata apice dilatato-concava, æstivatione valvata, antico tertiò breviore. *Stamina* fertilia 2, sepalis posticis opposita, horumque unguibus adnata; *antheræ* biloculares, extrorsæ, longitudinaliter dehiscentes. Rudimentum *pistilli*. Fœm. *Perianthium* superum, sæpiùs minutum, tridentatum, aliquandò masculino subsimile et exsertum. *Staminum* rudimenta 2 vel 0. *Ovarium* disco cupuliformi celluloso-areolato insidens; *stylus* filiformis exsertus, deciduus; *stigma* capitatum, trilobum. *Fructus* disco immutato insidens, subbaccatus; tela centralis (embryo?) e cellulis angulatis lutescentibus conflata.

Plantæ *spithamææ parasiticæ.* Caules *squamis loco foliorum imbricatis vestiti.* Spicæ *solitariæ, terminales, densifloræ.* Flores *tribracteati, bracteis præsertim anticis barbato-villosis, masculi magis conspicui, deorsùm arcuati.* Perianthium *coriaceum.* Pollen *angulatum, angulis porosis.*

Mystropetalon Thomii, bracteis anticis per anthesin latè oblongis lateralibus $\frac{1}{3}$ longioribus, perianthii masculi laciniarum laminis lanceolatis; perianthio fœmineo subgloboso obtusè tridentato.

Mystropetalon Thomii, *Harvey, Gen. S. Afr. Pl.* p. 419. *Ann. Nat. Hist.* no. 12. vol. ii. p. 386. t. 19.

Hab. Caledon Baths, Swellendams, Africæ Australis. *D. Harvey.*

Planta digitalis vel subspithamæa. Axis cellulosa, cellulæ plerumque rubescentes: vasorum fasciculi plures, longitudinales, subbiseriati, e fibris ductubusque conflati. Cutis et medulla nulla. Folia decolorata, adpressa, e basi latiusculâ linearia, canaliculata, densè imbricata, præsertim infra spicam florum, plùs minùs pubescentia, speciminum fructiferorum sæpiùs transversè fracta: vena centralis unica. Flores subsessiles, densè spicati, tribracteati; fœminei inferiores, masculi superiores et pauciores. Bracteæ 2 laterales, obliquè carinatæ, subacutæ, hirtæ: antica $\frac{1}{2}$ longior, spathulata, hirta, apice barbato-villosa. Sepala 3, e toro annulari obsoleto exorientia, imâ basi connata, longè unguiculata, spathulata, apice cochleariformia, præconcava; 2 postica plùs minùs cohærentia, longiora, texturâ (saltèm post macerationem in acido pyroligneo) coriaceâ exsuccâ. Venula centralis unica, carinuliformis. Stamina 3; duo fertilia sepalis posticis opposita et altè cohærentia; filamenta (libera) brevia, subulata, axi centrali opacâ vasculosâ. Antheræ magnæ, ovales, extrorsæ, conniventes, sinu basilari affixæ, biloculares, longitudinaliter dehiscentes. Stamen tertium, dum adest, rudimentarium, adnatum ungui sepali tertii antici. Pollen 4-6-hedrum, angulis poro vel sulco perforatis. Rudimentum pistilli centrale, capite glanduloso-globoso. Flores fœminei eodem more bracteati. Perianthium deciduum, formâ et divisione varium, modò brevissimum, tubulosum, 3-dentatum, modò longiùs ad medium usque 3-partitum, raiò perianthium masculum æmulans exsertum. Stamina rudimentaria (perianthiorum majorum) 2, dentiformia, minuta. Ovarium globosum, parcè puberulum, basi attenuatâ insuper torum cupuliformem subdiaphanum laxè celluloso-areolatum insertum, et reconditum, ut videtur solidum et omninò cellulosum. Stylus filiformis, deciduus, obsoletè 3-sulcatus, basin versus subtrigonus, epigyno more angustatus discoque obsoleto amplexatus. Stigma capitatum, subtrilobum, aspectu sub lente granulosum. Fructus densè spicatus, sphæricus, parcè puberulus, toro immutato insidens, bracteis e maximâ parte fracturâ lapsis quasi subexsertus, in speciminibus meis subcrustaceus, apice cicatrice areoliformi inconspicuè notatus. Tela centralis, (embryo?) lutescens, e cellulis irregularibus, angulatis, nucleosis, integra vix segreganda. Inter hanc telam et epicarpium tela cellulosa, spongiosa adest. Torus cupuliformis bractearumque bases post fructus persistunt.

Obs. I.—For specimens of this very remarkable plant I am indebted to Mr. Harvey, the founder of the genus, which appeared in the 'Annals of Natural History' (*loc. cit.*), with a note by Sir W. J. Hooker, describing it to be a genus of the natural order *Rhizantheæ* of Blume, group *Balanophoreæ*.

Obs. II.—The central tissue of the fruit, although it is marked off by its yellow tint, has not appeared to me to be separable as one body, breaking up rather on the slight pressure occasioned by attempts at dissection. In this want of firmness and cohesion it differs considerably from the embryo of *Balanophora* and *Phæocordylis.* So far as I have been able to judge, the appearances presented by it at various stages of maturity are such as would suggest a greater resemblance to a sporuliferous mass, than in any other so-called Rhizantheous plant examined by me.

Obs. III.—It appears to me to be a plant *sui ordinis*, having no relation to any other plant admitted into *Rhizantheæ*, except *Cynomorium**, to which it seems to me to present considerable resemblance in the general structure of the stamen and of the female flower. It is not, perhaps, altogether improbable that the scales forming part of the flowers of both sexes of *Cynomorium* may be found to have a definite relation with the stamen, and with the glandular body from which that organ is represented as arising, and which would appear to be composed of two parts.

Obs. IV.—In bracteation, number and form of the segments of the perianth, the situation of the stamina, the form of the pollen, inferior ovarium and composition of the style and stigma, it presents curious agreements with *Loranthaceæ*. And at present I would consider it (doubtfully) as the homogeneous embryo form of that order, which I take to include *Proteaceæ*, *Santalaceæ*, &c., and which agrees nearly with Dr. Lindley's alliance *Tubiferosæ*.

There are, it will be seen, some discrepancies between my description and that of Mr. Harvey, who however drew up his from recent specimens.

§ 6. Sarcophyte.

Sarcophyte, *Sparrm. in Act. Holm.* xxxvii. 300. t. 7. *ex Endlicher, Genera Plant.* 73. no. 714. *Meletem. Botan.* fasc. 1. t. 11.

Ichthyosma, *Schlectend. Linnæa*, ii. 671. t. 8.

Char. Gen. *Flores* dioici. Mas. *Involucrum* 3–4-phyllum, æstivatione valvatum. *Columnæ stamineæ* totidem, et oppositæ. *Antheræ* indefinitæ, uniloculares, stipitatæ, sacculiformes, circumscissæ, in apice columnarum sitæ. Fœm. *Capitula* nuda. *Ovaria* indefinita, conglutinata; *styli* (solitarii) breves, stigmatibus discoideis terminati. *Fructus* baccatus, compositus (ovariis parùm mutatis); *nuclei* vel *embryones*? tot quot ovaria.

Planta *parasitica, sicca etiam insigniter sanguinea.* Caulis *dodrantalis.* Flores masculi *paniculati; racemis squamâ suffultis, in thyrsum ferè congestis.* Involucri *folia carnosa,*

* Richard, Mém. du Muséum, viii. 420–424. et 431. t. 21.

concava. Caput antherarum *membranâ circumscissâ, in columnam deflexâ, quasi circumcinctum.* Pollen *rotundatum, simplex.* Capitula fœminea *spicata, oblonga, oculo nudo areolata; spicæ paniculatæ basi squamâ suffultæ.* Fructus *moriformes, dispositione et formâ capitulorum.*

Sarcophyte sanguinea (Sparrm.), Meletemata Botan. fasc. 1. p. 11. Harvey. Gen. S. Afric. Plants, p. 300.

Ichthyosma Wiedemanni, *Schlect. in Linnæa*, ii. p. 671. t. 8.

Hab. Ad Caput Bonæ Spei.

Of this very remarkable plant I have only examined dried specimens (subsequently kept in dilute spirits), communicated by Mr. Harvey. It has a peculiar, by no means fungiform habit, the males reminding one of the males of *Nepenthes*: it abounds in red colouring matter.

Obs. I.—The only notices of this plant which I have had access to are those of MM. Schlectendal and Endlicher above cited.

The generic character I have endeavoured to draw up agrees in tenour with the last part of the observation appended by M. Endlicher to the generic character, and though it may be completely erroneous, I think it agrees best with the appearances presented by the male plant; for the filaments or columns of these have rather the relations of bodies axillary to the concave leaves by which they are surrounded, than those of bodies forming a verticillus on a different and inner plane.

Obs. II.—I have not been able to observe the membrane surrounding the base of the antheriferous part of each column in its entire state, its rupture appearing to take place at an early period.

The singular structure of the anthers is also against the supposition of their belonging to single stamina, unless the spaces between the polliniferous cells be found to have arisen from the formation of pollen grains. In all instances, I believe, in which the anther is so formed as to present either the usual cells or irregular cavities, the spaces between these are filled up with solid tissue, being the unaltered portion of the originally solid body. So that I think M. Endlicher's generic description, which relates to many polliniferous distinct bags, covered by a common membrane, itself distinct from those bags, is incompatible with what is known of single stamina.

It may perhaps be said, that the analogies of *Balanophora* are in favour of M. Endlicher's generic character; but it requires, in my opinion, a very exalted idea to be held of the value of parasitism, &c. to conceive any affinity between *Sarcophyte* and *Balanophora.*

I am also led to object to M. Endlicher's remark regarding the anthers of *Sarcophyte* being in some measure analogous to those of *Rafflesia.* To constitute any such analogy, the spaces between the polliniferous bags ("*tubuli*" of Endlicher) must be shown to have disappeared during the formation of the pollen, and the enveloping membrane to have been continuous at one time with the pollen-bags and the spaces between them; even then the analogy would I think be remote. Adopting M. Endlicher's views, the nearest analogical structure would perhaps be the anther of *Rhizophora.*

If the structure be as I suspect, *Sarcophyte* shows a very curious analogy between its male flower and the fructification of certain *Filices*, such as *Cyathea* and *Sphæropteris.*

Obs. III.—In all the ovaria I have examined, chiefly by means of sections, I have observed a white central part, composed of smaller cells; and in this again a brown, generally central nucleus; this nucleus has appeared as it were suspended, being continued upwards into the brown line representing the ordinary canal of communication, which passes directly into the stigmatic tissue. In each of the brown nuclei, for there are not unfrequently two, there is a separable cell, which, when highly magnified, and making due allowances for alteration from having been dried, seems like a membranous bag filled with grumous matter. I have not been able to ascertain what the relations of this are with the surrounding brown tissue, or the changes it may be supposed to undergo during the maturation of the fruit.

It may be observed, that the term "*ovarium uniloculare,*" though perhaps strictly applicable, would scarcely suggest itself to the examiner.

The mature nucleus or embryo is of a hard crustaceous consistence; the general appearance is that of some albumens. Under high magnifying powers, the cells of which it is composed present singular appearances, as if their longer faces or sides were encased in armour; from this deposit? the general induration probably arises.

Obs. IV.—The affinities of this genus seem to me very doubtful. Bartling and Reichenbach refer it to *Cytineæ**; Lindley to *Cynomoriaceæ*†; Endlicher to *Balanophoreæ*‡. To all these, insurmountable objections appear to me to be presented. Even if the structure of the male flowers be as described by M. Endlicher, the females are widely different from those of *Balanophoreæ* (to which botanists seem perhaps most disposed to refer the genus), particularly by their general structure, their much greater general perfection, the union of the ovaria, and the obvious stigmatic surfaces. Perhaps on the whole the general tendency of the plant is towards *Urticinæ*.

§ 7. Thismia.

Thismia, *Griff.*

Locus Naturalis, subregnum *Monocotyledones* inter *Taccas* et *Burmanniaceas*.

Char. Gen. *Perianthium* superum, campanulatum, (caducum,) 6-partitum, laciniis 3 exterioribus (brevibus), oblongis; 3 alternis, interioribus, longissimis, subulatis; faux annulo semiclausa. *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, radicum parasitica, aspectu cereaceo.* Perianthium *luteum, coccineo pictum.*

Thismia Brunoniana.

Descr. Planta aphylla, radicum parasitica, spithamæa vel digitalis. Caulis simpliciusculus, dimidiâ suâ longitudine humo obtectus, crassitie pennæ anserinæ, angulatus. Squamæ (loco foliorum) alternantes, adpressæ, lanceolatæ, acutæ. Bracteæ squamis similes, vel solitariæ sub floribus, vel imbricatæ in pedicellis, interdum flori unico ternæ. Flores pauci, in racemum brevem terminalem dispositi, sæpiùs breviter pedicellati, pro ratione plantæ magni, pulchrè colorati, inodori. Perianthium superum, campanulatum, extùs verrucis plurimis, parùm elevatis, sine ordine evidente dispositis, ovato-oblongis, sublobatis insignitum; tubus basin versus ovario adnatus, anthesi peractâ paullò supra apicem ovarii citissimè circumscissus; faux annularis, circumferentiâ exteriore obsoletè

* Ord. Plantar. 81. Conspectus Regn. Veg. 78. † Intr. Nat. Syst. 394.

‡ Melet. Botan. i. 11. Gen. Pl. 73.

6-angularis (angulis cum laciniis perianthii alternis), dimidium exterius planum, interius elevatum, integrum, tubi aperturam semiclaudens; limbi laciniæ 6, interdùm 5? (et tunc laciniæ subulatæ 2), reflexæ vel patenti-reflexæ, æstivatione imbricatæ; 3 exteriores, breves, oblongæ, obtusæ, subinæquales; 3 interiores angustiores, productæ in processum carnosum, subulatum, longissimum, tubum subæquantem, et in tubum per æstivationem equitantem. Color lætè luteus; tubus secus fasciculos vasculosos numero 12 sanguineo-coccineo vividè pictus, lineolis transversis ejusdem coloris simplicibus fasciculos connectentibus. Stamina 6, annuli faucis basi inserta, perianthii laciniis opposita, intùs deflexa, et arctè ad tubi parietem interiorem applicita. Filamenta brevia, crassa, libera, utrinque lineâ glandulosâ arcuatâ aurantiacâ ex annulo oriente marginata: connectiva plana dilatata margine cohærentia ultra loculos antherarum producta, apice bilamellosa, lamellis sinuato-repandis dentatis, hinc illinc capillaceim divisis; corpus dimidiato-ovatum aspectu grumoso utrinque ad basin lamellarum adest, singulo singulis proximis respondente et massam ovatam centro lineatam antheriformem exhibente; antherarum loculi distantes, oblongæ, pro ratione connectivi parvi, medio lineâ longitudinali latâ e cellulis transversis conflatâ (an lineâ dehiscentiæ) insigniti, verè introrsi sed ob deflexuram staminum extrorsi. Pollen simplex, oblongum, majusculum, glabrum, membranâ tenuissimâ hyalinâ, nucleum centralem e granulis præmobilibus inæqualibus includens. Ovarium tubi parti inferiori adnatum, post hujus lapsum truncato-turbinatum, apice subconicum, in stylum brevem attenuatum, 1-loculare. Ovula numerosa, placentis parietalibus ope funiculorum longorum affixa, anatropa. Placentæ infra medium steriles. Stigmata 3, bifida vel emarginata, conniventia: (vel potiùs stylus tripartitus, laciniis emarginatis vel bifidis, conniventibus, secus latera *continuè* stigmatosis). Fructus carnosus, formâ ovarii, initio stylo terminatus, demùm pericarpii apice circumscisso ore circulari sursùm hians, 1-locularis, polyspermus. Semina indefinita, situ ovulorum, oblongo-ovata, plumbeo-livida, micropyle mammilliformi. Tegumenta bina; exterius celluloso-areolatum, fragile, facilè separandum; interius tenuissimum, membranaceum, vix separandum, massam cellulosam (embryonem) cereaceam, e cellulis materie grumosâ moleculari et oleaginosâ farctis conflatam continens. Placentæ seminibus lapsis discretæ fiunt. Fructus vacui demùm marcescunt.

Hab. Ad pedes Bambusarum in humo ligno semiputrido farcto prope Palar Oræ Tenasserim. Grad. Lat. 12° 50′. Long. 98° 20′. Flores et fructus protulit mense Octobris, A.D. 1834*.

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* I found associated with this plant a species of *Salomonia* and another of *Burmannia*, both of the ordinary appearance of plants parasitic on roots: of the former I subjoin a character:

Salomonia aphylla, parasitica, floribus pentandris.

Herba spithamæa, parum ramosa, pallide brunnea, prædita squamis lanceolato-ovatis, pallidis, loco

Obs. I.—By this singular plant I would wish to commemorate the late Mr. Thomas Smith, the discoverer of one of the most important points of vegetable structure, on which a very general rule has been founded. To his great merits the following quotation from Mr. Robert Brown's remarks on *Kingia* bears the most satisfactory testimony:—"I was aware of the existence, in several plants, of a foramen in the coats of the ovulum, always distinct from, and in some cases diametrically opposite to, the external umbilicus, and which I had in no instance found cohering either directly with the parietes of the ovarium or with any process derived from them. But as I was then unable to detect this foramen in many of the plants which I had examined, I did not attach sufficient importance to it; and in judging of the direction of the embryo, entirely depended on ascertaining the apex of the nucleus, either directly by dissection, or indirectly from the vascular cord of the outer membrane; the termination of this cord affording a sure indication of the origin of the inner membrane, and consequently of the base of the nucleus, the position of whose apex is therefore readily determined. In this state of my knowledge the subject was taken up in 1818 by my lamented friend the late Mr. Thomas Smith, who, eminently qualified for an investigation where minute accuracy and great experience in microscopical observation were necessary, succeeded in ascertaining the very general existence of the foramen in the membranes of the ovulum. But as the foramina in these membranes invariably correspond with each other and with the apex of the nucleus, a test of the direction of the future embryo was consequently found nearly as universal and more obvious than that which I had previously employed."—Appendix to Capt. P. P. King's Coasts of Australia, ii. p. 541.

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foliorum. Spicæ bracteatæ, densifloræ. Flores minuti, pallidè brunnei. Capsula ecristata. Semina albuminosa. Embryo dicotyledoneus.

The *Burmannia* belongs to a form not uncommon in some parts of India characterized by an absence of ordinary leaves and green colour, small stature and few flowers, which are either white or blue. It would appear to approach the *Gonyanthes* of Blume. While *Salomonia aphylla* is curious as an instance of specific parasitism on roots, unaccompanied by the ordinary modification of form of the embryo, *Burmannia* is perhaps equally curious for exhibiting instances of the form of embryo usually associated with parasitism on roots, in connexion, in one form, with apparent parasitical habits, in the other with leaves apparently of ordinary structure and function.

Obs. II.—The venation of the perianth appears to me worthy of notice. The tube is supplied by simple vascular fascicles, double in number to the laciniæ: of these, those alternating with the laciniæ terminate at or near the sinuses by passing off on either side into the laciniæ themselves, with the central fascicles of which they sooner or later combine. The fascicles corresponding to the axes of the component parts of the perianth are simple throughout, with the exception of a branch that passes off into each filament: those of the shorter laciniæ terminate manifestly within the apex.

Obs. III.—After the opening of the fruit, which takes place by the separation of the free apex of the pericarpium, the fruit does not undergo much change: in some of my specimens it at last appears to be deliquescent or marcescent, the rim first disappearing. From the general appearance shortly after the escape of the seeds, and particularly from the resemblance of the then free placentæ to some forms of abortive stamina, I had at first taken them to be neuter flowers, and indeed had described them as such.

Obs. IV.—In the number and situation of the parts of the flower, the placentation, the direction of the stamina (which appears to present great obstacles to independent impregnation), and in some measure their structure, this genus may I think be well compared with *Tacca*. And it was this obvious affinity, together with the remarkable agreement it presents with *Burmannia** in the structure of its seeds, that induced me long since to refer it to the *Monocotyledonous* division of *Vegetabilia*. This view is I think borne out by the general structure of the plants, especially, perhaps, by the apparently uniseriate opposition of the stamina to the laciniæ of the perianthium, which appears to me quite that of those *Monocotyledones* in which the stamina are equal in number to the two series of the perianthium. The only objection indeed, as it appears to me, consists in the occasional quinary variation by suppression in number of parts, which, however, as it would appear to affect the inner series of the perianthium, is not perhaps of a very important nature.

There are however other speculative reasons connected with the system of

* Neither is the remarkable form of anther nor the venation of the perianth incompatible with the structure of *Burmannia*. The resemblance, again, of the dilated points of the styles, and the direction and form of the stigmatic openings of this last genus with those of *Tacca*, in which the stigmata are very incorrectly described, appear to me worthy of notice.

interchange, as it were, of structure and representation of form, which lead me to consider this as a *Monocotyledonous* form of the albuminiform homogeneous embryo, and as the analogue of *Rafflesiaceæ* and *Cytineæ* of *Dicotyledones*. These speculations I have endeavoured to illustrate in that part of the present memoir which is intended to show that the group *Rhizantheæ* cannot be concentrated so as to be placed after *Monocotyledones*, or indeed after any of the primary divisions, but that it presents types appertaining to both *Dicotyledones* and *Monocotyledones*.

EXPLANATION OF THE PLATES.

Tab. XXXIV.

Fig. 1. Male flower of *Sapria Himalayana*, just before expansion:—of the natural size.
Fig. 2. Section of the same.
Fig. 3. Anther, viewed laterally; 3 *a*, 3 *a*, vertically:—magnified.
Fig. 4, 4. Longitudinal sections of the same.
Fig. 5. Half of longitudinal section of the same, viewed somewhat obliquely.
Fig. 6, 6. Transverse sections of anther.
Fig. 7. Part of the *Endothecium*, highly magnified.
Fig. 8. Pollen, seen with $\frac{1}{16}$ m. (after long maceration).
Fig. 9. The same, fresh, seen with a simple lens of $\frac{1}{20}$ focus.
Fig. 10. A hair from the apex of the column:—highly magnified.
Fig. 11. Mode of parasitism.

Tab. XXXV.

Fig. 1. Female flower of *Sapria Himalayana*:—of the natural size.
Fig. 2. The same, longitudinally divided.
Fig. 3. Part of a placenta:—magnified.
Fig. 4, 4. Two of the ovula:—highly magnified.

Tab. XXXVI.

Fig. 1. Plant of *Thottea grandiflora*, reduced about $4\frac{1}{2}$ times.
Fig. 2. Fruit of ditto, reduced in the same proportion.
Fig. 3. Flower, of the natural size.

Fig. 4. *Corona staminea* and *stigma*, after the removal of the perianthium, seen laterally:—magnified.

Fig. 5. The same, seen vertically.

Fig. 6. A stamen, seen in front, before dehiscence:—more magnified.

Fig. 7. The same, after dehiscence.

Fig. 8. Pollen, dry:—highly magnified.

Fig. 9. The same, in water, ditto.

Fig. 10. A transverse section of the ovarium:—magnified.

Fig. 11. Part of the placenta with two ovula.

Fig. 12. Ovulum:—still more magnified.

Fig. 13. Fruit, after dehiscence, reduced 3 times.

Fig. 14. Portion of the placenta of the same, with two seeds:—magnified.

Fig. 15. Seed:—much magnified.

Fig. 16. Longitudinal section of ditto.

Fig. 17. Embryo:—still more magnified.

TAB. XXXVII.

Fig. 1. Plant of *Asiphonia piperiformis*:—of the natural size.

Fig. 2. Section of stem.

Fig. 3. Expanded flower, seen in front:—magnified.

Fig. 4. Stamen, seen in front:—much magnified.

Fig. 5. Pollen:—highly magnified.

Fig. 6. Column, seen vertically:—much magnified.

Fig. 7. Column, base of perianthium, and apex of ovarium, seen laterally.

Fig. 8. An ovulum, in its earlier stage.

Fig. 9. The same, at a later period, cut longitudinally.

Fig. 10. Fruit, after dehiscence:—of the natural size.

Fig. 11. Transverse section of placenta:—magnified.

Fig. 12. Seed, seen on its inner face or angle:—much magnified.

Fig. 13. The same, cut longitudinally.

TAB. XXXVIII.

Fig. 1. Male plant of *Sarcophyte sanguinea*:—of the natural size.

Fig. 2. Involucrum before dehiscence:—magnified.

Fig. 3. The same expanded, showing the male flowers.

Fig. 4. Male flower: the apex of the pedicel is seen to be surrounded by a sublaceral reflexed membrane, the remains of the perianthium:—more magnified.

Fig. 5. Transverse section of staminal disc.

Fig. 6. Two stamina, with portions of the disc:—still more magnified.

Fig. 7. Pollen:—$\frac{1}{16}$ m.

Fig. 8. Female plant:—of the natural size.

Fig. 9. Longitudinal section of a female capitulum:—magnified.

Fig. 10. The same of a single ovarium, or such part of the capitulum as corresponds to one:—much magnified.

Fig. 11. Longitudinal section of part of a ripe fruit, corresponding to one pericarpium.

Fig. 12. Nucleus of the same.

Fig. 13. One of the component cells of the same:—$\frac{1}{4}$ m.

Tab. XXXIX.

Fig. 1, 1, 1. Plants of *Thismia Brunonis*:—of the natural size.

Fig. 2. Alabastrum:—magnified.

Fig. 3. Perianthium (upper part) just after separation from ovarium:—magnified.

Fig. 4. Vertical view of faux of the same.

Fig. 5. Uppermost part of perianthium laid open and spread out, with the antheræ turned up:—more magnified.

Fig. 6. Stamen and part of *corona faucis,* in the natural position:—highly magnified.

Fig. 7. The same, inverted in front.

Fig. 8. Pollen:—$\frac{1}{25}$ triplet.

Fig. 9. Young ovarium and style, laid open:—magnified.

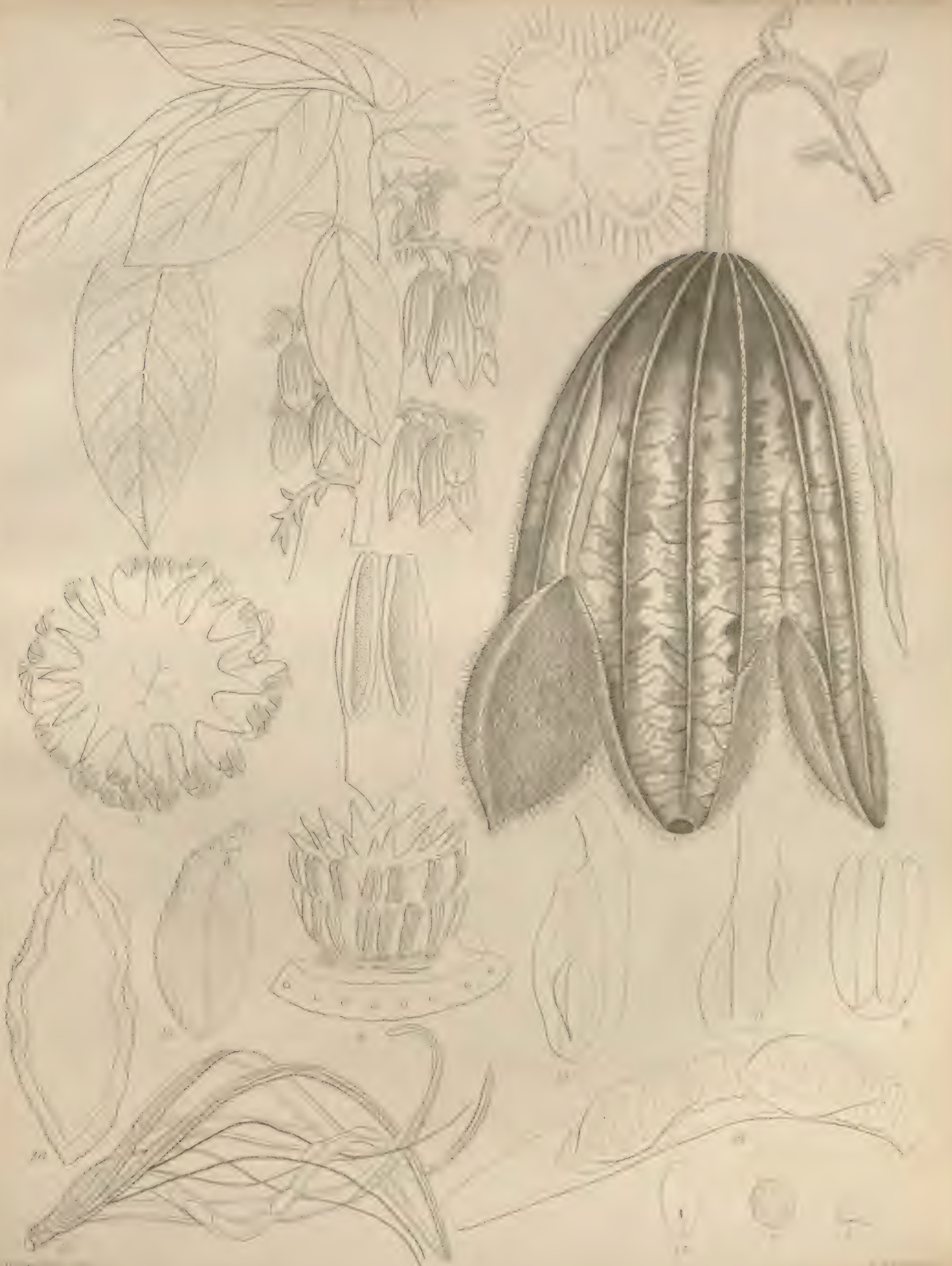
Fig. 10. A ripe seed:—much magnified.

Fig. 11. Embryo, enclosed in the inner tegument.

W. Griffith delin.

E. S. Weddell sc.

W. S. Weddell




10.

W Griffith delin.

E S Weddell sc.

XXVIII. *Monograph of the Class* Myriapoda, *Order* Chilopoda. *By* George Newport, *Esq., Fellow of the Royal College of Surgeons, President of the Entomological Society, &c. Communicated by the Secretary.* (*Continued from* p. 302.)

Read March 19th, April 2nd and 16th, 1844.

Class MYRIAPODA.

Order 1. Chilopoda.

Family 1. Cermatiidæ.

THIS family is at present composed of only a single genus, *Cermatia* of Illiger, Leach, &c. It presents many analogies with the higher *Articulata*, and seems to represent in the osculant class *Myriapoda* the active and rapacious *Cicindela* among *Insects*. The general structure and habits of the two are in many respects very similar. The form of the head, the long setaceous antennæ, the prehensile forcipated mandibles, the elongated palpi, the projecting, compound organs of vision, the elongation of the limbs, and the more compact form of body, are all indications of a higher degree of organization in this family than in others of the same class, and place it as much above the other genera of *Myriapoda* as the more complete organization of the predaceous *Cicindela* places that genus at the head of true *Insects*. But while the general form of body, the elongated antennæ, and the compound organs of vision approximate the *Cermatiidæ* to *Insects*, the parts of the mouth, the structure of the legs, and more especially the multiplicity of the tarsal joints, bring them near to the *Arachnida*, to which also they are closely allied in their great activity and predaceous habits. The *Cermatiidæ* are as much superior in the whole of their anatomical structure to the other genera of *Chilopoda*, as the lowest *Chilopoda* are to the lower vermiform *Chilognatha*. The head and organs of vision resemble those of *Insects*, and the body is compact and formed of a small number of segments, covered by only eight dorsal plates, each of which covers two ventral segments. These characters distinguish the *Cermatiidæ* from other *Myriapoda*, and are uniform in all the species. This great similarity of structure renders the identification of the species exceedingly difficult, the consequence of which has been, that naturalists have fallen into the error of assigning to particular species characters that are common to the genus. Thus, Fabricius has assigned to his species *C. longicornis* the number and scutellate form of the dorsal plates, with rounded margins, and median stomata; and elongated legs and antennæ; all which are common to the whole family. Mr. Templeton also has recently fallen into a like error in employing the minute spines on the edges of the plates for the same purpose. Indeed so similar is the structure of the different parts of the body in all the species, and so alike are the colours and markings on the body and limbs, that it is not to be wondered at that so few species have hitherto been recognised. Thus, I have never yet seen a species of *Cermatia* in which the legs were not more or less annulated with dark fasciæ, or which had not longitudinal bands of colour on the dorsal plates. Yet the colour and markings of the body, when carefully examined, are usually the most obvious indications of the species. When specimens are preserved in a dry state, their colours do not undergo much change, but remain tolerably perfect, and may then be relied on as some of the best characters. But when any *Myriapoda* have been long preserved in spirit, it is almost impossible to make out even the markings with much certainty, as the original colours disappear, and very little more than the former existence of coloured fasciæ, or even of the annulations on the legs, can then be distinguished. The only anatomical characters on which we can rely with certainty in the *Cermatiidæ* are derived from minute variations in the form, and the relative lengths and dimensions of the different structures. Mr. Templeton* has lately employed the relative length of the antennæ and legs to that of the body, and the size of the spines on the edges of the dorsal plates, as good marks of species. But excellent as are the first of these characters, and although they are almost invariable in uninjured specimens, they require to be taken in conjunction with other peculiarities, since the antennæ are very frequently injured, and the posterior legs, which easily fall off, may

* Transactions of the Entomological Society of London, vol. iii. part 4, 1843.

have been reproduced; in which case they would most likely be shorter than the original ones. The character derived from the spines on the scutella is of very doubtful utility. The most constant specific character I have yet met with, in addition to that first noticed by Mr. Templeton, is the relative length of the first and second basilar joints of the metatarsi †, more especially of the metatarsi of the posterior pair of legs. This character is of more value than that which is derived from the length of the posterior legs alone, or of the antennæ, the extremities of which are fragile, and are frequently lost. In regard to colour, it yet remains to be ascertained whether this differs in the two sexes, or whether even it varies in different individuals of the same sex. From the few opportunities I have yet had of comparing the sexes, I am inclined to believe that the colour and markings on both are very similar.

Family 1. CERMATIIDÆ.

The characters of the *Cermatiidæ* are distinctly marked. The head (TAB. XXXIII. fig. 36.) is very large and transverse, the eyes (*) tuberose and aggregated: the basilar region almost absent (B, C), and coalesced with the enlarged cephalic (A). The mandibles are large, distant, and forcipated (*f* to *m*); the palpi elongated, and armed with spines; the labial teeth long and acute; and the antennæ very long, setaceous, and formed of a great multitude of joints.

The body is covered by eight dorsal plates or scutella (fig. 37.), the posterior border of which is rounded (*p*), deeply emarginated in the middle, thickened, and perforated by a longitudinal orifice or stoma (*o*). The margins of the plates are everted and armed with minute spines, and the surface is usually roughened with parallel series of spinulæ. The sides of the body are furnished with nine pairs of spiracles, as in the *Insecta*, the entrances to the tracheal vessels. The anal extremity has a double outlet, and the external organs of reproduction in the female are exertile, and are armed with a pair of forceps (TAB. XXXIII. fig. 38.); and in the male with two pairs of short styliform appendages.

The organs of locomotion consist of fifteen pairs of legs, each articulating

† In the first part of this paper (page 283–284) the joint that articulates with the tibia has been described by mistake as the *metatarsus* instead of *tarsus*, and the remaining joints as *tarsal* instead of *metatarsal*.

with a single ventral segment. The legs are margined on their upper and under surfaces with longitudinal ridges of spinulæ, and the coxa, femur, tibia and tarsal joints are armed at their distal extremities with elongated spines. The posterior pair of legs are always greatly elongated, the metatarsi are very long, and formed of a great multitude of short joints, and the femoral, tibial and tarsal joints are annulated with dark-coloured fasciæ.

These characters are found in the species of the continents of Europe, Asia, Africa and America, as well as in those from Australia and the islands of Ceylon, New Zealand and the West Indies.

Tribus 1. Schizotarsia, *Brandt.*

Familia 1. Cermatiidæ, *Leach.*

Scuta dorsalia 8; singulo segmenta 2 ventralia obtegenti. Scutorum stigmata mediana. Pedes antennæque multiarticulatæ.

Genus 1. Cermatia, *Illig.*

Caput transversum. Oculi prominentes. Scuta dorsalia emarginata. Stomata latere incrassata. Pedes antennæque longissimæ.

1. *Cerm. coleoptrata*, capite scutellisque virescentibus asperis longitudinaliter saturatiùs trifasciatis, ventre pedibusque flavescentibus; articulis femoralibus tibialibusque angustè saturatiùs biannulatis, pedum pari postremo corpore bis longiore: articulo metatarsorum basali secundo quater longiore secundoque tertio bis longiore.—Long. lin. 9.

Scolopendra coleoptrata, *Linn. Syst. Nat.* 10th edit. ii. 1062.
Iulus araneoides, *Pallas, Spic. Zool.* fasc. 9. tab. 4. fig. 16.
Cermatia lineata, *Illiger.*
Scutigera coleoptrata, *Lamarck, Anim. sans Vert.*
Scutigera lineata, *Dufour, Annal. des Sc. Nat.* t. xi. p. 92.
Cermatia livida, *Leach, Zool. Misc.* iii. p. 38.
Scutigera araneoides, *Latr. Hist. Nat. des Crust. et Ins.* t. i. p. 77.
Scutigera livida, *Gray, Griffith's Animal Kingdom*, pl. 1. (*Insects*) fig. 2. 1832.
Cermatia livida, *Heineken, Zool. Journal*, vol. v. 1833, p. 41.
Scutigera araneoides, *Gervais, Ann. des Sc. Nat.* t. vii. 1837. p. 48.
Scutigera araneoides, *Lucas, Hist. des Anim. Articul.* t. iv. p. 537.
Cermatia coleoptrata, *Templeton, Trans. Ent. Soc. Lond.* vol. iii. part 4. p. 307.
Cermatia coleoptrata, *Newp. in Ann. & Mag. Nat. Hist.* xiii. p. 95.
Hab. In Hispaniâ et Ins. Madeirâ. (*v. in Mus. Linn. et Brit.*)

Head with a triangular depression, the two sides of which end in a median sulcus between the eyes, and which is extended to the lower part of the face. Eyes prominent, black. Antennæ one-fifth longer than the body. Dorsal plates rounded at the angles and covered with numerous elevated points. Coxal joints of the legs impressed with minute punctures; metatarsi of the posterior pair of legs much longer than the remaining portions of the limbs, with the basilar or first joint four times as long as the second, and the second twice as long as the third. Coxal joint of the legs with a single annulus, with two annuli on each femoral and tibial joint near their articulations.

The original *Scolopendra coleoptrata* is still extant in the Linnean cabinet, with its name attached to it in Linnæus's hand-writing. This has enabled me to identify it with Leach's species, *Cermatia livida*, in the British Museum, from which this description has been taken. Besides six dried specimens in the Museum cabinet, there is also one in spirits, from which I have been able to ascertain its original colouring. Leach appears to have taken his description from a dried specimen which had originally been preserved in spirits, but which had entirely lost its proper colour. The following note, in Leach's hand-writing, is attached to his original specimen: "2. *Scutigera*, Lamarck (*Cermatia livida*, Leach, Zool. Misc. viii. p. 38. f. 136.): common, running about at midnight in the houses, June 14."

2. *Cerm. Floridana*, viridis, stomatibus dorsalibus albidis, fasciâ dorsali medianâ rufescenti lateralibusque duabus latioribus, ventre flavescente-viridi, scutorum spinis marginalibus uniformibus quàm in *Cerm. coleoptratâ* evidentioribus.—Long. lin. 9-10.

Cerm. coleoptrata, *Say, in Journ. Acad. Nat. Sci. Philad.* ii. p. 5.

Hab. In Americâ Boreali, Floridâ. (*v. in Mus. Brit.*)

This specimen was taken by Mr. Doubleday in East Florida, North America, where it is very common, running about in the houses. It greatly resembles the species from Madeira, but seems to be distinct from it, the middle dorsal fascia being narrower than in *C. coleoptrata*.

3. *Cerm. rugosa*, aurantiaca, scutis rugosis nigrescentibus, stigmatibus dorsalibus scutellorum marginibus lineâque medianâ unicâ flavis, tibiis annulis tribus, tarso annulis duobus latis brunneis, pedum pari postremo articulo metatarsorum primo secundo bis longiore secundoque tertio etiam bis longiore.—Long. unc. $\frac{8}{10}$.

Cerm. rugosa, *Newp. in Ann. & Mag. Nat. Hist.* xiii. p. 95.

Hab. In Africâ. (*v. in Mus. Brit.*)

In this species the lateral margins of the scutella are almost straight, the posterior border is obtusely rounded, as in *C. rubrolineata,* and the marginal teeth are regular, strong and very acute. The posterior part of the head is convex, and the yellow dorsal median line of the scutella is extended to the face, on which it ends in two narrow diverging yellow lines. The antennæ are twice as long as the body. The mandibles are yellow, with three brown, imperfect annuli, and the legs are very long, as compared with the length of the body, the posterior pair being nearly three times its length.

This species being from Africa, I have endeavoured to ascertain whether it is either of those figured by Savigny in the great work on Egypt, but have been unable to identify it with either of those species, and shall therefore regard it as distinct.

4. *Cerm. Oweni,* scutellis nigro-fuscis asperis fasciâ unicâ latâ longitudinali flavescente, antennis corpore plùs duplò longioribus, pedum pari postremo corpore ferè ter longiore: articulo metatarsorum primo secundo quater et ampliùs longiore.—Long. unc. $1\frac{1}{4}$.

Cerm. araneoides, *Owen in Cat. Mus. R. C. Surg.* part 4. fasc. 1. no. 335. p. 100.

Hab. ——? (*v. in Mus. Coll. Reg. Chirurg. Londin.*)

This is a very distinct species, somewhat resembling *C. rugosa,* but much larger, and more nearly allied to *C. nobilis.* It has the dorsal stomata much elevated, and the yellow median fascia is extended to the face, and is there bounded on each side by a narrow black line. The legs are yellowish orange, but the annuli have almost disappeared in this specimen, which is preserved in spirit.

5. *Cerm. nobilis,* pallidè brunnea, lineâ medianâ flavescenti brunneo-marginatâ fasciâ utrinque longitudinali saturatiore transversalique ad cujuscunque scuti basin obscurâ, scutorum marginibus undulatis v. crenulatis spinis validis numerosis armatis, pedibus elongatis; pari postremo valdè attenuato corpore bis longiore: coxis flavescenti-brunneis juxta apicem cæruleo annulatis: femoribus virescentibus annulis duobus saturatè cæruleis: tibiis flavis obscurè annulatis: metatarsis rufescentibus articulo primo secundoque basilari æqualibus (?).—Long. unc. 2.

Cerm. nobilis, *Templeton in Trans. Ent. Soc. Lond.* iii. part 4. 1843, p. 307. pl. xvii. f. 1–4.

Cerm. nobilis, *Newp. l. c.* p. 95.

Hab. In Indiâ Orientali et Ins. Mauritii.

I have drawn up this description from Mr. Templeton's account of the species.

6. *Cerm. Downesii*, brunnea, lineâ unicâ angustâ medianâ fasciisque duabus latis lateralibus longitudinalibus saturatioribus, scutellis asperis margine undulatis, pedibus ochraceis: coxis annulo cæruleo unico: femoribus annulis duobus latis: tibiisque duabus obscuris: metatarsis rufescentibus articulo basilari primo secundo quater et ampliùs longiore, pedum pari postremo corpore bis longiore.—Long. unc. $1\frac{1}{2}$.

Hab. In Indiâ Orientali, Nemuck. (*v. in Mus. D. Hope.*)

This species very greatly resembles *C. nobilis*, and may be readily mistaken for it. But it differs in having a median dark line instead of a yellow one, and in the length of the basilar joints of the metatarsi, the first of which in all the legs is thrice as long as the second; while in Mr. Templeton's figure they are represented as being of equal length in *C. nobilis*. This character alone is sufficient to distinguish the two species. I have named this species in honour of —— Downes, Esq., Assistant Surgeon in the Honourable East India Company's Service.

7. *Cerm. Hardwickei*, viridis, fasciâ utrinque longitudinali brunneâ, antennis rufescentibus corpore tertiâ parte longioribus, pedibus apice aurantiacis violaceo-annulatis; pari postremo corpore bis longiore: articulo metatarsorum primo secundo duplò longiore.—Long. unc. $1\frac{1}{10}$.

Cerm. longicornis ♀, *Hardw. in Linn. Trans.* xiv. p. 131.

Cerm. Hardwickei, *Newp. loc. cit.* p. 95.

Hab. In Indiâ Orientali, *Hardwicke.* (*v. in Mus. Brit.*)

Head with a triangular depression behind the eyes, with three impressed lines on the face, as in *C. coleoptrata*; labrum and front hairy; *labium* divided by a deep median suture, thinned at the dental margin, and covered with very fine hairs; dorsal plates very convex, with the middle portion elevated, and covered on each side with four or five irregular longitudinal series of very minute spines; posterior border of the plates deeply emarginated and more rounded than in *C. coleoptrata*, with the marginal spines strong, uniform and very acute. Præanal scale elongated, quadrate, and armed with a pair of curved, unidentated, sharp-pointed forciples. Inferior surface of the legs with a few scattered fine hairs. The antennæ are not annulated, as represented in the drawing in the 'Linnean Transactions,' vol. xiv. tab. 5. fig. 1. In General Hardwicke's original drawings in the British Museum, MSS., vol. 11,002. no. (19.) 86, the longitudinal middle portion of the plates is of a light red, or orange colour, and the metatarsi are orange-coloured, except in the posterior pair of legs, which are annulated throughout; the basilar joint of the metatarsus of the posterior pair of legs is twice as long as the second joint.

These characters distinctly show that this is not the *S. longicornis* of Fabricius, which is described with "*antennæ corpore duplo longiores, flavæ,*" and the body as "*supra fuscus lineâ dorsali ferrugineâ, subtus flavescens.*" General Hardwicke's species has *two* longitudinal fasciæ, and the antennæ are only one-third longer than the body. As the specific name employed by General Hardwicke is thus referable to a species already described, I have changed the name of his species to *Cerm. Hardwickei.*

8. *Cerm. longicornis,* Fabr. Entom. Syst. ii. 1793, p. 389.
Hab. In Tranquebariâ.

9. *Cerm. Guildingii,* brunnea, fasciâ unicâ latâ flavâ, stigmatibus dorsalibus ore nigris, pedum pari postremo metatarsis longissimis: articulo basilari secundo triplò longiore: femoribus annulo unico: tibiis articulisque tarsi biannulatis.—Long. lin. 9.
Hab. In Ins. Caribæâ S^ti^ Vincentii. (*v. in Mus. D. Hope.*)

This species is very closely allied to *Cermatia longitarsis*, and may readily be mistaken for it, as the metatarsal joints are equally long as in that species, but it seems to differ in the relative lengths of the first and second basilar joints.

10. *Cerm. longitarsis,* virescens, fasciâ longitudinali unicâ medianâ pallidiore, capite parvo; fronte piloso, pedibus postremis corpore plus duplò longioribus; metatarso reliquo membro duplò longiore, pedibus flavis annulis duobus latissimis violaceis in quoque articulo femorali tibialique.—Long. unc. 1.
Cerm. longitarsis, *Newp. in Ann. & Mag. Nat. Hist.* xiii. p. 95.
Cerm. longipes, *Lam. Anim. sans Vert.* v. p. 29.?
Hab. ——? (*v. in Mus. Brit.*)

The most marked characters of this species are the single longitudinal dorsal fascia, the great length of the metatarsal joints of the posterior pair of legs, and the breadth and dark colour of the annuli, which cover the chief portion of the legs. The antennæ are one-fourth longer than the body. The spines on the scutella are ranged on the dorsal surface in two somewhat approximated waved median series, but are distributed irregularly over the other portions of the scutella. The margins of the scutella are very slightly waved, and the marginal spines are small, acute and somewhat approximated: the coxæ of the legs are very short and thickly punctured.

This specimen, in the British Museum collection, was found in a bottle, which seems to have formed part of the original collection of Sir Hans Sloane.

I have some hesitation in naming this species, which may be the *Cermatia longipes* of Lamarck, as the relative proportions of the body, antennæ and posterior legs agree with those given by Mr. Templeton, who however has assigned no other characters by which the species might be determined.

11. *Cerm. dubia*, brunnescens, fasciâ unicâ pallidiore medianâ maculâque nigrescenti utrinque ad marginem exteriorem posticum cujuscunque scutelli, pedibus flavescentibus; articulo quoque femorali tibialique angustè biannulato, pedum paris 12^{mi} articulo metatarsali primo secundo quater longiore.—Long. unc. 1.

Cerm. dubia, *Newp. l. c.* p. 95.

Hab. ——? (*v. in Mus. Brit.*)

This specimen was found in the same bottle with *C. longitarsis*, of which I was at first disposed to regard it as the other sex; but on closer examination it presented some marked differences. Thus, in addition to the characters above given, the dorsal plates are more rugose, and the spinous tuberosities larger and more thickly placed; and the marginal spines are larger, stronger, and more uniform in size. The antennæ are one-half longer than the body. The legs are roughened, and covered with fine hairs; the emargination of the dorsal plates is deep and blackened; and there are three blackish patches at the posterior part of the head. I am unable to give the length of the posterior pair of legs or of their metatarsi, as the specimen had lost these parts, and have therefore taken the relative lengths of the joints from the twelfth pair. These characters seem sufficient to distinguish this as a species.

12. *Cerm. Latreillei*, scutis capite facieque nigris, ventre stigmatibus dorsalibus macularumque parvarum serie obliquâ capitis utrinque aurantiacis, pedibus flavis; articulis femoralibus tibialibusque nigro biannulatis; metatarsorum articulo primo nigrescente secundo quater longiore.—Long. unc. 1.

Hab. In Novâ Hollandiâ. (*v. in Mus. D. Hope.*)

Latreille (in 'Nouv. Dict.' xxx. 447) has mentioned the existence of a species of *Scutigera* from New Holland, but has not named it, or given any description of it. I propose therefore to name this species in honour of that distinguished naturalist. The antennæ and posterior pair of legs of this beautiful species are wanting in Mr. Hope's specimen.

13. *Cerm. Vesuviana,* virescenti-flava, scutis asperis subcarinatis fasciis duabus pallidioribus (?), mandibulis flavis, pedum postremorum femoribus annulo unico: tibiis tarsisque annulis duobus atro-violaceis; articulo metatarsali primo secundo quintuplò longiore, antennis corpore ferè bis longioribus, metatarsis rufescentibus.—Long. lin. 10.

Scutigera Vesuviana, *Costa, Mem. Zool.* i. p. 52?

Hab. In Regno Neapolitano. (*v. in Mus. D. Hope.*)

I am greatly inclined to believe that this is the *Scutigera Vesuviana* of Costa, although the description given of his species is not sufficiently precise to identify it. The following are his remarks on it:

"*Scutigera Vesuviana.*

"Scutigera murina, mandibulis flavescentibus, antennis crassis subconicis, pedibus carneis.

"Longa lin. $5\frac{6}{10}$; larga lin. 11.

"Tutta di color marrone più chiaro nel margine. Antenne mediocri di no. 50 articuli anellari e decrescenti, quei degli apici orbiculari. Mandiboli gialli. Capo e tarsi di color carniccio. Femori inermi. Corpo coperto di 7 scudi marginati, e quasi posti ad embrice."

This species, Costa says, lives in volcanic regions where smoke comes from the ground, and feeds on living and dead animals.

14. *Cerm. rubrolineata* (Tab. XL. fig. 1.), saturatè aurantiaca, fasciis tribus longitudinalibus castaneis, femoribus juxtà apicem annulo unico, tibiis tarsis articuloque metatarsali primo annulis latis duobus violaceis, articulo metatarsali primo secundo quadruplò longiore.—Long. unc. 1.

Cerm. rubrolineata, *Newp. Ann. & Mag. Nat. Hist.* xiii. p. 96.

Hab. In Indiâ Orientali, *Hardwicke.* (*v. in Mus. Brit.*)

Posterior part of the head nearly flat, without depressions; antennæ a very little longer than the body; dorsal plates very much flattened, with their posterior borders more rounded and obtuse than in *C. Hardwickei,* with the median longitudinal portion formed by a line of minute spines. Præanal scale short, quadrate, deeply emarginated. Marginal spines of the scutella somewhat scattered. Posterior pair of legs about one-fifth more than twice as long as the body. Scutella and body very slightly hairy.

This species approaches the *Lithobiidæ* in the broad and flattened form of the dorsal plates, and in the rounded form of their posterior borders. It was placed in the cabinet by the side of *C. Hardwickei,* but it is a very distinct species.

15. *Cerm. capensis*, Templeton in Trans. Ent. Soc. Lond. vol. iii. part 4. 1843, p. 308, pl. xvi. fig. 8–11.

16. *Cerm. maculata*, flava, fasciâ medianâ longitudinali nigrâ maculisque duabus nigris in scutis singulis, scutorum lateribus irregulariter undulatis, stigmatibus dorsalibus ad latera saturatè aurantiacis, articulis tibialibus tarsalibusque singulis latè nigro bifasciatis.—Long. lin. 9.

Cerm. maculata, *Newp. l. c.* p. 96.

Hab. In Novâ Hollandiâ, ad fl. Cygnorum. (*v. in Mus. Brit.*)

Head with two longitudinal rows of black spots on the face, anterior to the eyes, and a single median row on the upper posterior surface. Mandibles with a single spot at their external distal angles. Dorsal plates depressed, roughened, with the sides sinuous; each plate with a slight dorsal median elevation formed by a double row of minute, approximated spines, somewhat as in *L. rubrolineata*, but with the posterior border of the plates thin and deeply emarginated, and the sinuation of the lateral margins caused by a partial folding of the tegument and projection of the spiracles at the front of the coxæ. Legs with the tibial and tarsal joints of each with broad black rings. Basilar joint of the metatarsi of the tenth pair more than twice as long as the second joint. Colour yellow, with a longitudinal dorsal band, and two spots on each dorsal plate, and the annulations on the legs black; stigmata orange.

This is a very beautiful species; but the specimen from which I have derived my description is in bad condition, so that I have not been able either to ascertain the length of the antennæ or of the posterior legs. The black markings on the back, and the orange-coloured stomata, contrast beautifully with the bright yellow ground of the body and legs.

17.? *Cerm. Australiana*, scutis depressis posticè angustatis marginibus rectis, corpore flavescente fasciâ medianâ longitudinali maculisque utrinque duabus brunneis stomatibus dorsalibus aurantiacis, articulis femoralibus annulo unico tibialibus tarsalibusque singulis annulis duobus latissimis violaceis; articulo metatarsali primo nigrescente secundo triplò longiore.—Long. lin. 8.

Hab. In Novâ Hollandiâ Occidentali. (*v. in Mus. D. Hope.*)

I am doubtful whether this is not a variety of the last species, from which however it seems to be distinct by the straight lateral margins of the dorsal plates. I have named it therefore with a query.

18. *Cerm. Smithii*, virescenti-marmorata fasciâ medianâ unicâ saturatiore, scutis dorsalibus

rugosis margine parùm undulatis: posticè angustatis rotundatis profundè emarginatis subdepressis, pedibus postremis corpore triplò longioribus; metatarso femore tibiâque tarso plùs duplò, articulo metatarsali primo secundo tertiâ parte, secundo tertio duplò longiore.—Long. lin. 8.

Cerm. Smithii, *Newp. l. c.* p. 96.

Hab. In Sinu Insularum Novæ Zealandiæ. (*v. in Mus. Brit.*)

This is the first species of *Cermatia* obtained from New Zealand, and agrees precisely in its general characters with those from Africa and Asia.

Family 2. Lithobiidæ, *mihi.*

The species of the genus *Lithobius* of Leach have many marked characters that distinguish them at once from the *Scolopendridæ*, with which they have hitherto been connected. I have therefore separated the *Lithobii* as a distinct family.

The *Lithobiidæ*, the common Centipedes of this and most of the northern countries of Europe (Tab. XXXIII. fig. 27 to 34; and Tab. XL. fig. 2 and 3.) have the cephalic portion (A) of the head very broad, depressed, cordate, and almost covering the basilar portion, which exists only as a short narrow ring (B, C). The eyes (*) are stemmatous, and vary in number and magnitude; and the antennæ are setaceous, elongated, and formed of a multitude of short joints (D). The mandibles (*g*) are large and forcipated: the labium (*b*, *c*) is broad, extended forwards, and divided by a deep median sulcus, and armed in front (*e*) with distinct minute teeth. The body is formed of sixteen imbricated, depressed, alternating, long and short segments (fig. 33.), that have the posterior margin straight, or slightly excavated, and the angles of the ninth, eleventh, thirteenth and fifteenth are acute and elongated. The seventh and eighth segments are quadrate, and nearly equal. There are fifteen pairs of legs; the four posterior pairs are much lengthened, and their coxæ (fig. 34 *a*) have each a deep, elongated oval, transversely furrowed excavation† on their under surface. The males are usually larger and more robust than the females, and have the head much broader; and the anal segment of the body is truncated (Tab. XXXIII. fig. 34.), and has a single pair of minute styliform

† This was first noticed in the common *Lithobii* of this country by Mr. Walker ('Entomologist,' Jan. 1842, p. 239). I have since found it in all true *Lithobii* from every part of the world.

appendages. In the female the anal segment is divided by a median sulcus, and is armed on each side with a pair of forceps.

The species of this family are exceedingly common, and reside beneath the rotten bark of trees, under stones, and in crevices in the earth. They shun the light, and run with great rapidity. Like the *Cermatiidæ* they are of carnivorous habits, although Mr. Westwood * and some other naturalists believe that they feed partly on vegetable matter. But this most certainly is a mistake, and probably has arisen from their being found amongst decaying vegetables. Their presence there is to be attributed to their habit of preying on vegetable-feeding larvæ found in such localities, and not to their own predilection for vegetable food. The decidedly carnivorous form of their organs of nutrition, the forcipated structure of the mandibles, and the strongly denticulated labium distinctly indicate their kind of food (Tab. XXXIII. fig. 28 to 32.), which consists of soft-bodied larvæ, small earth-worms and *Onisci*. I have seen a *Lithobius Leachii*, that had been confined for some weeks without food, attack with great ferocity a living earth-worm, that was more than twice its own length, the instant it was within its reach. It seized its prey transversely with its powerful mandibles, and notwithstanding the writhings and contortions of the worm, which coiled around its body, the *Lithobius* did not appear to be at all incommoded, but held securely on, and seemed only to increase the energy of its gripe. It persevered in its attack for several hours, until the worm became exhausted. The *Lithobius* then succeeded in biting off a portion of one end of the worm, and fed upon this to repletion, retaining it constantly between its mandibles; and, like the *Arachnida*, appeared to squeeze and to suck out the juices. Being accidentally disturbed, the *Lithobius* dropped its prey and attempted to escape; but as soon as its alarm had subsided it began again to search for it, using its antennæ as explorers, and the instant it was discovered darted on it as at first. When several specimens of *Lithobii* are confined in the same vessel without food, they attack and destroy each other, more especially the very young specimens; but this is only when urged by hunger. However much the *Lithobii* may suffer from want of food, they will not attack the *Geophili*. When much pressed for nourishment, they will sometimes prey on the cooked flesh of *Vertebrata*, but this is almost invariably

* Entomologist's Compendium.

a poison to them, and they usually die within a few hours. Their bite is poisonous to small *Articulata*; and I have little doubt that they inject a fluid into the wound from the apex of the mandibles, and that a poison-gland is contained in the base of these organs, as I have discovered in *Scolopendra*, although I have not yet detected it in *Lithobius*. Degeer*, who was more practically acquainted with the habits of *Insects* and *Myriapoda* than almost any other naturalist of the last century, says, "J'ai vû qu'une mouche, qui fut mordue par une de ces Scolopendres, mourut presque dans l'instant, ce qui semble être une marque que leur morsure est vénimeuse." But the effect of the bite of *Lithobius* was not so marked on the worm, although I doubt not that it was more rapid on the fly; precisely as the bite of the larva of the glow-worm, as I have often witnessed, almost instantaneously paralyses its natural prey, the garden snail, *Helix hortensis*, which dies quickly from the effects of repeated bites.

Very little is at present known of the mode of development of the *Lithobiidæ* beyond the fact that their young acquire periodic additions of segments, legs and eyes, like the *Iulidæ*; and also, as I have satisfactorily ascertained, that they cast their tegument at distant periods of growth, and are capable of reproducing lost parts, like the *Crustacea* and *Arachnida*. The *Lithobiidæ* are frequently found with one or more of the legs much smaller than the rest, although with the same number of joints. These are limbs that have been reproduced, perhaps even a second time, as I have elsewhere shown†. The only instance I am acquainted with of the development of supernumerary limbs in the *Myriapoda* exists in a specimen of *L. Leachii* in my own collection. In this instance the anterior or prothoracic leg, on the right side, has the tibia exceedingly short; but the tarsus is enlarged, and not only gives attachment to a metatarsus, formed of two joints and a claw, but also to another tibial joint, from the middle of which a second biarticulated metatarsal joint is produced, and from its extremity also a third; each joint having its complete armature of spines and hairs.

The generic characters of the *Lithobiidæ* have been almost as imperfectly studied as their natural history. The best characters of the family are the

* Mémoires pour l'Histoire des Insectes, tom. vii. p. 557.

† Phil. Trans. 1844, part ii. pp. 283 to 288.

number, alternation, and form of the dorsal plates (Tab. XXXIII. fig. 33.), and the elongations of the angles of the eight posterior ones, together with the excavations on the four posterior pairs of coxæ (fig. 34 *a*). These characters are as well-marked in the New Zealand and Tasmanian species as in the American and European. The number of separate ocelli, organs of vision, are also good secondary characters of species, and the great size and singleness of these mark one distinct genus, *Henicops* (fig. 27*, Tab. XXXIII., and fig. 3, Tab. XL.).

The specific characters are founded chiefly on the number of the ocelli and labial teeth in the adult, and on the colour and markings of the body. The first of these are in general good structural characters, but they are occasionally subject to some variation. Thus, a tooth is sometimes deficient (fig. 31.) on one half of the labium, or is supernumerary on the other. When a tooth is absent, the space it should have occupied is not filled up; and when a supernumerary tooth is developed, the two are in general crowded into a narrow compass. On comparing the two sides of the labium these irregularities are readily detected. The relative size of the species is also of some value, and the colour and markings are good characters in the recent state; but they disappear and become confused in dried specimens.

Familia 2. Lithobiidæ.

Scuta dorsalia 15, subquadrata, inæqualia: angulis elongatis acutis. Coxarum paria posteriora excavationibus ovatis. Antennæ elongatæ setaceæ.

Genus 2. Lithobius, *Leach.*

Antennæ multiarticulatæ. Caput latum, depressum. Ocelli numerosi. Labium latum, lamelliforme, anticè denticulatum, medio sulcatum emarginatum.

1. *Lith. variegatus* (Tab. XL. fig. 2.), capite magno quadrato, ocellis utrinque 16, mandibulis magnis prominentibus, labio complanato profundè punctato anticè margine dilatato; denticulis 14 validis acutis nigris, corpore depresso brunneo maculis duabus in unoquoque segmento saturatioribus, pedibus nigro-fasciatis.—Long. lin. 7, v. 8.

Lith. variegatus, *Leach, Zool. Misc.* iii. Lithobius, sp. 2. p. 40. *Walker, 'Entomologist,'* Jan. 1842, p. 238. *Leach, Edinb. Encyclop.* vii. 409. *Id. Trans. Linn. Soc.* xi. 382. *Gervais, Ann. des Sc. Nat.* 1837, p. 49. sp. 3. *Lucas, Nat. Hist. Anim. Artic.* t. iv. p. 543. *Newport, Annals & Mag. Nat. Hist.* xiii. p. 98.

Hab. In Wimbledon Common prope Londinum. (*v. in Mus. Brit.*)

From the general appearance of this species, the large size of the head, and the length and annulation of the legs, I am induced to place it at the head of the genus as coming very near to the *Cermatiidæ*. There is not a doubt of its distinctness as a species, although M. Gervais * formerly imagined the contrary. It is exceedingly local, but exists in great profusion in some places. There are more than thirty individuals, including males and females, in the cabinet at the British Museum, all of which were captured at Wimbledon. The annulations on the thighs and tibiæ of the posterior five or six pairs of legs sufficiently distinguish this from every other British species. The sexual differences in the head of this species are very strongly marked. The head of the female is much smaller and rounder than that of the male, and the mandibles are less projecting. The species varies in the entire absence of annulations on the thighs and tibiæ, as well as in size, some specimens being very much larger than others. This variety seems to be found in Ireland, as there is a specimen which had been placed in the cabinet at the British Museum by the side of *L. forficatus*, ticketed in Leach's hand-writing, "Ireland," and which specimen seems to have occasioned some mistake in the description of *L. forficatus*.

2. *Lith. rubriceps,* capite magno subquadrato saturatè rubro, ocellis parvis utrinque 14, labio complanato profundè punctato; denticulis 14 parvis acutis nigris, corpore subolivaceo, labio mandibulisque flavescentibus, pedum paribus posterioribus latè nigro obscurè annulatis.—Long. $1\frac{4}{10}$ unc.

Hab. In Hispaniâ Australi. (*v. in Mus. Brit.*)

The head is large, subquadrate, punctured, and narrowed anteriorly, and its lateral and posterior borders are distinctly margined. The ocelli are small, black, and fourteen on each side: the antennæ are yellow and pubescent, with fifty-one joints: the labium is flattened and deeply punctured, with its external angles produced, and the dental margin nearly straight and armed with fourteen minute black teeth: the mandibles are large, yellow, and tipped with black. The body is brown or subolivaceous; and the legs yellowish with the posterior pairs indistinctly annulated, with the tibial joints compressed, densely ciliated, orange-yellow, and with the claw black.

This is a magnificent species, closely allied to the last, and is the largest yet discovered. It very much resembles the variety of *L. variegatus* from Ireland, but is much larger.

* Annales des Sciences Naturelles, Janvier 1837.

3. *Lith. fasciatus*, saturatè testaceus, scutorum dorsalium lateribus fasciâque latâ longitudinali medianâ nigrescentibus, ocellis 18 magnis nigris, labii denticulis 18 minutis nigris, labio mandibulis pedibusque flavis: metatarsorum articulis ferrugineis pilosis.—Long. $1\frac{1}{4}$ unc.

Hab. In Italiâ ad Florentiam Neapolinque. (*v. in Mus. D. Hope.*)

The head is ferruginous, convex, subquadrate, with scattered punctures; the ocelli are very large, especially the four upper ones, and together with the sides of the head are of a deep black; the antennæ are ferruginous, pubescent, with forty-one joints: the labium is broad, flattened, punctured and hairy, with the dental border nearly straight, and armed with eighteen minute black teeth, of which one or more of the external ones are often absent; the body is polished, with a black longitudinal fascia, often more or less indistinct. Mandibles, labium and legs yellow, the five posterior legs blackened or annulated; metatarsal joints very hairy, ferruginous; claws black; articular spines of all the legs very short, excepting one on the tarsus, which is much elongated.

This is a fine species, collected by Mr. Hope both at Florence and Naples. It approaches very much in its appearance to *L. variegatus*, but is a great deal larger.

The specimens obtained from Naples are usually of a much lighter colour, but in other respects they agree precisely with those from Florence.

4. *Lith. Mexicanus*, latior quàm *L. forficatus*, ocellis utrinque 9 haud approximatis.
Lith. Mexicanus, *Perbose in Rév. Zool.* Sept. 1839, p. 261.

5. *Lith. multidentatus*, lateritius, pedibus flavescentibus, laminis dentalibus distinctis margine rotundatis angulis externis subproductis denticulis 16 conspicuis armatis, capite quadrato; subsegmento antennali polito impunctato, labio lævi polito, antennis subpilosis articulis 4 basalibus longitudine ferè æqualibus.—Long. unc. $\frac{5}{8}$.

Hab. Prope Novum Eboracum, *E. Doubleday.* (*v. in Mus. Brit.*)

6. *Lith. Americanus* (TAB. XXXIII. fig. 29.), ferrugineus, capite magno subquadrato posticè ad marginem elevato; subsegmento antennali sparsè profundè punctato, antennis pubescentibus, ocellis nigris utrinque 24–26, labio complanato polito margine ferè recto: denticulis 10 parvis nigris subapproximatis, scutis dorsalibus lævibus convexis subquadratis posticè rectis, segmento præanali piloso, pedibus validis flavis spinis validis armatis. Long. unc. 1; lin. 1.

Lith. spinipes, *Say, Journ. Acad. Nat. Sci. Phil.* ii. p. 108.; *et in Œuvr. Entom. Ed. M. A. Gory*, i. p. 21.? *Lucas, l. c.* iv. p. 543.?

Hab. In Americâ Boreali. (*v. in Mus. D. Hope.*)

This species resembles *L. forficatus,* but is larger, and is distinguished from it by the flattened form of the lip, with its straight margin, as well as by the form of the dorsal plates. In the form of the labium and disposition of the teeth it is allied to *L. Sloanei,* but differs from that species in the number of teeth, and in the straight margins of the segments. It differs also from *L. pilicornis* in the labium being flattened, polished, and entirely without hairs. This species varies in having *eleven* instead of ten teeth. I am inclined to believe that it is the *L. spinipes* of Say, as the spines on the legs are largely developed. The size of the spines is the chief character assigned by Say to his species; but this is insufficient to distinguish it, as the articular spines, more or less developed, are common to the whole genus. I have therefore described it as a new species. The other characters given by Say to his species are also common to the whole genus.

7. *Lith. planus* (Tab. XXXIII. fig. 32.), ferrugineo-variegatus, capite magno subquadrato polito granulosus posticè ad marginem elevato incrassato, antennis brevibus pubescentibus, ocellis utrinque 23, labio polito pilis raris; laminis dentalibus lunatis angulis externis anticè elongatis profundè emarginatis: denticulis 14 acutis nigris, scutis dorsalibus complanatis rugosis margine elevatis, pedibus nudis spinis articularibus parvis.—Long. lin. 8, v. 9.
Hab. In Americâ Boreali. (*v. in Mus. D. Hope.*)

The characters of the labium and teeth of this species are very distinct. The deep emargination is formed by the approximation of two slightly crescentric dental plates, set with strong, sharp, elongated teeth, which distinctly indicate the predaceous habits of the species. The general characters of the head, labium and teeth closely connect this species to *L. variegatus.* The labium and mandibles are bright orange; head orange, mottled; the eyes and sides of the face blackish, and the antennæ annulated and pubescent. The dorsal surface of the body is flattened and slightly rugose, and the legs are naked, brownish yellow, with small articular spines.

8. *Lith. Hardwickei,* antennis valdè pilosis articulis quibusdam elongatis, ocellis magnis utrinque 18, labio complanato margine dentali excavato: denticulis utrinque 5–8, laminâ ventrali præanali pilosâ tuberculatâ.—Long. lin. 8.
Lith. Hardwickei, *Newp. Ann. Nat. Hist.* xiii. p. 96.
Hab. Ad Singapore. (*v. in Mus. Brit.*)

This species very much resembles *L. forficatus*, but is smaller and of a lighter colour. The antennæ are very hairy, with forty-one joints, some of which are one-half longer than the others. The great characteristics of this species are the number of the ocelli, the form of the dental plates, and the tuberculation of the præanal plates, which distinguish it from the British species. I am not certain of the normal number of the teeth, since there is only a single specimen of *L. Hardwickei* in the British Museum, and in this the teeth are abnormal, there being only five on one plate and eight on the other.

9. *Lith. longicornis*, antennis corporis ferè longitudine pilosis 56–60-articulatis, capite subquadrato; subsegmento antennali lævi anticè angustato, ocellis parvis utrinque 10–14, laminis dentalibus angustatis: denticulis 8 acutis nigris, scutis dorsalibus impressione utrinque laterali curvâ, pedibus nudis; spinis subfemoralibus minutis.—Magn. *Lith. forficati.*

Lith. longicornis, *Risso, Europ. Merid.* v. p. 154? *Gervais, Ann. Sc. Nat.* Janv. 1837, p. 49. sp. 4? *Lucas, Hist. Nat. Anim. Art.* p. 543. sp. 4?

Hab. ——? (*v. in Mus. Linn.*)

This specimen is about the size of *L. forficatus*, and stands beside it in the Linnean cabinet. I believe it to be the *L. longicornis* of Risso, but have been unable to identify it with the description given by that author, excepting as regards the length of the antennæ. It is a distinctly-marked species, of a ferruginous colour, and has the fifth dorsal plate narrowed, and longer than in most other species, and the angles of the plates are only slightly produced. The ocelli also are few in number; the labial teeth are black and acute, and the labium is slightly narrowed and punctured. From the length of the antennæ, the slight development of the angles of the short dorsal plates, and the clustered ocelli, it seems to make a near approach to the *Cermatiidæ*.

10. *Lith. forficatus*, ferrugineus, capite ovato-quadrato; subsegmento antennali impressionibus sparsis obsoletis, antennis pubescentibus, labio lævi polito; laminis dentalibus distinctis paulò angustatis: denticulis 12 minutis æquidistantibus acutis, ocellis 22–24, pedibus ferè nudis; articulis brevibus: spinis subfemoralibus nullis, squamâ præanali pilosissimâ, scutis dorsalibus lævibus margine postico tenui angustato, laminâ 5tâ subquadratâ haud elongatâ lævissimè excavatâ: 7mâ margine postico recto.

Scolopendra forficata, *Linn. Syst. Nat.* ed. 10. i. p. 1062. *Fabr. Entom. Syst.* ii. p. 390.

Lith. vulgaris, *Leach in Edinb. Enc.* vii. p. 409. *Id. in Linn. Trans.* xi. p. 382. *Id. in Zool. Misc.* iii. p. 40.? *Gerv. in Ann. Sc. Nat.* vii. (1837), p. 49. *Lucas, l. c.* iv. p. 543.
Lith. lævilabrum, *Leach* (*olim in*) *Edinb. Enc.* vii. p. 409. *Walker in Entomologist*, Jan. 1842, p. 237.
Hab. In Europâ. (*v. in Mus. Linn.*)

The specimen from which this description is taken is in the Linnean cabinet, and has a ticket attached to it with the name "*forficata*" in Linnæus's handwriting. It is distinct from the specimen in the British Museum, described by Dr. Leach as *L. forficatus*, as the labium in the Linnean specimen is smooth and without punctures, while the labium in Leach's species is covered with impressed dots. It differs also in the entire absence of subfemoral spines, and in the equidistant arrangement of the labial teeth. There is a specimen in the British Museum with the name *L.* "*lævilabrum*" attached to it, in Dr. Leach's handwriting, which, from the small number of ocelli, fifteen on each side, the hairiness of its legs, and the indistinctness of the joints of the antennæ, I am satisfied is only the young of this, or a closely allied species. The very young *Lithobii* have fewer ocelli and teeth than the adult.

11. *Lith. Leachii* (Tab. XXXIII. figs. 30, 31.), saturatè ferrugineus, capite lato cordato; subsegmento antennali profundè punctato, antennis pilosis, labio subconvexo punctato, ocellis utrinque 24–26, laminis dentalibus minutis: denticulis 12 nigris e quibus tres interiores utrinque subapproximatæ, antennis palpisque pilosis, pedibus validis flavis: spinis subfemoralibus magnis pilis raris.—Long. unc. 1.
Lith. forficatus, *Leach in Edinb. Enc.* vii. p. 408. *Id. in Linn. Trans.* xi. p. 381. *Id. in Enc. Brit. Suppl.* i. p. 431. pl. 22. *Id. in Zool. Misc.* iii. tab. 137. *Treviranus, Zeitschr. Phys.* ii. p. 18. pl. 4–6. (1817.) *Samouelle, Entom. Comp.* (1819), p. 115. *Gerv. in Ann. Sci. Nat.* vii. (1837), p. 49. *Lucas, Hist. Nat. Anim. Art.* iv. p. 540.
Hab. In Europâ. (*v. in Mus. Brit.*)

There is only a single specimen of this species in Dr. Leach's cabinet which at all answers to the description he has given. I am strongly inclined to suspect that some oversight was committed by Leach in the description he has given of this species, the labium of which he describes as "toto profundè impresso punctato." This character by no means agrees with the specimen, which has only the anterior portion of the labium deeply punctured. I suspect that he derived this character in part from the specimen of *L. variegatus* that was placed by the side of it, and which *has* the whole of the labium deeply punctured. Leach might have been led to this mistake by the entire absence of annulation on the legs of this variety of *L. variegatus*. What seems to support this conjecture is Leach's note on the locality of *L. forficatus*:—"Habitat in Europâ sub lapidibus. In Angliâ, Hiberniâ rarior."

12. *Lith. Sloanei,* capite magno subquadrato; subsegmento antennali profundè punctato, ocellis utrinque 24–26, antennis 40-articulatis pilosiusculis, labio complanato polito obsoletè punctato angulo anteriore exteriore paulùm producto, denticulis 8 brevibus obtusis nigris e quibus tres utrinque interiores subapproximatæ, pedibus longis subnudis; spinis subfemoralibus validis, pedum pari postremo dimidium corporis longitudine æquante. —Long. $1\frac{3}{10}$ unc.

Lith. Sloanei, *Newp. l. c.*

Hab. ———? (*v. in Mus. Brit.*)

This specimen was found in an obscure collection of *Scolopendræ* in the British Museum, and, from the label on the bottle, appears to have formed part of the original collection of Sir Hans Sloane, in honour of whom I have now named it.

13. *Lith. pilicornis* (TAB. XXXIII. fig. 34.), ferrugineus, capite cordato; subsegmento antennali lævi, antennis pedibusque elongatis pilosissimis, labio polito pilis raris punctisque obsoletis: denticulis 10 e quibus 3 utrinque interiores subapproximatæ, ocellis utrinque 20–24, metatarsis ferrugineis.—Long. unc. $1\frac{2}{10}$.

Lith. pilicornis, *Newp. l. c.*

Hab. In Angliâ. (*v. in Mus. Brit.*)

This species is very much like *L. Sloanei*, of which at first I suspected it was only a variety. But it differs from that species in having the head cordate and polished, with the posterior margin thickened, the antennæ and body more hairy, the labium hairy, with *ten teeth*; and also in its smaller size. In the form of the labium and number of the teeth it very much resembles *L. Americanus*, but differs from that species also in having the labium hairy.

14. *Lith. Argus,* ferrugineus, capite parvo subconvexo, antennis pilosis, ocellis parvis brunneis utrinque 28–30, labio angustato emarginato polito: denticulis 10 nigris.—Long. unc. $\frac{9}{10}$.

Hab. In Novâ Zelandiâ, prope Wellington. (*v. in Mus. D. Hope.*)

The general appearance of this species is that of *L. forficatus*, but it is somewhat smaller; while the numerous ocelli mark it as quite distinct. It is interesting as showing the existence of true *Lithobii* in New Zealand. It was taken by Dr. Stephenson.

15. *Lith. brevicornis*, ferrugineo-marmoratus infrà posticè pedibusque pilosissimus, antennis pilosis 41-articulatis vix dimidium corporis æquantibus, ocellis parvis æqualibus utrinque 20, labio polito punctis sparsis obsoletis: denticulis 12.—Long. $\frac{7}{10}$ unc.

Lith. Vesuvianus, *Costa, Mem. Zool.* i. p. 60. f. 7?

Hab. Prope Neapolin. (*v. in Mus. D. Hope.*)

This species might at first be regarded as the young of *L. fasciatus*, which it resembles in its general appearance. But it differs from that species in having a greater number of ocelli, and much fewer labial teeth, and in the deep emargination of the labium. The joints of the legs are short and thick, and the metatarsi are ferruginous and very hairy. The hairiness of the posterior segments and legs is a mark that the specimen has scarcely attained its adult size, although its close approach to maturity seems to be shown in the number of ocelli, and of joints to the antennæ.

I have named this species with doubt, because I am unable to ascertain whether it may not be the species named, but not yet described, by Signor Achille Costa as *Lithobius Vesuvianus*, and of which only a very imperfect delineation has been given. Signor Costa's specimen was a young and immature one.

16. *Lith. castaneus*, saturatè castaneus, antennis pedibusque pilosis, ocellis utrinque 14, labio convexo subovato transverso; laminis dentalibus rectis angustissimis singulâ dentibus tribus minutis acutis nigris, scutis dorsalibus alternis posticè in margine incrassatis impressioneque longitudinali utrinque anticè transversèque productâ.—Long. lin. 9.

Lith. castaneus, *Newp. l. c.* p. 96.

Hab. In Siciliâ. (*v. in Mus. Brit.*)

Head, labium and dorsal surface of the body dark chestnut. Frontal segment elongate, quadrate, a little narrowed anteriorly. Antennal subsegment very distinct, slightly pilose; posterior surface of the head with two slight longitudinal impressions. Ocelli fourteen on each side. Antennæ with forty-one joints, very hairy, basilar joint longer than the second. Labium convex, subovate, transverse, with only a very slight longitudinal sulcus; dental plates very narrow, small and transverse, with six acute black teeth. The first, third, fifth, seventh, eighth, tenth, twelfth and fourteenth dorsal plates with the posterior margin greatly thickened; each plate with two lunate deep impressions close to the margin, and extended across the segment. Legs very hairy, with the thighs large and strongly spined. Posterior pair of legs very strong.

17. *Lith. nudicornis*, Gerv. in Ann. Sci. Nat. Janv. 1837, p. 49. Lucas, Hist. Nat. Anim. Art. iv. p. 543. (1840.)

18. *Lith. melanops*, virescenti-flavus, capite aurantiaco, ocellis magnis nigris utrinque 12, subsegmento antennali basi transversè nigrescenti-fasciato, denticulis labialibus 6 acutis. —Long. $\frac{6}{10}$ unc.

Hab. In Angliâ, prope Sandwich in Com. Cantiano. (*v. in Mus. Brit. nostroque.*)

Head orange-coloured; the eyes, sides and front with a blackish fascia; eyes large. Antennæ with forty joints, hairy, yellow. Mandibles and labium bright yellow. Metatarsal joint hairy, orange. Femoral and tibial articulations with short spines.

This is the smallest of the British species. It was taken by myself at Sandwich, during a continuance of dry weather, under moist stones in a garden, in the month of September 1842, but I have not met with it since, and it appears to be rare. I possess four specimens. It is very distinct from other species, especially in regard to the excavations in the coxæ, which, instead of being simply transversely furrowed, have each four oval, cup-shaped bodies within them. The largest of the species does not exceed six-tenths of an inch in length.

19. *Lith. platypus*, pedum paribus 4 posterioribus latis incrassatis.?
Lith. ———, *Savigny, Icon. Déscr. Egypte, Ins. Myriap.* fig. 3.

The above character is derived from an inspection of Savigny's figure in the great work on Egypt; but as no description of the plates has yet been published, I have given the character with a query. M. Gervais* very justly remarks, that the specimen figured was immature, as is shown in the small number of ocelli and of joints to the antennæ, there being only four ocelli on each side, and twenty joints to each antenna. But notwithstanding this, Savigny appears to have delineated a distinct species, if the figure he has given is correct, and I see no reason to doubt it. I am not acquainted with any other *Lithobius* that exhibits, in any stage of growth, that peculiar form of the legs which characterizes Savigny's species.

* Annales des Sci. Nat. Jan. 1837, p. 49.

Genus 3. Henicops*, *Newp.*

Caput latum, depressum, ocello magno utrinque unico. Labium lamelliforme.

1. *Hen. maculata* (Tab. XXXIII. fig. 37; Tab. XL. fig. 3.), capite cordato; subsegmento antennali subemarginato, antennis pubescentibus, labio complanato angulis rotundatis: denticulis 6 acutis paulùm elongatis, mandibulis labioque læté aurantiacis, superficie dorsali serie utrinque macularum aurantiacarum, ventrali pallidè flavâ, pedibus cinerascentibus; pari postremo elongato.—Long. lin. 5. v. 6.

Hab. In Tasmaniâ. (*v. in Mus. D. Westwood.*)

This is one of the smallest known species of *Lithobiidæ*; and it is interesting to observe, that while it forms the type of a generic division, distinguished by the organ of vision being only a single ocellus on each side of the head, it exactly coincides with the true *Lithobiidæ* in the form of the head, dorsal plates, legs, and armature of the labium. In these respects it is exceedingly interesting, as proving that the true characters of this family, although hitherto almost entirely overlooked by naturalists, are as distinct in the species of the southern hemisphere as in those of our own climate. This species is the first of the *Lithobiidæ* hitherto received from Van Diemen's Land; it was obligingly lent to me by J. O. Westwood, Esq., who has also furnished me with references to some of the published tracts on the *Myriapoda.*

2. *Hen. emarginata,* ferruginea, pedibus flavescentibus, capite magno quadrato-ovato, laminis dentalibus distinctis transversis edentulis singulâ tamen emarginaturis 3 inconspicuis, scutis dorsalibus margine elevatis.—Long. ½ unc.

Lithobius emarginatus, *Newp. Ann. & Mag. Nat. Hist.* xiii. p. 96.

Hab. In Novâ Zelandiâ. (*v. in Mus. Brit.*)

This specimen is exceedingly interesting, as proving the existence of both genera of *Lithobiidæ* in New Zealand. It was brought to England in the collection of insects obtained by Captain Sir James C. Ross during his voyage to the Antarctic regions, and is ticketed in the collection as "found in the ground." The specimen however is a young individual, but sufficiently matured to afford a positive specific character in the emargination of the dental plates.

* Ἑνικὸς, *single*; and ὤψ, *the eye.*

Family 3. Scolopendrellidæ, *mihi.*

Additional Remarks.—Read March 4th, 1845.

[Since the publication of the *Synopsis Generum* of *Myriapoda*, in the last part of the Society's Transactions, I have found it necessary, on a closer examination of M. Gervais' genus *Scolopendrella*, to alter the place assigned to it in the arrangement of the class, and to make it the type of a distinct family. In the *Synopsis Generum*, and also in the systematic description of the species, read to the Society in March last, I had connected this genus with the *Geophili*, and regarded it as a subfamily, *Scolopendrellinæ*; and had included in the genus a new species by the name of *Scolopendrella immaculata*. The connecting of this genus with the *Geophilidæ* was in deference to the views of M. Gervais, who discovered the type, and who seems to have regarded the short alternating segments of the body, and the existence of anal styles, as the connecting affinities. But on more closely examining the characters of *Scolopendrella*, as given by M. Gervais, and comparing them with those of my new species, I find that they indicate a much higher type of development than the *Geophilidæ*, and very nearly approach the *Lithobiidæ*. One of the most marked indications of this affinity is in the very short, basilar segment of the head, which in the new species, *S. immaculata*, not only gives attachment to the mandibles, as in *Lithobius*, but also to a diminutive pair of legs, as in *Scolopendra*. These legs, attached to the basilar segment, have entirely disappeared in the *Lithobiidæ*. In other very marked characters, as in the number and alternation of long and short segments to the body, and the imbrication, elongation of the angles, and excavation of the posterior margin of the dorsal plates, the *Scolopendrellidæ* approach very closely to the *Lithobiidæ*, in which these latter characters are seldom or ever wanting; but they are never found in any of the *Geophilidæ*.

I propose therefore to establish the *Scolopendrellidæ* as a separate family, and to place them next after the *Lithobiidæ*. This view of the position which the *Scolopendrellidæ* ought to occupy in the arrangement of the class is supported by their mode of development and growth, which is very similar to that of *Lithobius*. Thus I have obtained some specimens of the species discovered by myself in the neighbourhood of London, with only twelve joints to the antennæ.

and nine pairs of legs; others with ten pairs of legs, and nineteen joints to the antennæ; and others, still larger, with eleven pairs of legs, and more than twenty joints to the antennæ; while those which appeared to be adult specimens had twelve pairs of legs, and twenty-eight joints to the antennæ. These facts show, that in their mode of development they resemble the *Lithobiidæ*, which acquire their adult number of legs and segments by a succession of developments, which in the *Geophilidæ* take place only to a very limited extent.

The soil preferred by the *Scolopendrellidæ* is a moist light mould at the roots of grass. These little animals, like their congeners the *Lithobii*, shun the light, and run with great celerity, from which I am inclined to regard them as of carnivorous habits, preying, perhaps, on the microscopic *Poduridæ* found in the same places. The periods at which I have captured them are the spring and summer months. The perfect full-sized specimens are found in May, while the smaller ones are most abundant in June and July.

Familia 3. Scolopendrellidæ.

Corpus pedesque breves, appendicibus styliformibus. *Segmenta* inæqualia; scutis dorsalibus imbricatis. *Antennæ* elongatæ, articulis ultra 16.

Genus 4. Scolopendrella, *Gervais.*

Antennæ moniliformes, pilosæ. *Corpus* e segmentis 14. *Pedum* paria 12. *Caput* depressum; segmento basilari brevissimo.

1. *Scolopendrella notacantha,* alba, scutorum dorsalium angulis posticis elongatis spinescentibus.—Long. lin. $1\frac{1}{2}$.

Scolopendrella notacantha, *Gerv. in Rev. Zool.* 1839, p. 279.

Hab. Prope Parisios, in hortis.

2. *Scolopendrella immaculata* (Tab. XL. fig. 4. *a, b, c*), alba immaculata, stylis analibus triangularibus acutis.—Long. lin. $1\frac{1}{4}$.

Hab. Prope Londinum, ad St. John's Wood.]

Family 4. Scolopendridæ.

The *Scolopendridæ* differ from the *Lithobiidæ* and *Scolopendrellidæ* in possessing twenty-one pairs of legs and twenty segments to the body, besides the two segments which constitute the head.

The anterior or cephalic segment (Tab. XXXIII. fig. 4. a) is small, heart-shaped, and narrowed anteriorly, with its posterior margin thin and rounded, or straight and abbreviated. The antennæ are tapering, with from seventeen to twenty slightly elongated, subconical joints. The basilar segment (B) bears the large mandibles, and also the first pair of legs, which are atrophied and palpiform. The segments of the body are alternately longer and shorter on the dorsal surface, but nearly equal on the ventral; and there are usually nine, but in some genera ten pairs of spiracles at the sides (*a, b*). The posterior pair of legs are elongated, and their basilar or femoral joints are in general armed with strong spines.

The generic characters of the family are derived in part from the number of legs and spiracles, and joints in the antennæ, and from the organs of vision. The latter consist of four stemmata on each side (Tab. XXXIII. fig. 35.) in *Scolopendra*, *Heterostoma*, *Cormocephalus* and *Scolopendropsis*, but in *Cryptops* they are either entirely absent, or consist but of a single ocellus concealed beneath the under surface of the head (24*).

The structural characters of species are derived from the denticulations of the labium (fig. 5†.) and from the number, arrangement and shape of the spines, and the form of the femoral joints of the posterior pair of legs (Tab. XXXIII. fig. 22. s. and Tab. XL. fig. 5. to 10.). Professor Brandt has correctly remarked, that the shape and armature of the posterior legs usually afford good characters, as the peculiarities of these parts are as constant in the young as in adult specimens. This is always the case, except in those instances in which the limbs have been reproduced, and then very frequently some of the spines are absent; while in other instances of reproduction the spines are smaller and more numerous than in the original limbs. The similarity of the structural characters in the young and adult individuals arises from the circumstance that the *Chilopoda* acquire the whole of their segments, legs, ocelli, and joints to the antennæ, before they have attained even one-third of their adult size; so that, although they continue to undergo repeated changes of tegument, they then merely increase in bulk and length at each change. The number of joints to the antennæ may be employed in the division of the *Scolopendræ* into sections, which hereafter, perhaps, may be found sufficiently uniform to constitute separate genera. But this character is of no use in the identification of species. Thus an elongated form of the posterior pair of legs, armed with three spines on the superior internal surface of each femur, with two spines in a longitudinal series on the inferior surface, and eighteen joints to the antennæ, are common to several distinct species, of which *S. subspinipes*, Leach, is the type. A like number of joints to the antennæ and spines on the superior margin of the femur, and an entire absence of spines on the under surface indicate another division; while twenty joints to the antennæ, a club-shaped, angulated form of the posterior pair of legs, and three longitudinal series of spinulæ on the under surface of the femur, are characters that distinguish a third subdivision, of which the true *L. morsitans*, Linn. is the type.

The colour and markings of the body in recent specimens are of great assistance in the identification of species, when taken together with structural characters, although they cannot alone be depended on, especially in the examination of those which have been long preserved in spirit. Each family of the *Chilópoda* is distinguished by some general peculiarity of colour or of markings on the body that is common to nearly the whole of the species of that group. Thus the *Cermatiidæ* have longitudinal bands of colour on the dorsal surface, and almost invariably annulations on the legs; the *Lithobiidæ* are nearly all of a brown or ferruginous hue; while in the *Scolopendridæ* a yellow or a ferruginous colour of body, with transverse bands of dark green or blue on the margins of the segments, is exceedingly common, more especially in tropical species, and longitudinal bands of colour are rare.

The habits of the *Scolopendridæ* are decidedly carnivorous, and their bite is venomous; but although quickly fatal to insects and small invertebrata, the injury it occasions to those who suffer from its effects in warm climates is exceedingly various, and seems to depend much on the state of health and constitution of the sufferer and his susceptibility to disease. But added to this explanation I would suggest, that the virulence of the poison of the centipede, and the degree of injury inflicted by it, may depend much on the circumstance as to whether the animal has recently bitten and expended its venom on some other object; in which case the injury occasioned by all poisonous animals is undoubtedly less severe. The diminished virulence of the poison may be satisfactorily accounted for by what we now know of the manner in which the secretions of all glands are elaborated*, by the growth, bursting and diffluence of

* Trans. Roy. Soc. Edinburgh, 1842.

successive series of epithelial cells that line the interior of those organs, the fluid contained within, and into which these cells and their nucleoli are resolved, being the proper secretion. When this is expended too frequently, and the organ in consequence is excited by what we may regard as the stimulus of want, the secreting epithelial cells are hastened in their development, and the fluid into which they are resolved is imperfectly elaborated, and its properties, doubtless, are less active. The gland by which the poison of the centipede is secreted has not hitherto been described. Leeuwenhoek discovered at the apex of the mandibles an orifice that communicated internally with an elongated cavity, and he also saw a drop of fluid exude from the orifice, but he does not appear to have discovered the true secreting gland. Although I do not now intend to enter on an examination of the internal organs of *Myriapoda*, I may here briefly state that I have been somewhat more fortunate in this respect, and not only have confirmed Leeuwenhoek's observation in regard to the existence of a longitudinal opening at the inner margin of the apex of the mandible, but also have traced backwards a sac with which it communicates, and have discovered the gland of which this sac is the reservoir or efferential cavity. The gland itself extends backwards from its junction with the sac at the articulation of the claw and atrophied tarsal and tibial joints to their articulation with the femoral portion of the mandible, of which it occupies the whole length, situated almost close to the external surface beneath the tegument, abundantly supplied with vessels and nerves.

Familia 4. SCOLOPENDRIDÆ.

Segmenta podophora 21 vel 23. *Pedes* posteriores incrassati; articulo primo vel secundo spinoso. *Antennæ* subulatæ, 17–20-articulatæ.

Subfamilia 1. SCOLOPENDRINÆ.

Genus 5. SCOLOPENDRA.

Segmentum cephalicum cordatum, imbricatum. *Oculi* stemmatosi, utrinque 4. *Antennæ* attenuatæ, 18–20-articulatæ. *Spiracula* valvularia, in paribus 9. *Pedum* paria 21.

Divisio 1. *Parvidentatæ.*

Dentes labiales numerosi minimi, uniformes, coadunati.

Sectio A.

Pedum paris postremi articulo basali complanato, brevi, crasso; spinis in superficie inferiore numerosis, in seriebus longitudinalibus tribus dispositis. Antennæ plerumque 20-articulatæ.

1. *Scol. angulipes,* testacea, capite pedibusque postremis ferrugineis, his brevissimis crassis; articulo basali triangulari complanato marginibus subelevatis: margine interiore spinulis 6 superficieque internâ spinulâ unicâ.—Long. unc. $4\frac{1}{2}$.

Scol. angulipes, *Newp. l. c.* p. 97. sp. 10.

Hab. In Insulâ Madagascar. (*v. in Mus. Brit.*)

Cephalic segment small, cordate; basilar segment and body yellowish, with the labium and mandibles ferruginous: labial sutures distinct; dental plates lozenge-shaped; teeth eight, small and distinct, but obtuse, with the margin arched. Mandibular tooth large; posterior pair of legs very thick, short, with the joints triangular. Superior surface of the basilar joint flat, with acute, slightly elevated margins; the internal one with six minute spines, the four anterior of which are very small, and arranged in two series, closely approximated; the fifth intermediate between these and the sixth or apical one, which is very large and quadrifid at the apex; internal surface flat, with a single tooth near the inferior border; inferior surface rounded, with nine teeth arranged in three alternating longitudinal series, three in each series, as in *S. morsitans.* Second joint with the superior surface somewhat convex in the middle, with the margins free and elevated, inclosing an elongated oval space. Lateral anal appendages small, obtuse, with the apex multifid. Preanal scale four-sided, short, cordate, with the posterior margin rounded.

This species is distinctly allied to *S. morsitans,* Linn., and might at first sight be mistaken for it, but it differs in the legs being shorter and thicker, and more triangular, in the form of the dental plates, and in the colour of the head, posterior legs and body.

2. *Scol. morsitans,* viridi-flavescens, segmentis plerumque marginatis, dentibus 8 brevibus obtusis; margine dentali rotundato, pedum paris postremi articulis femorali tibialique marginibus supernè liberis elevatis; femoralis superficie interiore spinulis 5 v. 6 nigris quarum posteriore apicalive magnâ quadrifidâ: inferiore spinulis 9 triseriatis alternantibus.—Long. unc. $2\frac{1}{2}$—3.

Scol. morsitans, *Linn. Syst. Nat.*

Scol. marginata, *Say, in Journ. Acad. Nat. Sci. Phil.* 1821, p. 9. *et in Œuvr. Entom. ed. Gory,* livr. i. p. 22.

Scol. Brandtiana, *Gerv. in Ann. Sc. Nat.* Janv. 1837. *Lucas, Hist. Nat. Anim. Art.* tom. iv. p. 344.

Scol. platypus, *Brandt, l. c.* p. 61. *Newp. l. c.* p. 98.

Hab. In Insulis Caribæis. (*v. in Mus. Brit.*)

This species very closely resembles *S. cingulata* in its general appearance. The spinulæ on the inferior surface of the posterior legs are arranged in three series, which alternate with each other, so that, as remarked by M. Brandt, who first correctly described this species, they form with each other a succession of triangles. The preanal scale is very short, somewhat quadrate, with the posterior margin very slightly rounded. The lateral appendages also are short, with a slightly produced apex, bifid.

This appears to be a very common species of the West India islands, and perhaps also of the whole of tropical America, and most certainly is the *Scolopendra platypus* of Brandt, whose specimens were obtained from Jamaica and Havannah. It is the one to which Linnæus gave the name *morsitans*, but confounded with a great variety of other species. There is no specimen of it now existing in the Linnean cabinet, but it is evidently the smallest of two species described by Brown in his 'History of Jamaica.' In a copy of Brown's work, now in the library of the Linnean Society, and formerly belonging to Linnæus, there is Linnæus's autograph name "*Scolopendra morsitans*" on the margin of the page, opposite to Brown's description, "*Scolopendra* 1. *pedibus quadriginta*;" and Linnæus refers to Brown's work in his copy of the 'Systema Naturæ,' now also in the library of the Linnean Society.

In naming the species *S. morsitans*, Linnæus probably had in view the following observations of Brown on this species:—

"This insect is reckoned very venomous; the prongs of the forceps are very strong, bending and pointed, which enable them to bite very hard, and they probably emit some venomous juice also. Some who have been bit by them informed me that the parts are very painful for two or three hours, and turn frequently of a livid colour. I have seen them often kill a cockroach with a single nip."

Var.? *α.* Dentibus labialibus 10 distinctis nigris; margine dentali arcuato.

Hab. In Demerarâ. (*v. in Mus. Brit.*)

Var.? *β.* Dentibus labialibus 10 subacutis.

Hab. In China? (*v. in Mus. Brit.*)

Var.? γ. ——— ?

Hab. Tobago. (*v. in Mus. Brit.*)

Obs.—I have considerable doubt whether these are identical with the Jamaica species, which can only be ascertained by comparison with recent specimens.

3. *Scol. limbata,* De Haan. Brandt, *l. c.* p. 61. sp. 7.

4. *Scol. varia,* virescens, capite lætè flavo, segmentorum marginibus viridibus, margine labiali rotundato: dentibus 10 minutis, pedibus postremis complanatis haud marginatis angulo interno elongato quadrifido.—Long. unc. 5.

Hab. ——— ? (*in Mus. Soc. Zool.*)

This species greatly resembles *S. morsitans,* but differs from it in the posterior legs being more slender and without elevated margins. It is also much larger. The cephalic segment is small, and the basilar rather large. The posterior legs are flattened on their upper surface, with the external border subacute, the internal with two spines, the four anterior in two subapproximated pairs, with the fifth elongated and quadrifid. The inferior surface of the basilar joint convex, with nine spines in alternating series, as in *S. morsitans.* Preanal scale cordate, with the margin rounded. Lateral appendages very short.

5. *Scol. platypoides,* flava, segmentorum marginibus viridibus, capite antennisque rufis, pedibus postremis brevibus crassis; articulis basali secundoque marginibus elevatis: margine interiore spinulis 6 uti in *Scol. morsitans* seriatis.—Long. unc. 4.

Scol. platypoides, *Newp. l. c.* p. 97. sp. 14.

Hab. In Brasiliâ. (*v. in Mus. Brit. et D. Miers.*)

Cephalic segment quadrate cordate; antennæ red; basilar segment large, transverse; mandibular tooth large; labium smooth, flat, without sutures; dental plates short, transverse, quadrate, with the anterior margin rounded; teeth eight, short, obtuse, distinct. Posterior pair of legs short, with the basilar and second joints equal; flat on the superior surface, with the internal margin acute, with six spinulæ, the four posterior of which are approximated in double series; external margin slightly rounded, with a slightly elevated border; inferior surface rounded, with nine small spines arranged in three longitudinal irregular series. Lateral anal appendages very short, obtuse, with the apex bifid. Preanal scale flat, with an impressed longitudinal line; posterior border rounded.

This is very like *S. morsitans*; but it has an orange-coloured head and red antennæ like *S. varia* and *S. erythrocephala*, characters which I have not observed in any individuals of *S. morsitans*. I have examined specimens, both young and adult, collected by Mr. Miers himself in Brazil, which have removed all doubts on the subject of its distinctness as a species.

6. *Scol. bilineata*, De Haan. Brandt, *l. c.* p. 64.
Hab. In Insulâ Java.

7. *Scol. erythrocephala*, Brandt, *l. c.* p. 63. sp. 10. *Newp. l. c.* p. 97.
Hab. In Insulâ Java.

8. *Scol. tigrina*, flava, capite antennis segmento basilari pedibusque postremis rufis, segmentorum margine posteriore saturatè viridi, pedibus postremis brevibus crassis subconvexis; articuli basalis margine exteriore elevato: interno spinis 5 nigris in seriebus alternantibus dispositis.—Long. unc. 5.
Hab. In Indiâ Orientali, Sultanpore. (*v. in Mus. Brit. & "United Service."*)

Head subquadrate, cordate; antennæ 19-jointed, blackish at the tips; basilar segment large, transverse; mandibular tooth large; labium convex, smooth, with a longitudinal suture: dental plates short transverse, thickened; teeth eight, small, black, obtuse; posterior pair of legs moderate, first and second joints equal, rather thick, with the superior surface flattened, smooth, subconvex; external margin with a raised border; internal margin with five spines arranged in two alternating series, the posterior or angular spine large, with the apex quinquefid. Inferior surface rounded, with nine sharp black spinulæ arranged in three longitudinal series, three in each series, not one of which is parallel to the other. Lateral anal appendages short, deeply punctured, with the apical process bifid, and a very minute spinous tubercle at the posterior margin. Preanal scale short, subcordate, with the posterior margin rounded.

A specimen of this very beautiful species was brought alive from the north of India to the British Museum in a collection of fossil bones. It agrees very nearly with M. Brandt's description of *S. erythrocephala*, excepting that the legs of that species are olive-coloured and the back somewhat marbled, and it is very much smaller. I ought to remark, however, that all the specimens I have seen concur in having the legs yellow and the back without any marbling.

Var.? α. Differs from the preceding in having 20 joints to the antennæ, of which the ten or twelve apical ones are black. The labial teeth ten, black, distinct; the posterior pair of legs much narrower, with a free elevated external and internal margin to the femoral, tibial and tarsal joints.—Length $3\frac{3}{4}$ inches.

It inhabits the Mysore. (In the cabinet of the Rev. F. W. Hope.)

The narrowness of the legs, with the free elevated margins of the joints, and the number of the teeth, induce me to regard this as distinct.

9. *Scol. Leachii,* virescens, pedibus postremis supernè complanatis uti in *Scol. morsitante* angulatis marginatisque tamen gracilioribus; margine interiore spinis sex biseriatis $\frac{2}{4}$.—Long. unc. 3.

Scol. Leachii, *Newp. l. c.* p. 97.

Scol. morsitans, *Leach, Zool. Misc.* iii. sp. 1; *Donov. Ins. Ind.*

Hab. In Africâ Occidentali, Fantee et Ashantee, *Bowdich.* (*v. in Mus. Brit.*)

Cephalic segment cordate, small, smooth and flattened; basilar segment large, a little narrowed posteriorly; mandibles and tooth large; labium smooth, slightly depressed, sutures absent; dental plates short, transverse and thickened; teeth eight, small, obtuse; posterior segment of the body with a very distinct median dorsal ridge, as in *S. morsitans.* Posterior pair of legs slightly elongated; femoral and tibial joints equal; superior surface of the femoral joint flat, smooth, with the external margin subacute; internal margin compressed, with six teeth arranged in two alternating series; two in the superior and four in the inferior series, the fourth or angular one large, obtuse, and slightly bifid. Internal surface flattened, toothless; inferior surface rounded, with nine spines arranged in three longitudinal series, three in each series, those of the external and internal series parallel with each other; second joint flattened, with the margins elevated. Lateral anal appendages short, with the apex produced, simple, or slightly bifid. Preanal scale four-sided, somewhat cordate, with a longitudinal median line, and the posterior margin slightly rounded.

I have described this species from Dr. Leach's original specimen in the British Museum. It very much resembles the true Linnean *S. morsitans,* but is distinguished from it by the joints of the posterior pair of legs, which are longer and more slender. There is a ticket to the original specimen, with the name and word "Fantee," in Dr. Leach's hand-writing. These specimens, of which there are several, were brought from the western coast of Africa by the traveller Bowdich.

10.? *Scol. angusta,* Lucas in Hist. Nat. des Isles Canaries, par MM. Webb et Berthellot, tom. ii. p. 49. (*v. in Mus. Brit.*)

I am doubtful whether this species is in reality distinct from *S. Leachii,* which it very closely resembles.

11. *Scol. formosa*, segmento cephalico cordato, mandibulis labioque rufis, segmentorum marginibus viridibus, pedibus aurantiacis, dentibus 10 distinctis nigris, pedum postremorum femoribus margine exteriore elevato: interiore spinis 5 nigris in seriebus 2 alternantibus: superficie inferiore rotundatâ spinis 6 in seriebus 3 longitudinalibus.—Long. unc. 4.

Hab. In Indiâ Orientali, Midnapore. (*v. in Mus. Brit.*)

12. *Scol. longicornis*, capite segmentis posterioribus pedibusque rufescentibus, corpore læte olivaceo flavove marginibus viridibus, pedibus postremis gracilibus elongatis triangularibus; articulorum trium basalium superficie superiore complanatâ marginibus elevatis tenuissimis: margine interiore spinulis 6.—Long. unc. 3.

Scol. longicornis, *Newp. l. c.* p. 97.

Hab. In Novâ Hollandiâ Intertropicali, Port Essington, *Gilbert.* (*v. in Mus. Brit. et D. Hope.*)

Cephalic segment cordate, subquadrate, depressed at the sides; antennæ much elongated; basilar segment large; mandibular tooth large, with a small tubercle near the apex; labium with a triangular depression at its anterior part, sutures absent; dental plates transverse quadrate, with the anterior margin of each arched and a little dilated; teeth eight, very distinct, but obtuse. Posterior pair of legs elongated, triangular, with the upper surface of the first three joints flattened, with thin elevated borders. Internal margin of the basilar joint with six small spines arranged in two irregular subapproximated series; the posterior or angular spine large, elongated, and divided at its apex into six very minute ones: lateral and inferior surfaces of all the joints rounded, the basilar one with nine small spines, arranged in three slightly diverging, longitudinal, elevated series, three in each series, with a slight spoon-shaped excavation between the middle and internal series at the base; fourth and fifth joints narrow and cylindrical. Lateral anal appendages short, with the apex slightly elongated, quinquefid, with the posterior margin compressed, and a minute tubercle on its external surface near the base of the legs. Preanal scale quadrate, subcordate, with the margin straight.

This species bears a very close resemblance to *S. Leachii*, but is distinguished from it by the rounded terminal joints of the posterior legs, the tubercle on the anal appendages, the elongation of the antennæ, and the greater length of its body. It was captured at Port Essington in Australia, and I may here remark that a great similarity exists between many of the *Scolopendræ* of the north-western coast of Africa and those of the Australian continent.

13. *Scol. tuberculidens*, testacea, dente mandibulari magno basi tuberculo minimo acuto

armato, pedum paris postremi articulo basali angusto complanato 6-spinoso: spinâ angulari magnâ 5-fidâ.—Long. unc. 3.

Scol. tuberculidens, *Newp. l. c.* p. 97.

Hab. In Insulâ Ceylon. (*v. in Mus. Brit.*)

Cephalic segment cordate, depressed; basilar segment large; mandibular tooth with a very distinct tubercle at its base; labium smooth, with a triangular depression between the dental plates; dental plates quadrate, elongate, with the anterior margin rounded; teeth eight, distinct, but obtuse. Posterior pair of legs with the basilar joint narrow, equal, elongated, with the superior surface flattened and the external margin with a very slight elevated border; internal margin with five or six minute slightly hooked spines, the four anterior of which are sub-approximated, and arranged in two parallel series; angular spine large, quinquefid. Internal and inferior surfaces rounded, with nine spines arranged in three slightly diverging alternating longitudinal series, three in each series, the posterior spine of the internal series on the internal surface. Second joint elongated, flattened and slightly margined. Lateral anal appendages obtuse, minutely punctured, with the apex pointed and bifid. Preanal scale cordate, quadrate, with the posterior margin straight.

This species also greatly resembles *S. Leachii*, but is quite distinct from it. The basilar joint of the posterior legs is much narrower than in that species, and the disposition of the spines on the under surface of the joint is different.

14. *Scol. Fabricii*, capite mandibulis labioque flavo-aurantiacis, corpore flavescenti-olivaceo, segmentorum marginibus posterioribus saturatè viridibus, dentibus 10, pedibus flavescentibus; pari postremo gracili elongato magnitudine æquali: superficie superiore complanatâ spinulis 5 alternantibus.—Long. unc. $2\frac{3}{4}$.

Scol. morsitans, *Fabr. Entom. Syst.* ii. p. 389. sp. 6; *Newp. l. c.* p. 97.

Hab. In Africâ. (*v. in Mus. Brit. et Banks.*)

Cephalic segment cordate, flattened; antennæ red, darker at the extremities; basilar segment moderate; mandibular tooth large; labium flat, narrower anteriorly, sutures absent; dental plates almost quadrate, with the margin rounded; teeth ten, short, obtuse. Posterior pair of legs with the basilar joint slender, with the superior surface flattened; the external margin acute and the internal one with five spines, the four posterior of which are arranged in two alternating series, not approximated; the apical one elongated, quadrifid; the inferior surface rounded, with nine spines in three series, three in each series, forming transversely three oblique rows, the distal spine of the internal series situated on the internal inferior border. Lateral anal appendages narrowed and short, with the apex small and bifid. Preanal scale smooth, subcordate, with the margin rounded.

On examining the few specimens of this genus in the Banksian cabinet belonging to the Linnean Society, I found this species had been ticketed by Fabricius himself as the *S. morsitans* of Linnæus. But I have not a doubt that both Fabricius and Linnæus included several species of nearly the same size under the common name of *S. morsitans*. Linnæus, in his own copy of the 'Systema Naturæ,' edit. 1766, refers to descriptions of species in numerous works, which prove this to have been the case. Thus, amongst others, he refers to Brown's 'Jamaica' and Catesby's 'Carolina,' and he says of *S. morsitans*, "Habitat in Indiis," and in his 'Systema Naturæ' he has also written against it, "Cap. B. Spei." This sufficiently proves that several species have been confounded under one name, and also that the species named by Fabricius in the Banksian cabinet was one of those which Linnæus erroneously regarded as identical with the true *S. morsitans*. I was not aware of these circumstances at the time of publishing in the 'Annals and Magazine of Natural History' my description of species in the British Museum cabinets, and on the authority of the Fabrician species in the Banksian cabinet, I then erroneously attached the name of *S. morsitans* to this African species.

15. *Scol. Richardsonii,* capite corporeque dilutè olivaceis, antennis segmentorumque marginibus saturatè viridibus, mandibulis labioque aurantiacis, dentibus 8 parvis obtusis, pedum postremorum articulo femorali margine superiore biseriatim 6-spinoso: inferiore 9–10-spinoso.—Long. unc. $2\frac{1}{2}$.

Hab. In Novâ Hollandiâ, prope Sydney. (*v. in Mus. Brit.*)

The head and body of this species are light olive, with the antennæ 20-jointed, dark green; legs yellow, with the metatarsi green; margins of the segments dark green. The dental plates are small, slightly elongated, quadrate, with eight small obtuse teeth. The posterior pair of legs are narrow, flattened, and without distinct margins; the femoral and tibial joints of equal length, with six spinulæ on the superior internal border of the femur arranged in two alternating series, four in the upper and two in the lower, the apical one elongated and trifid. The inferior surface of the joint rounded, with from nine to eleven spinulæ, in three elevated series. Lateral anal appendages slightly elongated, quinquefid. Preanal scale short, subquadrate, with the posterior border straight.

16. *Scol. spinigera*, brunnea, capite labioque ferrugineis, pedibus paris postremi gracilibus complanatis subæquè crassis; margine superiore interiore superficieque interiore spinarum acutarum seriebus 2 longitudinalibus armatis.—Long. unc. $1\frac{3}{4}$.

Scol. spinigera, *Newp. l. c.* p. 98.

Hab. Prope Tripoli Africæ Borealis, *Ritchie.* (*v. in Mus. Brit.*)

Cephalic segment subcordate, with the posterior margin straight; antennæ with nineteen joints; basilar tooth large; labium smooth, convex, sutures absent; dental plates small, quadrate; teeth eight, acute, pointed, with the second and fourth on each plate irregular. Posterior pair of legs elongated, flattened, and a little dilated; basilar joint with the external margin subacute; internal one with numerous acute spines, arranged in two, and sometimes three, short, oblique, double series, from three to five in each series; internal angular process large, elongated, with the apex multifid. Inferior surface slightly flattened, with from fifteen to twenty very minute spines arranged in two double, irregular, longitudinal series. Lateral anal appendages roughened, convex, with the apex elongated and quinquefid, with one minute spine on its external surface, and one on its external posterior margin. Preanal scale flat, four-sided, slightly elongated, with the posterior margin rounded.

17. *Scol. affinis*, viridi-fusca, capite labio mandibulisque ferrugineis, pedibus viridibus, pedum posteriorum articulo basali infernè paulùm excavato: spinis minutissimis triseriatis, dentibus 8 e quibus in unaquâque laminâ dentali exteriore interioreque elongatis.—Long. unc. $1\frac{1}{2}$.

Scol. affinis, *Newp. l. c.* p. 98.

Hab. In Græciâ. *D. C. Fellows.* (*v. in Mus. Brit.*)

Cephalic segment cordate, subquadrate, with the posterior margin somewhat transverse; mandibular tooth large; labium smooth, sutures absent; dental plates quadrate; teeth eight, the external and internal one of each plate projecting, with a slight excavation between them; basilar joint of the posterior pair of legs flattened, with the margins rounded; internal margin armed with numerous spines, as in *S. spinigera.* Inferior surface slightly excavated, with at least three rows of very minute spines, amounting to from fifteen to twenty-five on each side of the excavation. Lateral anal appendages scabrous, with the apex elongated, multifid, and the external margin with three or four minute spines. Preanal scale smooth, elongate, quadrate, with the posterior margin rounded.

18. *Scol. punctiventris*, fusco-olivacea, antennis viridibus, mandibulis labioque aurantiacis, pedibus flavis, dentibus 8 distinctis: margine angustato, appendicibus analibus densè

profundèque punctulatis, pedibus postremis brevibus olivaceis; articulo basali spinis 4 marginalibus 6que inferioribus triseriatis 2, 2, 2.—Long. unc. 1¾.

Scol. punctiventris, *Newp. l. c.* p. 100.

Hab. In Floridâ Americæ Borealis. (*v. in Mus. Brit.*)

Cephalic segment slightly elongated, depressed, subovate; antennæ short; basilar segment rather large; labium flattened, elongated, narrowed anteriorly, without sutures; dental plates narrowed, elongated, subquadrate, with the border slightly rounded; teeth eight, the internal ones elongated. Lateral anal appendages deeply punctured, narrowed, with the apex acute and slightly recurved. Preanal scale subquadrate, with the border subemarginated. Posterior legs very short; basilar joint slightly elongated, with the upper surface subconvex; the internal margin with four spines, arranged in two alternating series; the three anterior spines minute; the apical one large, thick and acute. Inferior surface of the joint rounded, with six spines arranged in three longitudinal binary series, those of the external and internal parallel with each other.

This specimen was brought from Florida by E. Doubleday, Esq., F.L.S.

19. *Scol. Algerina,* capite antennis corpore pedibus postremis squamâque præanali olivaceis, pedibus appendicibusque analibus lateralibus aurantiacis, pedibus postremis brevibus complanatis: spinis 4 marginalibus.—Long. unc. 2¼.

Hab. In Algeriâ. (*v. in Mus. D. Hope.*)

Frontal segment of the head cordate, basilar segment large: labium smooth, sutures indistinct; dental plates small, transverse; teeth eight, small, almost obsolete; mandibular tooth large. Body rather wide: first and second joint of the posterior pair of legs short and broad, with the superior surface flattened; basilar joint with the external margin a little elevated; internal margin with four minute spines; internal surface flattened, without spines; inferior surface rounded, with nine spines arranged in three slightly diverging longitudinal series. Lateral anal appendages short, with two minute tubercles: preanal scale quadrate, narrowed posteriorly, with the posterior margin straight.

Sectio B.

Pedum pari postremo serie longitudinali unicâ spinarum (2 v. 3) armato, vel lævi nudo.

(*a.*) Antennæ 19- v. 20-articulatæ; pedes breves, crassi, angulati.

20. *Scol. cingulata,* sordidè lutea, segmentis viridi-marginatis, dentibus labialibus 10 nigris distinctis, antennis (?) 18-articulatis, pedum pari postremo mediocri valido subcomplanato marginibus rotundatis; margine interiori spinulis 5 nigris; spinâ apicali elongatâ bifidâ.—Long. unc. 3.

Scol. cingulata, *Latr. in Cuv. Règne Anim.* edit. 2. vi. p. 339. *Brandt, l. c.* p. 57. sp. 1. *Newp. l. c.* p. 97.

Scol. morsitans, *Gerv. l. c.* sp. 3. *Kutorga, Scol. mors. Anat.* (*Petrop.* 1834.) tab. 3. p. 1. *Lucas, l. c.* p. 544. sp. 3. pl. 3. f. 4. (*sine synon.*)

Scol. Italica, *Koch, Deutschl. Crust. Myriap.* fasc. 9. tab. 1.

Hab. In Siciliâ. (*v. in Mus. Brit. et D. Hope.*)

The description given by M. Brandt of *S. cingulata* very correctly agrees with a specimen of this Myriapod from Sicily in Mr. Hope's collection, and with others from Asia Minor in that of the British Museum. It agrees also, in the number of joints to the antennæ, with the *S. morsitans* of M. Gervais. But as it is doubtful whether other specimens from Corfu, and a species from Egypt, figured by Savigny, are distinct, although closely resembling *S. cingulata*, I have determined to retain them apart from it at present, but with some expression of doubt.

21.? *Scol. cingulatoides,* flava, capite labio pedibusque postremis aurantiacis, dentibus 8 nigris obtusis, pedum paris postremi articulo basali crasso brevi complanato marginibus subelevatis uti in *Scol. cingulatâ* spinulis armato.—Long. unc. 3.

Scol. cingulatoides, *Newp. in Ann. & Mag. Nat. Hist.* 1844. p. 96.

Scol. fulva, *Gerv. l. c.* sp. 2?

Hab. In Insulâ Corcyrâ. (*v. in Mus. Brit.*)

This species varies from the true *S. cingulata* in the usual number of joints to the antennæ, of which there are nineteen in each of five specimens in the Museum collection, and also in the number of teeth and the margins of the posterior legs.

22. *Scol. audax,* Gerv. in Ann. Sci. Nat. Janv. 1837. sp. 4.

I am unacquainted with this species, but from the description given of it I presume it to be distinct.

23. *Scol. Savignii,* capite corpore antennis pedumque pari postremo olivaceis, mandibulis labio appendicibusque analibus lateralibus brevibus punctatis ferrugineis, pedibus flavescentibus.—Long. unc. $3\frac{1}{2}$.

Scolopendra, *Savigny, Egypte, Myriap.* f. 1.

Hab. In Egypto. (*v. in Mus. Brit.*)

This species closely resembles *S. cingulata*, but is quite distinct from it in colour, and also in the structure of the posterior pair of legs, and in the greater length of the antennæ, which have twenty articulations.

The posterior legs are convex on the upper surface with the margins rounded, and the spinulæ arranged almost as in *S. cingulata*.

24. *Scol. Hispanica*, lætè olivacea, segmentorum marginibus posticis saturatè cæruleis, superficie ventrali mandibulis labio pedibusque aurantiacis, pari postremo viridi; articulo basali infrà spinulis tribus acutis, dentibus labialibus 10 nigris obtusis.—Long. unc. $3\frac{1}{4}$.

Hab. In Hispaniâ australiore. (*v. in Mus. Brit.*)

This species resembles *S. cingulata*, but is quite distinct from it. The head is smaller, antennæ shorter, and posterior legs more convex. The cephalic segment is small, convex, subcordate; labium smooth, flattened, narrowed; dental plates subquadrate, very distinct, with the margin rounded; teeth distinct, ten, black; posterior pair of legs with the femoral and tibial joints equal, smooth, and somewhat flattened on the upper surface, with the external margin rounded; internal margin with five spinulæ, the four posterior ones arranged in two oblique series, two in each series, the apical one elongated, with the apex trifid. Inferior surface convex, with three spinulæ arranged in a single series.

There are two examples of this species in the Museum collection, in one of which the posterior legs appear to have been reproduced, as the spinulæ are irregular, smaller, and more numerous; this is a condition which reproduced limbs frequently exhibit.

(*b.*) Antennæ 18-articulatæ, articulis elongatis; pedum pari postremo gracili, articulo femorali infrà spinoso.

25. *Scol. subspinipes*, testacea (?), segmentorum margine posteriore viridi, pedum paris postremi articulo primo secundoque æqualibus subcomplanatis internè acutè tri-spinosis: spinâ secundâ infra apicalem.—Long. unc. 4.

Scol. subspinipes, *Leach in Trans. Linn. Soc.* xi. p. 383. *Id. in Zool. Misc.* iii. p. 41. *Id. in Enc. Brit. Suppl.* p. 440.

Hab. ——? (*v. in Mus. Brit.*)

Head flattened, cordate, ovate; basilar segment large; labium convex, smooth; dental plates short, transverse, slightly convex, and punctured; teeth eight, short, obtuse, the internal one on each side bifid, mandibular tooth moderate. Lateral anal appendages (coxæ of the posterior pair of legs) short, ferruginous, punctured, with the apex trifid, and directed inwards. Preanal scale elongated, triangular, with the margin slightly rounded, and impressed with a longitudinal sulcus: superior surface of the femoral, or basilar joint of the posterior pair of legs rather broad, flattened, with the external margin subacute; internal margin rounded, with three acute spines, the second one placed on the internal surface of the joint; inferior surface rounded, with two spines on the external side; second or tibial joint narrow, slender, of the same length as the femur.

There is only a single specimen of Dr. Leach's species in the Museum cabinets, and it is worthy of remark that most of the structural characters I have given are to a great extent common to several species which most certainly are distinct. I have been obliged, therefore, to seek a specific character in what appears to have been the original colour of Leach's species; this is a good guide in recent specimens, but it is difficult to ascertain with precision in dried ones; on this account I have given this part of the character with a slight doubt.

I must remark also that the right posterior leg of this specimen appears to have been a reproduced one, as the spines on the inferior surface are obsolete.

26. *Scol. Placeæ*, aurantiaca, tarsis scutorumque dorsalium margine posteriori saturatè viridibus, capite labio mandibulisque rubris, dentibus 10 minutis distinctis, squamâ præanali angustâ elongatâ margine rotundatâ, pedibus postremis gracilibus.—Long. unc. 5.

Hab. In Brasiliâ. (*v. in Mus. Brit. et D. Miers.*)

The cephalic segment of this species is subtriangular, cordate; labium convex, smooth; dental plates short, transverse, distant, with the margin rounded; teeth ten, distinct, but very small; legs with the metatarsal joints green, tarsal yellow, and claw black. Body elongated and elegantly formed. Posterior pair of legs elongated, with the superior surface of the basilar joint flattened, with three acute spines on the internal margin. Internal surface with two spines which form an oblique ascending series with the superior apical spine. Inferior surface rounded, with two spines; second joint slender, compressed. Preanal scale subtriangular, elongated, margin rounded. Lateral anal appendages with the apex elongated and acute.

This species resembles *S. subspinipes*.

27. *Scol. Gervaisii*, capite mandibulis labio appendicibusque analibus lateralibus saturatè rubris, segmentis ferrugineis marginatis, pedibus antennisque flavescentibus, laminis dentalibus rotundatis; dentibus conspicuis, pedum pari postremo elongato spinis tribus acutis quarum secundâ prope articulationem tibialem.—Long. unc. $5\frac{1}{2}$.

Scol. subspinipes? *Gerv. in Ann. Sci. Nat.* Janv. 1837. *Brandt, Mem. Ins. Myriap.* p. 59. *Lucas, Hist. Nat. Anim. Art.* t. iv. p. 544. sp. 5.

Hab. In Brasiliâ. (*v. in Mus. Brit.*)

This appears to be a very common species, but in the condition in which the *Myriapoda* are usually brought to Europe, its colours are easily overlooked, as they undergo much change in spirits. The most marked character of this species is the indistinctness of the labial teeth, which in some specimens are entirely absent. It differs also in the apex of the lateral anal appendages being more elongated and bifid.

28. *Scol. Ceylonensis*, saturatè castanea, articulis tarsalibus virescentibus, scutorum dorsalium lateribus distinctè marginatis, pedum pari postremo spinis ut in *Scol. subspinipede* armato.—Long. unc. 5.

Hab. In Ins. Ceylon. (*v. in Mus. Brit.*)

29. *Scol. planiceps*, capite parvo complanato cum labio mandibulis appendicibusque analibus cacainis, corpore olivaceo, segmentorum marginibus saturatè viridibus, dentibus 10 distinctis obtusis, pedibus postremis ferrugineis; femoribus subdilatatis: margine interiore spinis 4 acutis alternatim biseriatis: superficie inferiore spinis 2 longitudinaliter dispositis.—Long. unc. 5.

Hab. In Insulâ Antiguâ Caribæarum. (*v. in Mus. Brit.*)

30. *Scol. septemspinosa*, capite antennis corpore pedumque pari postremo saturatè olivaceis, mandibulis labio corpore subtùs pedibusque saturatè ferrugineis, pedum pari postremo elongato gracili; spinis 3 uncinulatis in articuli basalis margine superiore interiore 2que in ejus superficie internâ inferiorique.—Long. unc. 4.

Scol. septemspinosa, *Brandt, l. c.* p. 60. sp. 4?

Hab. In Chinâ. (*v. in Mus. D. Hope.*)

Cephalic segment almost ovate, convex, smooth; mandibular tooth moderate; labium very smooth and convex, sutures absent; dental plates short, transverse, with the anterior margin straight; teeth ten, very minute, obtuse, and coalescing; posterior pair of legs elongated and elegantly formed; first and second joints of equal length, superior surface of the first subconvex, with the external margin subacute; internal margin with three slightly hooked teeth, the posterior one long, sharp, and simple; internal surface rounded, with two small teeth a little anterior to the first and second marginal ones: inferior surface rounded, with two strong spines arranged in a longitudinal series on the external inferior margin. Preanal scale elongate, quadrate, narrowed posteriorly, with the posterior margin straight.

31. *Scol. sexspinosa*, flava, appendicibus analibus lateralibus ferrugineis (*Scol. septemspinosæ*

simillima) pedum postremorum articulo basali supernè complanato superficieque internâ inferiorique singulâ longitudinaliter bispinosâ.—Long. unc. 3½.

Scol. sexspinosa, *Newp. l. c.* p. 96.

Hab. ——? (*v. in Mus. D. Hope.*)

Mandibular tooth well-developed. Dental plates small and transverse; teeth ten, small, obtuse, the three innermost on each side coalescing. Posterior pair of legs moderate; basilar joint longer than in *S. subspinipes*, and subconvex on the upper surface: external margin rounded; internal with two acute black spines, the angular one well-developed and subacute, or slightly bifid; internal and inferior surfaces smooth, each with two spines in a longitudinal series. Second joint smooth, rounded and elongate. Anal scale triangular elongate, with the posterior margin narrowed, slightly rounded, and impressed with a longitudinal sulcus.

32. *Scol. lutea,* antennis corpore pedibusque lætè flavis, capite labio mandibulis appendicibusque analibus saturatè aurantiacis, dentibus 10 obtusis inconspicuis, pedum postremorum articulo femorali subcomplanato: margine interiore spinis 4 nigris e quibus apicali elongatâ acutâ: superficie inferiore spinis 2 longitudinaliter dispositis.—Long. unc. 4.

Hab. In Ins. Caribæis? (*v. in Mus. Brit.*)

33. *Scol. ornata,* aurantiaca, segmentorum lateribus margineque postico articulisque tarsalibus metatarsalibusque viridibus, capite saturatè rubro, dentibus 10 nigris minutis valdè distinctis, pedum paris postremi articulo basali spinis tribus acutis: spinâ apicali acutâ simplici.—Long. unc. 5.

Hab. ——? (*v. in Mus. D. Hope.*)

This is a very beautiful species, perfectly distinct in every respect of form, size, and shape of the head, from *S. subspinipes* and its affinities, but precisely similar as regards the shape and armature of the posterior pair of legs, preanal scale, and lateral anal appendages. The upper surface of the basilar joint of the posterior legs is flattened, subconvex, with two small spines on the superior internal margin, and one on the internal surface.

34. *Scol. flava,* tota flava, appendicibus analibus lætè olivaceis, segmento cephalico basilarique depressis latis, dentibus 10 minutis, pedibus postremis elongatis angustatis; articuli basalis superficie superiore subconvexâ marginibus subacutis: interiore spinis tribus validis acutis: inferiore convexâ spinis duabus acutis nigro-apiculatis.—Long. unc. 5½.

Hab. In Insulâ Ceylon? (*penes me.*)

The posterior legs are moderately elongated, with the basilar and second joint equal and narrowed. Superior surface subconvex, with the external margin subacute: internal margin rounded, with two spines, the apical one elongated, hooked and bifid. Internal surface smooth, with a single spine immediately below the marginal one. Inferior surface convex, with two spines in a longitudinal series on the external side. Preanal scale elongated, trigonate, with the angle rounded, and the posterior margin straight, with a longitudinal impression, most strongly marked in the male. Anal appendages olivaceous, minutely punctured, with the apex bifid.

(*c.*) Antennæ 18-articulatæ, articulis elongatis; pedum pari postremo gracili haud armato.

35. *Scol. inermis*, saturatè castanea, dentibus labialibus 10 minutissimis, pedum paris postremi gracillimi articulo basali subcylindrico lævi nudo: spinâ articulari apice bifidâ, squamâ præanali elongatâ triangulari margine rectâ.—Long. unc. 5¼.

Hab. In Orâ Tenasserim Peninsulæ Ulterioris Indiæ Orientalis. (*v. in Mus. Brit.*)

This species greatly resembles *S. Gervaisii*, but differs from it in the entire absence of spines on the femora of the posterior pair of legs.

36. *Scol. Silhetensis*, ferruginea, segmentorum marginibus posticis saturatè viridibus, antennis articulisque tarsalibus metatarsalibusque rufescentibus; unguibus nigris, pedum paris postremi articulo basali complanato; margine superiore interiore spinis tribus acutis nigris uncinatis: superficie inferiore rotundatâ nudâ, dentibus labialibus 10 minutis.—Long. unc. 5½.

Var. a. Pedum paris postremi articulo basali basi paulùm angustatâ, squamâ præanali elongatâ margine postico rotundatâ, corpore pedibusque coloris magis rufescentis.

Hab. In Silhet Indiæ Orientalis. (*v. in Mus. D. Hope.*)

Cephalic segment convex, cordate, ovate, posterior border thin; basilar segment large, transverse; mandibular tooth large; labium smooth, sutures absent. Dental plates short, transverse, bounding anteriorly a deep ovate impression on the labium; teeth ten, minute, obtuse and coalescing, forming a rounded margin; posterior pair of legs elongated, with the basilar and second joints equal, third joint a little shorter than the second; basilar joint slightly dilated, with the superior surface flattened and of equal width throughout; the external margin subacute, straight; internal margin with three strong spines, the middle one on the internal surface, the angular one bifid and elongated; inferior surface smooth, rounded, toothless. Second joint narrower than the first, slightly constricted and rounded. Preanal scale elongated, concave, with the lateral and posterior margins straight; in the female rounded.

37. *Scol. De Haanii,* Brandt, l. c. p. 59. sp. 2.
Scol. subspinipes, *De Haan in literis, ibid.*

38. *Scol. concolor,* ferruginea, pedibus aurantiacis, pedum paris postremi articulis tribus basalibus æqualibus; articulo basali basi angustato: supra lato complanato: margine interno trispinoso spinis primâ tertiâque maximis acutis: infrâ lævi rotundato edentato. —Long. $6\frac{1}{2}$.

Hab. In Bengaliâ. (*v. in Mus. D. Hope.*)

Head subcordate, ovate; mandibular tooth small; labium smooth; sutures absent; dental plates transverse quadrate, punctured; teeth ten, small, obtuse, but distinct; preanal scale very long, narrow, four-sided, with the posterior margin rounded; lateral anal appendages short, thick, punctured, with the apex produced, bifid; posterior legs moderate, very like those of *S. De Haanii.*

This species agrees very nearly with Brandt's description of *S. De Haanii,* but is perfectly distinct from it. There are several species that have characters similar to those assigned to *S. De Haanii. S. concolor* is chiefly marked by the dilatation of the basal joint of the posterior legs and the sharpness of their external margins.

39. *Scol. Childreni,* capitis segmento basilari mandibulis labio appendicibusque analibus lateralibus ferrugineis, superficie dorsali saturatè olivaceâ, pedibus validis basi rufescentibus apice flavescentibus; pari postremo toto rufo.—Long. unc. $6\frac{1}{2}$.

Scol. Childreni, *Newp. l. c.* p. 95.

Hab. ——? (*v. in Mus. Brit.*)

Cephalic segment cordate, flattened, with the posterior margin rounded; antennæ yellow; mandibular tooth large; labium smooth, slightly excavated, sutures absent; dental plates short, transverse, quadrate; teeth ten, small, indistinct, almost obliterated. Body depressed, broad in the middle, but narrowed anteriorly and posteriorly; lateral anal appendages a little elongated, very smooth, without punctures, slightly margined on the inferior surface, with the apex bifid. Preanal scale four-sided, elongate, with the posterior margin rounded. Legs elongated, strong, and very smooth. Posterior pair with the basilar joint shorter than the second, and flat on its superior surface, with the external and internal margins subacute, smooth. Internal margin with three spines, the middle one on the internal surface, the apical one elongated, bifid. Inferior surface rounded, smooth, without spines. Second joint of the posterior legs slender, smooth, rounded and elongated.

I have named this fine species in honour of J. G. Children, Esq., F.R.S., from whose collection it was obtained. There is only a single specimen of this species in the Museum cabinets.

40. *Scol. Hardwickii*, latè flava, segmentis 3tio, 5to, 8vo, 10mo, 12mo, 14to, 16to, 18voque saturatè cæruleis, pedibus flavis; paris postremi articulis distalibus cærulescentibus, labio mandibulis appendicibusque analibus lateralibus ferrugineis.—Long. unc. $6\frac{1}{2}$.

Scol. Hardwickii, *Newp. l. c.* p. 96.

Hab. In Insulâ Orientali. (*v. in Mus. Brit.*)

Cephalic segment cordate, margin rounded; antennæ 18-jointed, basilar segment rather short; mandibles and basilar tooth large; labium convex; dental plates small, short, transverse; teeth numerous, at least sixteen, sometimes more, very small, obtuse, and almost obliterated; posterior pair of legs moderate, first and second joints equal; basilar joint subquadrate, flattened on the superior surface, with three minute spines, besides the angular one, on the internal margin, two of which are slightly approximated; angular spine large, bifid; inferior surface convex, toothless. Lateral anal appendages short, obtuse, with the apex very slightly developed. Preanal scale elongate, quadrate, with the posterior margin slightly rounded.

I have great pleasure in naming this species in honour of the late General Hardwick, who was the first to distinguish it, and who has given an excellent figure of it in his drawings in the library of the British Museum, vol. 1,002. 89, 22.

Sectio C.

Pedum paris postremi articulo basali subcylindrico; spinis magnis irregularibusve. Antennæ 17-articulatæ.

41. *Scol. multidens,* ferruginea, capite rufescente, labio mandibulisque aurantiacis, dentibus labialibus 12–14 parvis, pedibus flavis articulis distalibus virescentibus.—Long. unc. $4\frac{1}{2}$.

Scol. multidens, *Newp. l. c.* p. 97.

Hab. ——? (*v. in Mus. Brit.*)

Cephalic segment cordate, slightly emarginated; labium flattened, smooth; mandibular tooth large, with a very minute tubercle; dental plates transverse, quadrate, convex; teeth small, twelve or fourteen in number; posterior pair of legs moderate, first and second joints equal; superior surface of the basilar joint subconvex, with the external margin subacute; internal margin with three spines, the two anterior somewhat approximated; the internal angular one large, acute; internal surface subconvex, with two spines on its inferior margin in a longitudinal series; inferior surface with three spines in a longitudinal series. Lateral anal appendages slightly elongated, with the process trifid. Preanal scale four-sided, short, narrowed posteriorly, with a longitudinal impression; the posterior margin rounded.

42. *Scol. punctidens,* capite corpore pedibusque (in sicco) albidis, articulis pedum parium posteriorum 10–12 distalibus virescentibus, antennis viridibus, mandibulis labioque aurantiacis, pedibus postremis margine superiore interno spinis sex longitudinaliter biseriatis e quibus posteriore angularive bifidâ; superficie inferiore spinis sex biseriatis e quibus 4 externis 2 internis.—Long. unc. $3\frac{3}{4}$.

Scol. punctidens, *Newp. l. c.* p. 97.

Hab. In Americâ Australi? (*v. in Mus. Brit.*)

In its general appearance this species is very like *S. cingulata,* to which it approaches very closely in the form of the head, the frontal portion of which is cordate ovate, with two longitudinal elevated ridges; antennæ slightly pubescent, 17-jointed, green; basilar segment large and wide, with the mandibles strong and projecting, orange-coloured; basilar tooth large, with a tubercle near its apex; labium orange, smooth, convex, with the sutures very distinct, with a small black spot at the external base of the mandibles; dental plates quadrate, deeply punctured, with the posterior external angle produced; teeth six, black, short, and obtuse; posterior pair of legs slightly elongated; superior surface of the basilar joint convex, margins rounded, with six sharp spines, arranged in two longitudinal series; two in a series on the upper surface, and four in an irregular series on the internal margin; the internal angular spine large, bifid; interior and inferior surfaces rounded, with six spines on the inferior arranged in two longitudinal series, two in the internal and four in the external.

43.? *Scol. clavipes,* Koch, Deutschl. Crust. &c. heft 9. t. 1. Brandt, l. c. p. 62. sp. 8.

44.? *Scol. ambigua,* Brandt, l. c. p. 63. sp. 9. (e Cap. Bon. Spei.)

It is doubtful whether these species may not belong to the subfamily *Cormocephalinæ*, as I have not had an opportunity of examining them. They are inserted here only provisionally.

45. *Scol. viridicornis* (TAB. XXXIII. fig. 1, 2, 4, 5; TAB. XL. fig. 5, 6.), antennis dorsoque saturatè viridibus, segmentorum margine posteriore flavo, mandibulis labio segmento pedumque pari postremo saturatè rufis, pedibus flavis; articulis tarsalibus viridibus.—Long. unc. 5.

Scol. viridicornis, *Newp. l. c.* p. 97. sp. 12.

Scol. Hopei, *Newp. MSS.*

Hab. In Brasiliâ. (*v. in Mus. Brit. et D. Hope.*)

Cephalic segment cordate; basilar segment large; mandibular tooth large, with a minute tubercle near its apex; labium smooth, sutures distinct; dental plates large, thick, punctured, subquadrate, a little elongated posteriorly; teeth eight, black, small, obtuse, with the three internal ones on each side approximated; posterior pair of legs short, with the basilar joint thick, and subconvex on its superior and external surface, with six or seven spinulæ arranged irregularly on the internal margin and superior surface, the posterior or apical one large and acute. Internal surface flattened, with one sharp spine; inferior surface with five or six small spines arranged in three longitudinal, alternating series, two in each series. Lateral anal appendages red, short, with the apex bifid or subacute. Preanal scale four-sided, elongate, with the posterior margin straight.

This is a very marked and beautiful species, but is subject to much variation in regard to colour. It very much resembles *S. variegata*, but differs from it in the legs being much thicker, and in the spines on their upper surface being irregularly distributed, as well as in the absence of annulations on the legs; the spines on the legs also vary in number.

There are three specimens in Mr. Hope's cabinet, and two in the cabinets of the British Museum.

46. *Scol. variegata*, suprà saturatè castanea, segmenti cephalici margine anteriore segmentorum dorsalium margine posteriore labio mandibulis superficieque ventrali lætè aurantiacis, antennis olivaceis, pedibus aurantiacis olivaceo-fasciatis.—Long. unc. 5.

Scol. variegata, *Newp. l. c.* p. 97.

Hab. In Demerarâ. (*v. in Mus. Brit. et D. Hope.*)

Cephalic segment large, cordate; mandibular tooth large; labium convex, sutures distinct; dental plates large, quadrate; teeth six, small, obtuse; posterior pair of legs short and strong, with the superior surface of the basilar joint plano-convex; margins rounded. Internal superior surface and margin with five slightly curved spines, the two posterior of which are subapproximated longitudinally, the third placed on the middle of the internal surface, the fourth, very minute, on the superior surface, and the fifth or angular one much elongated, bifid or trifid. Inferior surface convex, with seven small spines arranged in three longitudinal series, two in the external and internal, and three in the middle series. Lateral anal appendages ferruginous, obtuse, with the apex pointed, and the posterior margin compressed and acute. Preanal scale quadrate, elongate, a little narrowed posteriorly, with the posterior margin slightly rounded.

47. *Scol. angulata,* saturatè viridis, segmento basilari labio mandibulisque aurantiaco-rufis, mandibulis apice nigris, pedibus flavescentibus articulis tarsalibus metatarsalibusque viridibus; paris postremi articulis femoralibus rufescentibus, segmentorum omnium superficie dorsali complanatâ: margine anteriore laterali angulato.—Long. unc. $4\frac{1}{2}$.

Scol. angulata, *Newp. l. c.* p. 97.

Hab. In Insulâ Trinitatis. (*v. in Mus. Brit.*)

Cephalic segment cordate, quadrate, with the posterior margin rounded; dental plates small, quadrate; teeth eight, small, acute, the two internal ones on each side coalescing. Posterior pair of legs moderate, with the first and second joints equal; femoral joint with the superior surface and margins rounded; superior surface and internal margin with six or seven spines, arranged in two irregular triangles; internal angular process short, armed with three parallel spines. Internal surface with four or five spines; inferior surface with nine spines arranged in three longitudinal series, two in the external and middle, and four or five in the internal series. Lateral anal appendages reddish brown, with the process yellow, short, but projecting, quadrifid. Preanal scale short, quadrate, a little narrowed posteriorly, with the margin rounded.

48. *Scol. cristata,* brunnea, antennis pedibusque virescentibus, dentibus 6 e quibus exteriore quadrato interno utrinque bifido, segmento postremo convexo cristâ medianâ longitudinali, pedibus postremis brevibus; articulo basali margine interiore spinulis 5 acutis: superficie inferiore spinis 6 longitudinaliter triseriatis, 2, 2, 2.—Long. unc. $6\frac{3}{4}$.

Scol. cristata, *Newp. l. c.* p. 98.

Hab. In Chinâ? (*v. in Mus. Brit.*)

The cephalic segment of this species is small, but the basilar large, with the prebasilar fold very distinct. Mandibles acute, apex black, with the tooth large and slightly tuberculated. The labium is smooth and flattened, with the longitudinal and transverse sutures distinct. The dental and subdental plates and teeth very distinct, the external tooth on each side almost quadrate. The posterior segment convex, shield-shaped, with an elevated obtuse longitudinal crest, commencing in a point on the front of the segment. Posterior pair of legs short; the basilar joint longer than the second, with the superior surface convex; the external margin rounded; the internal margin and surface with five acute spines tipped with black, the four anterior in two subapproximated alternating series; the fifth or apical spine acute, with the apex bifid. The internal surface flattened, with a single spine. Inferior surface with six acute spines, arranged in three longitudinal series, two in each series; those of the external and internal parallel with each other, the distal one of the latter forming part of a diagonal line with the single spine on the internal surface, and the angular or posterior on the superior internal margin. Lateral appendages short, convex, minutely punctured, with the apex short, trifid. Preanal scale elongate quadrate, with a longitudinal depression, posteriorly rounded.

This specimen was brought by Capt. Sir E. Belcher, R.N., of the *Sulphur*, and is believed to be from China. I have a strong suspicion however that this is a mistake, and that it is a South American species.

49. *Scol. canidens*, saturatè olivacea, dentibus 8; tribus interioribus in unaquâque laminâ brevibus obtusis approximatis laminæ superficie excavatâ: exteriore reliquis longiore, pedum paris postremi articulo basali margine interno serie duplici spinularum acutarum 8 v. 9: superficie inferiore excavatâ spinis 6 v. 8 biseriatis.—Long. unc. 2¼.

Scol. canidens, *Newp. l. c.* p. 98.

Hab. In Egypto. (*v. in Mus. Brit.*)

Cephalic segment subovate, elongated, with the posterior margin nearly straight; basilar segment large; dental plates elongated, quadrate, with the anterior margin straight, or slightly excavated; the inferior surface with a deep triangular excavation bounded by the internal and external tooth on each plate; teeth eight, the three internal ones on each plate obtuse, subapproximated; the external one acute, elongated, and distinct from the others; labium smooth, separated from the dental plates by a distinct border. Posterior pair of legs short, with the basilar joint longer than the second; superior surface flattened, with the external margin subacute; internal margin with from eight to nine minute spines, the seven or eight anterior ones very small, six of which are arranged in a double subapproximated series; internal angular process large, bifid. Inferior surface of the joint slightly excavated longitudinally, with a series of from six to eight irregularly-placed minute spines on each border of the excavation. Lateral anal appendages small, narrow, with the process a little elongated, and multifid at the apex. Preanal scale quadrate, with the posterior margin slightly rounded.

50. *Scol. violacea*, Fabr. Ent. Syst. tom. ii. p. 289. Guérin, Icon. Règne Anim. de Cuv., Ins. pl. 1. fig. 7. Gervais, loc. cit. sp. 1. p. 50. Lucas, loc. cit. sp. 1. p. 544.

Scol. crassipes, *Brandt, loc. cit.* sp. 5. p. 60?

51. *Scol. gigas*, lætè ferruginea, segmento cephalico antennisque saturatè viridibus, pedibus nigrescentibus v. saturatè olivaceis; articulis pallidiùs fasciatis, superficie ventrali olivaceâ, pedum postremorum femoribus labio mandibulisque rufis: his apice nigris.—Long. unc. 10.

Scol. gigas, *Leach in Trans. Linn. Soc.* xi. p. 383. *Id. in Zool. Misc.* iii. p. 42. *Newp. l. c.* p. 98. sp. 25.

Hab. In Venezuelâ. (*v. in Mus. Brit. et "United Service."*)

Cephalic segment small, cordate; antennæ 17-jointed, short; labium smooth, sutures distinct; mandibular tooth small; dental plates large, somewhat quadrate, with the anterior margin straight, punctured, and the posterior angle elongated; labial palpi with a small tubercle near the distal interior angle of the second joint; third joint spoon-shaped, with the superior margin ciliated and the apex toothed. Basilar joint of the posterior pair of legs convex, with the external margin rounded; internal margin irregular, with seven minute black spines, four of which are ranged in a line that extends diagonally upwards; articular spine minute; internal surface rounded, with seven or eight small black spines, arranged in three oblique series, two, three or four in each series, the middle series extending backwards and upwards to the upper surface of the joint; inferior surface rounded, with six minute spines, arranged in two transverse series; inferior surface of the distal extremity of the terminal joint of all the legs with a minute spine sunk in a little foveola. Lateral anal appendages short, thick, with the process short and acute. Preanal scale four-sided, a little elongated and narrowed, with the posterior margin rounded.

The specimen in the British Museum from which I have taken this description is that described by Leach. It has been stuffed with cotton wool, while in the recent state, and hence has retained its original colours; but it is extended greatly beyond its original size, and now measures about thirteen inches in length. Its natural length seems to have been from ten to eleven inches. There is no notice attached to it of the country from whence it was derived, but there is a specimen of the same species in the Museum of the United Service, that was sent by Sir Robert Kerr Porter from Venezuela in South America.

52. *Scol. gigantea,* capite labio superficie dorsali pedibus postremis appendicibusque analibus ferrugineis, superficie ventrali lutescente, segmentis posterioribus 12 v. 13 longitudine plùs duplò latioribus, laminis dentalibus subquadratis; dentibus 8 nigris: exteriore triangulari acutâ distante: tribus reliquis in unaquâque laminâ in superficiem latam coalitis, pedibus postremis subcylindricis; articulo basali obconico intùs infernèque spinis numerosis minutis armato.—Long. unc. $10\frac{1}{2}$.

Scol. gigantea, *Linn. Syst. Nat.* ed. ii. p. 1063. *Fabr. Ent. Syst.* ii. sp. 5.
Scol. 2. *Brown, Hist. Jamaica,* t. 42. f. 4.
Hab. In Insulâ Jamaicâ? (*v. in Mus. Brit.*)

Mandibles black at the apex, the tooth large, acute, and with a small tubercle. Posterior legs moderate, with the femoral joint obconic, and one-third longer than the tibial; internal margin and surface rounded, with from twelve to fifteen small, sharp, black spines, arranged partly on the superior surface. Inferior surface convex, with from eight to ten spines irregularly distributed. Angular process large, tuberculiform, with from six to eight minute black spines. Distal angle of the femoral joint of the eleven posterior pairs of legs with from three to five spinulæ. Preanal scale elongate quadrate, margin rounded. Lateral anal appendages very short, obtuse, with the process tuberculiform, with five minute black spines.

This magnificent and truly gigantic species is quite distinct from all hitherto described. It differs from *S. gigas* of Leach in the more cylindrical form of the posterior pair of legs and the obconic femoral joints, and in the legs being all of an uniform colour.

The specimen in the Museum cabinet is believed to be from Jamaica. It agrees more nearly than any known species with fig. 4. tab. 42. of "*The large Centipie*," in Brown's 'History of Jamaica,' the description of which is, "Scolopendra 2: *maxima, pedibus triginta sex*." I have no doubt, however, that this description, so far as relates to the number of legs, is inaccurate, as on referring to the figure I find that *nineteen* pairs of legs are delineated, while not only are some of these incorrectly placed, but the subbasilar legs are entirely omitted. Yet this is the species which Linnæus describes, apparently from Brown's figure and account of it, as Linnæus himself has written the name "*Scolopendra gigantea*" on the margin of the page of his own copy of Brown's work, now in the possession of the Linnean Society. That Linnæus described his species from Brown's figure seems evident from the fact, that in the copy of the 'Systema Naturæ,' dated 1766, Holmiæ, used by himself for reference, and now in the Society's library, he refers to Brown's work, but says, "*S. pedibus utrinque* xvii. *Habit. in America*;" and adds, "*sequente multo major, sed simillima*." Fabricius has exactly copied Linnæus's description, so far as the characters and locality of the species are concerned; so that it is very probable that neither of these two authorities even saw the species they have named. It may be desirable in support of this opinion to compare Brown's observations with those of Linnæus. He says, after his description:—"This insect is sometimes found on the wharfs of Kingston, and commonly thought to be brought there among the timbers and dye-woods imported from the main. It is generally very large, and sometimes measures above ten inches in length."

Divisio 2. *Latidentatæ.*

Laminæ dentales subquadratæ; dente intimo lato, extimo triangulari acuto distante. Pedes postremi spinis minutis numerosis. Spiracula paris anterioris maxima.

53. *Scol. valida,* ferruginea, labio mandibulisque rufis, dentibus 6, laminis dentalibus excavatis, segmentorum marginibus lateralibus liberis, pedibus postremis brevibus latissimis complanatis: spinulis 8 v. 9 sparsis in superficie margineque interiore superiore: 9que in superficie inferiore.—Long. unc. $4\frac{1}{2}$.

Scol. valida, *Lucas in Webb & Berth. Hist. Nat. des Iles Canar.* ii. p. 49. no. 42.

Hab. In Insulis Canariis. (*v. in Mus. Brit.*)

This is a distinct species, and is very readily identified. The cephalic segment is small, cordate, quadrate; dental plates very distinct, and deeply excavated on their surface; teeth six, the internal one bifid; dorsal segments with free elevated lateral margins. The posterior pair of legs are short, very broad, depressed, quadrate, with the external and internal margins rounded; the internal margin and surface of the femoral joint with eight or nine minute, irregularly-distributed, black spinulæ, the angular one quadrifid. Inferior surface flattened, with nine spinulæ arranged in three longitudinal series. Lateral anal appendages very short; preanal scale quadrate cordate, with the posterior margin slightly rounded.

54. *Scol. alternans,* flavescenti-brunnea, capite mandibulis labio appendicibusque analibus saturatè ferrugineis, dentibus labialibus 6: intimis acutis latis spathulatis: extimis angustatis acutissimis, pedum postremorum articulo basali elongato subconvexo internè infernèque spinulis numerosis minutis nigris inferioribus transversim seriatis armato. —Long. unc. 6.

Scol. alternans, *Leach in Linn. Trans.* xi. p. 383. *Id. in Zool. Misc.* iii. p. 41.

The great Scolopendra, *Shaw, Nat. Misc.* i. t. 9?

Scol. morsitans, *Beauvois, Ins. Afr. et Amer.* 152.

Scol. Sagræ, *Gerv. l. c.* p. 50. sp. 8. *Brandt, l. c.* p. 66. sp. 14. *Lucas, l. c.* p. 545. sp. 8. *Newp. l. c.* p. 98.

Hab. In Insulis Caribæis. (*v. in Mus. Brit.*)

Cephalic segment cordate, rounded posteriorly; basilar segment very large; mandibles strong, with the tooth small, but armed with a minute tubercle near its apex; labium flattened, with the transverse suture distinct; dental plates quadrate, with the posterior margin slightly elongated; teeth six, large, with the internal one on each side sharp, broad, spatulate and formed for cutting, with the two external ones on each side narrowed and very acute; femoral joint of the posterior pair of legs elongated and flattened, with the superior surface subconvex, and the external margin subacute; internal margin and surface with a multitude of minute black spinulæ, from thirty to forty in number, distributed both over the internal surface and margin, and on the internal superior surface; internal angular process large, with the apex multifid. Inferior surface rounded, with from fifteen to twenty very minute points distributed in little irregular transverse clusters of three or four in each cluster, usually arranged in a transverse direction; tibial joint shorter than the femoral, rounded. Lateral anal appendages smooth, but not polished, with the apex produced and multifid, and a minute tooth at the external posterior border; preanal scale flattened, small and elongate, rounded posteriorly, with the margin straight.

The chief characteristic marks of this species are the labial teeth, and the number and great irregularity of the tubercles on the posterior pair of legs. These are too irregular to afford a good description. The specimen from which the above description was taken has Dr. Leach's autograph specific name attached to it.

55. *Scol. Grayii*, capite corpore pedibusque saturatè ferrugineis, pedibus longis compressis; paris postremi articulo femorali elongato; spinis parvis circiter 15 in margine superficieque interiore in seriebus 3 v. 4 obliquis: 12–14 que in superficie inferiore in seriebus tribus longitudinalibus alternantibus dispositis.—Long. unc. $6\frac{1}{2}$.

Scol. Grayii, *Newp. l. c.* p. 98.

Hab. ———? (*v. in Mus. Brit.*)

Cephalic segment cordate, with two longitudinal, slightly elevated cristæ; basilar segment with two oblique ones. Mandibular tooth moderate; labium smooth, with very minute punctures; dental plates strong, subquadrate; teeth six, the two external ones on each side strong, acute, triangular, with the internal one on each side acute, dilated, subquadrate at its anterior margin; dorsal surface of the body with two minute elevated cristæ, extending from the head to the terminal segment; basilar segment of the posterior pair of legs elongated, with the superior surface and external margin rounded; internal surface and margin with at least fifteen small spines, three of which are arranged in a longitudinal series on the internal margin, and the others in three oblique lines on the internal surface; inferior surface convex, with from twelve to fourteen spines arranged in three alternating longitudinal series. Lateral anal appendages smooth, with the apex multifid, and three minute tubercles on the posterior margin. Preanal scale narrow, elongated, with posterior margin straight.

I have much pleasure in naming this fine species in honour of J. E. Gray.

Esq., F.R.S., chief officer of the Zoological department of the British Museum.

56. *Scol. complanata,* corpore pedibusque postremis rufescentibus, segmentis mediis præsertim dilatatis, dentibus 8, labio mandibulisque rufis apice nigris, antennis pedibusque virescentibus, pedibus postremis angustis complanatis spinis in superficie internâ infernâque numerosissimis.—Long. unc. 5.

Scol. complanata, *Newp. l. c.* p. 98.

Hab. In Insulâ Caribæâ Sti Christophori. (*v. in Mus. Brit.*)

Cephalic segment cordate, ovate; mandibular tooth large, with a minute tubercle at its base; labium smooth, transverse, sutures distinct; dental plates quadrate; teeth eight, the external one on each side acute, the internal one notched and very much dilated, spatuliform at its anterior margin; antennæ longitudinally striated with minute hairs at the apex; posterior pair of legs with the basilar joint elongated, superior surface flattened, with the internal margin and surface armed with from twenty-one to twenty-four minute spines, arranged in three irregular oblique series; internal angular process quinquefid, with two of the spines elongated and hooked downwards; sometimes one or two spines on the superior surface of the joint; inferior surface with seventeen small black spines, thirteen of which are arranged in three alternating longitudinal series, and the remaining four disposed in a triangle or quadrangle at the inner inferior surface of the base of the joint. Lateral anal appendages short, with the process quinquefid, and four minute tubercles on the posterior margin. Preanal scale small, elongated, very narrow posteriorly, with the margin straight.

57. *Scol. incerta,* brunnea, capite mandibulis labio appendicibusque lateralibus saturatè rufis, antennis pedibusque flavis, dentibus 6 nigris obtusis, pedibus postremis complanatis angustis elongatis; articulo basali subconvexo spinis ultra 20 acutis nigris in superficie superiore internâ; processu articulari elongato mammillari multifido.—Long. unc. $5\frac{1}{4}$.

Hab. ———? (*v. in Mus. D. Hope.*)

This species so very closely resembles *S. complanata,* that I have some doubt whether it ought to be described as distinct; but it seems to differ in some peculiarities which usually afford good distinctions of species. The cephalic segment is small, cordate, ovate, with its posterior margin almost circular, and there are two longitudinal elevations on its surface, and also two oblique ones on the basilar segment, as in *S. Grayii.* The dental plates are subquadrate, with a deep sulcus; teeth six, obtuse, the external one distant; labium smooth, with scattered obsolete punctures, and a transverse ridge behind the sutures; mandibles tipped with black; legs yellow, the tibio-femoral articulation of the penultimate and antepenultimate pairs with two or three black spinulæ; posterior pair elongated, narrowed, with the basilar joint longer than the tibial, subconvex on its upper surface, with more than twenty black spines on the surface and internal margin; articular process elongated, nipple-shaped, with the apex multifid; inferior surface with about twelve spinulæ arranged in three irregular series. Anal appendages dark red, with the apex elongated and multifid, and two spinulæ on the posterior border. Preanal scale yellow, small, elongate, trigonal, margin straight.

58. *Scol. multispinosa*, saturatè ferruginea, antennis articulisque tarsalibus metatarsalibusque viridibus, dentibus labialibus 6, pedum postremorum articulo basali elongato complanato subconvexo; spinulis in margine interno 6 vel 7 in seriebus 2 alternantibus: processu angulari multifido: spinulisque in superficie internâ inferiore 17–20 in seriebus 5 longitudinalibus.—Long. unc. $4\frac{3}{4}$.

Scol. multispinata, *Newp. l. c.* p. 98.

Hab. In Insulâ Caribæâ S^ti^ Christophori. (*v. in Mus. Brit.*)

Cephalic segment cordate, rounded; mandibular tooth large; dental plates subquadrate, elongated posteriorly; teeth six, the internal one on each side broad, spatulate, with the edges sharpened, the external one on each side small and acute; labium and mandibles very dark ferruginous; posterior pair of legs slightly elongated, with the basilar joint elongated, flattened, somewhat compressed; superior surface with six or seven minute black spines, arranged in two alternating series, near the internal margin, which is rounded, and has a series of six teeth, internal to those on the surface; internal angular process with the apex multifid; lateral and inferior surfaces convex, with from seventeen to twenty minute spines, arranged in three irregular longitudinal series on the external side, and two on the internal; second joint flattened, with the margins rounded. Lateral anal appendages ferruginous red, smooth, with the apex multifid, and three minute black spines on the external posterior margin. Preanal scale four-sided, elongate, narrowed posteriorly, with the margin straight.

Genus 6. Scolopocryptops, *Newp.*

Oculi nulli. *Segmenta podophora* 23, posteriora angustata. *Pedum paria* totidem. *Segmentum cephalicum* cordatum, imbricatum. *Labium* edentulum. *Antennæ* 17-articulatæ. *Appendices anales laterales pedesque posteriores* elongati.

1. *Scol. Miersii*, testacea, capite mandibulisque saturatè rufis, antennis pedibusque flavis, pedibus postremis gracillimis; articulo femorali subcylindrico lævi articulo tibiali lon-

giore; spinâ medianâ unicâ acutâ in margine superiore interno alterâque majore in superficie inferiore.—Long. unc. $3\frac{1}{2}$.

Hab. In Brasiliâ. (*v. in Mus. D. Miers.*)

This is a distinct species, and has the cephalic segment very convex, ovate quadrate, a little narrowed in front, with a slight emargination between the antennæ. The labium and mandibles are thickly and deeply punctured. The posterior pair of legs are very slender, with the inferior surface compressed or somewhat carinated. Preanal scale punctured, subquadrate, narrowed posteriorly and slightly emarginated.

I have named this species in honour of J. Miers, Esq., F.R S., F.L.S. &c., by whom it was captured.

2. *Scol. melanostoma*, ferruginea, lævis, stigmatibus nigris, pedibus elongatis flavescentibus pubescentibus; pedum postremorum articulo femorali subcylindrico spinâ unicâ medianâ in margine superiore interno alterâque in superficie inferiore, appendicibus analibus lateralibus valdè elongatis acutis.—Long. unc. $1\frac{3}{4}$.

Hab. In Insulâ Caribæâ S[ti] Vincentii, *Rev. L. Guilding.* (*v. in Mus. D. Hope.*)

This species very closely resembles the preceding, but differs from it in the elongation of the anal appendages, the colour of the spiracles, and also in size. It differs also from *S. sexspinosa* in the absence of a spine at the distal articulation of the femur, in the pubescence of the legs, and in the posterior border of the preanal scale being slightly emarginated, as in *S. Miersii.*

3. *Scol. ferruginea*, lateritia polita, pedibus flavis, segmentis convexis marginibus lateralibus distinctis, labio angustato profundè punctato impressionibusque 2 lateralibus, appendicibus analibus lateralibus elongatis acutis, squamâ præanali subcordatâ complanatâ margine posteriore rotundatâ.—Long. unc. $1\frac{1}{2}$.

Scolopendra ferruginea, *Linn. Syst. Nat.* ed. 12. p. 1063. no. 6. *Fabr. Entom. Syst.* ii. p. 389. no. 5. *Gerv. l. c.* no. 17.

Scolopendre rousse, *De Geer. Mém.* vii. p. 568. pl. 43. f. 6.

Hab. ———? (*v. in Mus. Linn.*)

The species described by Linnæus is stated by De Geer to have been from Africa, and this statement has been copied by Fabricius, but I strongly suspect this to have been a mistake, and that, like other species of this genus, it is either from North or South America or the West Indies. De Geer has both figured and described this species, and his description agrees with the specimen that remains in the Linnean cabinet.

4. *Scol.* 6-*spinosa* (Tab. XXXIII. fig. 20-23), ferruginea, segmentis posterioribus attenuatis, pedibus elongatis flavis; postremorum articulo femorali spinâ unicâ magnâ in superficie inferiore alterâ minore medianâ in margine superiore interno tertiâque minutissimâ articulari, appendicibus analibus lateralibus valdè elongatis.—Long. unc. $1\frac{4}{10}$.

Cryptops sexspinosus, *Say in Journ. Acad. Nat. Sci. Phil.* ii. *Œuvres Entom.* i. p. 24. *Gerv. in Ann. Sci. Nat.* Janv. 1837. p. 51. sp. 4. *Lucas, Hist. Nat. Anim. Artic.* p. 547. sp. 4. *Newp. l. c.* p. 100.

Hab. In Georgiâ et Floridâ. (*v. in Mus. Brit.*)

This description is taken from one of Say's original specimens. It has the mandibular tooth very distinct, but the labium is convex, with a straight border, without denticulations. The posterior legs are much elongated, and the lateral appendages margined, and terminated with an acute spine. The preanal scale is subcordate, with the posterior border slightly rounded.

5. *Scol. longitarsis* (Tab. XL. fig. 10.), aurantiaca, capite mandibulis labio segmentorumque margine posteriore rufis, pedibus pubescentibus flavis; postremis attenuatis valdè elongatis articulis tarsalibus metatarsalibusque 12: femore tibiâ longiore, illo infernè longitudinaliter 4-spinoso, hâc bispinosâ.—Long. unc. $1\frac{3}{4}$.

Hab. In Insulâ Caribæâ S^ti^ Vincentii, *Rev. L. Guilding.* (*v. in Mus. D. Hope.*)

This is an exceedingly interesting species. The cephalic segment is convex, subquadrate, ovate, with a slight sulcus between the insertions of the antennæ: the dental border of the labium is nearly straight, with a very slight emargination: mandibles tipped with black: dorsal plates convex, not margined, but impressed on each side with a deep sulcus, and having the posterior angles slightly produced; posterior pair of legs elongated, tapering, fourteen-jointed; the femur and tibia spined. Lateral anal appendages also much elongated, with the apex black and acute. Preanal scale quadrate, rather narrow behind, with the margin straight.

Genus 7. Cryptops, *Leach.*

Segmenta podophora 21. *Antennæ* 17-articulatæ. *Oculi* nulli vel inconspicui. *Labium* edentulum. *Pedum postremorum* articulo basali plerumque inermi. *Appendices anales laterales* obtusæ.

The genus *Cryptops*, as defined by Dr. Leach, is a well-established section; but some species have been included in it which seem not to answer precisely to the characters that have been given. Thus the *C. sexspinosa*, Say, belongs to *Scolopocryptops*, and *C. Savignii*, described by Leach himself, has the femora of the posterior pair of legs spined.

1. *Crypt. australis*, flava, capite antennis mandibulis labio segmentoque postremo aurantiacis, scutis dorsalibus lateraliter rotundatis anticè transversè sulcatis impressionibusque 4 longitudinalibus, pedibus flavis pubescentibus; articulis femoralibus tibialibus tarsalibusque æqualibus.—Long. unc. $1\frac{1}{10}$.

Hab. In Insulâ Australi Novæ Zelandiæ. (*v. in Mus. Brit.*)

This specimen is interesting from its being the first *Cryptops* hitherto obtained from the southern portion of the globe, and I have in consequence named it from this circumstance. It was collected by Mr. Percy Earl. The posterior pair of legs have been lost from the only specimen I have yet seen, but it nevertheless affords sufficient marks of distinction. It is a somewhat thick species, and the body is a little enlarged posteriorly. The cephalic segment agrees well in form with that of *C. hortensis*, but is a little more contracted in front, and has a slight depression between the insertions of the antennæ: the labium is perfectly smooth, without teeth, but with a slight longitudinal suture, and the mandibles are obscurely punctured.

2. *Crypt. nigra*, cærulescenti-nigra, labio superficieque ventrali flavis, mandibulis antennis pedibusque ferrugineis; postremis espinosis brunneis nigro-annulatis, ocello unico nigro pone antennas.—Long. unc. $2\frac{1}{2}$.

Hab. In Indiâ Orientali. (*v. fig. inter Icon. Hardw. in Mus. Brit.* vol. 11,002. pl. 90. no. 23.)

The drawing from which I have named and described this species is dated May 30, 1820; and when it is stated that General Hardwicke's drawings were all made in India from recent specimens, they may be regarded as nearly correct, certainly as to colouring, although in minute anatomical details there may occasionally be errors. Thus in the figure above described there are twenty-one joints to each antenna, but in every other respect the figure is that of a true *Cryptops*. A similar mistake occurs in the figure of *Scolopendra Hardwickii* in the same collection, as I have proved by comparison with the species itself.

3. *Crypt. hortensis* (Tab. XXXIII. figs. 23, 24.), ferruginea, capite subovato anticè angustato, labio impressione profundâ triangulari in sulcum longitudinalem desinente, antennis pedibusque pilosis, articulis femoralibus inermibus subconicis tibiali longioribus, squamâ præanali elongatâ quadratâ posticè rotundatâ.—Long. unc. 1.

Crypt. hortensis, *Leach in Edinb. Encycl.* vii. p. 408. *Id. in Trans. Linn. Soc.* xi. p. 384. *Id. in Enc. Brit. Suppl.* i. p. 431. *Id. Zool. Misc.* iii. t. 139. *Donov. Brit. Ins. Gerv. l. c.* sp. 1. *Lucas, Hist. Nat. Anim. Art.* p. 546. sp. 1. *Koch, Deutschl. Crust. Myriap. &c.* heft ix. no. 1.

Hab. In Angliâ. (*v. in Mus. Brit.*)

This character is derived from Leach's specimens.

4. *Crypt. Savignii*, flavescens, capite ferrugineo; *Crypt. hortensi* simillima sed major, femoribusque postremis spinosis.—Long. unc. $1\frac{6}{10}$.

Crypt. Savignii, *Leach, Zool. Misc.* iii. sp. 2. *Gerv. l. c.* sp. 2. *Lucas, l. c.* p. 546. sp. 2. pl. 3. f. 2. *Newp. l. c.* sp. 5.

? Scolopendra germanica, *Koch, Deutschl. Crust. Myriap. &c.* heft ix. no. 2.

Hab. In Angliâ. (*v. in Mus. Brit.*)

5. *Crypt. hyalina*, pallida, lævis, lineis 2 longitudinalibus saturatioribus, capite antennisque ferrugineis, pedibus postremis brunneis spinulis 5 in articulo tertio tarsali ve.—Long. lin. 7.

Crypt. hyalina, *Say, l. c.* sp. 1. *Id. Œuvr. Entom.* i. sp. 23. *Gerv. in Ann. Sci. Nat.* Janv. 1837, sp. 3. *Lucas, Hist. Nat. Anim. Artic.* p. 546. sp. 3.

Hab. In Georgiâ et Floridâ. (*v. in Mus. Brit.*)

There is a single specimen in the Museum, and this was sent by Say to Dr. Leach.

6. *Crypt. anomolans* (TAB. XXXIII. figs. 25, 26.), flava, antennis 15 (?)-articulatis, labio angustissimo sulcis 2 longitudinalibus curvatis, segmento basilari maximo subquadrato, scutis dorsalibus impressionibus 2 lateralibus obliquis, squamâ præanali brevi subquadratâ marginibus rotundatis, appendicibus lateralibus profundè punctatis scabris rotundatis.—Long. unc. $1\frac{3}{4}$.

Crypt. anomolans, *Newp. l. c.* p. 100. sp. 2.

Hab. ——? (*v. in Mus. Brit.*)

Genus 8. THEATOPS*, *Newp.*

Ocelli distincti. *Antennæ* breves, subulatæ, 17-articulatæ. *Segmentum cephalicum* truncatum subimbricatum; margine labiali denticulato. *Pedum postremorum* articulo magno, obconico, abbreviato. *Pedum* paria 21. *Appendices anales laterales* obtusæ.

* Θεατὸς, *visible*; and ὢψ, *the eye*.

This genus is perfectly distinct in the form of the head and the short antennæ from the true *Scolopendræ*, in the structure of the respiratory organs from the *Heterostominæ*, and in the number of legs from *Scolopendropsis*; while it approaches *Cryptops*, but differs also from that genus in the distinctness of the ocelli, and in the possession of labial teeth.

1. *Theat. postica*, aurantiaca, ocellis inconspicuis lateralibus, dentibus 8 minutis, segmento postremo maximo elongato quadrato lateribus rotundato medio profundè sulcato margine posteriore transverso, pedibus postremis brevibus crassis rotundatis attenuatis; articulo basali brevissimo conico.—Long. unc. $\frac{8}{10}$.

Crypt. postica, *Say in Journ. Acad. Nat. Sci. Phil.* ii. p. 112. *Id. Œuvr. Entom.* i. p. 24. *Gerv. in Ann. Sci. Nat.* Janv. 1837. p. 51. sp. 5. *Lucas, Hist. Nat. Anim. Art.* p. 547. sp. 5. *Newp. l. c.* p. 100.

Hab. In Georgiâ Floridâque Orientali. (*v. in Mus. Brit.*)

The mandibles are short, thick, and have a distinct basal tooth; the dental plates are elongated and widely separated; the teeth eight, minute, but distinct. The basal joint of the posterior pair of legs much shorter than the second, which is twice as long as the succeeding joints. The lateral anal appendages deeply punctured. Preanal scale flat, with a median longitudinal sulcus and scattered punctures, with the margin straight.

This description is taken from a specimen in the Museum sent by Say to Dr. Leach, and having the ticket of the latter attached to it.

Subfamilia 2. Heterostominæ.

*Segmentum cephalicum basilare*que truncata. *Dentes* maximi, elongati. *Spiracula* magna, rotundata, haud valvularia, in paribus 10.

The *Heterostominæ* are a distinct subfamily, characterized by the number and structure of their external respiratory organs, and by the great size of the labial teeth. They seem to comprise two genera, that differ from each other in the size of the mandibular tooth, in the armature of the posterior legs, and in the form of the respiratory orifices, which latter in *Branchiostoma* are projecting, and closed by a branchiform membrane thrown into folds, and reminding us very strongly of the branchiform structure of the spiracles in some water-beetles, as in *Dyticus*. In *Heterostoma* the spiracle is a perforated sieve-like membrane.

Genus 9. Branchiostoma*, *Newp.*

*Antennæ pedes*que elongati. *Dentes* triangulares acuti, mandibularis maximus. *Spiracula* circularia, membranâ branchiformi corrugatâ intùs vestita. *Pedes postremi* graciles, spinis minutis, articulari plerumque obsoletâ.

1. *Branch. lithobioides*, virescens fasciis saturatioribus transversis, capite segmento postremo superficie ventrali femoribusque aurantiacis, articulis tibialibus tarsalibusque viridibus, dentibus 6 e quibus 2 interiores cujusvis laminæ coaliti, pedibus postremis cylindricis spinulis 6 in margine superiore interno.—Long. unc. 1¾.

Hab. In Chinâ. (*v. in Mus. D. Hope.*)

In its general appearance this species resembles a *Lithobius*. The mandibles and mandibular tooth are large, and the labium is smooth, with a few scattered obsolete punctures. The dental plates are distinct, quadrate, and the teeth six, black and acute, the two internal ones on each plate united. All the legs are elongated; the posterior pair are slender, cylindrical, and armed on the internal superior surface of the femoral joint with six spinulæ, but there is no articular spine or process. The inferior surface has six acute black spinulæ, arranged in two longitudinal series, three in each series; those in the internal one are slightly approximated. The lateral appendages are elongated, with the apex bifid. Preanal scale subquadrate, narrowed posteriorly, with the border emarginated.

2. *Branch. longipes*, fusca, mandibulis labio appendicibusque analibus lateralibus aurantiacis, dentibus 4 triangularibus lobulatis acutis nigris, pedibus postremis elongatis; articulo basali gracili paulùm complanato spinulis 3 in margine superiore interno e quibus 2 anteriores subapproximatæ 7que in superficie inferiore.—Long. unc. 1[illegible].

Hab. ———? (*v. in Mus. Brit.*)

The cephalic segment is somewhat flattened; antennæ 19-jointed; teeth two on each plate, lobulated, triangular, and very acute; posterior pair of legs elongated, with the femoral longer than the tibial joint, slender, and with its upper surface flattened, with three spinulæ on the internal margin, the two anterior of which are subapproximated, and near the base of the joint; inferior surface with seven black spinulæ, arranged in two longitudinal series, four in the outer and three in the inner one. Lateral anal appendages orange-coloured, punctured, elongated, with the apex bifid, and a single spinula on the external surface. Preanal scale subcordate, with the posterior margin straight.

* *Βράγχια, branchiæ; στόμα, mouth, spiracle.*

3. *Branch. nuda*, cærulescenti-violacea, pedibus flavescentibus; postremis valdè elongatis cylindricis: articulis femoralibus tibialibus tarsalibusque subæqualibus: metatarsalibus compressis: femoribus nudis vel infernè spinulâ unicâ minutissimâ armatis.—Long. unc. $1\frac{3}{4}$.

Hab. In Novâ Hollandiâ, ad Paramatta. (*v. in Mus. nostr.*)

Cephalic segment subtriangular; antennæ 20-jointed; teeth eight, black, rather small, very acute, the two internal ones on each plate subapproximated; mandibular tooth very large, with a tubercle at its apex. Labium smooth, polished. Posterior pair of legs naked and cylindrical, with only an extremely small spine on the under surface near the base. Lateral anal appendages short, punctured, with the apex rather obtuse, or slightly bifid. Preanal scale short, subquadrate, with the posterior margin slightly rounded.

4. *Branch. spinicauda* (Tab. XL. fig. 7.), pallidè brunnea, lineâ unicâ dorsali medianâ saturatiore, pedibus longis; postremorum articulo basali in margine interiore medio spinâ unicâ maximâ armato.—Long. unc. $1\frac{4}{10}$.

Scolopendra spinicauda, *Newp. l. c.* p. 98.

Hab. In Africâ Boreali, prope Tripoli, *Ritchie*. (*v. in Mus. Brit.*)

Cephalic segment cordate, subquadrate, with the posterior margin straight; antennæ 17-jointed, large at the base; basilar segment large, narrowed posteriorly; mandibular tooth large, with a small spine at its apex; labium smooth, with the longitudinal sulcus distinct; dental plates narrowed, subquadrate, with the posterior external angle elongated; teeth eight, triangular, acute, with the second and fourth on each plate most projecting from the plane of the teeth; posterior pair of legs elongated, with the basilar joint rather short, and its superior and lateral surfaces rounded and armed on the internal superior margin with one very large spine, and one very minute one at the internal posterior angle. Inferior surface somewhat quadrate, with six sharp spines, arranged in two longitudinal alternating series, three in each series, the external one on the margin, and nearest the base of the joint. Lateral anal appendages roughened, tuberculous, with the apex smooth, elongated and pointed. Preanal scale cordate, subquadrate, with the posterior border slightly emarginated.

This is an interesting and very elegantly formed little species, several specimens of which were sent to the Museum in the same bottle with others of *Scolopendra spinigera*, of which at first I regarded it as the other sex. It varies in sometimes having four spines in the external inferior series.

Genus 10. HETEROSTOMA*, *Newp.*

Antennæ elongatæ, 20-articulatæ. *Segmentum cephalicum* parvum, anticè rotundatum; *basilare* latum, margine anteriore transverso. *Dentes* maximi, lanceolati, acuti. *Spiracula* magna, cribriformia, in paribus 10. *Pedes postremi* spinis validis armati.

This is a very distinct genus, the characters of which are constant in all the species. The mandibular tooth is small, and often entirely absent. The respiratory organs are not closed by valves, but are formed, externally, each by a large suboval, cribriform plate (TAB. XL. fig. 8 *a, b.*), placed vertically at the sides of the second, fourth, sixth, seventh, ninth, and succeeding alternate segments. The perforations in these plates communicate internally with a large number of minute tracheal vessels, one to each perforation, and do not together open at once into a large tracheal stem, like the valvular spiracles in other *Scolopendridæ*. This peculiarity of structure of the breathing organs is associated with a very marked form of head, large elongated antennæ, acute and powerful labial teeth, and strong posterior legs, of which the femora have large acute spines. These characters seem to indicate very predaceous habits.

Most of the species hitherto obtained are from the western coast of Africa and from Australia, and there is also one of the most marked species of the genus from Ceylon, and one from the South Sea Islands.

This genus includes the majority of the species described as *Longidentata* † in my former account of specimens in the collection at the British Museum.

1. *Heter. trigonopoda*, nigro-viridis, antennis viridibus apice ferrugineis, dentibus 8, mandibulis labioque virescenti-ferrugineis, pedibus flavescenti-viridibus, segmento postremo pedibus appendicibusque analibus lateralibus ferrugineis, pedum postremorum articulo basali spinis in margine interno 5 magnis totidemque biseriatis in superficie inferiore. —Long. unc. 4.

Scolopendra trigonopoda, *Leach, Zool. Misc.* iii. p. 36. *Gerv. in Ann. Sci. Nat. l. c.* p. 50. sp. 7. *Lucas, Hist. Nat. Anim. Art.* p. 545. sp. 7. *Newp. l. c.* p. 99.

? Scolopendra Eydouxiana, *Gerv. in Voy. de la Favorite*, v. p. 180. t. 53.

Hab. In Africâ, Congo et Senegal. (*v. in Mus. Brit.*)

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* Ἕτερος, *different*; στόμα, *mouth, spiracle.*

† Annals and Mag. Nat. Hist., Feb. 1844, p. 99.

Cephalic segment small, with the posterior margin straight; basilar segment large: antennæ ferruginous, and pubescent at the apex: mandibular tooth rather small: labium smooth: dental plates large, elongated, subquadrate, with the posterior external angle produced, deeply punctured: teeth eight, large, black, triangular and very acute, with the margin a little arched: basilar joint of the posterior pair of legs slightly elongated, convex on the upper surface, with the external margin rounded: internal margin with five large acute spines, four of which are somewhat approximated, and arranged two and two in a double series; the fifth or angular one very large, acute. Internal and inferior surfaces rounded, with five large acute spines, in two longitudinal series, two on the internal inferior margin, and three in the external series; tibial joint subquadrate, smooth, with the margins subacute. Lateral anal appendages elongated, punctured, bifid at the apex, with one strong spine on the inferior external margin: posterior superior margin compressed, with three spinous tubercles, the two posterior of which are very small and approximated laterally. Preanal scale four-sided, short, with a longitudinal impression, with the posterior border deeply emarginated.

On examining Dr. Leach's specimen very carefully, and comparing it with the description and figure given by M. Gervais of his *Scolopendra Eydouxiana*, I much suspect that these two species are identical. I am strengthened in this opinion by the fact that both are from the same country, Africa, as a ticket in Dr. Leach's handwriting, indicating the habitat, is attached to his specimen in the British Museum. A second specimen agreeing exactly with Leach's was brought from Congo by Mr. Curror. These specimens agree with M. Gervais' description in every particular, excepting the two series of spines on the inferior surface of the posterior pair of legs. In this respect I am fain to imagine that the innermost of these series might have been regarded by M. Gervais as belonging to the internal surface of the joint; or that it might be wanting in his specimen. Several specimens recently brought home by Mr. Fraser, of the Niger expedition, agree with Dr. Leach's specimen in every particular, excepting one specimen, which has had one of its legs reproduced, and in this instance the spines were more numerous and less regular than in the others.

2. *Heter. spinosa* (TAB. XL. fig. 8.), olivacea, mandibulis labio pedibusque postremis ferrugineis, dentibus 6 maximis, spiraculorum laminis saturatè brunneis, pedum postremorum articulo basali robusto subconico spinis 5 validis alternantibus in margine interiore spinâ angulari acutâ in mare crassâ dilatatâ (*o*) in fœminâ magnâ: spinisque totidem

in superficie inferiori, appendicibus analibus lateralibus longissimis rotundatis acutis. **—Long. unc. 5.**

Hab. In Insulâ Ceylon. (*v. in Mus. "United Service" et Soc. Zool.*)

The segments are sometimes margined with green? Cephalic segment ovate, cordate; basilar segment large, transverse: labium and mandibles ferruginous: teeth six, black and triangular; dental plates punctured; mandibular tooth absent. Posterior pair of legs strong; femoral joint elongated, with the upper surface convex, the external margin subacute, and the internal with five strong spines, the four anterior of which are arranged in two alternating series, and the fifth, or apical one is very long and acute in the female, and is developed into a broad lancet-shaped appendage in the male. Inferior surface armed with four and sometimes five strong spines, in two longitudinal series. Lateral anal appendages very long, rounded, curved and slender, with a strong spine on the external margin and the apex trifid. Preanal scale subcordate, deeply emarginated.

3.? *Heter. fasciata*, aurantiaca, capitis segmentorumque marginibus posterioribus virescenti-fasciatis, laminis spiraculorum saturatè aurantiacis, pedum postremorum articulo basali secundo longiore spinis 5 marginalibus totidemque in superficie inferiore e quibus tres in serie externâ duæ in serie internâ.—**Long. unc. 5.**

Hab. ———? (***v. in Mus. Brit.***)

This species very closely resembles *H. spinosa*, and may perhaps be only a variety of it. The colour of the dried specimen in the Museum is orange-yellow with green fasciæ, the respiratory plates deep orange, and the labium and mandibles ferruginous: mandibular tooth absent; teeth six, large, black: femoral joint of the posterior pair of legs longer and stronger than the tibial; superior surface subconvex; external margin rounded, internal armed with five spines arranged in two alternating series, the apical spine large and acute. Inferior and lateral surfaces flattened, with three spines on the external and two on the internal margin. Lateral appendages elongated, with the apex bifid, and two spinulæ on the posterior inferior surface. Preanal scale slightly elongated, subquadrate, deeply emarginated, with the angles rounded.

4. *Heter. platycephala*, capite depresso majusculo, mandibulis labio pedibusque postremis castaneis, corpore antennis pedibusque pallidè olivaceis, dentibus 6 magnis nigris acutis sulcatis, pedibus postremis spinis 5 validis in margine interiore elevato irregulari 6que in superficie inferiore.—**Long. unc. 4.**

Hab. In Insulis Oceani Pacifici. (***v. in Mus. Brit.***)

The cephalic segment is broad, subtriangular, and with the basilar segment chestnut-coloured;

the labium is flattened, with the dental plates very large, and armed with six powerful, triangular, acute, deeply sulcated, black teeth, the internal one on each side bifid: the body and legs are olivaceous, with obscure fasciæ; posterior pair castaneous, elongated, with a raised longitudinal line on the upper surface of the basilar joint, with the margins acute, the internal one with five sharp spines in two alternating series. Inferior surface with six spines in two longitudinal series, three in each series. Lateral anal appendages elongated and acute, with two spinulæ on the external surface. Preanal scale subtrigonal, with the posterior border emarginated.

5. *Heter. sulcidens,* saturatè olivacea v. cærulescenti-violacea, mandibulis labio pedibusque postremis fulvo-aurantiacis, dentibus 6 nigris acutis margine serratis longitudinaliter profundè sulcatis, pedum postremorum articulo basali porcâ longitudinali elevatâ spinis in margine interiore 5 longis acutis 6que in superficie interiore.—Long. unc. $3\frac{1}{4}$—6.

Scolopendra sulcidens, *Newp. l. c.* p. 99.

Scolopendra squalidens, *Newp.* var. *l. c.* p. 99.

Scolopendra scabriventris, juvenis, *Id. l. c.* p. 99.

Hab. In Novâ Hollandiâ, Paramatta. (*v. in Mus. Brit., Soc. Linn. nostroque.*)

The specimens in the Linnean Society's collection measure nearly six inches in length and are of a dark blue colour: the antennæ are fuscous and pubescent at the apex; the labium smooth and the dental plate deeply punctured: the legs are yellowish green, with the claws black; the spines on the internal margin of the posterior pair are very strong and acute, and are arranged in two irregular series, the second and fourth spines being on the internal surface; the inferior surface of the joint is also armed with six spines, three of which are arranged in a longitudinal series on the external border, and two in a series on the internal, with the remaining spine, the anterior one of the internal series on the internal surface, near the basal articulation of the limb. Lateral appendages punctured, with the apex bifid, and two spines on the external inferior surface and five or six very minute ones on the superior margin. Preanal scale cordate, deeply emarginated.

6. *Heter. sulcicornis,* ochracea, antennis elongatis pilis minutis strigosis, dentibus 6 magnis acutis margine denticulatis longitudinaliter sulcatis, pedum postremorum articulo basali spinis 6 nigris in margine interiore superiore 6que in superficie inferiore.—Long. unc. $3\frac{3}{4}$.

Scolopendra sulcicornis, *Newp. l. c.* p. 99.

Hab. In Novâ Hollandiâ ad Portum Essington. (*v. in Mus. Brit.*)

This is a very distinct species, readily identified. It has the basilar segment large, but narrowed posteriorly; mandibular tooth small; dental plates large, with the external angle elongated, twisted and punctured; teeth six, very large, black, acute, triangular, serrated on the margins, and with deep longitudinal sulci. Basilar joint of the posterior pair of legs with five black, acute, alternating spines on the internal superior margin, and six, arranged in two longitudinal series, on the inferior surface, three in each series; those of the inner one irregular. Lateral appendages slightly elongated, with the apex bifid, and a single spinula on the inferior margin, with five on the upper. Preanal scale subquadrate, narrowed posteriorly, with the margin slightly excavated.

7. *Heter. flava*, corpore pedibusque lætè flavis, segmento cephalico viridi, antennis aurantiacis, dentibus 6 minutis nigris, pedum postremorum articulo basali gracili subquadrato tibiâ longiore in superficie interiore spinis 5 nigris armato.—Long. unc. 3.

Hab. In Novâ Hollandiâ, ad fluvium Cygnorum. (*v. in Mus. D. Hope.*)

This species is allied to *H. sulcicornis*, but differs in having the posterior legs longer and more slender, and the spines larger, more acute, slightly hooked, and of an intense black. Those on the superior margin are arranged in equidistant alternating series. On the inferior surface there are six spines, three of which form a single longitudinal series on the external, and three on the internal margin; the middle one of the latter coalescing at its base with the corresponding one in the outer series. The lateral anal appendages have each two spines on the side, and from three to four small ones on the superior edge. The preanal scale is subquadrate, with the border slightly emarginated.

8. *Heter. megacephala* (TAB. XL. fig. 9.), corpore brevi olivaceo, capite magno convexo, antennis mandibulis labio appendicibusque analibus lateralibus rufescenti-olivaceis, dentibus 6 triangularibus acutis, pedum postremorum articulo basali tibiali longiore: spinis in margine interiore 5 longis acutis 6que in superficie inferiore magnis e quibus 5 longitudinaliter biseriatis sextus intermedius.—Long. unc. $3\frac{1}{4}$.

Scolopendra megacephala, *Newp. l. c.* p. 99. sp. 35.

Hab. In Novâ Hollandiâ ad Portum Essington, *Gilbert.* (*v. in Mus. Brit.*)

The distinctive characters of this species are the size of the head and the general shortness of the body, as compared with other species. The cephalic segment is very convex, large, rounded anteriorly, with the posterior margin straight; antennæ reddish olive, and pubescent at the apex; basilar segment very large, convex, almost quadrate; mandibular tooth small, with a deep incision at the inner side of the joint. Labium smooth; longitudinal suture distinct; dental plates large, reddish olive, with the posterior external angle elongated; teeth six, large, black, triangular and acute, with the margins slightly serrated. Posterior pair of legs rather short, with the basilar joint longer than the second, and the superior surface convex, with five large, acute, black spines on the internal superior margin, arranged in two alternating series, the apical spine simple. Inferior surface rounded, with six large, acute and slightly curved spines, arranged in two longitudinal series, three on the outer margin and two on the inner, with the sixth near the median line of the joint, between the two series. Lateral anal appendages much elongated and pointed, with the margin rounded, and one spine on the external surface, near the apex, which is bifid; the posterior superior margin a little compressed, with three spinous tubercles. Preanal scale quadrate, deeply emarginated, with a longitudinal sulcus.

This is an exceedingly interesting and well-marked species, although it very much resembles *Scolopendra sulcidens.* But it is easily distinguished by the large size of the head and shortness of the body. The *Heterostomæ* are marked instances of the very same type of species existing on the western coast of Australia as on the corresponding shores of Africa.

9.? *Heterostoma spinulosa.*
Scolopendra spinulosa, *Brandt, Recueil, &c.* sp. 12. p. 65.

M. Brandt expresses some doubt whether this species is not identical with *Scolopendra Eydouxiana* of M. Gervais, which it seems to approach very closely. If such be the case, it may prove to be identical with *S.* (*Heterostoma*) *trigonopoda* of Dr. Leach.

10. *Heterostoma elegans.*
Scolopendra elegans, *Brandt, loc. cit.* p. 74.
Hab. Ad Caput Bonæ Spei.

11. *Heterostoma fulvipes.*
Scolopendra fulvipes, *Brandt, loc. cit.* p. 72.

From the general character of the spines on the legs of these two species, as described by Brandt, I suspect that they may belong to this genus, but I have not yet had an opportunity of examining them; and M. Brandt's description does not enable me to decide the question, as the number of joints to the antennæ is not stated, nor the form of the head indicated.

Genus 11. SCOLOPENDROPSIS, *Brandt.*

Ocelli utrinque 4. *Segmentum cephalicum* truncatum. *Pedum paria* 23. *Appendices anales laterales* obtusæ, nec spinosæ nec mucronatæ.

1. *Scolopendropsis Bahiensis,* Brandt, Recueil, &c. p. 73–75.

This appears to be a good genus, established by Brandt, as indicated by the number of legs, truncated cephalic segment, and absence of spines to the lateral appendages. It differs from *Scolopocryptops* in possessing ocelli, and in the form of the cephalic segments. As I have not yet obtained a specimen, the characters given are drawn up from Brandt's description.

Subfamilia 3. CORMOCEPHALINÆ.

Segmenta cephalicum basilareque truncata. *Antennæ* 17-articulatæ. *Labium* angustum: dentibus parvis. *Spiracula* valvularia.

The *Cormocephalinæ* differ from the *Scolopendrinæ* in having the cephalic segment abruptly truncated and not imbricated. In this respect they resemble the *Heterostominæ*, from which, however, they differ most completely in the number of joints to the antennæ, the structure of the teeth, and the number and structure of the respiratory organs. They seem to form one distinct genus, which is divisible into three groups; *first*, with the posterior legs slender and elongated; *secondly*, with the posterior pair of legs short and clavated; and *thirdly*, a subgenus, *Rhombocephalus*.

Genus 12. CORMOCEPHALUS*, *Newp.*

Antennæ breves, attenuatæ. *Segmentum cephalicum* breve, abruptè truncatum. *Spiraculorum* valvularium paria 9. *Segmenta podophora* 21.

A. Pedes postremi graciles, elongati.

1. *Corm. rubriceps,* capite labio mandibulisque saturatè rufis, corpore nigrescenti subcomplanato posticè valdè attenuato granticè dilatato, pedibus antennisque rufescenti-olivaceis, pedibus postremis in margine superiore interno 3-spinosis in superficie internâ inferiorique spinis 7 obliquè biseriatis.—Long. unc. $4\frac{3}{4}$.

* Κορμὸς, *a trunk*, and κεφαλὴ, *head.*

Scolopendra rubriceps, *Newp. l. c.* p. 99; *et in Dieffenb. New Zeal.* ii. p. 270.
Hab. In Novâ Zealandiâ, *Dieffenbach.* (*v. in Mus. Brit.*)

Cephalic segment dark red, minutely punctured, and deeply emarginated. Mandibular tooth and dental plates large; teeth eight, acute, large and projecting. Antennæ reddish olive, very finely pubescent; body dark brown, polished, somewhat flattened, with the margins produced, and the second, third and fourth segments narrowed, those of the posterior half of the body dilated; legs moderate, reddish olive, with the basilar joint of the posterior pair a little elongated, subconvex, with the external margin rounded; internal margin rounded, with three spines, the posterior angular one large, bifid; interior and inferior surfaces rounded, with three sharp spines disposed on an elevated ridge on the external surface, passing diagonally outwards; and four spines on a similar ridge, directed obliquely backwards and inwards on the inner surface, the last of which is situated at the base of the angular spine of the superior margin. Lateral anal appendages brown, with the apex light-coloured and bifid. Preanal scale four-sided, elongate, narrowed posteriorly, with a longitudinal median sulcus; posterior margin straight.

2. *Corm. lobidens*, saturatè castaneus, antennis pedibus ventreque lætè flavis, margine dentali angustissimo; dentibus utrinque in lobos 2 acutos extùs basi lobulatos coalitis, pedibus postremis cylindricis elongatis gracilibus in margine interiore 5-spinulosis: spinulâ angulari bifidâ.—Long. exsiccat. unc. 8.

Scolopendra lobidens, *Newp. l. c.* p. 99.
Hab. ——— ? (*v. in Mus. Brit.*)

Basilar segment and mandibles very large and projecting; labium convex, deep red, tipped with black; teeth united on each side into two subtriangular, obtuse lobes, each with a smaller lobule external to its base; the anterior margin of each dorsal plate rounded, with an elevated border; basilar joint of the posterior pair of legs rounded, and narrowed in the middle, but enlarged at their distal articulation; superior internal margin with four minute spines, the second and third approximated at their base; the angular process bifid; interior surface with one or two minute spines; inferior surface convex, with three minute teeth arranged in a single longitudinal series. Preanal scale elongate, almost triangular, with the posterior margin straight.

B. Pedes postremi breves, crassi, clavati.

3. *Corm. aurantiipes*, olivaceus, pedibus aurantiacis, laminis dentalibus angustatis; dentibus 6 brevibus obtusis, pedum postremorum articulo basali convexo porcâ elevatâ medianâ diagonali; margine interno acuto spinulis 3 quarum angulari bifidâ; su-

perficie inferiore spinulis 5 quarum 3 in margine exteriore 2 in interiore.—Long. unc. $3\frac{1}{2}$.

Scolopendra aurantiipes, *Newp. l. c.* p. 99.

Hab. In Novâ Hollandiâ, ad Portum Essington. (*v. in Mus. Brit.*)

Antennæ large at their base, 17-jointed; basilar segment short, wide, convex; labium smooth, with the anterior portion flattened, with a transverse sutural ridge; dental plates almost quadrate, narrowed anteriorly, and faintly punctured; teeth six, the internal one on each side bifid and conjoined with the middle one, the external one distinct; posterior pair of legs subconic, with a slight elevation on the femur that passes transversely inwards to the middle of the articulation with the tibia; external margin rounded; internal one acute, with three spines, the angular one large and bifid; internal surface flat, with two spines, arranged in an oblique longitudinal line, near the distal articulation; inferior surface with three spinulæ on a raised diagonal line on the external, and two on a corresponding line on the internal margin. Lateral appendages short, bifid. Preanal scale elongated, narrowed posteriorly; margin straight.

4. *Corm. obscurus*, pallidè olivaceus, antennis segmentorumque marginibus posticis viridibus, capite mandibulis labioque saturatè ferrugineis, pedibus postremis ochraceis, dentibus 8 nigris obtusis, pedibus postremis quam in *Corm. aurantiipede* gracilioribus spinisque majoribus cæterùm simillimis.—Long. unc. $2\frac{1}{2}$.

Hab. In Novâ Hollandiâ, prope Sydney. (*v. in Mus. Brit.*)

This species so closely resembles *C. aurantiipes*, as hardly to be distinguished from it in the dried state, except by the coloured margins of the segments, the larger and more acute spines, and the more slender form of the legs. It is also much smaller in size. There are four specimens in the Museum, all agreeing exactly with the above description.

5. *Corm. fœcundus*, olivaceus, capite labio mandibulisque saturatè castaneis politis sparsè punctatis, antennis lætè viridibus, pedibus postremis ochraceis convexis; superficie inferiore spinulis nigris quatuor obliquè biseriatis in margine externo duabusque in interno uniseriatis.—Long. unc. 3—$3\frac{1}{2}$.

Hab. In Novâ Hollandiâ, prope Paramatta. (*v. in Mus. Brit. nostroque.*)

In addition to the characters above stated I may add, that the antennæ are brown at the apex; the dental plates are narrowed and rounded at their margin; teeth eight, black, obtuse; mandibular tooth very large; posterior pair of legs with the femoral shorter than the tibial joint, convex, subconical, with the external margins rounded, the internal subacute, with three spinulæ, the two anterior subapproximated; the apical one large and acute. Inferior surface with four spinulæ on the external and two on the internal margin; internal surface with two spinulæ, which with the angular process form a series directed obliquely upwards. Lateral appendages dark chestnut, punctured, with the apex elongated, bifid, or simple. Preanal scale flattened, elongate, with the posterior margin narrow and transverse.

This species very much resembles *C. aurantiipes* and *C. obscurus*, but differs from both in the number and arrangement of the spines on the inferior surface of the legs, and also in the greater depth of the excavation. I have received it, in various stages of growth, from about one inch in length to nearly four inches, and in very great abundance, from Paramatta, where it appears to be the prevailing species. On this latter account I have named it *C. fœcundus.* The smallest specimens agree with the largest in almost every particular of form, colour, number of joints to the antennæ, and number and arrangement of the spines on the legs. The chief difference is in regard to colour, which in the youngest individuals is indistinct and often confused.

6. *Corm. Westwoodii,* saturatè viridis, pedibus flavis, antennis cæruleis, mandibulis segmento cephalico segmentis posterioribus pedibusque aurantiacis, dentibus 8 nigris parvis acutis, pedibus postremis crassis validis spinulis 3 acutis in margine interiore 2que in superficie internâ; superficie inferiore spinulis 4 in margine externo 2que in interno. —Long. unc. 3.

Scolopendra Westwoodii, *Newp. l. c.* p. 100.

Hab. In Novâ Hollandiâ, prope Sydney. (*v. in Mus. Brit., Banks. et D. Hope.*)

This species varies much in colour, but always preserves the same general appearance. The dark blue antennæ and yellow legs contrast very prettily with the red head and posterior pair of legs. The labium is thickly punctured: the dental plates are small and narrowed anteriorly, with the margin rounded: teeth eight, minute, black, distinct. Posterior pair of legs short and thick; femoral joint convex, subconic, a little longer than the tibial, with three acute spinulæ on the rounded internal margin, the apical one the largest, bifid; internal surface with two spinulæ, which with the apical one form a series diagonally upward. Inferior surface with four spines, arranged in two alternating equidistant series on the external margin, and three in a single series on the internal. Lateral anal appendages elongated, minutely punctured, with the apex acute or bifid. Preanal scale subquadrate, margin straight.

7. *Corm. ambiguus*, (in sicco) fulvus, capite antennis mandibulis labioque ferrugineis, pedibus flavis; postremis subangustatis: articulo femorali convexo spinulis 3 acutis nigris in margine interno: superficie inferiore spinis 4 in margine externo totidemque in interno.—Long. unc. $2\frac{3}{4}$.

Scolopendra ambigua, *Brandt, l. c.* p. 63. sp. 9?

Hab. In Africâ Australi, *D. A. Smith.* (*v. in Mus. Brit.*)

In Dr. Smith's specimen the cephalic segment is cordate, quadrate, with the basilar segment large; dental plates quadrate; teeth eight, black, distinct; femoral joint of the posterior pair of legs with three black spinulæ on the superior internal margin, the two anterior of which are subapproximated, the apical one acute. Inferior surface with four spinulæ on the external margin, arranged in a double approximated series, and four in a single series on the internal margin and surface, forming a series of five with the apical spine. Lateral appendages subobtuse, deeply punctured, ferruginous, with two short spinulæ. Preanal scale elongated, tetragonal, with the posterior margin slightly rounded.

This species was brought from Southern Africa by Dr. A. Smith. It appears to be the *Scolopendra ambigua* of M. Brandt, although I have still a slight doubt, as the form of the cephalic segment has not been described by that distinguished naturalist.

8.? *Corm. miniatus*, capite mandibulis labio pedibus totis segmento posteriore appendicibusque miniatis, antennis cæruleis, corpore olivaceo, segmentorum marginibus saturatè viridibus, pedibus postremis spinulis 3 in margine superiore interno 5que in superficie inferiore.—Long. unc. $2\frac{1}{4}$.

Hab. In Novâ Hollandiâ, prope Adelaide. (*v. in Mus. Brit.*)

This species so closely resembles the following in every particular of structure, although not in colour, that I have some doubt whether it is other than a variety. Consequently I have described it with a query.

9. *Corm. subminiatus*, capite mandibulis labio segmento postremo pedibusque miniatis, corpore depresso flavo, segmentorum marginibus viridibus, dentibus 6 brevibus obtusis, spinulis in superficie internâ inferiorique 6 in seriebus 2 divergentibus dispositis.—Long. unc. $2\frac{1}{4}$—$3\frac{1}{2}$.

Scolopendra subminiata, *Newp. l. c.* p. 100. sp. 46.

Hab. In Novâ Hollandiâ, ad fluvium Cygnorum. (*v. in Mus. Brit., Soc. Linn., D. Hope.*)

In Mr. Hope's specimen the femora of the whole of the legs, excepting those of the posterior pair, are light orange, with the metatarsal and tarsal joints green; the basilar and posterior segments and legs are bright orange, and the cephalic and the posterior and lateral margins of the dorsal segments dark green. The teeth are six, short, obtuse and coalescing, the external one distinct and acute. The posterior legs are short, with the basilar joint subconic, with the external margin subacute, the internal with three spinulæ, the apical one acute, the two anterior subapproximated. Inferior surface convex, with three spinulæ in a raised diverging series on the external margin and three on the internal, the last situated on the internal surface near the articulation. Anal appendages punctured, short, with the apex bifid. Preanal scale subtriangular, with the posterior margin straight.

Formerly I regarded this as a variety of *C. Westwoodii*, but it is quite distinct, although it resembles that species in the structure of the posterior legs. It is one of the most beautiful of the genus.

10. *Corm. pallipes*, pallidè virens, antennis pedibusque flavescentibus, margine dentali arcuato; dentibus 8 obtusis, pedum postremorum articulo femorali convexo brevi subquadrato spinulis 3: superficie inferiore spinulis 4 in margine externo 2que in interno. —Long. unc. $1\frac{3}{4}$.

Hab. In Insulâ Van Diemen et in Novâ Zealandiâ. (*v. in Mus. Brit.*)

The cephalic segment is flattened, subquadrate; mandibular tooth large; dental plates arched, short; teeth eight, obtuse; posterior pair of legs short, thick, with three spinulæ on the internal superior margin; inferior surface with four spinulæ in an irregular series on the external and two on the internal margin. Lateral appendages slightly elongated. Preanal scale with the margin straight.

This is a species that may readily be mistaken at first for the young of *C. subminiatus* or *C. aurantiipes*. I believe it however to be distinct, as the specimens from Van Diemen's Land and New Zealand correspond in size and general appearance, and differ from the young of a closely-allied species, *C. fœcundus*, which, however small, always approach somewhat in colour to the adult specimens.

11. *Corm. violaceus*, capite corporeque pallidè olivaceis violaceo tinctus, antennis cæruleis, mandibulis labioque aurantiacis, articulis tarsalibus viridibus, dentibus 8 nigris ferè obsoletis, pedum postremorum articulo femorali subconico tibiali longiore spinulis 3 in margine interno 2que superficialibus; superficie inferiore spinulis 4 in margine externo 2que in interno. Long. unc $2\frac{1}{4}$.

Hab. In Novâ Zealandiâ, prope Wellington. (*v. in Mus. Brit. et D. Hope.*)

The apical spine of this species is slightly elongated, and trifid at its apex; and the four spinulæ on the inferior external margin are arranged in two subapproximated pairs, and the two on the internal margin in a single longitudinal series. The lateral anal appendages are deeply punctured and elongated, with the apex bifid. Preanal scale subquadrate, with the posterior margin almost straight.

12. *Corm. lineatus* (Tab. XL. fig. 11.), sordidè *ochraceus*, superficie dorsali lineis 5 longitudinalibus elevatis, pedibus postremis clavatis; articulo basali brevissimo conico spinâ unicâ angulari minutâ articulisque omnibus sulco longitudinali profundo in superficie superiore versus extremitatem distalem.—Long. unc. 1½.

Hab. In Insulâ Caribæâ S^{ti} Vincentii, *Guilding.* (*v. in Mus. D. Hope.*)

The antennæ of this species are very thick at their base, with the joints short, as in *Geophilus*; the labium is narrowed anteriorly, and marked with a triangular impression; the dental plates are distinct and elongated, with an elevated median crest; the teeth six, subobsolete, the external one most distinct; the posterior legs are clavate, rounded, with the basilar joint conic, much shorter than the second joint and rounded, without spines on the inferior surface. The lateral appendages punctured; and the preanal scale cordate, with the posterior margin rounded.

13. *Corm. Guildingii*, ochraceus, superficie dorsali lineis 2 longitudinalibus impressis distantibus, pedibus postremis clavatis maximis elongatis; articulis æqualibus longitudinaliter impressis; basali conico: superficie internâ complanatâ serie obliquâ spinarum 3 minutarum totidemque in margine articulari distali: superficieque inferiore spinulis 3 in lineâ obliquâ elevatâ dispositis.—Long. unc. 1.

Hab. In Insulâ Caribæâ S^{ti} Vincentii, *Guilding.* (*v. in Mus. D. Hope.*)

The dental plates of this species are distinct, but the teeth very minute. The lateral anal appendages smooth, with the middle internal surface roughened with a multitude of minute tubercles. Preanal scale subquadrate, with the margin rounded.

The species is named in honour of the late Rev. Lansdowne Guilding, by whom this species and *C. lineatus* were collected.

Subgenus Rhombocephalus*, *Newp.*

Segmentum cephalicum elongatum, subtriangulare; *subbasilare labiumque* angustissima.

1. *Rhomb. viridifrons*, aurantiacus, segmento cephalico anticè segmentorum dorsalium mar-

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* Ῥόμβος, *lozenge-shaped*, κεφαλή, *head.*

ginibus pedibus postremis antennisque saturatè viridibus, dentibus 8 parvis obtusis, pedibus postremis elongatis; articulo basali in superficie superiore rotundato spinis in margine interno 4 minutis biseriatis: in superficie inferiore paulùm excavato spinis 2 in margine externo totidemque in interno.—Long. unc. 2.

Scolopendra viridifrons, *Newp. l. c.* p. 100.

Hab. In Galliâ Australi? (*v. in Mus. Brit.*)

2. *Rhomb. Gambiæ,* sordidè ochraceus lineâ longitudinali dorsali nigrâ, segmento basilari magno, pedibus postremis articulis æqualibus magnis; articulo basali subconico in superficie superiore convexo spinisque 2 in margine interno quarum apicali elongatâ bifidâ: in superficie inferiore paulùm excavato spinulis 2 nigris in margine interiore 4que obliquè biseriatis in interno.—Long. unc. $1\frac{1}{2}$.

Hab. In Africâ, ad ripas fluvii Gambiæ. (*v. in Mus. D. Hope.*)

The dental plates of this species are elongated, with their margin arched and narrowed; teeth eight, minute, but distinct. Lateral appendages deeply punctured, as in *Cryptops*, with the apex bifid. Preanal scale subtrigonal, with the posterior margin straight.

3. *Rhomb. parvus,* saturatè olivaceus, mandibulis labio pedibusque flavis, pedibus postremis elongatis; articuli basalis superficie superiore convexâ spinulis in margine interno 3 e quibus angulari bifidâ: superficie internâ complanatâ 1-spinosâ: inferiore rotundatâ spinis 2 longitudinaliter seriatis, appendicibus lateralibus profundè punctulatis, apice spinis 3 minutis, squamâ præanali subtriangulari.—Long. unc. 1.

Hab. In Insulâ Malta. (*v. in Mus. Brit.*)

4. *Rhomb. politus,* pallidè olivaceus nitidus, lineâ longitudinali nigrâ medianâ unicâ, antennis cæruleis, pedibus virescentibus, mandibulis flavis, appendicibus analibus lateralibus profundè punctatissimis, pedum postremorum articulo basali subelongato dilatato complanato spinulis 5 in margine interno biseriatis e quibus apicali simplici elongatâ : in superficie inferiore profundè excavato spinulis in utroque margine 4.—Long. unc. $1\frac{1}{2}$.

Hab. In Novâ Hollandiâ Occidentali. (*v. in Mus. D. Hope.*)

The dental plates are elongated, with eight distinct teeth.

5. *Rhomb. brevis,* saturatè viridis, capite segmento postremo appendicibus pedibusque rufis, antennis articulisque tibialibus tarsalibusque cæruleis, pedum postremorum articulo basali recto secundo longiore: margine interno spinulis 3 e quibus angulari subelongatâ: in superficie inferiore paulùm excavato spinis in utroque margine 3 minutis longitudinaliter seriatis, squamâ præanali trigonâ.—Long. unc. $\frac{3}{4}$.

Hab. In Novâ Hollandiâ Occidentali. (*v. in Mus. D. Hope.*)

Family 5. Geophilidæ, *Leach.*

The *Geophilidæ* connect the Arachnidan type of *Myriapoda* with the *Annelida*, as the *Iulidæ* also connect the Crustacean type with the same class.

The *Geophilidæ* (Tab. XXXIII. figs. 10 to 19; and Tab. XL. figs. 12, 13.) have the body slender, greatly elongated, and formed of a multitude of segments, each of which bears a single pair of spiracles and legs. The number of moveable segments in this family varies from about thirty-five to more than two hundred. It is not characteristic of genera, as in the other families of *Chilopoda*, but it seems, within slight limits, to mark each particular species: although even in the individuals of each species there is a little variation. This is an exceedingly important fact, since, although the exact number of segments is not always the same in each individual, it rarely or ever exceeds certain extremes; and thus, while we are enabled to employ the average number as a character for species, we are led to important considerations with reference to the comparative physiology and development of the species, as well as of the two sexes, in the whole of the *Articulata*. Thus I have invariably found that the male *Geophili* have fewer segments than the female. The males of *Arthronomalus longicornis* have fifty-one or fifty-two leg-bearing segments, while the females usually have fifty-three or fifty-four. The full-grown females of *Geophilus terrestris* have eighty-three or eighty-four pairs of legs and segments, but the very young have only seventy-nine, and the males of the same species eighty-one or eighty-two. The extreme variation in these species is thus four or five segments and pairs of legs. In a large Neapolitan species, *Geophilus lævigatus*, Bruhl.? the variation is somewhat greater. Thus in eight males the number varied between ninety-six and ninety-nine, while in eleven females it ranged between one hundred and three and one hundred and seven; and of two female specimens of *Geophilus sulcatus*, one individual had one hundred and thirty-six segments and pairs of legs, and the other one hundred and forty. Each of these moveable segments in the adult *Geophilus* is formed of two unequal rings, the posterior of which is much the largest, and alone bears the spiracles and legs. These rings, even in an advanced stage of the embryo, before quitting the egg, and before any appendages are developed, are themselves distinct segments of equal size, which become anchylosed together in pairs, as I have formerly stated elsewhere*, in reference to the whole of the *Articulata*, after which the posterior of the two more and more exceeds the anterior in extent of development the nearer the period of the embryo condition approaches its termination. A few days after the young *Geophilus* has left the egg, it exhibits nearly all the characters of the adult. In this respect it differs greatly from the individuals of other families of *Chilopoda*. The young *Geophilus*, like the parent, has fourteen joints to the antennæ, and this number is constant in all the species and genera of the family that have hitherto been discovered. It has also, as above shown, nearly as many segments and pairs of legs, there being only four or five less than in the adult. At all periods of growth the organs of vision are either entirely absent, or consist only of a single pair of ocelli, concealed on the under surface of the head immediately behind the insertion of the antennæ. The labium is straight, narrow, and entirely without denticulations, and is often divided by a longitudinal suture. The mandibles are somewhat conical, with the femoral portion straighter and more elongated, as compared with their size, than in the *Scolopendridæ*. The head is formed of three moveable segments: the *cephalic* (A) (TAB. XXX. figs. 3, 10 & 15.), which I have already shown (p. 288), is composed of four subsegments of the embryo (fig. 3.), united as one region; the *basilar* (B), which gives origin to the mandibles (*g*) and palpi; and the *subbasilar* (C), which bears the first pair of legs. The basilar and subbasilar are quite distinct from each other in *Geophilus*, *Gonibregmatus* and *Arthronomalus*, but are consolidated together in *Mecistocephalus*, the first genus of the family, as they are in the whole of the *Scolopendridæ*. The *Geophilidæ* reside constantly in the earth, and are common in light soils. They subsist in part on succulent roots, ripe fruit and decaying vegetable matter. Some of the species are gregarious, at least in their hybernacula, and are found in winter coiled up in little packets of six or eight each, in cavities of the earth only large enough to contain them, in light rich soils that have not been disturbed for several weeks. I have constantly seen them dug up in this state at the end of December in the hop-plantations in Kent.

The female of *Arthronomalus longicornis* deposits her eggs, from thirty to fifty in number, in a little packet, in a cell which she forms for them in the

* Phil. Trans. 1843, part ii. p. 244.

earth, and never once leaves them until the young are developed, which is at the end of about a fortnight or three weeks. During the whole of this time she remains in the cell with her body coiled around the eggs, incubating them, and constantly turning and attending to them. I have been so fortunate as to verify this observation several times during the last three years, and I believe this is the first recorded instance of incubation among the *Myriapoda*.

In the table of Genera and Families given in the introductory part of this Monograph (p. 276), I had connected the *Scolopendrellidæ* with the *Geophilidæ* in deference to the views of M. Gervais, and, in consequence, divided the family into two subfamilies, *Scolopendrellinæ* and *Geophilinæ*; but having since satisfied myself of the right of the first to be considered as a separate family, more closely allied to *Lithobiidæ*, the *Geophilidæ* now constitute a very natural group.

Familia 5. Geophilidæ, *Leach*.

Segmenta numerosa, subæqualia, singula e subsegmentis 2 completis sed inæqualibus effomata. *Antennæ* 14-articulatæ. *Segmentum anale* pedibus brevibus, styliformibus.

Genus 13. Mecistocephalus, *Newport*. (*Geophili maxillares*, Gervais.)

Segmentum cephalicum angustissimum, elongatum, quadratum, latitudine plùs duplò longius. *Antennæ* subapproximatæ, articulis obconicis. *Segmenta basilare subbasilareque* coalita, pedum par anticum gerentia. *Mandibulæ* incrassatæ, prominentes, margine interno denticulatæ. *Corpus* sensim attenuatum.

1. *Mecist. ferrugineus*, Koch, Deutschl. Crust. Myriap. &c. heft 3. no. 1.

2. *Mecist. maxillaris*, subvillosus, capite antennisque ferrugineis, corpore pallidè flavo, pedum paribus 46.

Geophilus maxillaris, *Gerv. in Ann. Sci. Nat.* Janv. 1837. sp. 2.

Hab. Prope Parisios.

3. *Mecist. punctifrons* (Tab. XXXIII. fig. 17.), capite saturatè castaneo, segmento cephalico mandibulisque profundè punctatis, corpore testaceo, mandibulis dentibus duobus acutis magnis, pedum paribus 49.—Long. unc. $2\frac{3}{10}$.

Mecist. punctifrons, *Newp. in Proc. Zool. Soc.* Dec. 13, 1842, p. 179.

Hab. In Indiâ Orientali, prope Maderaspatanam. (*v. in Mus. Brit.*)

4. *Mecist. Guildingii* (Tab. XXXIII. figs. 18, 19.), capite ferrugineo, segmento cephalico

lævigato punctis raris, mandibulis quadridentatis, labio profundè punctato, corpore testaceo, pedum paribus 49.—Long. unc. $1\frac{1}{2}$.

Hab. In Insulâ Caribæâ S[ti] Vincentii, *Guilding.* (*v. in Mus. D. Hope.*)

There are five specimens of *M. Guildingii* in Mr. Hope's cabinet, and all of them, although varying a great deal in size, have precisely the same number of legs.

5. *Mecist. punctilabium*, capite mandibulis labio segmentoque subbasilari ferrugineis, mandibulis tridentatis, corpore virescenti, segmentis posterioribus antennis pedibusque ochraceis, labio densè profundèque punctato, pedum paribus 61.—Long. unc. 2.

Mecist. punctilabium, *Newp. l. c.* p. 179. *Id. in Ann. & Mag. Nat. Hist.* Feb. 1844, p. 100.

Hab. In Insulâ Corcyrâ. (*v. in Mus. Brit.*)

Genus 14. Arthronomalus*. (*Geophilus*, Leach. *Geophili longicornes*, Gerv. Subgenus *Necrophlœophagus*, Newport.)

Segmentum cephalicum subquadratum, angulis rotundatis. *Antennæ* segmento cephalico triplò longiores, subapproximatæ, subattenuatæ, articulis inæqualibus, subconicis, inversis. *Segmenti basilaris* margo posterior anteriore multò latior. *Labium* emarginatum. *Corpus* subattenuatum.

A. Segmentum cephalicum anticè transversum.

1. *Arthron. longicornis* (Tab. XXXIII. figs. 15, 16.), flavus, capite mandibulis labioque saturatè ferrugineis, antennis pilosissimis segmento cephalico quadruplò longioribus, labio elongato medio inconspicuè sulcato lævi punctis raris, stylis analibus pilosis, pedum paribus 51 ad 55.—Long. unc. $2\frac{1}{2}$–3.

Geophilus longicornis, *Leach in Trans. Linn. Soc.* xi. p. 386. *Id. in Zool. Misc.* iii. p. 45. t. 140. fig. 3–6. *Id. in Enc. Brit. Suppl.* i. p. 431.

Scolopendra fulva, *De Geer, Mém. Insect.* vii. p. 361. *Trevir. Verm. Schrift.* ii. p. 33. t. 7. fig. 3–5.

Geophilus electricus, *Gerv. in Ann. Sc. Nat.* vii. p. 52. *Id. in Dict. Pitt. d'Hist. Nat.* t. 399. f. 13. *Lucas, l. c.* p. 549. sp. 3.

Hab. Copiosissimè in Angliæ comitatibus Kent, Surrey, Middlesex, alibique. (*v. in Mus. Brit.*)

Some specimens of this Myriapod vary in having the cephalic segment and

* Ἄρθρον, *a joint*, and ἀνώμαλος, *irregular*. I have thought it better to change the name of this section of *Geophilidæ*, and derive it from characters taken from the articulations of the antennæ.

antennæ a little shorter and less hairy than others; the anal styles large, thick, and clavated; and only fifty-one, two, or three pairs of legs. These individuals, I believe, are the males, as those which have fifty-four or five pairs of legs are most certainly the females. I am supported in this opinion by the circumstance, that of two individuals presented to me by F. Bond, Esq., and which had been found by him in contact with each other at the end of the month of October, one specimen had but fifty-one pairs of legs, with the anal styles clavated, while the other had fifty-five. The specimens preserved by Dr. Leach, in the British Museum, have, with one exception, fifty-four or fifty-five pairs of legs. Of ten other specimens, collected at Wimbledon, those which have the greatest number of legs, fifty-five pairs, have the anal styles slender; while those with the smallest number, fifty-one to fifty-three, have them large and clavated, and the antennæ shorter than in the other individuals. These circumstances are confirmatory of the opinion that those with from fifty-one to fifty-three pairs of legs are males. This is an interesting fact, and proves that this species most certainly is not the *Scolopendra electrica* of Linnæus, as it has been thought to be by M. Gervais. The Linnean species is described as "*pedibusque utrinque* 70." Another circumstance equally interesting is, that *both* the individuals, when found by Mr. Bond, *were luminous*. This seems to indicate that luminosity is common to more than one species of *Geophilidæ*, and perhaps to the whole family, and that it is evolved at the season of copulation. There is, I think, further reason for believing this to be the case, from the circumstance that I myself once found two individuals of this species on the ground in contact with each other, and which shone almost as brightly as the glow-worm, for which at the instant I mistook them. This was at midnight on the 25th of September. On taking the specimens into my hand the luminous matter was exuded and adhered to my fingers, and continued to shine for some time like phosphorus. The individuals appeared to be able to give it forth at pleasure. I omitted to examine these individuals to ascertain whether they were the two sexes*.

* The property of giving out light at certain seasons appears to be common to some tropical as well as to European *Geophili*. Oviedo, the friend and companion of Columbus, and who, about twenty years after the discovery of America, published a History of the Indies, mentions this property most distinctly when noticing the existence of *Scolopendræ* in the Island of St. Domingo, as we find in the

2. *Arthron. punctiventris,* flavus, capite saturatè ferrugineo, antennis flavis breviusculis pilosis minutè punctatis, labio plano quadrato profundè punctato, mandibulis minutè bidentatis apice nigris, appendicibus analibus lateralibus magnis punctis pilosis profundè impressis, pedum paribus 66 pilosissimis.—Long. unc. $1\frac{3}{4}$.

Necrophlœophagus punctiventris, *Newp. in Ann. & Mag. Nat. Hist. l. c.* p. 101.

Hab. In Siciliâ. (*v. in Mus. Brit.*)

3. *Arthron. carpophagus.*

Geophilus carpophagus, *Leach in Linn. Trans.* xi. 385. *Id. in Zool. Misc.* iii. *Gerv. Ann. Sc. Nat.* 1837. *Lucas, Hist. Nat. Anim. Art. Newp. l. c.* sp. 1. p. 101.

Legs fifty-five pairs. Length 2 to $2\frac{1}{2}$ inches.

There are three specimens in the British Museum, preserved by Dr. Leach, but in too bad a condition to be correctly described as regards colour. One of these specimens has only fifty-one pairs of legs.

4. *Arthron. similis,* virescenti-flavus, capite antennis segmentisque analibus aurantiacis, mandibulorum apicibus unguibusque nigris, segmento cephalico elongato quadrato convexo anticè paulùm angustato posticè recto, antennis pilosis moniliformibus: articulo terminali subelongato, segmentis basilari subbasilarique æqualibus, labio lævigato subtriangulari porcâ elevatâ medianâ, pedum paribus 55.—Long. unc. $1\frac{3}{4}$–2.

Hab. In Angliæ comitatu Kent, prope Sandwich. (*in Mus. nostr.*)

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following passage in his now almost forgotten work, for the translation of which from the original Spanish I am indebted to the kindness of my friend E. Doubleday, Esq., F.L.S. :—" There are in this island (St. Domingo) many kinds of *Scolopendra* or hundred-legs; for some are slender and as long as one's finger, and like to those of Spain, and these bite and cause considerable pain. . . . . There are other of these worms about *half the length of the finger, and slender, with many feet, and these shine much by night, and leave a light where they go,* and may be seen fifty or even a hundred paces off; yet the whole animal does not shine, but only the joints where the legs spring from the body, and the light is very bright." These remarks most distinctly refer to some species of *Geophilidæ*, as the following sentence does perhaps to some *Annelide* :—" There are others, which, in all that has been stated, are very like these in size and in shining, but they have this great difference, *that the head also shines*, but the light of the head is that of a very bright burning coal." In reference to the true *Scolopendra*, he says :—" In the city of St. Domingo I have often seen some of these hundred-legs or Scolopendras as long or longer than a span, and as wide as one's thumb, and certainly they seem things to be afraid of. They have tawny stripes at the origin of the legs, and the horns (antennæ) are tawny, and the body darker; but though they are animals of evil aspect, I have heard no one complain of their bites, and I did not like to try them, for though they might not do mischief, it seems as though they can be suspected of nothing but evil."—*Oviedo, Coronica de las Yndias*, lib. 15. cap. 2. fol. 113.

I have two specimens of this species, which I regard as distinct from *Geophilus carpophagus* of Leach. They differ from Leach's species in colour, have the body and legs much stouter, the cephalic segment longer and the posterior margin straighter, with the labial border narrower and the antennæ less hairy.

5. *Arthron. Hopei*, aurantiacus, labio lævi polito minutè bidentato levissimèque longitudinaliter sulcato, antennis brevibus pubescentibus, laminis dorsalibus lævibus convexis lateribus rotundatis longitudinaliter bisulcatis, pedibus (maris) utrinque 61.—Long. unc. $1\frac{6}{10}$.

Hab. Prope Neapolin. (*v. in Mus. D. Hope.*)

6. *Arthron. flavus*, capite corpore pedibusque flavis, mandibulorum apicibus nigris, segmento cephalico lævigato impressionibus duabus lateralibus angulis posticis acutis, antennis pubescentibus segmento triplò longioribus, labio lævi, mandibulis obsoletè punctatis, pedum paribus 69.—Long. unc. $2\frac{1}{2}$.

Hab. In Angliâ, prope Gloucester. (*in Mus. nostr.*)

This specimen, which I received from Gloucester, is a male, the female of which species has probably seventy pairs of legs. It agrees well with the Linnean description of *Scolopendra electrica*, having the body almost linear, with the number of legs described. I have preferred adopting a characteristic name while there remains any doubt of the identity of the true Linnean species.

B. Segmentum cephalicum anticè subproductum.

7. *Arthron. opinatus*, aurantiacus, capite corporeque latis, segmento cephalico cordato quadrato subimbricato, antennis brevibus pilosis, labio valdè elongato lato lævi nitido mandibulisque obscurè punctatis, pedibus utrinque 52–54.—Long. unc. $2\frac{1}{10}$.

Hab. In Novâ Hollandiâ et Ins. Van Diemen? (*v. in Mus. Brit.*)

The very peculiar form and subimbrication of the cephalic segment, and the almost uniform size of all the segments of the body, without narrowing or enlargement of the posterior ones, induce me for the present to place this species in a separate section, as it may, perhaps, hereafter form the type of a new subgenus. Being the first species of the family hitherto received from Australia, from whence I had expected to receive *Geophili*, I have named it *A. opinatus*.

Genus 15. Gonibregmatus, *Newp.*

Antennæ filiformes, subapproximatæ. *Segmentum cephalicum* breve, transversum, cordiforme, anticè acutè triangulare; *basilare* cephalico latius, subbasilari brevius. *Mandibulæ* magnæ arcuatæ, prominentes, contortæ. *Labium* brevissimum, transversum, margine integro prominente. *Corpus* subconvexum, elongatum, æquale; segmentis numerosis, posterioribus 2 vel 3 incrassatis tuberosis.

1. *Gonib. Cumingii* (Tab. XXXIII. fig. 11–14; Tab. XL. fig. 12.), cinerascens, segmento cephalico convexo posticè rotundato, mandibulorum apicibus nigris, labio lævi, segmentis brevibus convexis irregulariter longitudinaliter sulcatis, segmenti antepenultimi laminis dorsalibus ventralibusque atrophiatis, stylis analibus posticè carinatis, pedum paribus 161.—Long. unc. $4\frac{3}{4}$–5.

Gonib. Cumingii, *Newp. in Proc. Zool. Soc.* Dec. 1842. p. 180. *Id. in Ann. Nat. Hist.* Feb. 1844. p. 101. sp. 1.

Hab. In Insulis Philippinis, *Cuming.* (*v. in Mus. Brit.*)

Genus 16. Geophilus, *Leach.*

Antennæ approximatæ. *Segmentum cephalicum* parvum, breve, subtriangulare, anticè angustatum, posticè dilatatum transversum. *Corpus* depressum anticè attenuatum; segmentis pedibusque numerosis. *Styli anales* breves, antenniformes.

A. Antennæ filiformes.

1. *Geoph. acuminatus,* totus ferrugineus anticè valdè attenuatus, antennis moniliformibus pilosis, segmento cephalico triangulari convexo, labio brevissimo, pedum paribus 41.—Long. unc. 1–$1\frac{1}{2}$.

Geoph. acuminatus, *Leach in Linn. Trans.* xi. p. 431. *Id. in Enc. Brit. Suppl.* i. p. 431. *Id. in Zool. Misc.* iii. p. 45. *Gerv. in Ann. Sc. Nat.* 1837, p. 52. *Koch, Deutschl. Crust. Myriap. &c.* heft 9. no. 6? *Lucas, l. c.* p. 549. sp. 8. *Newp. l. c.* p. 101.

Hab. In Angliâ. (*v. in Mus. Brit.*)

The only individual of this species preserved in the British Museum is not more than one inch in length, although Leach states it to be one inch and a half. It is a male specimen, having the anal styles very large and thick, but it has only forty-one pairs of legs. I have never yet obtained Leach's species alive.

2. *Geoph. maritimus*, Leach in Zool. Misc. iii. p. 44. t. 140. f. 1, 2. Gerv. l. c. sp. 9. p. 53. Lucas, l. c, sp. 9. p. 550.

I am quite unacquainted with this species, of which there is no specimen in the Museum, although Leach describes it as very common on the sea shore.

3. *Geoph. rubens*, saturatè aurantiacus, lineâ medianâ duplici nigrâ e segmento corporis primo ad penultimum ductâ, segmento cephalico subcordato, antennis pilosis, labio mandibulisque lævigatis punctis raris, mandibulis nigris, pedum paribus 50.—Long. unc. $1\frac{1}{4}$.

Geoph. rubens, *Say in Journ. Acad. Nat. Sci. Phil.* vol. ii. *Id. Œuvr. Entom.* i. p. 25. *Gerv. in Ann. Sc. Nat.* 1837, p. 52. *Lucas, l. c.* p. 549. sp. 5. *Newp. l. c.* p. 101.

Hab. In Americâ Boreali. (*v. in Mus. Brit.*)

The specimen from which the character is taken was one of Say's original specimens.

4. *Geoph. breviceps*, totus ferrugineus, segmento cephalico convexo lævigato subtriangulari anticè rotundato lineâ impressâ transversâ posticè truncato, segmento basilari subbasilari breviore, antennis segmento cephalico ferè triplò longioribus pubescentibus moniliformibus, labio brevi lævigato lineâ medianâ impressâ, pedum paribus (in mare) 53.—Long. unc. 1.

Hab. In Angliâ. (*in Mus. nostr.*)

I have but a single specimen of this species, which exhibits a curious abnormal development of the left antenna, which has but nine articulations, but these are longer than in the right antenna.

5. *Geoph. Vesuvianus*, ferrugineus, fasciis duabus longitudinalibus saturatioribus, segmento cephalico lævi convexo subtriangulari anticè rotundato, antennis elongatis moniliformibus pilosis, labio brevissimo lunato anticè excavato, pedum paribus (in mare) 69.—Long. unc. $1\frac{4}{10}$.

Hab. Prope Neapolin. (*v. in Mus. D. Hope.*)

6. *Geoph. Humuli*, flavo-ferrugineus, segmento cephalico angusto subquadrato elongato anticè rotundato posticè recto, segmento subbasilari angustissimo, antennis pilosis apice acutis: articulis basalibus parvis, labio longitudinaliter cristato, mandibulis apice nigris, pedum paribus 71.—Long. unc. $1\frac{3}{4}$.

Hab. In cultis Humuli Lupuli in Angliæ comitatu Kent. (*v. in Mus. Brit. nostroque.*)

I have five examples of this species of different sizes. It is very common in the hop-plantations in the neighbourhood of Canterbury, where it is supposed to be injurious to the plant by attacking the root. This species hybernates in little packets of six or eight, coiled up together in the form of a ball, in holes just large enough to contain them, in light soils that have remained for some time undisturbed.

7. *Geoph. Whitei*, capite aurantiaco, corpore flavo-virente, segmento cephalico brevi subcordato, antennis nudis moniliformibus, labio leviter longitudinaliter cristato utrinque obliquè sulcato, pedum paribus 74.—Long. unc. $1\frac{1}{4}$.

Hab. ——— ? (*v. in Mus. Brit.*)

I have named this species in honour of a zealous naturalist, Adam White, Esq., of the British Museum.

8. *Geoph. simplex*, Gervais in Mag. de Zool. cl. 9. no. 133. p. 37, 1835. Id. in Ann. Sc. Nat. 1837, p. 52. Lucas, l. c. sp. 4. p. 549.

Geoph. linearis, *Koch, Deutsch. Crust.* heft 4. no. 1.

Hab. In Galliâ.

Legs 80 pairs.

B. Antennæ sensim acuminatæ.

9. *Geoph. brevilabiatus*, fuscus, segmento cephalico brevi subovato transverso, basilari subbasilarique subæqualibus, labio brevissimo sublunato medio leviter cristato anticè emarginato, pedum paribus 79.—Long. unc. 2.

Hab. In Orâ Tenasserim Peninsulæ Indiæ Ulterioris. (*v. in Mus. Brit.*)

10. *Geoph. lineatus*, pallidè griseus, segmentorum lateribus lineisque duabus longitudinalibus subapproximatis saturatè cæruleis, capite antennis segmentoque anali rufis, pedum paribus 77.—Long. unc. $3\frac{1}{2}$.

Hab. In Honduras. (*v. in Mus. Brit.*)

This very beautiful species has the cephalic segment red, smooth and subcordate, the labium short, smooth, and with two lateral impressions; the dorsal plates rounded at the sides, with free elevated margins, and with two blue patches between three longitudinal sulci, and there is a dark blue line on each side above the spiracles.

11. *Geoph. subterraneus* (Tab. XXXIII. fig. 10.), flavus, capite ferrugineo parvo, corpore posticè incrassato, segmento cephalico subtriangulari anticè acuto, antennis flavis basi

crassis vix pubescentibus, labio mediocri lævigato lineâ elevatâ medianâ, appendicibus analibus lateralibus subtuberosis profundè punctatis, pedum paribus 78–83.—Long. unc. $3\frac{1}{2}$.

Geoph. subterraneus, *Shaw in Linn. Trans.* ii. p. 7. *Leach in Linn. Trans.* xi. p. 385. *Id. in Enc. Brit. Suppl.* i. p. 431. *Id. Zool. Misc.* iii. p. 44. *Gerv. in Ann. Sc. Nat.* 1837, p. 52. sp. 7. *Lucas, l. c.* p. 549. sp. 7. *Newp. l. c.* p. 101.

Hab. In Angliâ. (*v. in Mus. Brit.*)

There are four examples of this species preserved by Dr. Leach in the Museum cabinet, the longest of which is three inches, and has 83 pairs of legs; and the most minute is only seven-tenths of an inch, and has but 78 pairs.

12. *Geoph. lævigatus*, Brullé, Expédit. Scientif. de Morée. Ins. p. 62. pl. 28. f. 14. Gervais, Ann. Sc. Nat. 1837, p. 52. Id. Mag. de Zool. cl. 9. pl. 137. f. 2. Lucas, l. c. sp. 12. p. 550.

Hab. In Peloponneso.

Legs 100 pairs.

13. *Geoph. Barbaricus*, ferrugineo-fuscus lineá longitudinali saturatiore a capite ad segmentum corporis penultimum ductâ, segmento cephalico acuto triangulari, corpore sensim dilatato, segmentis 8 vel 10 posterioribus angustatis, stylis analibus brevibus crassis, pedum paribus (in mare?) 110–118.—Long. unc. $3\frac{1}{2}$.

Geoph. Barbaricus, *Gerv. in Mag. de Zool.* cl. 9. pl. 133. f. 3. p. 10. *Id. in Ann. Sc. Nat.* 1837, p. 53. *Lucas, l. c.* p. 551. sp. 14. *Newp. l. c.* p. 101.

Hab. In Africâ Boreali, Tripoli. (*v. in Mus. Brit.*)

14. *Geoph. sulcatus*, Brullé, Expédit. Scientif. de Morée, pl. 28. fig. 2. p. 62. Gervais, Ann. Sc. Nat. 1837, sp. 13. p. 53. Lucas, l. c. sp. 13. p. 550.

Hab. In Peloponneso.

Legs 140 pairs.

15. *Geoph. Gabrielis*, Linn. Syst. Nat. Fabr. Ent. Syst. ii p. 392. Gervais, Ann. Sc. Nat. 1837, sp. 10. p. 53. Lucas, l. c. sp. 10. p. 550.

Scolopendra semipedalis, *Dufour, Ann. Génér. des Sc. Phys.* t. vi. p. 317. pl. 96.

Hab. In Hispaniâ et Italiâ.

Legs 148 pairs.—Length 6 to 7 inches.

16. *Geoph. Lefebvræi,* Guérin, Iconog. du Règne Anim. de Cuv., Ins. pl. 1. fig. 10. Lucas, l. c. sp. 16. p. 551.

Hab. In Ægypto.

Legs 159 pairs.—Length 6½ inches.

17. *Geoph. Xanthinus* (Tab. XL. fig. 13.), totus aurantiacus, segmento cephalico subtriangulari anticè acuto posticè transverso, antennis basi crassissimis segmento cephalico vix duplò longioribus, labio brevi lævi posticè rotundato lineâ elevatâ medianâ rubrâ: margine producto dentibus 2 minutis, angulis lateralibus mandibulorum apicibus unguibusque nigris, segmentis præanalibus penultimisque ad latera laminis magnis scabris vestitis, stylis analibus parvis, pedum paribus 162.—Long. unc. 6½–7.

Hab. In Lyciâ, in valle fluvii Xanthi, *Fellows.* (*v. in Mus. Brit.*)

There are three examples of this fine species in the British Museum, brought to this country by Sir Charles Fellows. They agree precisely in character, except in length. They seem to approach very near to the next species.

18. *Geoph. Walckenaeri,* Gervais, Mag. de Zool. cl. 9. p. 133. fig. 1. p. 8. Id. Ann. Sc. Nat. 1837, p. 53. Lucas, l. c. sp. 11. p. 550.

Hab. Prope Parisios.

Legs 163 pairs.—Length 7½ inches.

19. *Geoph. Savignianus,* Gervais, Ann. Sc. Nat. 1837, p. 53. Lucas, l. c. sp. 15. p. 551.
Scolopendra, Savigny, D.

Hab. In Ægypto.

Legs 210 pairs.—Length 3 inches.

Species of *Geophilidæ* which I have been unable to identify from imperfect descriptions:

Geoph. hortensis, Koch, Deutsch. Crust. 22. heft 1.
Geoph. subtilis, Koch, Deutsch. Crust. etc. 22. heft 2.
Geoph. phosphorea, Linn. Gmel. Syst. Nat. ii. p. 1064. sp. 4.—Asia.
Geoph. occidentalis, Linn. Gmel. Syst. Nat. ii. p. 1064. sp. 10.—America.
Geoph. angustatus, Esch. Mém. de la Soc. Imp. Mosc. vi. p. 112.
Geoph. longissimus, Risso, Hist. de l'Europ. Mérid. v. p. 155.
Geoph. attenuatus, Say, Journ. Acad. Nat. Sc. Philad. vol. ii. part 1. p. 113.

DESCRIPTION OF TAB. XL.

Fig. 1. *Cermatia trilineata*, Newp.

Fig. 2. *Lithobius variegatus*, Leach.

Fig. 3. *Henicops maculatus*, Newp.

Fig. 4. *Scolopendrella immaculata*, Newp. :—magnified.

a. Natural size.

b. The antennæ magnified.

c. A leg magnified.

Fig. 5. *Scolopendra viridicornis*, Newp. *S. Hopei*, Newp. MSS.

Fig. 6. Inferior surface of the head of the same.

Fig. 7. *Branchiostoma spinicauda*, Newp.

Fig. 8. *Heterostoma spinosa*, ♂. Newp.

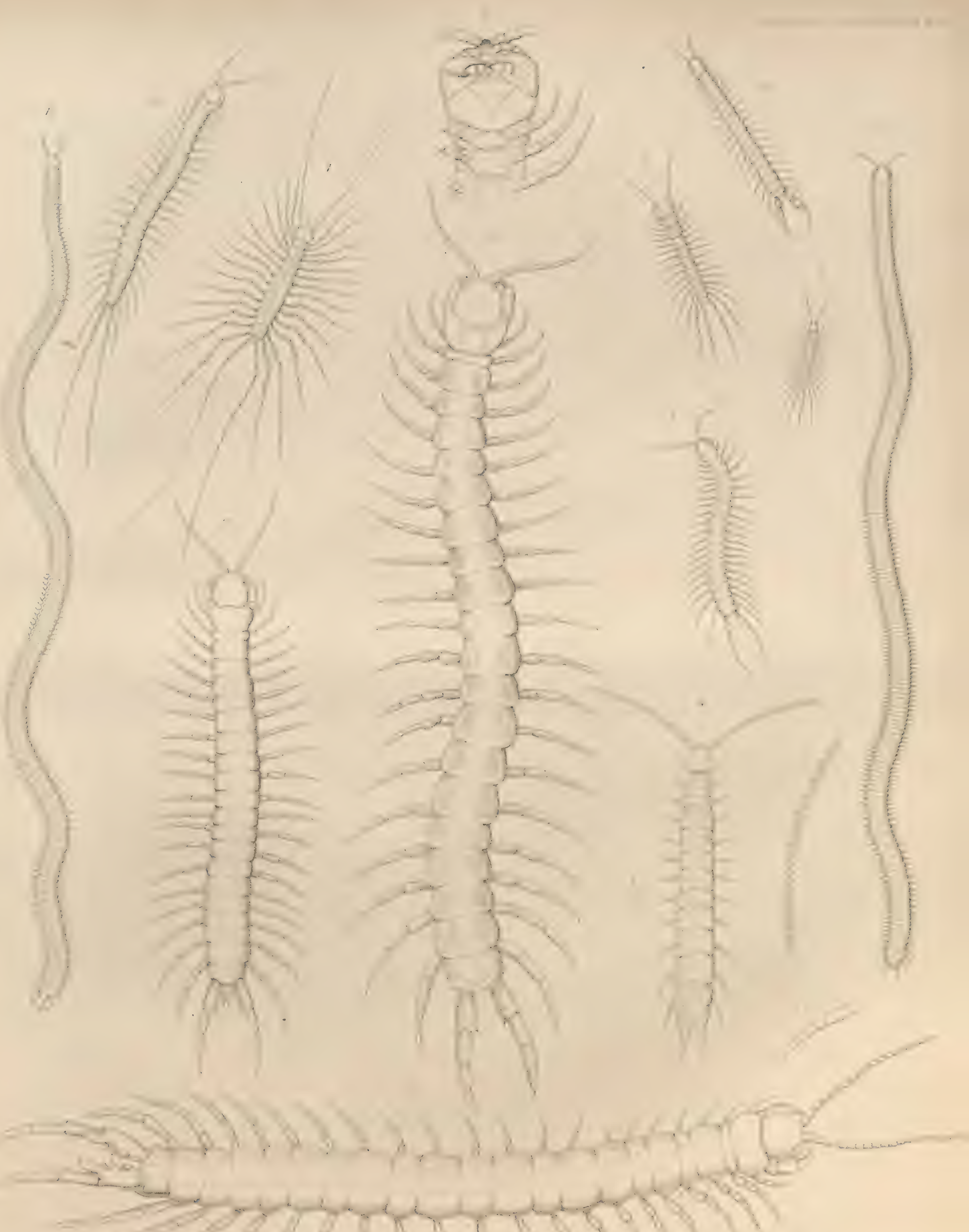
Fig. 9. *Heterostoma megacephala*, Newp.

Fig. 10. *Scolopocryptops longitarsis*, Newp.

Fig. 11. *Cormocephalus lineatus*, Newp.

Fig. 12. *Gonibregmatus Cumingii*, Newp.

Fig. 13. *Geophilus Xanthinus*, Newp.



XXIX. *Descriptions, &c. of the Insects collected by Captain* P. P. King, *R.N., F.R.S. & L.S., in the Survey of the Straits of Magellan.* By John Curtis, *Esq., F.L.S. &c.**

Read May 7th, 1844.

Order Coleoptera.

Family Dermestidæ.

*56. Dermestes Vulpinus, *Fabr.* *Panz. Faun. Germ.* 40. pl. 10.

Common at Valparaiso and Gorrite.

Family Histeridæ.

*57. Hister Mathewsii, *Curt.*

Violaceo-ater, capite thoracis margine elytrisque punctulatis; nisi in elytrorum disco ubi maculæ 2 magnæ ochraceæ striæque tres basales breves.

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

Shining violaceous black; head, abdomen and lateral margins of thorax thickly punctured, a line of punctures at the base of the latter and a few hairs on the sides; elytra finely punctured, except on the shoulders and disc: a stria on each side of the suture, a curved line of punctures at the base, a very short one beyond it, and 2 longer oblique ones towards the shoulders, the outer one double and the space between them vermiculated, as well as a transverse space near the apex which is smooth; a very large ochreous orbicular spot on each, not touching the suture or costa, the edges sinuated: anterior tibiæ dilated, with 9 or 10 teeth outside, intermediate and hinder with long spines.

Valparaiso.

I have named this pretty species after the late Mr. A. Mathews, A.L.S., who sent me specimens from Lima, as well as many other interesting insects which the want of an opportunity has long prevented me from describing.

* Continued from p. 205, vol. xviii.—Those species with the asterisk attached are in the cabinets of Mr. Curtis.

58. HISTER FURCATUS, *Curt.*

Nitidè virescenti-niger, thoracis lateribus brevi-canaliculatis punctulatis, elytris striâ suturali curvatâ basali tribusque versus costam apicem haud attingentibus; apice punctato.

Length $1\frac{2}{3}$ line, breadth $1\frac{1}{2}$.

Shining greenish black, head minutely punctured: thorax with an abbreviated channel close to the lateral margin, the sides punctured, with a line of punctures at the base; a punctured stria down each side of the suture, curved at the base, 2 deep ones towards the costa not reaching the apex, and a shorter one outside; apex of elytra and abdomen thickly punctured; anterior tibiæ dilated, with 8 or 9 teeth outside, the others spiny.

One example only; I believe from Rio.

59. HISTER CASTANIPES, *Curt.*

Lævis niger, thoracis lateribus punctulatis, elytris pedibusque castaneis; illis striâ suturali furcatâ duabus aliis æquilongis alterâque humerali breviore.

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

Black, very smooth and shining; head minutely punctured, with a semicircular channel: thorax with a depressed punctured stripe on each side, not touching the margin: elytra castaneous, the disc pitchy, apex punctured; a sutural stria curved at the base and reaching beyond the middle, 2 others beyond it as long, with a shorter one near the shoulder: abdomen punctured: tibiæ compressed and dilated, anterior with 7 or 8 rounded teeth outside, the others with a single series of spines.

A single specimen from Gorrite, at the mouth of the Rio de La Plata.

Family HYDROPHILIDÆ.

*60. HYDROPHILUS CHALYBEATUS, *Curt.*

Nitidus atro-cæruleus, elytris lineis tribus punctulorum remotorum piliferorum, palpis antennisque ochreis apice nigris, pedibus subcastaneis; femoribus piceis.

Length 6 lines, breadth 3.

Shining, deep blue-black, exceedingly thickly and minutely punctured; a short impression close to each eye, a doubly recurved loop of punctures on the face, 3 lines of remote punctures on the elytra, producing hairs; the costa violaceous, with long depressed ochreous hairs: clothed beneath with silky ochreous pubescence: palpi and antennæ ochreous, the tips of one and the club of the other black: tibiæ and tarsi subcastaneous.

From St. Paul's; I have also received it from other parts of Brazil.

It is distinguished from Germar's *H. setiger* by the colour of the legs and the sides of the thorax.

*61. HYDROPHILUS OCHRIPES, *Curt.*

Piceus, palpis antennis labroque basi ochreis apice nigrescentibus, pedibus thoracis margine inferiore sternoque ferrugineo-ochraceis.

Length 4 lines, breadth $2\frac{1}{4}$.

Shining piceous with a violet tint, thickly and minutely punctured: head bright green at the base: elytra with indistinct lines of punctures and irregularly pitted: palpi, antennæ and base of labrum ochreous, the tips and club blackish: legs and inferior lateral margin of thorax ferruginous-ochre; spine of sternum ferruginous.

From Valparaiso and Brazil.

Family SCARABÆIDÆ.

Section COPROPHAGI.

*62. COPRIS SEMISQUAMOSA, *Curt.*

Nigra, clypeo magno bidentato cornu brevi emarginato armato, thorace brevi anticè irregulariter truncato, elytris profundè striatis.

Length $10\frac{1}{2}$ lines, breadth 6.

Smooth, black, shining: head rugose, dilated into a spreading clypeus, the margin sinuated, forming 2 divaricating teeth in front, and a minute one on each side, from which runs an oblique channel to the eye; on the crown is a short transverse horn, the apex emarginate: club of antennæ ochreous: thorax short and broad, the front sloped off suddenly, the surface scaly, leaving the crown smooth and the base punctured; across the middle runs an elevated waved space forming 2 cavities on each side, the external one being round and deep; a channel down the back: elytra semiovate and firmly striated, the striæ minutely punctured: underside clothed with rusty brown hairs, which form a fringe round the thorax: legs hairy; anterior thighs with a bright patch of orange pubescence near the base; tibiæ with 4 external teeth, the others dilated at the apex, and free from denticulations outside; tarsi dilated, except the anterior pair.

The male was from Rio Janeiro, from whence I have also received it.

It is unlike any named species I possess; the notched clypeus and smaller size distinguishing it at once from *C. Carolina.*

63. Copris punctatissima, *Curt.*

Nigra, clypeo emarginato haud tuberculato, thorace magno punctatissimo tuberculo parvo anticè armato, elytris profundè punctato-striatis.

Length 8 lines, breadth $4\frac{3}{4}$.

Head semicircular, transversely rugose; clypeus scarcely bidentate and not reflexed; an obscure raised Ƭ-shaped line on the crown: thorax long and broad, excessively thickly punctured, with a little tubercle in front and a slight depression behind it; on each side is a small but distinct fovea: elytra firmly punctate-striate, the punctures large.

This female from Chiloe has greatly the habit of that of *C. anaglyptica* of Say, but the simple clypeus, the large and thickly punctured thorax and the simply punctured striæ of the elytra distinguish them.

*64. Phanæus splendidulus, *Fab.*

A male from Gorrite.

Section Geotrupidæ *or* Arenicolæ.

*65. Acanthocerus muricatus, *Kirby MSS.*

Niger, punctulatus, elytris punctato-striatis apice tuberculatis.

Length $1\frac{3}{4}$ line, breadth $1\frac{1}{4}$.

Globose, black or pitchy, shining: head uneven and punctured: thorax perfectly smooth and finely punctured, sides a little reflexed; scutel large and punctured: elytra punctured in striæ, the spaces being broken into irregular tubercles at the apex and along the outer margin: tibiæ serrated with minute spines.

This curious little insect, which has the appearance of an *Anisotoma*, was named *Sphœrosomus muricatus* by Mr. Kirby. It seems to be confined to Valparaiso.

Section Trogidæ.

*66. Trox bullatus, *Curt.*

Niger cinereo mixtus, thorace inæquali angulis posticis sublobatis, elytris tuberculis innumeris minutis conspersis lineisque tribus tuberculorum magnorum pluribusque parvorum notatis.

Length $7\frac{1}{2}$ lines, breadth 5.

Cinereous, all the protuberances black: head with a cleft tubercle in front; clypeus slightly emarginate: thorax very uneven, the sides indistinctly crenated, with a deeper notch forming a semicircular lobe at each angle behind; the posterior margin very convex, but not lobed; the front raised, forming 2 ridges, which are broken into 2 small elevations in the centre; on each side are 2 others and 4 along the base: elytra sprinkled with innumerable little black buttons, also 3 or 4 rows of large shining black ones, having a faint channel on each, with lines of smaller buttons between them and round the costal margin, and 2 more regular rows on either side of the suture: anterior tibiæ with 2 minute indistinct teeth on the outside near the middle, the others rough.

This insect, from Valparaiso, might be mistaken for a large specimen of the following, but it is readily distinguished by the hinder thoracic angles not being excised.

67. Trox pilularius, *Germ. Coleopterorum Species*, vol. i. p. 113.

From Rio Janeiro, but apparently not abundant: the 4 lines of buttons on the elytra are large and very elevated.

*68. Trox lachrymosus, *Curt.*

Cinereus nigro mixtus, thorace parvo inæquali, elytris amplis elongato-ovatis punctato-striatis lineis 4 tuberculorum magnorum 5 parvorum notatis.

Length from 5 to 6 lines, breadth from 3 to 4.

Ash-coloured, the elevations black; head and thorax punctured: clypeus not large, with a thickened margin and 2 raised oval tubercles on the crown: thorax small, the margins as well as the clypeus edged with short black hairs, the base slightly produced at the scutel; 2 large elevations near the disc with a little pit in each, one on either side, and 4 along the base: elytra nearly twice as broad and 4 times as long as the thorax, the buttons not very elevated: striæ of elytra punctured, and between them, except at the outer margin, are 4 lines of large and 5 of minute black shining buttons, and there are 2 large humeral elevations: anterior tibiæ short and slightly sinuated outside.

This species is common at Valparaiso, and is similar in form and proportions to *T. suberosus*, Fab.; the small thorax, punctured elytra, with the costal margin free from buttons, and above all the large high and bare shoulders, distinguish this species from its congeners.

*69. TROX TRISULCATUS, *Curt.*

Cinerascenti-niger, capite lævi, thorace sulcis 3 latis longitudinalibus, elytris striatis: intervallis fasciculatis.

Length from $2\frac{1}{4}$ to 3 lines, breadth $1\frac{1}{3}$ to $1\frac{1}{2}$.

Head and thorax punctured, the former nearly orbicular, with the surface even; the latter small, the sides ciliated and slightly reflexed, scarcely narrowed before, the posterior angles acute; a broad but shallow depression down the back, and a long oval one on each side: elytra punctate-striate, with lines of tufts between them, the suture and the alternate spaces raised, with the fascicles larger: anterior tibiæ with 2 little teeth outside, the others rough, with a spine near the middle.

From Valparaiso.

It is so very similar in form and size to the *T. scaber* of Illiger, that I can scarcely believe them to be distinct. I may observe, that in describing the species of *Trox*, the clay or reddish colour is not to be depended upon in many cases, as it is extraneous and communicated by the soil which the specimens inhabited.

Section SCARABÆIDÆ *or* XYLOPHILI.

*70. HOPLITES QUADRISPINOSUS, *Fab.*

Scarabæus Titornus, *Perty in Spix & Martius, Delect.* pl. 9. f. 12.

Scar. 4-spinosus, *Oliv. Entom.* vol. i. gen. 3. p. 33. no. 35. pl. 19. f. 179.

A male from Rio Janeiro.

*71. SCARABÆUS ABDERUS, *Sturm, Verz. für* 1826, p. 66. pl. 2. f. 17. ♂.

A pair from Gorrite: the female is chestnut-brown, not obscure-black like the male; the head is roughly punctured, with the clypeus acuminated: the thorax is smooth, shining and sparingly punctured.

*72. SCARABÆUS SYLVANUS, *Fab.*

A female from Rio Janeiro.

*73. SCARABÆUS CUNICULUS, *Fab.*

Not uncommon at Valparaiso: all the specimens are densely clothed beneath (excepting the abdomen) with bright fulvous soft hairs, and the margin of the anterior tibiæ of the females is rather sinuated than toothed.

*74. Oryctomorphus pictus, *Waterh.*

Piceus, clypeo bidentato, fronte tuberculato, thorace impressione centrali, elytrorum areâ scutellum cingente strigâque in singulo obliquâ undulatâ nitidè ferrugineis (Tab. XLI. fig. 1. ♀).

Length 10 lines, breadth fully 5.

Pitchy-coloured, shining; antennæ ferruginous, the club long and slender in the male (fig. *a*. female): head trigonate, thickly punctured with a small pointed tubercle on the crown, clypeus with the sides sinuated, the apex notched and recurved, the black mandibles projecting on either side: thorax thrice as broad as the head, transverse, semiovate-truncate, the anterior margin and base both semicircular, with distinct scattered punctures, a broad hollow impression down the centre vanishing behind; scutel ovate-trigonate, very smooth, the apex ochreous: elytra much broader than the thorax behind the middle, and thrice as long, indistinctly and irregularly punctured, leaving a smooth line down the suture, and 4 others on each elytron: a semicircular bright and deep ochreous space round the scutel, and an oblique stripe of the same colour from the shoulder, in the direction of the sutural apex, but vanishing beyond the middle, where it is dilated and approaches the suture: underside ferruginous-brown, densely covered with soft long tawny pubescence; pygidium exposed, finely punctured; margin of penultimate abdominal segment ferruginous: legs of the same colour; thighs short and stout, hinder oval; tibiæ short, anterior not broad, tridentate, the others coarsely punctured and notched externally, with an oblique denticulated ridge on the outside.

The only specimen in Capt. King's collection is a female, taken at Valparaiso. Mr. Waterhouse I find has a male, brought home by Mr. Darwin, which he has described under the name of *Gonocheile picta*. I have never seen Mons. Guérin's characters of his genus *Oryctomorphus*; but I conclude from his figure of *O. bimaculatus*, in the plates of the 'Voyage de la Coquille,' that our insect may be included in that genus. His species differs from ours in having a larger club to the antennæ, which is a sexual difference, and the oblique ochreous stripes on the elytra are wanting; whereas in Mr. Waterhouse's male they are much more distinct and extended than in Capt. King's female, which seems to be intermediate. It is therefore not improbable that they may prove to be one species only.

*75. Chalepus gemmatus, *Fab.*

Geotrupes lugubris, *Schönh. Syn.* vol. i. p. 21. pl. 2. f. 1.

Melolontha dubia, *Oliv. Entom.* vol. i. gen. 5. p. 32. pl. 3. f. 20.
Taken at Monte Video. I have also received it from Rio Janeiro and New York.

*76. Cyclocephala pallens, *Fab.*

Not uncommon about Rio Janeiro.

Section Phyllophagi.

N. G. Tribostethes, *Curt.*

Palpi iis *Brachystemi* similes, nisi quod maxillares longiores, labiales breves; illorum articulus basalis minutus, 2dus 3tiusque obovato-truncati, hoc breviore, 4tus longus, gracilis, fusiformis, extus sulco longo exaratus. Antennæ 10-articulatæ, articulus basalis crassus clavatus, 2dus parvus subglobosus, 3tius ellipticus, tres sequentes oblongi, 7mus cuneiformis, reliqui clavam ellipticam capitis longitudine efformantes (fig. *b*.). Clypeus integer rotundatus, margine paulùm elevato, suturâ transversali inconspicuâ. Thorax parvus transversus: scutellum mediocre, cordatum. Elytra thorace latiora, elliptica. Alæ amplæ. Pectus villosissimus, sterno haud producto; pygidio nudo. Pedes longiusculi, haud crassi; tibiæ anteriores angustæ, extùs tridentatæ, reliquæ setosæ suturis ordinariis; tarsi graciles, articulis omnibus subclavatis; ungue simplici (fig. *c*).

*77. Tribostethes castaneus.

Pallidè castaneus, capite thoraceque virescenti vel æneo tinctis (Tab. XLI. fig. 2. ♂).

Brachygaster castaneus, *Laporte, Cours complet d'Hist. Nat.*
Length 8 lines, breadth 4.

Shining castaneous with an ochreous cast: head thickly and coarsely punctured, with a green reflection and a violet tint round the clypeus: thorax reflecting green, rather thickly but irregularly punctured, the sides a little produced at the middle, with a fovea close to the margin, a channel down the centre, the base sinuated: scutel with a fringe of ochreous hairs over the base: elytra obscurely punctured, with 2 double lines of punctures on each, the space along the suture coarsely punctured: underside and thighs clothed with long ochreous wool; abdomen and pygidium pubescent; teeth of anterior tibiæ black.

A single female was taken at Valparaiso, and I obtained the male from Brazil.

Although a short description of this insect has been published in the work above alluded to, it is advisable to identify it more completely here, that I may make a few remarks upon this and the two following species. They have all been included in the genus *Brachygaster*, but their structure is so different in some respects, that the characters laid down will not embrace them. *Brachygaster* is at once distinguished by the outer claws of all the tarsi being bifid in both sexes, and the posterior tarsi compressed and thickened, especially the basal joint. In *Callichloris* the claws are simple, and in *Tribostethes*, in which they are the same, the joints of all the tarsi are more or less elongated; even in the anterior they are not transverse, and the 5th joint is not notched; the club also of the antennæ is exceedingly elongated in the males.

*78. Brachystemus prasinus, *Guér. Voyage de la Coquille*, pl. 3. f. 4.

The clypeus of the female is entirely rusty-brown; in the male the margin only is of that colour.

It was abundant in Chiloe, and has often been confounded with the following species.

Callichloris, *Dejean.*

Palporum maxillarium articulus penultimus minutus, subglobosus; terminalis crassior, longior, subfusiformis, extùs planus. Antennæ 10-articulatæ, articulus basalis crassus, pyriformis, 2dus subglobosus, 3tius 4tusque oblongi, 5tus brevis, 6tus cyathiformis, 7mus cuneiformis, reliqui clavam gracilem fusiformem efformantes. Labrum transversum, medio paulùm angulatum. Clypeus transversè ovalis, margine fortiter reflexo. Femora gracilia; tibiæ anticæ versus apicem angustatæ, extùs tridentatæ, reliquæ subscabræ, apice pectinatæ calcaribusque 2 brevibus armatæ; tarsi anteriores articulis 4 basalibus brevibus, 3tio 4toque cyathiformibus, 5to omnium intùs emarginato: ungue longo, gracili, simplici, anteriore maximè inæquali. Sternum haud productum.

79. Callichloris perelegans, *Curt.*

Pulchrè flavo-virens punctatissima, elytris punctato-striatis, subtùs pygidioque ferrugineis, anticè pilis albidis villosis posticè pubescentiâ concolori vestita.

Length 7 lines, breadth 4.

Of a beautiful but dead pea-green, with a slight yellow or golden reflexion on the sides, but not polished: antennæ ferruginous: head and thorax exceedingly thickly and finely punctured, the latter narrowed anteriorly, the base convex, with a broad lock of whitish hairs from beneath, broader than the scutel: down the back is a distinct but not deep channel: scutel subtrigonate, thickly punctured: elytra a little broadest behind, irregularly punctured, with 5 regular and several indistinct punctured striæ: claws ochreous: underside of head and pectus clothed with long silky whitish hairs; abdomen and the exposed pygidium densely covered with short hairs of the same colour, but forming a little recurved brush at the apex.

This seems to be a rare species at Valparaiso; for the collection contained only 3 specimens of the same sex, and they are probably males. The peculiar green colour of the upper side and legs contrasted with the whitish underside, and the lock of hair combed over the scutel, at once characterize this pretty species. Rather than encumber science with names when it can be avoided, I have adopted the appellation assigned to this genus by Dejean in his Catalogue; at least I imagine such to be the case. I regret that, having no duplicate to dissect, I cannot give more detailed generic characters.

*80. Geniates barbatus, *Kirby*, *Trans. Linn. Soc.* vol. xii. p. 403. pl. 21. f. 8.

A female from Rio Janeiro.

*81. Leucothyreus? spurius, *Curt.*

Sine nitore fulvus, capite thoraceque minutè punctulatis; hujus angulis posticis acutis, elytris singulis paribus 4 striarum inconspicuarum notatis.

Length $8\frac{1}{2}$ lines, breadth 5.

Entirely fulvous, excepting the black eyes: clypeus rounded and reflexed, with a line across the base: thorax narrowed before, with the angles appearing lobed, the hinder angulated; scutel punctured: elytra dull, broadest beyond the middle, indistinctly punctured, with a sutural stria and 4 obscure double ones on each: inosculation of the tibiæ piceous, anterior tridentate, the teeth piceous, 2 upper ones small; 4 anterior tarsi very much dilated and pubescent, forming brushes beneath: the joints cordate in the 1st pair.

I received this male insect from Brazil, and although it forms no part of Capt. King's collection, its interesting form will be sufficient excuse for my introducing it here. It so greatly resembles *Geniates barbatus, mas,* that until they are compared their differences would not be suspected; nevertheless, its beardless mouth and dilated intermediate tarsi separate it from that genus and connect it with *Leucothyreus*; the other differences are, its fulvous head, angulated thorax, broader and duller elytra, and more slender tibiæ; but the 4 posterior tibiæ and likewise the claws exactly agree with *Geniates*. The female I have not seen.

82. Leucothyreus? antennatus, *Curt.*

Antennarum clavâ longissimâ (fig. *c*): ochreus, capite castaneo (Tab. XLI. fig. 3.).

Length 6 lines, breadth 3.

Ochreous, shining: head castaneous; club of antennæ long and slender; clypeus thickly punctured; head more sparingly: thorax transverse, thickly and minutely punctured, as well as the scutel: elytra irregularly but distinctly punctured, with three smooth ridges, formed by double lines of punctures: anterior tibiæ tridentate, the others spiny: 4 anterior tarsi dilated, especially the 2nd joint of the anterior pair (fig. *d*), the others being obovate; underside very hairy.

The only example I have seen is from Monte Video. It looks exactly like a diminutive specimen of *Geniates barbatus*, but it will be seen by the shape of the tarsi that it forms another link between *L. spurius* and the genuine *Leucothyrei*.

*83. Leucothyreus Kirbyanus, *MacL. Horæ Entom.* vol. i. p. 146. pl. 3. f. 31. trophi.

From Rio Janeiro.

Serioides, *Guér.* Camptorhina, *Kirby.*

Antennæ 9-articulatæ, articulus basalis crassus, pyriformis, 2dus obovatus, 3tius longior gracilior, 4tus gracilis haud 2do longior, reliqui clavam gracilem tenuiter 5-lamellatam efformantes. Clypeus rotundatus. Labrum emarginatum: palpi maxillares longi graciles 4?-articulati, articulo basali minuto, tribus sequentibus elongatis subæqualibus, terminali truncato; palpi labiales 3-articulati, articulo 3tio fusiformi. Caput semiorbiculare. Thorax transversus, basi supra scutellum elongatum emarginatus. Elytra longissima. Pedes longi graciles; tibiæ anticæ breves, latæ, extùs tridentatæ, reliquæ spinosæ; tarsi similes, longissimi, graciles, setosi, articulis subæqualibus; ungues omnes simplices, longi, graciles.

84. Serioides atricapilla, *Kirby.*

Elongata, violaceo-brunnea, punctulata, elytris rugosis lineatis (Tab. XLI. fig. 4.).

Ser. Reichii, *Guér. Rev. Zool.* 1839, p. 301?

Length 6 lines, breadth 3.

Deep shining brown with a violet tint: antennæ ochreous, hairy at the base; club hairy and

5-jointed (fig. *f*): head irregularly punctured, divided from the clypeus by an angulated suture; the latter is reflexed, with a slight elevated line down the nose: thorax transverse, rather broadest at the base, the angles square, the base waved and emarginate at the centre; it is punctured, and the surface is a little uneven; scutel elongated and pointed: elytra elliptical, broader than the thorax and 4 times as long, rugose, punctured, with 8 or 9 ridges, appearing reticulated under a lens; slightly hairy beneath: legs ferruginous.

It is not stated where this insect was captured, but as it is a remarkable species, I have given its characters. It has a good deal the habit of *Omaloplia*, from which it is removed by its 5-jointed club of the antennæ and its simple claws, and it has not the least affinity with *Melolontha*. The *M. glacialis* and *M. testacea*, Fab., called *Macrosoma* by Mr. Hope, probably belong to this genus; if such be the case, Guérin's generic name will fall, and Mr. Kirby's had been previously employed by Schönherr.

Athlia, *Erichs.*

Palpi maxillares parvi, setosi, 4-articulati, articulo basali minuto, 2do elongato-clavato, 3tio obovato-truncato, 4to longitudine primi subsecuriformi. Antennæ minimæ, 9-articulatæ, articulus basalis crassus, clavatus, 2dus 3tiusque obovati, illo crassiore, 4tus brevis, 5tus 6tusque cyathiformes, reliqui clavam minutam, lobis crassis cymbiformibus, efformantes. Clypeus reflexus, anticè paulùm angustatus utrinque emarginatus. Caput latiusculum. Thorax transversus, convexus, lateribus convexis, basi parùm sinuatus, angulis anticis magis acuminatis: scutellum parvum, ovatum. Elytra thorace multò latiora, terque longiora, abdomen operientia, posticè latiora, rotundata: alæ amplæ. Pedes longi, haud graciles; tibiæ anteriores profundè emarginatæ tridentatæ, reliquæ setosæ; tarsi longissimi, subtùs pubescentes, anteriores crassiores; ungues omnium bifidi.

*85. Athlia rustica, *Erichs. in Wiegm. Arch.* vol. i. p. 266. pl. 3. f. 4.

Castaneus, punctulatus, pubescens, elytris singulis striis 4 elevatis, antennis pedibusque pallidè ferrugineis.

Length $6\frac{1}{2}$ lines, breadth 3.

Dull purplish brown, with very short ochreous hairs: head and thorax rather thickly and finely punctured, crown of the former and disc of the latter blackish: elytra with a greyish bloom, punctured, excepting the suture and 4 elevated striæ on each: palpi, antennæ and legs ferruginous: underside sparingly pubescent; postpectus coarsely punctured.

Taken by Lieut. Graves at Valparaiso.

I have adopted Erichson's names, supposing that the dilated tarsi may be a sexual character which his figure does not exhibit.

N. G. Pacuvia, *Curt.*

Palpi labiales minutissimi; maxillares graciles, 4-articulati, articulo basali minuto, 2do 3tioque ovalibus, 4to multò crassiore, parvo, ovato-lanceolato (fig. *g*). Antennæ parvæ 9-articulatæ, articulus basalis crassus, clavatus, 2dus magnus globosus, tres sequentes minores subglobosi, 5tus subcyathiformis, 6tus cuneiformis, reliqui clavam ovalem efformantes (fig. *h*). Caput trigono-truncatum. Clypeus reflexus, emarginatus. Thorax transversus, subhexagonus, lateribus prominentibus. Scutellum elongato-trigonum. Elytra thorace latiora, terque longiora, elliptica. Alæ amplæ. Pygidium nudum. Pedes longi extensi; femora anteriora brevissima, postica omnium crassissima; tibiæ anteriores breves extùs bispinosæ, reliquæ pilosæ medio spinosæ; tarsi longissimi, subtùs pubescentes, 4 anteriorum articulo 2do 3tioque dilatatis, omnium articulo basali 2do multò breviore, terminali gracillimo; unguibus longis gracilibus bifidis (fig. *i*).

*86. Pacuvia castanea, *Curt.*

Ochrea, punctulata, capite thoraceque castaneis, elytris singulis striis 4 duplicatis (Tab. XLI. fig. 5.).

Length $4\frac{1}{2}$ lines, breadth $2\frac{1}{4}$.

Deep ochreous, shining; palpi and antennæ pale ochreous: head and thorax castaneous, the former very thickly punctured, especially the clypeus; the latter punctured, thickest on the anterior margin, the sides almost angulated at the middle, with a faint fovea; anterior and basal margins slightly sinuated; scutel plain: elytra coarsely punctured, leaving 4 narrow lines on each: pygidium faintly punctured, sparingly clothed with ochreous hairs beneath: the legs but slightly hairy.

Two specimens from Valparaiso. The structure of the claws is most like *Omaloplia*, and the antennæ resemble *Rhizotrogus*, but they are not 10 jointed, and the club is very small.

N. G. Accia, *Curt.*

Palpi nudi, labiales minutissimi, maxillares parvi, 4-articulati, articulo basali minuto, 2do elongato clavato, 3tio breviori obovato, 4to omnium maximo elliptico-truncato (fig. *k*). Antennæ parvæ, 9-articulatæ, articuli 2 basales crassi, 1mo pyriformi, 2do globoso-pyriformi, 3tius gracilis longus, 4tus ovalis, 5tus 6tusque annuliformes, reliqui clavam tenuem efformantes (fig. *l*). Clypeus rotundatus reflexus. Caput mediocre. Thorax transversus, basi sinuatus, margine anteriore excavatus, angulis prominentibus: scutellum elongato-trigonum. Elytra thorace ferè quater longiora, elliptica, pygidium haud completè operientia. Alæ amplæ. Pedes longi, graciles; femora tibiæque anteriores brevissimæ, hæ latæ, extùs tridentatæ, 4 posteriores spinosæ; tarsi longi, graciles, setosi, haùd subtùs pubescentes, articulo basali longitudine 2di; unguibus gracilibus, simplicibus.

87. ACCIA LUCIDA, *Curt.*

Nitidè testacea, minutè punctulata, capite ferrugineo, elytris subcupreis striatis (TAB. XLI. fig. 6.).

Length $4\frac{1}{2}$ lines, breadth 2.

Bright ochreous, smooth and very glossy: head and clypeus concave, with a small elevation in the centre; finely punctured, with a rosy tinge: thorax more faintly punctured and convex: scutel not punctured on the disc: elytra paler, testaceous, with a faint greenish tint, more rosy at the base, with 9 punctured striæ on each vanishing at the apex; the interstices convex and sparingly punctured; a few scattered hairs beneath; pectus punctured: tibiæ inclining to ferruginous, especially the tips.

A single specimen from Port St. Elena. It has the habit of *Omaloplia*, and is distinguished from the preceding genus by its exposed labrum, differently formed palpi and antennæ, the length of the basal joint of the tarsi, which are not velvety beneath, and by its simple claws.

*88. COLPORHINA BIFOVEOLATA, *Curt.*

Ferruginea æneo tincta, punctulata, squamis albidis in thorace elytrisque maculas efformantibus vestita.

Length 3 lines, breadth $1\frac{2}{3}$.

Shining ferruginous with a brassy tint, sparingly clothed with lanceolated, depressed white scales, giving a mottled colour to the thorax and elytra: antennæ and palpi testaceous: head and clypeus strongly punctured, the latter lunate, with a distinct curved suture at the base, leaving the head of a transverse lenticular form: thorax very convex and regularly punctured, rather transverse, semiovate, broadest at the base; scutel moderate, semioval, punctured: elytra broader than the thorax, only twice as long, and exposing the pygidium, rather rugose with punctures; at the middle is a subcordate fovea, with an impression beyond it, extending round the apex, and forming an apical elevation: underside with variolated punctures and minute depressed white hairs: legs punctured and similarly clothed, stout, hinder elongated; tibiæ, anterior with the outer lobe elongated, with two indistinct teeth above; 4 posterior with a rough ridge across the middle; tarsi slender and pilose, 4 basal joints gradually decreasing in length, 5th long and clavate; claws bifid at the apex.

This little insect from Rio Janeiro seems to connect *Plectris* with *Ceraspis*, and has so much the habit of a group of Brazilian *Hoplitæ*, that I had at one time included it with them.

*89. Macrodactylus marmoratus, *Curt.*

Subcastaneus, pilis albidis vestitus, thoracis disco brunneo lineâ pilorum albidorum centrali, elytris fasciis brunneis irregularibus pubescentiæque albidæ maculis notatis.

Length $3\frac{1}{4}$ lines, breadth $1\frac{1}{8}$.

Pale ferruginous, shining, roughish, with whitish pubescence: palpi and sometimes the antennæ piceous, terminal joint of former stoutish, subovate: clypeus and head punctured, the former semiorbicular, the margin reflexed, the latter dark: thorax with the centre dark brown, leaving the sides and a line down the middle whitish with hairs, not broad, suborbicular, narrowed a little in front and truncated, base slightly convex; scutel whitish, small and semiovate: elytra scarcely broader than the thorax, more than twice as long, elliptic, rugose, with 4 elevated lines on each, vanishing at the apex, which is slightly gibbose, variegated with piceous at the base, middle and towards the apex, the spaces between with patches of whitish hairs: pygidium exposed, hairy and partially piceous; underside more or less piceous, clothed with pale hairs: legs dark chestnut; anterior tibiæ with 2 external lobes; tarsi slender; claws with a tooth behind the apex.

Two specimens were taken at Chiloe.

Philochlænia aula is the only authentic species I have of that genus, which I suspect contains an undigested mass of incongruous materials; and as that insect has simple claws, I have considered this species as a section of *Macrodactyla*, with the clypeus less elongated, the sides of the thorax not dilated, and the legs less sprawling. It will form a very natural transition to *Ceraspis*, having a good deal the figure of *C. peruvianus* of Guérin.

Section Anthobii *or* Glaphyridæ.

*90. Cratoscelis vulpina, *Erichs. in Wiegm. Archiv*, vol. i. p. 269. pl. 3. f. 5.

A female from Valparaiso; I have received the male from Brazil.

*91. LICHNIA LIMBATA, *Erichs. in Wiegm. Archiv*, vol. i. p. 270. pl. 3. f. 6.

A female of this insect was also brought from the same country: the remarkable male I obtained from a Brazilian collection. Both the above genera have elongated maxillæ, for sucking flowers, like moths.

Section MELITOPHILI *or* CETONIADÆ.

*92. GYMNETIS GLAUCA, *Dej. Gory & Perch. Mon.* pl. 71. f. 6.

Found at Rio Janeiro.

*93. GYMNETIS IRREGULARIS, *Gory & Perch. Mon.* p. 354. pl. 71. f. 3.

Found at Rio Janeiro.

*94. GYMNETIS MARGARITACEA, *Germar, Insect. Spec.* p. 132.

Found at Rio Janeiro.

*95. EUPHORIA (*Burm.*) LURIDA, *Fabr. Oliv. Entom.* vol. i. gen. 6. p. 43. n. 50. pl. 9. f. 81. *Burmeister, Handbuch der Entomologie*, vol. iii. p. 377.

St. Paul's and St. Catherine's, abundant.

Family LUCANIDÆ.

*96. DORCAS RUFIFEMORALIS, *Guér.*?

Cinereo-niger, capite thoraceque nitidis, elytris densè profundèque punctulatis: punctis ochreo papillatis, coxis femoribusque rufis.

Length of male 10 lines, breadth $3\frac{1}{2}$; female $7\frac{1}{2}$ long, 3 broad.

The mandibles of the male are almost as long as the head, with a stout emarginate tooth on the inside; there is a tubercle before and a more prominent one behind the eyes: the disc of the thorax is very much depressed and strongly punctured, as well as the exterior margin: there is a peculiar pearly or bluish bloom upon the thorax, and the singular punctures, each forming a ring round a minute ochreous papilla, give a brownish or dirty colour to the outer margins of the thorax and elytra, which I have not seen in any other species.

Abundant at Port Famine in January, February and March.

I gave the name of *D. femoralis* to this very distinct species many years since, but I understand it has been named as above in the 'Revue Zoologique.'

*97. PASSALUS PUNCTIGER, *Lep. & Serv.* *Percheron, Mon.* p. 47. pl. 3. f. 6.
From Rio Janeiro.

*98. PASSALUS INCERTUS, *Buquet?* *Guér. Mag. de Zool.* 1841, p. 27. pl. 77. f. 1.
From St. Paul's, Brazil.

*99. PASSALUS TRANSVERSUS, *Dalm.* *Perch. Mon.* p. 94. pl. 7. f. 5.
From St. Paul's, Brazil.

HETEROMERA.

MELASOMA.

Family PIMELIADÆ.

100. PRAOCIS RUFIPES, *Esch. Zool. Atlas*, pl. 14. f. 2. *Voyage de la Coquille*, pl. 4. f. 1.
In this specimen from Conception, the thighs and tibiæ are pitchy.

*101. PRAOCIS SUBÆNEA, *Erichs. Nov. Act. Acad. Nat. Cur.* vol. xvi. Supp. p. 248.
Praocis submetallica, *Guér. Mag. de Zool.* 1834, pl. 105. f. 3?
Large black specimens, as well as æneous ones, were collected at Valparaiso; these are fully 5 lines long, while the smaller males are 4 lines only.

*102. PRAOCIS LÆVICOSTA, *Curt.*

Obscurè æneo-nigra, elytrorum margine inferiore haud punctulato, tarsis subferrugineis.

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

Dead-black, sometimes with an æneous tinge above: clypeus emarginate and punctured: thorax semiorbicular, anterior margin concave, hinder angles large and pointed: elytra ovate, the surface not even, irregularly punctured, the margin keeled and terminating in an obtuse point; the costa inflexed, broad and not punctured; scutel and keeled margin whitish with shining hairs: tarsi more or less ferruginous.

Several specimens from Valparaiso.

The example that I have received of *P. lævigata*, Dejean, has the thorax broader than the elytra, which taper to the apex, but the costal margin is smooth in that species also.

It is by no means easy to determine the species of *Praocis*, from many causes.

I believe the sexes vary very considerably in form and size, and the colour cannot be depended upon, as the fresh specimens have a yellowish metallic hue, but the old ones which have been exposed to heat and damp are entirely black; the legs and antennæ exhibit every shade from deep pitchy to ferruginous, and the sculpture is much fainter in some individuals than in others. The minute silvery bristles which arise sparingly from the punctures are not unfrequently absent from age, and the pale outer margin of the elytra formed by these hairs is sometimes rendered ochreous or dirty, from the soil becoming attached to them. I may observe, that in perfect specimens the broad and very short scutel is covered with shining pubescence.

Family BLAPSIDÆ.

SCOTOBIUS, *Germar.*

This natural group of insects is entirely confined to the southern portions of the New World. It has been divided by Solier into 2 genera, distinguished principally by the form of the palpi; and *Scotobius* as it now stands may be arranged under 3 sections: 1. those with granulated ridges; 2. with simple ridges; 3. without ridges. Of this last section I have not seen an example, and Erichson's *S. planatus* is its representative.

* Elytra with granulated ridges.

*103. SCOTOBIUS PILULARIUS, *Germ.* p. 135. *Annales de la Soc. Ent. de France*, vol. vii. p. 60. pl. 3. f. 6. *Guér. Mag. de Zool.* 1834, pl. 110. f. 3.

From Gorrite, at the entrance of the river La Plata, and at Maldonado, in November, *Lieut. Graves.*

*104. SCOTOBIUS MURICATUS, *Guér. Mag. de Zool.* pl. 110. f. 1. *Solier*, *ibid.* p. 58.

Scot. elongatus, *Klug, ibid.* p. 69. var.

Several were taken at Gorrite and Maldonado in November.

*105. SCOTOBIUS RUGULOSUS, *Guér. Mag. de Zool.* pl. 110. f. 5.

I have received it from Chili.

This appears to be synonymous with Solier's *S. Gayi*, *ibid.* p. 62.

*106. Scotobius asperatus, *Erichs. Nov. Act. Acad. Nat. Cur.* vol. xvi. Supp. p. 247.

From Valparaiso.

This I take to be the *S. rugosulus* of Solier. With regard to *S. rugosulus* and some allied species, it appears to me there is some confusion. M. Guérin, who first described the former, says that the thorax is *rugose*, its form being a well-marked hexagon, with the sides angulated and margined; that the ridges on the elytra are *rugose*, and that the underside and legs are *rugose*, the latter tolerably stout. Now M. Solier says of his *S. rugosulus*, that the thorax is more entire on the lateral margins, and a little less margined than in his *S. Gayi*; that the back is covered with deep punctures, squeezed and separated by irregular shining intervals, larger at the centre than upon the sides, and *not at all granulated*; the ribs on the elytra of the interstices narrower and a little less elevated than in *S. Gayi*; the posterior tubercles smaller and a little more pointed; the legs evidently less robust, with the thighs strongly *punctured*. It appears therefore that M. Guérin's *S. rugosulus* has the thorax, ribs of elytra and legs *rugose*, viz. granulated, and that the thorax and legs of M. Solier's *S. rugosulus* are *punctured*.

*107. Scotobius bullatus, *Curt.*

Obscurè niger, rugosus, latus, brevis, capite thoraceque punctatissimis; hujus angulis posticis acutis, elytris punctato-striatis: porcis in intervallis nitidis granulatis ad apicem tubercula distincta efformantibus: seriebus 2 costalibus remotè tuberculatis.

Length $6\frac{1}{2}$ lines, breadth $3\frac{1}{3}$.

Dead-black; antennæ very short, 2 basal and apical joints and palpi ferruginous: clypeus and head thickly and coarsely punctured, the former slightly concave in front, with a transverse suture, the extremities of which are hooked: thorax more than twice as broad as the head, transverse-orbicular, concave before, the angles rounded; straight behind, the angles forming a minute well-defined tooth; the sides perfectly convex and delicately reflexed, the entire surface thickly and strongly punctured with irregularly crowded punctures; an obscure impression down the middle, and an indistinct fovea on each side; scutel short and broad: elytra much broader than the thorax, very ovate, the apex attenuated and slightly margined, the back is transversely wrinkled, and there are 6 lines of punctures on each elytron; there are also 7 narrow slightly-elevated shining ribs on each, including the sutural one, which are irregularly interrupted, being continuous at the base, but granulated at the apex; beyond the 7th, which forms a lateral keel, is the inflected margin, on which are 2 rows of little shining black studs, at remote distances: legs of the usual length and stoutness, shining and punctured: anterior tibiæ with the outer edge slightly crenated, the others scabrose: underside rather strongly and thickly punctured, especially the apex of the abdomen, the base and pectus somewhat striated.

Obs.—The punctures are filled with a dirty ochreous pubescence, apparently with a short shining yellowish bristle in the centre of each, and this is most evident on the underside of the thorax and on the legs.

Specimens of this very distinct species were found at Port Famine and Conception. It makes an approach to *S. tristis* of Guérin, but all the angles of the thorax are pointed in that species; the antennæ are also longer, the underside of the body is very finely punctured, the legs are small, rugose, &c. Vide 'Mag. de Zool.' for 1834, p. 18.

*108. SCOTOBIUS ARMENTARIUS, *Lacord.* *Solier in Ann. Soc. Ent.* vol. vii. p. 65.

This is allied to the foregoing: a single specimen was presented to me by Lieut. Graves, who took it in November at Maldonado.

** Elytra with simple ridges.

*109. SCOTOBIUS COSTATUS, *Guér. Voy. de la Coquille*, pl. 4. f. 5?

This figure is too black and too narrow for my specimens, which were found in moist places in houses in Lima, but they well accord with Solier's description.

*110. GONOGENIUS VULGARIS, *Guér. in Zool. Mag.* 1834. p. 16. *Solier in Ann. Soc. Ent.* vol. vii. p. 48. pl. 2. f. 12–16.

Under stones at Lima.

This and the preceding are introduced on account of their affinities and localities; they were both transmitted to me by the late Mr. A. Mathews.

111. LEPTYNODERES TUBERCULATUS, *Curt.*

Lutosus, capite trituberculato, thorace tuberculato, elytris porcis 5 acutis quarum 2 dorsalibus fortioribus (TAB. XLI. fig. 7.).

Length nearly 6 lines, breadth $2\frac{1}{2}$.

Similar in form to *L. varicosus* of Germar, but perfectly distinct; it is of a mud colour: antennæ very short, 3rd joint as long as the 3 following; head oval; clypeus with the margin reflexed, obverse-cordate, the 2 lobes covering the base of the antennæ, with 3 tubercles forming a triangle: thorax twice as broad as the head, somewhat cordate, the sides broadly margined and reflexed, very convex, but suddenly narrowed at the base, which is straight, with the angles acute, concave before, 2 irregular lines of crowded minute tubercles down the disc, and a small patch on each side: elytra considerably broader than the thorax, elongate-ovate, with 5 raised lines on each, the spaces between with 2 rows of indistinct punctures forming transverse waves; sutural keel not reaching the apex, 2nd and 3rd very much raised and presenting a sharp, slightly crenated ridge, 4th forming the margin and uniting with the 2nd at the apex; the 5th is on the inflected margin near to the costa and scarcely raised: legs moderately long and stout, with short pale hairs.

This genus connects *Scotobius* and *Psammetichus*. The fine species described was taken at Port St. Elena.

*112. Emalodera multipunctata, *Curt.*

Nitidè nigra, punctatissima, thorace obovato truncato, elytrorum punctis lineas numerosas duplicatas efformantibus; margine extùs apiceque tuberculatis (Tab. XLI. fig. 8.).

Length $5\frac{1}{2}$ to 6 lines, breadth 3 to $3\frac{1}{3}$.

The form of this insect is singular; it is short and broad behind, regularly tapering to the head, not unlike a *Cychrus*: the antennæ are shorter than the thorax; head flattened, somewhat hexagonal, irregularly punctured; clypeus emarginate, with a deep curved suture at the base: thorax obovate, being broadest towards the base, with the angles perfectly rounded, the anterior margin concave, covered with punctures, leaving a few smooth spaces on the disc, with a short channel and an impressed line or fovea near each anterior angle: elytra contracted at the base and exposing the scutel, which is exceedingly finely granulated, except at the tip; they are twice as broad as the thorax, ovate, convex, the apex conical, indistinctly wrinkled, with 6 faint punctured striæ down the back, and numerous irregular punctures forming double lines on the interstices: the 4th, 5th and remaining striæ have a line of minute shining tubercles between each, and some scattered over the apex: anterior and posterior thighs with a tooth beneath near the apex. The female is broader and larger than the male; the thorax is transverse and twice as broad as the head, and the posterior femoral teeth form spines.

Specimens were taken at Port Famine in January, February and March.

E. crenaticostata, the type of this genus, established by M. Blanchard, has been published in D'Orbigny's 'Voyage,' pl. 15. f. 4. Its natural position appears to me to be between the *Scotobii* and *Scaurus*.

*113. Nyctelia nodosa, *Germar* (Zophosis), p. 133. *Ann. Soc. Ent.* vol. v. p. 310. pl. 6. f. 1–8.

A single specimen was presented to me by Lieut. Graves, which he took in November at Maldonado. This is the typical species, and none of the following altogether agree with Solier's generic definition; yet there is such a gradation as would not justify their being formed into separate genera.

*114. Nyctelia caudata, *Curt.*

Nitidè atra, elytris nisi in areâ suturali obliquè et crassè sulcatis: apice in caudam semicircularem dilatatis (Tab. XLI. fig. 9.).

Length from $8\frac{1}{2}$ to 13 lines, breadth from 5 to $7\frac{1}{2}$.

Black, shining, somewhat oval and depressed: clypeus emarginated and coarsely punctured: thorax broad, transverse, narrowed and deeply emarginate before, the angles forming large triangular lobes; base bisinuated, leaving the centre projecting, and the lobes prominent and trigonate: thickly and coarsely punctured, with minute points between; the centre elevated, the dorsal space smooth, the sides flattened, the margins less punctured and somewhat undulating; scutel invisible: elytra very broad, oval and deflexed, especially behind, the margins sharp and perfectly granulated, sending forth 10 oblique deep channels, inclining backward, leaving a broadish sutural space free and elevated; the spaces between the furrows very elevated; the apex dilated horizontally and forming a large fan or tail, twice as broad as the head, more than semicircular; it is slightly rugose, with a thickened margin; inferior margin with 7 oblique furrows inclining towards the apex, and forming an acute angle with the others above; the costa is scratched transversely: legs long; anterior tibiæ crenated, with an external spine at the apex, the others spiny, hinder considerably the longest, crooked; tarsi very long.

A pair of this fine species was taken in December at Port St. Elena by Lieut. Graves, to whom I am indebted for a specimen. The thorax of the male is proportionately shorter than in the female, the oblique inferior furrows are obliterated, the caudal appendage is not so broad, yet it is much broader than the head, and its surface is more rugose than in the female.

*115. Nyctelia undatipennis, *Curt.*

Lævis nigra, elytris sulcis 7 brevibus latis transversis in margine exteriore (Tab. XLI. fig. 10.).

Length 8 lines; breadth of male $4\frac{1}{3}$, female $5\frac{1}{3}$.

Smooth shining black: clypeus emarginate and coarsely punctured: thorax transverse, delicately punctured in front, a little narrowed and emarginate, forming acute triangular angles, the base bisinuated, the angles produced and trigonate; sides slightly convex and punctured, the margin very narrow and indistinctly crenated, the disc convex; scutel invisible: elytra ovate, almost orbicular in the female; the suture sunk, except towards the apex; sides narrowly keeled and crenated; from thence extend 7 transverse, broad, oval grooves, forming narrow raised spaces, about half the breadth of the elytra, and slightly inclining downward; the apex narrowed and forming an oval sloping tail, slightly scabrose: legs moderately long and stout: anterior tibiæ with an external spine, the others scabrose: lobe of pectus broad at the apex, with 2 punctured grooves.

Taken at Port St. Elena by the same officer in December. It may be allied to *N. plicatipennis*, Lacordaire.

116. Nyctelia Fitzroyi, *Curt.* *Waterhouse in Proceed. Zool. Soc.*, Dec. 1841. p. 109.

Lævis nigra, elytris hemisphæricis caudatis, antennis pedibusque nitidè ferrugineis (Tab. XLI. fig. 11.).

Length 10 lines, breadth $7\frac{1}{2}$.

Smooth, black: clypeus emarginate, the sides with a few deep punctures: thorax shining, much broader at the base, which is bisinuated, than before; anterior margin deeply semicircular, the angles acute, trigonate, sides convex, a little sinuated behind, and forming produced subovate lobes, with a strong transverse groove: elytra orbicular, convex, deadish-black, and under a lens may be traced 6 scratched longitudinal lines, with various smaller branches between them, the edges crumpled; very much sloped off behind and narrowed at the apex, which forms a subtrigonate tail, a little rugose: pectoral lobe broad, rounded and rugose-striate, as well as the sides of the thorax and the basal abdominal segments: antennæ short and ferruginous: legs long, bright ferruginous; anterior tibiæ with an external spine, and serrated outside, the others with the external surface scabrose.

This noble species, which I have dedicated to Captain Fitzroy, who commanded H.M.S. 'Beagle,' was taken at Valparaiso. Its bright rusty legs will distinguish it from Mr. Waterhouse's *N. Darwinii.*

*117. Nyctelia granulata, *Curt. Waterhouse, ibid.* p. 109.

Lævis nigra, elytris latissimis ovatis orbicularibusve rugosissimis: rugis versus suturam lineas longitudinales efformantibus (Tab. XLI. fig. 12.).

Length of male 8, female 9 lines; breadth $4\frac{1}{2}$ to 6.

Shining black: clypeus emarginate, punctured, with a transverse impression at the base: thorax transverse, a little narrowed in front, which is broadly concave, forming prominent trigonate angles, the sides very convex and granulated, narrowed towards the base, which is bisinuated and forming triangular ovate angles; these have sometimes 2 or 3 transverse impressions; and the lateral margins are rugose in one specimen, with a fovea on each side: elytra convex, ovate in the male, orbicular and twice as broad as the thorax in the female; they are exceedingly rugose, formed by deep dull furrows, having elevated crumpled shining lines, which take a longitudinal direction next the suture, and an oblique and transverse one, to a greater extent, from thence to the outer margin; the apex is narrowed and winged, forming a subtrigonate granulated tail; inflected margin rugose, excepting the base; pectoral lobe coarsely punctured, with an elongated horseshoe impression; the pectus and abdomen, excepting the two apical segments, rugose-striate: tibiæ externally rugose, anterior with a short external spine.

My specimens of this very distinct species were taken at Cape Gregory by Lieut. Graves. Mr. Darwin's was found at Cape Negro.

*118. Nyctelia Bremii, *Waterhouse in Ann. & Mag. Nat. Hist.* vol. xiii. p. 48.

Nitidè nigra, elytris suborbicularibus caudatis lineis elevatis versus suturam obliquis ad marginem exteriorem curvatis profundè insculptis (Tab. XLI. fig. 13.).

Length 9 lines, breadth $5\frac{1}{2}$.

Shining black, like ebony: clypeus punctured: thorax transverse, broadly emarginate and narrowed in front, forming trigonate angles: sides very convex, the margin granulated, narrowed behind, the angles trigonate but rounded, base bisinuated, a strong transverse impression close to the anterior margin, and sometimes a ridge forming a double margin to the sides, but vanishing anteriorly: elytra nearly orbicular, convex, finely and deeply sculptured, forming 10 or 12 clean-cut elevated rays, branching from the suture and bending to the tuberculated outer margin, where many of them are furcate; the apex is pointed and winged, the margins being broad, flat, somewhat cordate and granulated: legs stout, sometimes ferruginous: anterior tibiæ crenulated, with a small external apical spine, the others scabrose: inflected margin striated obliquely; pectoral lobe large and rounded, coarsely punctured, with an elongated horseshoe channel; pectus rugose, centre of abdomen somewhat vermiculate.

This fine species was not uncommon at Cape Fairweather. From its beautifully sculptured surface, shining like ebony, I had named it *N. sculpturata*, but I am happy in adopting the name of the distinguished naturalist which has been lately assigned to it by Mr. Waterhouse.

*119. Nyctelia? corrugata, *Curt.*

Nitidè nigra, thoracis lateribus rugosis, elytris transversim undulato-canaliculatis porcas plurimas undulatas formantibus: suturâ depressâ bistriatâ (Tab. XLI. fig. 14.).

Length $8\frac{1}{2}$ lines, breadth 5.

Black, smooth and shining: antennæ brown; clypeus emarginate, with a transverse groove, sides slightly punctured; head with a long puncture on the crown: thorax twice as broad as the head, a little broader than long, scarcely narrowed before, but very concave, forming acute angles, sides very convex, contracted at the base, the angles ovate, the base straight and slightly striated longitudinally, lateral margins thickened and granulated internally, with numerous oblique furrows, inclining towards the head and forming short ridges; scutel minute and broad: elytra oval, convex, broader than the thorax at the base, but not twice as broad at the middle; suture very much depressed, with a groove on each side, the outer margin keeled and crimped, the entire back with numerous deep transverse grooves, somewhat oblique at the base and apex, forming convex ridges; each elytron with 2 indistinct curved longitudinal striæ, apex rather pointed and margined; inflected margin scratched only: pectoral lobe clavate, with a deep channel round: legs stout, hinder the longest; anterior tibiæ without an external spine at the apex, granulated outside, as are all the others, the hinder being crooked; basal joint of tarsi but slightly elongated.

This distinct species, which was not uncommon at Cape Fairweather in December, seems to connect *Nyctelia* with *Epipedonota*, for the anterior tibiæ are longer than the tarsi, and the external spine is wanting at the apex; yet the habit of the insect and the trophi apparently accord so strikingly with *Nyctelia*, that unless it be made a distinct genus, I think it better to let it form a section of that group.

*120. PSETRASCELIS PILIPES, *Guér. Mag. de Zool.* 1834, pl. 102. f. 1. *Annales Soc. Ent.* vol. v. p. 311. pl. 6.

This remarkable insect was taken by Lieut. Graves on the coast of Chili.

*121. MITRAGENIUS ARANEIFORMIS, *Curt.*

Niger, thorace subtilissimè vermiculato prope basin angulato, elytris cinereis cupreo-tinctis subscabris nigro maculatis; singulis porcis 2 ante apicem coalitis (TAB. XLI. fig. 15.).

Length from $8\frac{1}{4}$ to 9 lines, breadth $4\frac{1}{2}$ to $5\frac{1}{2}$.

Dull black: clypeus emarginate; head minutely punctured and pubescent: antennæ longer than the head and thorax, 3rd and five following joints elongated but decreasing, 9th only half as long as the preceding, clavate, 10th obovate, 11th larger, ovate-conic; in the female these three joints are the stoutest: thorax twice as broad as the head near the base, which is slightly bisinuated, elongate-trigonate, deeply concave in front, forming acute trigonate angles, the posterior truncated obliquely, and forming a dilated, slightly reflexed margin; the entire surface beautifully and exceedingly finely grooved longitudinally, like vermiculated striæ, excepting the dilated sides, which are granulated; scutel invisible: elytra the exact width of the thorax at the base, but considerably wider at the middle, and thrice as long; oval, conical behind, convex, covered with an ash-coloured epidermis of a slight coppery tint, with numerous minute black granulations, freckled and marbled also with fuscous spots, largest down the suture and the 2 keeled curved lines; the 1st of these is down the centre of the elytron, and is united with the 2nd towards the apex, and this is exactly midway between the 1st and the outer margin, which forms a similar keel: underside rather rugose-punctate, with very short pubescence; sides of antepectus beautifully striated longitudinally, like the back of the thorax: inflected margin convex and similar to the upper surface: legs very long, with ochreous pubescence; all the thighs densely clothed with longish hairs on the underside and also the tibiæ.

A pair of this handsome insect was taken at Port St. Elena in December. I have never seen any with the thorax so finely striated; and it is readily distinguished from *M. Dejeanii* by the 1st and 2nd elevated lines of the elytra being united at the apex, instead of the 1st and 3rd. In a male given to me by Lieut. Graves, the organ of generation is drawn out as long as the abdomen.

*122. CALLYNTRA MULTICOSTATA, *Guér. Mag. de Zool.* 1834, p. 5. *Solier in Ann. Soc. Ent.* vol. v. p. 337. pl. 7. f. 13.

Taken by Lieut. Graves.

123. EPIPEDONOTA LATA, *Waterhouse in Proceed. Zool. Soc.* 1841, p. 119.

From Chiloe.

*124. EPIPEDONOTA MARGINEPLICATA, *Curt.*

Nigra nitida, thorace concavo in disco longitudinaliter in marginibus transversè striato, elytris porcis 2 exteriore fortiore: intervallo inter hunc marginemque exteriorem regulariter transversè canaliculato (TAB. XLI. fig. 16.).

Length 11 lines, breadth 6.

Black, shining; antennæ short, with whitish hairs, the extremities silky whitish; clypeus and head punctured on the sides: thorax very broad, concave, narrowed in front and deeply emarginate, the angles acuminated; sides very convex, the base bisinuated, trigonate and rounded, the centre striated longitudinally and forming irregularly-vermiculated lines leaving plain spaces, with a very large transverse oval impression, reaching almost to the anterior and to the lateral margins, which are broad and transversely channeled: elytra gradually increasing from the base, which is concave and very broad, to a little beyond the middle, where it is very much sloped off, the apex being trigonate; there are 2 wavy striæ on the back, leaving the suture and the space between them a little raised and undulating; nearer to the external margin is a large ridge, raised most beyond the middle, the space between them with deep transverse channels, forming broadish convex spaces, about 18 in number: inflected margin smooth: abdomen striated, excepting the last 2 joints, which are partially punctured.

December, Port St. Elena, *Lieut. Graves.*

The foregoing *Nyctelidæ* formed the finest group brought home by Capt. King and Mr. Darwin; those submitted to my examination amounting to 12 species, 8 of which were nondescript; and probably those captured by the latter gentleman were equal in number and rarity.

*125. NYCTERINUS ABDOMINALIS, *Esch. Atlas*, p. 14.

It was taken at Conception.

*126. NYCTERINUS RUGICEPS, *Curt.*

Obscurè niger, capite punctulato ad basin granulato, thorace lævi, elytris punctato-striatis.

Length 8 lines, breadth 3.

Dull black, long and narrow: antennæ and palpi rusty piceous; labrum and clypeus finely punctured: head oval, strongly punctured, the base or neck thickly granulated: thorax convex, twice as broad, orbicular, a little broader before than at the base, the former slightly concave, the latter truncated; collar of elytra granulated; scutel shining, very broad and short, with a few punctures: elytra elongate-ovate, not much broader than the thorax, with 9 strongly-punctured striæ on each, somewhat in pairs, deepest at the apex, and an abbreviated one next the scutel: underside thickly and minutely punctured: legs stoutish, scabrose, pitchy-ferruginous.

Two specimens from Valparaiso.

TAXICORNES.

Family DIAPERIDÆ.

*127. OPLOCEPHALA QUADRITUBERCULATA, *Curt.* Neomida, *Dej. & Sturm's Catalogues.*

Piceo-nitida, trophis antennis pedibus subtùsque ferrugineis, capite 4-tuberculato.

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

Elliptical, convex, piceous, very smooth and shining: antennæ subferruginous, basal joint stout, obovate, 2nd small, 3rd elongate-ovate, truncated, remainder incrassated and perfoliate: trophi ochreous: head semicircular, punctured, the clypeus castaneous and defined at the base by a semicircular impression. *Male* with 4 small tubercles in front, and one on each side, on the inner margin of the eye: thorax slightly transverse, a little narrowed before, and finely and indistinctly punctured, with a faint dorsal line; anterior margin castaneous as well as the scutel occasionally: elytra scarcely broader than the thorax and thrice as long, finely punctured, with 8 clearly-punctured lines on each; apex with two foveæ: underside castaneous, thickly punctured: legs bright ferruginous.

A pair were taken at St. Paul's.

This insect approaches the *Oplocephala armata* of M. de Laporte's Monograph; but the male has only 2 tubercles on the crown of the head instead of

2 horns, and the form and proportions of the 4 basal joints of the antennæ are different and do not quite accord even with his generic character: for he says, "articulo primo brevi, incrassato, sequentibus tribus brevibus, tenuibus, cæteris dilatatis aut perfoliatis:" now the 3rd joint in our insect cannot be called short comparatively, and the 4th is the 1st of the dilated and cup-shaped joints.

*128. Alphitobius? punctatus, *Curt.*

Ellipticus, subconvexus, virescenti niger, punctatissimus, elytris piceo-brunneis striato-punctatis, trophis antennis pedibusque castaneis.

Length 2 lines, breadth 1.

Elliptical and slightly convex, black, with an obscure green shade, and scattered over with minute hairs: head and clypeus convex, orbicular, entire and punctured: thorax a little transverse, scarcely narrowed in front, the sides gently convex: elytra brown and punctured, with 8 punctured striæ on each, and an abbreviated one next the scutel, which is semiovate: abdomen punctured and striated: legs, trophi and antennæ castaneous, the latter fuscous at the apex.

From Valparaiso; I have also received it from other parts of Chili.

It appears to associate best with Dejean's genus *Heterophaga*, which never having been characterized, I have adopted Mr. Stephens's name, the type of which is the *Tenebrio mauritanica*, Fab.

*129. Epilasium rotundatum, *Dejean*, *Catalogue*, p. 192.

Ovale, nigrum, punctatissimum, pube pallidè brunneâ vestitum, elytris punctato-striatis.

Length 4 lines, breadth 2⅔.

Oval, convex, dull black, clothed with short depressed ochreous-brown hairs: clypeus deeply emarginate; head and thorax very thickly punctured, the latter semiorbicular, deeply emarginate in front, the angles rounded, sides with a broad flat margin, forming large trigonate lobes behind, the base convex, an indistinct line down the centre, and a small fovea on each side; scutel triangular: elytra with 9 distinct punctured striæ on each, somewhat in pairs after the sutural one: legs short: anterior tibiæ crenated externally, curved and dilated at the apex.

Taken at Maldonado and Gorrite.

Having received this insect from Paris with the above names, and not being aware that it has been described, I have subjoined the characters. It is a member of the genus *Opatrum*, and I doubt not that it lives in sandy situations.

Family TENEBRIONIDÆ.

130. EPITRAGUS ÆNEOBRUNNEUS, *Curt.*

Ferrugineus, æneo-tinctus, undique punctatus, capite punctatissimo, elytris minutè striato-punctatis.

Length 4 lines, breadth $1\frac{3}{4}$.

Light ferruginous, with a brassy-green tinge, shining; mandibles blackish, punctured: clypeus and head coarsely and thickly punctured: thorax a little transverse, semiovate, emarginate in front, base lobed in the centre, thickly and strongly punctured: elytra broader and thrice as long, apex conic, punctured, with 8 indistinct punctured lines on each: underside thickly punctured; sides and legs castaneous.

A single specimen from Rio Janeiro.

*131. EPITRAGUS SEMICASTANEUS, *Curt.*

Castaneus, minutè punctatissimus, capite thoraceque piceis, elytris inconspicuè punctato-striatis.

Length $3\frac{1}{2}$ lines, breadth $1\frac{2}{3}$.

Pale chestnut, with a very faint greenish cast: head and thorax piceous, very thickly and strongly punctured, the latter slightly transverse, the sides very convex, especially anteriorly, with a fine shining line down the back, free from punctures: elytra punctured, scabrose at the base, the shoulders smooth, each with 8 very indistinct punctured striæ: underside of thorax strongly punctured; abdomen very shining and finely but sparingly punctured: trophi, antennæ and legs light ferruginous.

A pair from Gorrite.

Mr. A. Mathews bred a species of *Epitragus* from cocoons which he found buried in the earth at Lima; and when the beetles were first hatched, they were covered with a grey powder, and many specimens are partially so when we receive them.

Family HELOPIDÆ.

*132. CYMATOTHES UNDATUS.

Helops undatus, *Fabr.* *Oliv. Entom.* vol. iii. gen. 58. pl. 2. f. 4.

From Rio Janeiro.

*133. ADELPHUS GEOMETRICUS, *Perty in Spix & Martius, Delect.* pl. 12. f. 16. From St. Paul's.

134. PROSTENUS? HIRSUTUS, *Curt.*

Nitidè æneus vel cupreus, pilis longis vestitus, punctulatus, antennis nigris, elytris subcastaneis punctato-striatis, femoribus basi rufis.

Length $2\frac{1}{2}$ lines, breadth $1\frac{1}{3}$.

Shining, with long upright hairs: trophi and antennæ black, the latter a little incrassated, apical joint rather the longest: head and thorax cupreous, strongly punctate, the former substriated at the base, the latter orbicular; posterior angles acute, with a smooth line down the back: elytra brown, with a slight æneous tint, each with 8 distinctly-punctured striæ, producing series of long, whitish, upright hairs, and intermediate lines of punctures, producing similar but shorter hairs: underside faintly punctured, with whitish depressed hairs: legs the colour of the elytra, but the coxæ and base of the thighs are bright ferruginous.

A single specimen from St. Catherine's: it is readily recognised by its hairy elytra.

Family MORDELLIDÆ.

135. MORDELLA TACHYPORIFORMIS, *Curt.*

Nigra, minutè et crebrè punctulata, suprà pube brevi brunneâ vestita.

Length 3 lines, breadth above 1.

Broad before and very tapering: black, shining, very thickly and minutely punctured all over, and clothed above with a short brown pubescence: 6 terminal joints of antennæ incrassated; head large, with a delicate channel down the centre: thorax broader, transverse, convex, angles all rounded, with a broad obtuse lobe over the scutel, which is trigonate-ovate: elytra transverse, not so long as the thorax but as wide, the hinder margin excised and forming a very acute trigonate external angle: wings fuscous, not so long as the body, which tapers and terminates in a straight stout aculeus; the penultimate segment and sides of the 2 preceding sericeous and dirty whitish.

A specimen from St. Paul's.

136. MORDELLA ARGENTIPUNCTATA, *Curt.*

Sericeo-nigra, thoracis margine antico elytrorum basali maculis 4 aculeisque basalibus argenteo-albis.

Length nearly 2 lines, breadth $\frac{2}{3}$.

Moderately tapering: black, thickly and minutely punctured, and densely clothed with short depressed blackish pubescence; 7 apical joints of antennæ a little dilated, obtrigonate: head globose: thorax broader, but long, the base somewhat lobed and margined with whitish silvery hairs; scutel, a narrow space round it, and 2 spots on each elytron of the same, one being oblique and before the middle, the other beyond it: the elytra are more than twice as long as the thorax and expose only the apex of the stout aculeus, the base of which, as well as 2 spots on each segment, are silvery: underside and legs sericeous ash-colour, forming yellowish silvery spots in certain lights.

This pretty species was found at Conception.

Family Cantharidæ.

*137. Epicauta conspersa, *Germar*?

Nigra pube cinereâ, punctis nigris minutis sparsim conspersa.

Epic. adspersa, *Klug*?

Length 5 lines, breadth 2.

This pretty species was apparently abundant at Gorrite, but I am unable to ascertain whether it be Germar's and Klug's species, not knowing where it is described. Dejean has included it in his genus *Epicauta*, which is distinguished from *Lytta* by its setaceous antennæ.

*138. Tetraonyx bimaculatus, *Klug*, *Verhand. Acad. Nat.* vol. xii. pl. 41. f. 10.

Tetr. 4-maculatus, *Fabr. Ent. Syst.* i. part 2. p. 50?

As Fabricius says the thighs are rufous, which is not entirely the case in our insect, a good portion of the apex being black, I am led to doubt whether the above be synonymous species, especially as our specimens come from Rio Janeiro, and the Fabrician inhabits North America.

*139. Tetraonyx 7-guttatus, *Curt.*

Niger, suprà aurantiacus, capitis thoracisque maculâ elytrorum maculis 4 basalibus fasciâque postmedianâ irregulari nigris, femoribus basi rufis.

Length 5½ lines, breadth 2¼.

Black, shining; head and thorax punctured, hairy and rufous, the former with the clypeus, margins of the eyes and a diamond spot on the face extending by a line to the base, black; the latter transverse, with a similar spot on the disc: scutel large and black, sometimes rufous in the middle: elytra orange-coloured, with a large black spot on each side close to the suture, and a smaller one near the costal margin; beyond the middle is a black irregular fascia formed by the union of 4 large spots: thighs rufous, excepting the apex.

Two specimens were taken at Conception.

*140. Tetraonyx cinctus, *Curt.*

Nitidè niger, pubescens, punctulatus, elytris subscabris: suturâ margineque exteriore ochraceis.

Length 4 lines, breadth $1\frac{1}{2}$.

Deep shining black, covered with longish pubescence: head and thorax punctured, the latter short and scarcely broader than the head, with a broad dorsal channel, forming a large fovea near the base: elytra finely scabrose, dark fuscous, the suture bright ochreous, connected with a broader line round the costa, the shoulder and a short lanceolate spot from it of the same colour.

Having distributed this pretty insect upon the Continent with the above name, I may be excused for introducing a description of it here. For numerous specimens I am indebted to the late Mr. A. Mathews, who took them near Lima.

Family Œdemeridæ.

141. Nacerdes? alternans, *Curt.*

Pallidè ochreus, oculis thoracis lineâ inconspicuâ elytrorumque strigis 2 longis pallidè fuscis.

Length $3\frac{3}{4}$ lines, breadth 1.

Smooth, clothed with the finest depressed pubescence: antennæ and palpi of a very pale fuscous-ochre colour; tips of maxillæ piceous; eyes dark: head and thorax ochreous, the former with a puncture in the forehead, the latter broader but not longer, obovate-truncate, being narrowed towards the base, with an indistinct fuscous dorsal line, darkest at the extremities and appearing like 2 dots in some lights, a similar dot on each side where the outline is most prominent; scutel large: elytra elliptical, tapering a little, broader than the thorax and thrice as long, with 4 faint lines on each; straw-coloured, with a broadish mouse-coloured stripe near the suture, not reaching the apex, and a narrower one near the costal margin, curved round at the apex, leaving the suture, outer margin, and a stripe down the centre, of a straw-colour: underside ochreous, sides of metathorax mouse-coloured: abdomen ochreous-white, margin of 2nd segment and the 3rd and 4th entirely mouse-colour: legs ochreous.

A single specimen from Gorrite.

Never having seen Dejean's characters of *Nacerdes* and *Asclera*, I am unable to determine with certainty the genus which embraces this species, but it agrees better in habit with *N. melanura*, Linn., than it does with the Fabrician species *A. thoracica* and *A. sanguinicollis*; and if I mistake not, the large size of the scutellum indicates that it is a *Nacerdes*, as that organ appears to be minute in *Asclera*.

Since the publication of the former part of this paper in 1838, I have received some specimens of one of the *Cisidæ** from Columbia, which have so evidently the habit of our genus *Exops*, that I am convinced there is the greatest affinity between that family and the *Cleridæ*†. I may also state, that I have found a figure of *Exops Bevani* in the Supplement to the 16th volume of the 'Nova Acta Acad. Nat. Cur.' pl. 39. f. 4, and named by Eschscholtz *Psoa Chilensis*, an additional proof of the affinity of our insect with the *Cisidæ*; at the same time it must be remarked, that the absence of the small basal joint of the tarsi in *Psoa*, by which it is legitimately tetramerous, and the antennæ of 10 joints only, render it impossible to include our *Exops* with 5-jointed tarsi and 11-jointed antennæ in the same genus.

Finding that the name *Odontoscelis* (vol. xviii. p. 186) is pre-occupied by a Homopterous genus, it is necessary to substitute another name; I therefore propose to call it *Scelodontis*.

London, March 1844.

* I established this family in 'British Entomology' (folio 402); but unfortunately the limited plan of the work did not allow of my discussing the subject. It was intended to embrace those *Bostricidæ* which have a labrum, as *Apate* (vide fol. and pl. 271 of the same work), *Cis*, &c., which is wanting in the typical groups of that family; vide *Scolytus* and *Platypus* (ibid. fol. and pl. 43 and 51).

† Vide my remarks upon the *Cisidæ* and *Cleridæ* in 'Brit. Ent.' fol. 402, and my arrangement in the 'Guide,' genera 321 to 336.

EXPLANATION OF THE PLATE.

Tab. XLI.

Fig. 1. *Oryctomorphus pictus*, ♀.
  a. Antenna of ditto.

Fig. 2. *Tribostethes castaneus*, ♂.
  b. Antenna of ditto.
  c. The hind foot.

Fig. 3. *Leucothyreus? antennatus.*
  d. The fore foot.
  e. The antenna.

Fig. 4. *Serioides atricapilla.*
  f. The antenna.

Fig. 5. *Pacuvia castanea.*
  g. Maxillary palpus.
  h. The antenna.
  i. Terminal joint of fore foot and claws.

Fig. 6. *Accia lucida.*
  k. Maxillary palpus.
  l. The antenna.

Fig. 7. *Leptynoderes tuberculatus.*

Fig. 8. *Emalodera multipunctata.*

Fig. 9. *Nyctelia caudata.*

Fig. 10. *Nyctelia undatipennis.*

Fig. 11. *Nyctelia Fitzroyi.*

Fig. 12. *Nyctelia granulata.*

Fig. 13. *Nyctelia Bremii.*

Fig. 14. *Nyctelia? corrugata.*

Fig. 15. *Mitragenius araneiformis.*

Fig. 16. *Epipedonota margineplicata.*

Obs. The lines by the side of the subjects in the Plate denote the natural lengths of those which are magnified.

XXX. *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. By* Edward Doubleday, *Esq., F.L.S. &c. &c.*

Read February 4th and March 18th, 1845.

It is now upwards of fifty years since Jones, in a paper read before this Society, pointed out certain variations in the neuration of the wings of the *Diurnal Lepidoptera*, which appeared to him to aid in dividing them into groups more natural than those of Linnæus or Fabricius. From that time, until the appearance in 1836 of the first volume of Dr. Boisduval's 'Spécies Générale des Lépidoptères,' little attention had been paid to the characters to be derived from these variations, equally valuable for the purposes of subdivision into minor groups, as genera and subgenera, and for binding these together into larger natural groups.

In January 1842 M. Lefebvre laid before the French Entomological Society the results of his observations on this subject, and his discourse, published in the eleventh volume of the Annals of that Society, is by far the most valuable contribution to our knowledge of the alary system of *Lepidoptera* that has yet appeared.

De Haan in the magnificent work on the Dutch Colonies, Dr. Rambur in the 'Faune Entomologique de l'Andalousie,' and Mr. Westwood in 'Humphreys's British Butterflies,' have to a certain extent made use of characters drawn from the neuration of the wing of the *Rhopalocera*, but only to a limited extent, and by no means in a satisfactory manner. None of these authors, however, have fairly tested the value of these characters by a careful investigation of some large natural group, with a view to its subdivision into minor groups founded upon them, followed up by an equally careful examination of the structure of the legs, antennæ and palpi, and of the form of the larvæ.

Whilst re-arranging the *Rhopalocerous Lepidoptera* in the collection of the British Museum, my attention was particularly directed to this subject, more especially in consequence of repeated perusals of M. Lefebvre's discourse, to which I am indebted for many important hints.

As far as I was able to carry my researches, I found the characters derived from the nervures of the highest importance, especially in the difficult family of the *Nymphalidæ*, where they are easier to detect and apparently of greater real value than those drawn from either the antennæ or the palpi, and often appear to confirm divisions founded on the form of the larvæ; as for instance, the variations in the structure of the subcostal nervure easily distinguish the genera *Helicodes*, *Charaxes* and *Apatura*, of which the larvæ are spined only on the head and are attenuated posteriorly, from *Marpesia*, *Nymphalis*, *Limenitis* and *Diadema*, of which the larvæ are more or less spined on the thoracic and abdominal segments, and nearly cylindrical: and relying on these characters in the absence of information as to the larvæ, I have placed *Agrias*, *Chlorippe*, *Prepona*, &c. with the former, and *Timetes*, *Amphirena*, *Victorina* and *Prothoë* with the latter, though in this I differ from my learned friend Dr. Boisduval, the 'facile princeps' of Lepidopterists past and present*.

A more extended study of this family would probably lead to its subdivision into four groups, which might be named *Argynnidæ*, *Nymphalidæ*, *Adoliadæ* and *Apaturidæ*, the last already separated by Dr. Boisduval, the first by M. Blanchard.

From the first of these divisions I have selected a small but natural group, the genus *Argynnis* of Godart, excluding however a few species, to show how easily and how naturally it may be subdivided by characters drawn from the nervures, especially from the subcostal.

As the term subcostal nervure will be used hereafter in a more limited sense than has always hitherto been given to it, it becomes necessary to point out what is to be considered as the true subcostal of the anterior wings, and the reasons for separating from it certain nervules hitherto always regarded as forming part of it. Whilst doing this I shall adhere strictly to M. Lefebvre's nomenclature, and shall chiefly refer for confirmation of my opinions to his plates.

* In a manuscript catalogue which I owe to his kindness he adopts the following arrangement: *Chlorippe*, *Apatura*, *Minetra*, *Meneris*, *Agrias*, *Amnosia*, *Timetes* (including *Marpesia*), *Autonema* (*Prothoë*, Hubn.), *Philognoma*, *Charaxes*, &c.

M. Lefebvre has pointed out that the nervules may be divided into superior and inferior, according to their position above or below a fold generally visible in the wings of Lepidoptera, to which he gives the name of *pli cellulaire*. To the nervules he proposes to give the names of first inferior, first superior, &c., choosing this fold as his starting-point for numbering them.

In the Diurnal Lepidoptera he gives the names of costal and subcostal nervures to the upper ones; of median, submedian and internal to the lower ones. The costal nervure admits of no doubt as to its limits, but it has been often a matter of doubt to what nervure his first and second superior nervule ought to be referred, as sometimes they seem to belong to the subcostal, sometimes to the median. This point M. Lefebvre decides by giving them to the subcostal, because he considers them to be always above the cellular fold. He views the subcostal as generally emitting four nervules, of which either the second or third is often, if not always, branched.

In the *Heterocera* he finds "quelques nervules qui n'ont pu étre consignées." These chiefly depend on a central nervure, which he calls the discoidal, which is sometimes above, sometimes below, the cellular fold.

Such is M. Lefebvre's theory of the wing. After a long examination of the wings of Lepidoptera, from *Papilio* to the last of the *Tineidæ*, I have arrived at a somewhat different conclusion, in which I have been confirmed by a hasty glance over other orders. I should not speak so confidently of the result of my labours, had I not submitted my observations to my friend Mr. Newport, who entirely coincided with my conclusions; and thus, having the sanction of our best physiological and anatomical entomologist, I cannot be accused of presumption in differing from all those who have preceded me.

The theory which I would propound is this: that the normal 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 economy.

It is not my intention now to follow out this theory further than so far as it applies to the Lepidoptera, more especially to the Rhopalocerous ones. I hope at some future time to enter fully into all its details.

The three upper nervures exist 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.

I must here refer to M. Lefebvre's third plate, where these nervules are the first superior and first inferior of figure 1, the first superior and first branch of the second superior in figure 3, and the first and second superior in figures 4 to 7. It will be seen at figure 5, which represents the wing of *Hyades Jairus*, that these nervules are united to the median by a curved disco-cellular nervure, but have no connexion whatever with the subcostal. In *Heliconia Melpomene* (fig. 6.) a short disco-cellular also unites them to the subcostal, and in *Vanessa Larinia* (fig. 3.) they are quite separated from the median, but united by a very short disco-cellular to the subcostal. In *Papilio* the upper of these nervules springs from the middle of the first portion of the disco-cellular; the other is united to the median by a continuation of the disco-cellular, which makes an angle with its upper portion, and has always been considered to be a part of the median; whence Jones and subsequent writers have stated that the true *Equites* or *Papilionidæ* had four branches to that nervure.

I must now refer more particularly to *Heliconia Selene* (fig. 7.). These nervules are there connected with both the median and subcostal, and from the transverse part, which M. Lefebvre would consider part of the disco-cellular, spring two short nervules, pointing inwards, and becoming gradually obliterated. These exist also in *Danaus* and some other genera, and it is surprising that they did not lead M. Lefebvre to suspect that they indicated a connexion with his discoidal nervure.

It is amongst the *Heterocera* that we must look for the normal state of the discoidal nervure. In these we find it sometimes a nervure of nearly equal solidity with the median or subcostal, but in others it appears to be only a tube of the same texture as the membrane of the wing; and then we find it merely a faint line extending from the disco-cellular to the base, evidently not tubular.

Thus in *Castnia*, where it branches about the middle of the discoidal cell, the upper branch is often almost atrophied; in *Heleona militaris* it is in this state throughout its whole course; in *Urania* and *Leiocampa* its course is indicated by a line, which shows no symptoms of being tubular, and which in the latter genus does not reach the base. One step more and it has vanished from the wing, though sometimes in certain lights a faint trace of it may with difficulty be detected. A close examination of the wing will always show a partially atrophied disco-cellular, connecting these nervules of the discoidal with either the subcostal or the median nervures, even where one of them has been described as quite free.

We thus see the discoidal nervure becoming gradually atrophied until only its nervules remain; and as air must in some way penetrate into them, they are, when the parent trunk has vanished, attached to the nervure immediately above or below them, or to both.

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, then the subcostal nervure generally offering five nervules, but sometimes only three. In the *Suspensi* the number of these nervules is almost invariably five, but in the *Succincti* it is more variable, especially in the *Erycinidæ*. Not unfrequently these nervules anastomose with the costal, as in some species of *Papilio* and *Danaus* and in *Hecalene Clytemnestra*, &c. *Leptocercus* presents an almost solitary instance of a bifurcation of one of these nervules; but perhaps the more correct view of this would be to consider that two nervules coalesce at their base in a manner analogous to the union of the costal nervure with the first subcostal nervule in some species of *Danaus*.

The genus *Argynnis* of Godart always offers five subcostal nervules, never, I believe, anastomosing with the costal nervure.

If we remove from it three species, *Arg. Alcandra*, *Aceste* and *Lucina*, and add to it some of the *Cethosiæ*, it is, as I have already said, a most natural group. Perhaps a fourth species, *Arg. Metea*, ought to be excluded also, but I only know it from Stoll's figure, which leads me to believe it to be a *Diadema*.

Long before Godart, Fabricius had divided this group into two genera, *Argynnis* and *Melitæa*, the latter placed immediately before *Helicopis*, with nine genera between it and the former, his generic character being strangely incorrect. His first species, *M. Lucina*, is now removed to another family, but his generic names have been retained by both continental and British entomologists, though they differ as to the limits of the genera. Nature, however, is decidedly on the side of our continental brethren.

Hübner in his 'Verzeichniss' has made almost as many genera as there are species in this group, but his divisions are so unnatural that they can in no case be adopted.

Dr. Horsfield has founded the genus *Phalanta* on *Arg. Phalanta* and its allies. M. Blanchard has separated *P. Pantheratus* of Martyn, the *Arg. Briarea* of Godart, making it the type of his genus *Clothilda*. Mr. Westwood has proposed to divide our British species into five groups, founded chiefly on the form and colours of the wings, to which he gives no names.

The generic name *Agraulis*, proposed by Hübner, has been retained, but not in accordance with his limitation.

Several very natural groups have as yet not been taken notice of; to provide for these species I venture to propose the following sections, founded, as will be seen in a great degree, on the position of the subcostal nervules, the first being the genus *Agraulis*, properly so called.

In *Agraulis Vanillæ* and *Moneta*, the first subcostal nervule has its origin beyond the disco-cellular nervure, the first and second being more widely distant than the second and third, the third and fourth near together, the nervure making a considerable bend downwards after throwing off the third nervule. A short upper disco-cellular connects the first discoidal nervule with the subcostal; a much longer and curved disco-cellular connects the second discoidal nervule with the median beyond its second nervule. The discoidal cell of the posterior wings is open, and both the subcostal and median nervures are much curved. These two species are much more nearly allied to many species of Godart's *Cethosiæ* than to the typical species of *Argynnis*, though it is doubtful if these ought all to be placed in the same genus, as is done by Dr. Boisduval.

The second section will include *Argynnis Thaïs*, *Clagia* and their allies.

In these the first subcostal nervule has its origin a short distance before the very short upper disco-cellular; the second arises opposite or immediately before this nervure; the third is less distant from the apex than from the disco-cellular; and the fourth is thrown off very soon after the third. The lower disco-cellular is long, little curved, uniting with the median before its second nervule. The cell of the posterior wings is open, the median and subcostal nervures are but little curved. *Terinos Clarissa* of Boisduval really belongs to this group, notwithstanding its different colouring: *Terinos* may therefore be used as a subgeneric name for it.

Argynnis Iole will form the type of a third section, the first subcostal nervule arising a little before the point of contact between the upper discoidal and the subcostal nervures, for here there can scarcely be said to be an upper disco-cellular, the second about double the distance beyond the point of junction. The median nervure of the posterior wings is more curved than in the preceding section, but in other respects the structure of both wings is nearly similar.

A fourth section is the genus *Phalanta* of Dr. Horsfield, in which, notwithstanding their more rounded wings, *Arg. Erymanthis* and *Prosope* must be included. Here the subcostal nervules are thrown off at nearly equal intervals, the first being immediately opposite the short upper disco-cellular. A slightly curved disco-cellular, of moderate length, connects the second disco-cellular with the median immediately opposite its second nervule. The subcostal and median nervules of the posterior wings are much curved, the discoidal cell being generally open; but in *Arg. Claudia* and a species from Congo closely allied to *Arg. Phalanta* it is closed by a very delicate disco-cellular.

Several species in the preceding sections show a tendency to an angular projection at the termination of the third median nervule of the lower wings; in *Arg. Egesta*, the type of the fifth section, they are absolutely tailed. In this species the first subcostal nervule precedes the short upper disco-cellular; the second is at rather more than an equal distance beyond it; the third at about two-thirds the distance between the base and the apex; the fourth shortly beyond it. The lower disco-cellular is straight, and joins the median nervure opposite to its second nervule. The posterior wings have the cellule closed, the subcostal and median nervures little curved.

In M. Blanchard's genus *Clothilda* the subcostal nervules are at nearly equal distances, the second being immediately opposite the scarcely visible upper disco-cellular. The third median nervule is bent nearly at a right angle at its junction with the lower disco-cellular, which is directed obliquely towards the outer margin. The discoidal cell of the posterior wings is closed; the subcostal, like the median nervule of the upper wings, is bent nearly at a right angle, where it is united to the disco-cellular; the latter is united to the median nervure opposite to its second nervule.

The seventh section includes Dr. Boisduval's section *Majores* of his genus *Argynnis*, with the addition of *Lathonia* and some other species, as *Niphe* and *Childrenæ* of the old world, *Aphrodite, Cybele* and *Diana* of the new. Here the first and second subcostal nervules have their origin before the very short disco-cellular; the third rather more than half-way between this and the apex; the fourth at about an equal distance from the third and from the apex. The lower disco-cellular is long, nearly straight, united to the median beyond its second nervule. The cell of the posterior wing is closed by a slender disco-cellular joining the median, which is there considerably curved, exactly opposite its second nervule.

The eighth section comprises the *Minores* of Dr. Boisduval, with the exception of one or two species, and also includes several species from the temperate regions of both North and South America. Our British species have been generally placed in the genus *Melitæa* by English entomologists, but the larvæ and pupæ, independent of other characters, point out their distinction from it. These species differ from those of the preceding section in having the first discoidal nervule united to the subcostal without the intervention of any disco-cellular, in having only one subcostal nervule before this point of junction, and in having the lower disco-cellular much longer. The disco-cellular of the posterior wings is much stronger, and joins the median beyond its second nervule.

The remaining species compose the genus *Melitæa*, properly so called. They differ from those of the preceding section in having a short upper disco-cellular to the anterior wings, and in having the cell of the posterior wings open, a character which, as was first pointed out by Herrich-Schæffer, serves to separate them from the other European forms of the genus *Argynnis* of Godart. There is a difference in the degree of curvature of the subcostal of the posterior wings and in the American group, of which *Arg. Tharos* and *Ismeria* may be considered the types; the disco-cellulars of the anterior wings are almost atrophied.

The geographical distribution of these groups is interesting. The first is confined to the warmer parts of America; the second, to the tropical parts of Asia; the third, to tropical Africa; the fourth is tropical and subtropical in both the old and new world; the fifth is from tropical Asia; the sixth occurs in Mexico and the West Indies; the seventh has its station in the temperate regions of the northern hemisphere, though three species occur in the warmer parts of Asia; the eighth has its head-quarters in Europe and the temperate regions of North America, but reappears in Chili and the Falkland Isles.

The genus *Melitæa* has three divisions: one numerous in Europe: the second, of which *M. Phaëton* and *Chalcedona*, Boisd. are as yet the only species known, confined to Northern America; the third, numerous in species, extending from Hudson's Bay to high latitudes of the southern hemisphere.

EXPLANATION OF THE PLATE.

Tab. XLII.

Fig. 1. *Agraulis Vanillæ*, Hübn.
Fig. 2. *Terinos*, n. sp.
Fig. 3. *Argynnis Iole*, Godart.
Fig. 4. *Argynnis Hegesia*, Godart.
Fig. 5. *Argynnis Egesta*, Godart.
Fig. 6. *Clothilda pantherina.*
Fig. 7. *Argynnis Cybele*, Godart.
Fig. 8. *Argynnis Dia*, Godart.
Fig. 9*a*. *Melitæa Cinxia*, Ochs.
Fig. 9*b*. *Melitæa Phaëton*, Boisd.
Fig. 9*c*. *Melitæa Ianthe.*


9 A
9 B

XXXI. *Note on the Development of the Ovulum of* Osyris, *in correction of the Statement made at Page* 178 *of the present Volume. By* WILLIAM GRIFFITH, *Esq., F.L.S. &c. &c.*

Read November 19th, 1844.

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 Nepalensis* 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.

Botanic Gardens, Calcutta, November 12, 1843.

XXXII. *Note on the Memoir printed at Page 249 of the present Volume.* *By* JOHN CURTIS, *Esq., F.L.S. &c. &c.*

Read January 21st, 1845.

SINCE my Paper upon the economy of the *Dielocerus Ellisii* was laid before the Linnean Society, some materials have accidentally fallen in my way, which appear to throw light upon the curious habits of that insect.

Last autumn I had a cocoon of the Emperor moth (*Saturnia Pavonia-minor*) transmitted to me, infested by a parasite: the cocoon being divided longitudinally, instead of the chrysalis, a series of cells (fig. 1.) was discovered, so analogous to those represented in the present volume (TAB. XXXI. fig. 5.), that I think a doubt can no longer exist that the woolly masses there exhibited (figs. 3, 4, 5.) are the cocoons of some large South American *Bombyx*, and that the substance of the caterpillar has been converted into cells by the larvæ of the Tenthredinous insect. Although this will set aside the theory of their having manufactured the nest, a still greater anomaly in their economy presents itself, that of a saw-fly being parasitic.

One side of the cocoon sent to me last autumn was occupied by hexagonal and irregularly-sided cells (fig. 1, *b*), but on the other they were nearly choked with the wool (fig. 1, *c*): from this it may be inferred that it is the fat on which the parasites subsist, leaving uninjured the vessels and secretions which supply the caterpillars of moths with silken materials for their cocoons; and at the same time there is strong evidence that it is this woolly substance, combined with liquid secretions at the command of the parasitic larvæ, of which the cells are formed, and that the quantity of woolly material remaining was a surplus unrequired by the larvæ.

The contents of the cocoon and cells have been subjected to the most rigid scrutiny, but I cannot find a vestige of any perfect insect to indicate the genus of this newly-discovered parasite. I detected, however, a dried and broken maggot (fig. 2.), which I joined together, and certainly there are no indications of its being the larva of a *Tenthredo* ; the head is not large enough, and I could not discover any feet, not even the pectoral. It is therefore more likely to be a larva of the family *Ichneumonidæ*. Great numbers of the curious spines which clothe the caterpillar of *Saturnia Pavonia-minor* fell out of the cocoon, as well as atoms of exuviæ apparently ; but I conjecture, from their imperfect state, that they had remained for many months exposed to the changes of the seasons.

The cells most analogous to these are some formed by the *Microgaster alvearius* (Curtis's Brit. Ent. fol. & pl. 321), which are as regular as a honeycomb ; and I find from the following notice, that the pupæ of the Eggar-moths are similarly infested. At a meeting of the Entomological Society, Dr. Calvert "exhibited a cocoon, apparently of one of the Eggar-moths, the interior of which was occupied by a great number of the minute cocoons of one of the *Ichneumonides adsciti* closely arranged with great regularity." (Ent. Trans. vol. iii. p. xxxv.)

Hayes, near Uxbridge, December 6, 1844.

Fig. 1. Longitudinal section of the cocoon. *a.* Its ciliated end. *b.* The side of the cells. *c.* The woolly portion.

Fig. 2. A dead larva in one of the cells, which was cut or broken into three portions.

XXXIII. *Extracts from the* Minute-Book *of the* Linnean Society *of* London.

1841.

March 16. READ a "Letter from Joseph Woods, Esq., F.L.S., to Mr. Richard Kippist, on *Crepis biennis* and *Barkhausia taraxacifolia*."

Mr. Woods is of opinion that the plant described by Sir James Smith in the 'English Flora' and 'English Botany,' by Sir W. J. Hooker in the 'British Flora,' by Mr. Babington in the Society's 'Transactions,' vol. xvii. p. 456, and by Mr. Mackay in his 'Irish Flora,' as *Crepis biennis*, is in reality *Barkhausia taraxacifolia*, distinguished especially by the long beak of its achenia, while those of *Crepis biennis* are, in the words of Gaudin, "neutiquam attenuata." The stem of *Crepis biennis* is also less branched and more leafy than that of *Barkhausia taraxacifolia*, the latter rarely producing a leaf except where there is a branch. Mr. Woods adds, that it is almost certain that we have the two species in England, though the difference has not been noticed. *Crepis biennis* grows in Kent and Surrey.

In a "Note" appended to Mr. Woods's letter, Mr. Kippist states that the authentic Linnean specimens of *Crepis biennis* from Scania, although too young to have ripe seeds, appear to confirm Mr. Woods's idea, the pappus being quite sessile even in those most advanced, and the stem moderately branched in the upper part, and very leafy below. The two specimens in the Smithian herbarium, one from Mr. Crowe's garden and the other from Mr. Rose's herbarium, have the stem much branched, and the pappus apparently sessile, but the achenia are immature.

The only developed specimen in Mr. Winch's herbarium is from Dartford in Kent, and has the pappus very decidedly stalked, the stem much branched in the upper part, and only a few scattered leaves in the lower, a branch being produced from the axilla of each cauline leaf with the exception of one or two of the lowermost. Other specimens, gathered near Cobham and Ramsgate, in the same county, and near Moulsey in Surrey, agree with Mr. Winch's plant in their stalked pappus and branched stem, and probably therefore belong to *Barkhausia taraxacifolia*. The only British specimens in the Society's possession that Mr. Kippist believes to be referable with certainty to *Crepis biennis* are two in the Hortus Siccus of Mr. Woodward, with ripe achenia and perfectly sessile pappus; the habitats of the plants are not given, but in all probability they were gathered either in Suffolk or Norfolk.

April 6. Read an Extract of a Letter from J. Burnham, Esq., to Hyde Clarke, Esq., F.L.S., on a supposed new British *Juncus*. Communicated by Mr. Clarke.

Mr. Burnham states this *Juncus*, which he proposes to call *Junc. lucens*, to be not very uncommon about villages and country-towns in Shropshire and Herefordshire, and to be met with also in other places both in England and on the continent, viz. in France and Bavaria. He thinks it may have been confounded, if observed before the flowering season, with *Junc. effusus*, from which however its thick and light-coloured culms at all times distinguish it. The following is Mr. Burnham's description of the plant:

"Planta pedalis et ultrà; radicibus parvis conicis, fibris inconspicuis; culmis plurimis æqualibus, omnibus florentibus, nec unquam sterilibus, subcylindricis (medullâ subtetragonâ albido-viridi, strato exteriore flavescenti annulis concentricis conspicuis), glaberrimis, tegumento unctuoso (huic speciei proprio) indutis, junioribus spathâ communi papyraceâ circumvallatis, adultis spathâ lacerâ effusis subsolitariis; capitulis terminalibus compactis; perianthiis oblongo-lanceolatis, flammeis, erectis, evanescentibus; pedicellis nigrescentibus. Cæterùm *Junco effuso* simillima."

Mr. Burnham suspects that this plant is alluded to in Ray's 'Synopsis Stirpium Britannicarum,' and it seems probable that it may be the same with *Juncus effusus*, β. of Smith's 'English Flora,' vol. ii. p. 168.

Nov. 16. Read "Descriptions of some Vegetable Monstrosities," by the Rev. William Hincks, F.L.S., F.R.S.E. &c. &c.

In this paper, which is a continuation of one read before the Society towards the close of the year 1839, and of which some account is given at page 691 of the previous volume, Mr. Hincks arranges the monsters described by him under the several heads of adherences, transformations, and increased or diminished developments of particular parts.

The adherences comprise, first, a case of the union of five grapes into one fruit in so complete a manner as to render it probable that the flowers were also united; secondly, an instance of cohesion between four peduncles of *Centaurea moschata*, without fusion of their capitula; and thirdly, the common case of adherence of two flowers of *Fuchsia fulgens*. The latter is introduced for the purpose of remarking how frequently, when the usual number of organs in a circle results from the suppression of certain parts rudimentally present, the same cause which produces adherence with the nearest flower, also developes all the rudiments, and thus increases the number of parts. On the other hand, in cases of union by fusion, that is, where the united flowers form one enlarged flower, Mr. Hincks observes, that one organ at least is generally sacrificed at each point of junction.

Of transformations Mr. Hincks notices two: first, a terminal bud of an *Azalea*, gathered about the period when the plant ceased to produce blossoms, which is partially converted into a flower, the leaves nearest the centre being imperfectly changed into stamina, and surrounded by many of petaloid aspect, while the outer leaves differ from the ordinary appearance only in having a little colour; the organs are not arranged in circles, and one leaf only, and that among the most remote from the centre, assumes the form of a pistillum. The second transformation described occurs in a specimen of *Gentiana campestris*, in which all the parts of the flower are converted into leaves, which are somewhat petaloid and crowded into a rose-like tuft: this kind of transformation is similar to that described and figured by DeCandolle in *Trifolium repens.*

The first case of increased or diminished development noticed by Mr. Hincks affects a specimen of *Anagallis arvensis*, resembling one described by M. Moquin-Tandon as found by M. Gay, in which an increased development of the exterior circle is accompanied by diminution in the interior ones: the effect produced is stated to be very unequal in different flowers, but the more the calyx is enlarged, the more the interior circles are contracted. The second case is the well-known wheat-ear carnation, *Dianthus Caryophyllus imbricatus*, L., which is noticed as probably affording the best example of the monstrous multiplication of a particular circle. A third case occurs in a capitulum of *Matricaria*, in which the bracteæ, consisting under ordinary circumstances of paleaceous scales, are enlarged into full-sized leaves, completely deforming the flower: the rose-ribwort is noticed as a phænomenon of the same kind. Fourthly, Mr. Hincks mentions a monstrous variety or highly developed form of *Convallaria multiflora*, cultivated at Kew, which he presumes to be the *var. bracteata* of De Candolle and Duby: in it the number of flowers usually reaches five or six, and each of them proceeds from the axilla of a small leaf on the pedicel. And lastly, the author notices under this head a case of abortion or atrophy affecting the leaf of a fern cultivated by Messrs. Rolleston, by which in one instance the whole side of a frond, and in another the secondary veins with the parenchyma at both sides are entirely suppressed; a phænomenon which he has also observed in *Scolopendrium officinale.*

Dec. 21. The Secretary announced to the Society, that, since its last Meeting, it had sustained a severe loss by the Death of its Librarian, Professor Don, which took place at the Society's House on the 8th instant.

1842.

Feb. 15. An Election took place to supply the Vacancy caused by the Death of Professor Don, when Mr. Richard Kippist was chosen in his place.

March 1. The Secretary reported that since the last Meeting the Society had received from Mr. Borrer the present of a valuable Herbarium of Foreign Flowering Plants, and read the following Letter from Mr. Borrer to Mr. Forster, offering it for the Society's acceptance: viz.—

"My dear Sir,

"Will you trouble yourself to offer for me to the acceptance of the Linnean Society, as a contribution to their Herbarium, a collection, arranged in part only, of foreign flowering plants?

"It contains European plants from Mertens, Woods, Hooker, &c., some of Drummond's American ones, nearly all of Gardner's, so far as they are as yet distributed, except the Cyperaceæ and the Grasses, and some North American from Hooker; several of the *Unio Itineraria* collections, from Arabia, Abyssinia, Algiers, Caucasus, Norway, the Pyrenees, &c.; Lippold's Madeira plants; a few from Australia, and home-dried garden specimens. From the *Unio* collections and from Lippold's the plants of the first five Linnean classes have been taken out.

"Yours faithfully,

(Signed) "W. Borrer."

"Henfield, Dec. 10, 1841."

It was ordered that the special Thanks of the Society be presented to Mr. Borrer, for this important addition to the Society's Herbarium.

April 5. The Secretary announced that the Society had received, in pursuance of the bequest of the late Professor Don, his Herbarium and Collection of Woods and Fruits, with the exception of such as relate to *Materia Medica*.

April 19. The Secretary announced that the Treasurer had received from the Executors of the late Archibald Menzies, Esq., F.L.S., £90, being the amount of a legacy of £100, bequeathed by him to the Linnean Society, after deducting £10 for Legacy Duty.

May 24. In accordance with a Resolution of Council of the 26th ult., the Secretary read the following Statement, viz.

"Linnean Society,
April 26, 1842.

"The Council having had under their serious consideration the financial affairs of the Society, submit the following Statement to the Fellows at large.

"The cost of the Collections and Library of Linnæus, together with those of the first President, Sir James Edward Smith, purchased of the Executors of the latter in 1828, amounted to £3000. Of this sum about £1500 were then raised by subscription; and to meet the remainder a debt on bonds was incurred, which now amounts to £1300, paying interest at 5 per cent.

"In consequence partly of this amount of interest, and partly of a diminution in the Annual Receipts, there has been accumulated within the last few years a further debt of about £500.

"By recent arrangements a saving of some amount has been made in the Expenditure; but the Council are convinced that no further material reduction can be made without greatly impairing the efficiency of the Society, and they desire to avoid, as far as possible, the necessity of calling upon the Fellows to agree to a small charge being placed upon the Society's Publications; that appearing to be the most obvious means of supplying the deficiency in the Annual Receipts.

"With this view they propose a General Subscription, which, they trust, may reach such an amount as to meet the present liabilities, and to relieve the funds of the Society from the burthen of debt and interest. They therefore earnestly recommend the Subscription to the Members of the Society."

The following is a List of the Subscriptions received:—

	£	s.
The Lord Bishop of Norwich, Pres.	50	0
His Grace the Duke of Somerset	26	5
His Grace the Duke of Northumberland	50	0
The Right Hon. Earl Brownlow	20	0
William Anderson, Esq.	10	0
William Atkinson, Esq.	2	2
Robert John Ashton, Esq.	5	0
Charles Cardale Babington, Esq.	5	0
Rev. John Barlow	5	0
Henry Beaufoy, Esq.	5	5
Thomas Bell, Esq.	21	0
John J. Bennett, Esq., Secretary	21	0
Rev. Miles Joseph Berkeley	5	0
John Blackwall, Esq.	10	0
Francis Boott, Esq., M.D.	10	0
William Borrer, Esq.	21	0
William Borrer, Jun., Esq.	5	5
William Bridgman, Esq.	5	5
Lieut.-Gen. Sir T. M. Brisbane, K.C.B.	5	0

	£	s.
Wm. Arnold Bromfield, Esq., M.D.	5	5
Henry Alexander Brown, Esq.	5	0
Robert Brown, Esq., V.P.	21	0
Harford James J. Brydges, Esq. ..	5	0
Walter Buchanan, Esq.	5	5
William John Burchell, Esq., LL.D.	5	0
Jonathan Couch, Esq.	1	0
Hugh Cuming, Esq.	5	0
Rev. William Cuthbert, D.D.	5	0
James Charles Dale, Esq.	5	0
Charles Daubeny, Esq., M.D.	5	0
David Elisha Davy, Esq.	5	0
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John Shute Duncan, Esq., D.C.L...	5	0
M. Pakenham Edgeworth, Esq.	5	0
Alexander Erskine, Esq.	10	10
Mr. James Forbes	1	1
Edward Forster, Esq., Treas. & V.P.	21	0
Edward Forster, Jun., Esq.	5	5
Thomas Forster, Esq., M.D.	5	5
George Townshend Fox, Esq.	5	5
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Rev. John Hailstone	5	0
John Alexander Hankey, Esq.	26	5
Rev. Henry Hasted	3	3
Ditto, Second Subscription	3	3
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Joseph Janson, Esq.	50	0
Capt. Theobald Jones, R.N., M.P. .	5	0
Benjamin Kennedy, Esq.	2	0
John Kidd, Esq.	5	0
Mr. Richard Kippist	5	5
Rev. William Kirby	5	5
John Leonard Knapp, Esq.	5	0
Henry Lee, Esq., M.D.	2	2
William Horton Lloyd, Esq.	50	0
Sir John William Lubbock, Bart...	5	5
Duncan M'Arthur, Esq., M.D.	1	1
Mr. James Main	1	1
Thomas White Mann, Esq.	4	4
Gideon Mantell, Esq., LL.D.	5	0
John Martin, Esq.	1	1
John Miers, Esq.	5	5
Ditto, Second Subscription	5	5
Joshua Milne, Esq.	50	0
George Moore, Esq.	5	0
R. I. Murchison, Esq.	10	0
Rev. Thomas Newton	5	0
William Ogilby, Esq.	5	0
Mr. William Pamplin	1	1
John Parkinson, Esq.	5	5
Frederick J. Parry, Esq.	5	0
Algernon Peckover, Esq.	5	5
Louis Hayes Petit, Esq.	10	10
William Pilkington, Esq.	10	0
John Reeves, Esq.	5	0
Edward Rudge, Esq.	5	0
William Wilson Saunders, Esq. ..	5	5
Daniel Sharpe, Esq.	5	5
Richard Horsman Solly, Esq.	21	0
Sir George Thomas Staunton, Bart.	10	0
Charles Stokes, Esq.	10	0
Richard Taylor, Esq.	21	0
Rev. George Thackeray, D.D.	5	5
James Thomson, Esq.	5	5
Nathaniel Bagshaw Ward, Esq.	10	0
John Obadiah Westwood, Esq.	7	7
Alfred White, Esq.	10	0
John Windsor, Esq.	3	3
James Edward Winterbottom, Esq.	10	0
Joseph Woods, Esq.	21	0
William Yarrell, Esq.	26	5
Total....	£994	3

Nov. 1. A Letter from James Ebenezer Bicheno, Esq., F.L.S., addressed to the Secretary, was read as follows:—

"Athenæum, Oct. 31, 1842.

"My dear Sir,

"I am desirous of leaving behind me a small token of remembrance to the Linnean Society, among whom I have found, and I believe retained, many friends.

"I wish it had been something better than a Portrait of myself; but if they will do me the honour to accept of it, there are some perhaps who will occasionally call to mind the many pleasant, and to me profitable, hours we have spent together.

"I am, my dear Sir,

"Most faithfully and sincerely yours,

(Signed) "J. E. Bicheno."

"*John J. Bennett, Esq.,*
Secretary of the Linnean Society."

It was ordered that the special Thanks of the Society be returned to Mr. Bicheno for his very acceptable present.

1843.

Nov. 7. A Portrait of Sir William Jackson Hooker, V.P.L.S., painted by Signor Gambardella, was presented by the undermentioned Fellows:—

The Bishop of Norwich, *President.*
Robert Brown, Esq., *Vice-President.*
Edward Forster, Esq., *Vice-President.*
J. J. Bennett, Esq., *Secretary.*
Richard Taylor, Esq., *Under-Secretary.*
Thomas Bell, Esq.
Rev. M. J. Berkeley.
William Borrer, Esq.
William Borrer, Jun., Esq.
Francis Boott, Esq., M.D.
The Earl of Derby.
L. W. Dillwyn, Esq.
Sir Isaac L. Goldsmid, Bart.
Joseph Janson, Esq.
W. H. Lloyd, Esq.
George Loddiges, Esq.
Charles Lyell, Esq.
Joshua Milne, Esq.
Joseph Neeld, Esq.
J. W. Russell, Esq.
T. B. Salter, Esq., M.D.
Sir George Staunton, Bart.
Charles Stokes, Esq.
H. F. Talbot, Esq.
Dawson Turner, Esq.

A series of Cabinets for containing the Plants of Mr. Winch's Herbarium, and a large Cabinet for the reception of the Society's Collection of Fruits, were presented by Joseph Janson, Esq., F.L.S.; and the special Thanks of the Society were directed to be given to Mr. Janson for his valuable present.

1844.

June 4. Read "An Attempt to arrange the *Carices* of Middle Europe," by Joseph Woods, Esq., F.L.S. &c.

In this paper Mr. Woods passes in review the principal characters by means of which the species of *Carices* may be arranged into groups, and adopts with some modifications the system of Koch. His arrangement is as follows:—

A. Spicâ unicâ simplici.

1. Diœcæ; stigmatibus 2.
   1. *C. dioica*; 2. *C. Davalliana*.
2. Monœcæ; stigmatibus 2.
   3. *C. pulicaris*; 4. *C. decipiens*; 5. *C. capitata*; 6. *C. Suteri*, which may belong to the following division, as the number of stigmas is not indicated.
3. Monœcæ; stigmatibus 3.
   7. *C. microglochin*; 8. *C. pauciflora*; 9. *C. Pyrenaica*; 10. *C. spicata*; 11. *C. rupestris*.

B. Spicis capitatis involucratis.

12. *C. cyperoides*; 13. *C. Baldensis*.

C. Spicis compositis.

1. Stigmatibus 3.
   14. *C. curvula*.
2. Stigmatibus 2; floribus sterilibus in spicarum apice.
   15. *C. fœtida*; 16. *C. stenophylla*; 17. *C. lobata*; 18. *C. incurva*; 19. *C. schœnoides*; 20. *C. divisa*; 21. *C. chordorhiza*; 22. *C. vulpina*; 23. *C. muricata*; 24. *C. divulsa*; 25. *C. teretiuscula*; 26. *C. paradoxa*; 27. *C. paniculata*.
3. Stigmatibus 2; spicis aliis fertilibus aliis sterilibus, v. floribus sterilibus in mediâ spicâ, v. floribus sterilibus in aliis spiculis basalibus in aliis apicalibus.
   28. *C. ludibunda*; 29. *C. intermedia*; 30. *C. modesta*; 31. *C. arenaria*; 32. *C. repens*; 33. *C. microstyla*.
4. Stigmatibus 2; floribus sterilibus in spicarum basi.
   34. *C. brizoides*; 35. *C. Schreberi*; 36. *C. Ligerica*, Gay; 37. *C. stellulata*; 38. *C. grypos*; 39. *C. ovalis*; 40. *C. axillaris*; 41. *C. Bœnninghausiana*;

42. *C. remota*; 43. *C. elongata*; 44. *C. lagopina*; 45. *C. heleonastes*; 46. *C. curta*; 47. *C. loliacea.*

D. Spicis distinctis, omnibus androgynis; floribus sterilibus in apice spicarum; stigmatibus 3.

48. *C. Linkii*; 49. *C. Sarda.*

E. Spicis lateralibus ♀; terminali androgynâ, floribus sterilibus apicalibus; stigmatibus (nisi in *C. bicolore*) 3; fructu inconspicuè rostrato.

50. *C. bicolor*; 51. *C. atrata*; 52. *C. aterrima*; 53. *C. nigra*; 54. *C. Vahlii*; 55. *C. Buxbaumii.*

F. Spicis distinctis; stigmatibus 2.

1. Fructûs rostro complanato marginato.

56. *C. mucronata*; 57. *C. microstachya.*

2. Fructûs rostro parvo teretiusculo plerumque membranaceo.

58. *C. Grahami*; 59. *C. saxatilis*; 60. *C. Goodenovii*; 61. *C. rigida*; 62. *C. cæspitosa*; 63. *C. trinervis*; 64. *C. aquatilis*; 65. *C. acuta*; 66. *C. Mœnchiana.*

G. Spicâ masculâ unicâ, fœmineâ unicâ vel pluribus; stigmatibus 3.

1. Spicis plerisque vel omnibus in apice culmi approximatis subsessilibus; fructûs rostro haud complanato vel bifido.

67. *C. supina*; 68. *C. platystachya*; 69. *C. macrolepis*; 70. *C. gynobasis*; 71. *C. Grioletti*; 72. *C. tomentosa*; 73. *C. præcox*; 74. *C. mollis*; 75. *C. reflexa*; 76. *C. umbrosa*; 77. *C. pilulifera*; 78. *C. montana*; 79. *C. ericetorum.*

2. Spicis plerisque vel omnibus in apice culmi approximatis subcorymbosis, fœmineis pedunculatis masculæ subæqualibus; fructu glabro, rostro parvo membranaceo vel nullo.

80. *C. rariflora*; 81. *C. limosa*; 82. *C. irrigua*; 83. *C. pallescens*; 84. *C. ustulata*; 85. *C. capillaris*; 86. *C. nitida*; 87. *C. alba.*

3. Characteres ut in G. 2; sed fructu pubescente.

88. *C. digitata*; 89. *C. ornithopoda.*

4. Spicis cylindricis densissimis corymbosis; fructûs rostro robusto profundè bifido.

90. *C. pseudo-cyperus.*

5. Spicis in apice culmi racemosis, summâ sessili, reliquis exsertè pedunculatis; fructûs rostro bidentato margine scabro.

91. *C. fuliginosa*; 92. *C. frigida.*

6. Spicis plerisque in apice culmi sessilibus, vel inclusè breviter pedunculatis; fructu nisi in margine glabro, rostro complanato bifido.
   93. *C. extensa*; 94. *C. flava*; 95. *C. Mairii*; 96. *C. Œderi.*
7. Spicis racemosis per culmi longitudinem descendentibus, superioribus sessilibus vel breviter inclusè pedunculatis, inferioribus subexsertè pedunculatis; fructûs rostro complanato bidentato.
   97. *C. Hostiana*; 98. *C. fulva*; 99. *C. Hornschuchiana*; 100. *C. binervis*; 101. *C. lævigata*; 102. *C. distans*; 103. *C. punctata*; 104. *C. Michelii*; 105. *C. brevicollis*; 106. *C. depauperata*; 107. *C. sylvatica*; 108. *C. tenuis.*
8. Characteres ut in G. 7; sed fructûs rostro incerto.
   109. *C. ferruginea*; 110. *C. geniculata*; 111. *C. brevifolia*; 112. *C. spadicea*; 113. *C. sempervirens*; 114. *C. firma*; 115. *C. refracta*; 116. *C. fimbriata.*
9. Spicis racemosis; fructu pubescente.
   117. *C. clandestina.*
10. Spicis laxè racemosis; fructûs rostro teretiusculo brevi, vel membranaceo v. nullo.
   118. *C. panicea*; 119. *C. vaginata*; 120. *C. pilosa*; 121. *C. strigosa.*
11. Spicis longis densis pendulis.
   122. *C. pendula*; 123. *C. microcarpa.*

H. Spicis masculis pluribus; stigmatibus 3.

1. Fructu vix rostrato, aliquando supernè scabro sed haud undique pubescente.
   124. *C. glauca*; 125. *C. claviformis*; 126. *C. Genuensis*; 127. *C. lasiochlæna*; 128. *C. lanceolata*; 129. *C. acuminata*; 130. *C. longiaristata*; 131. *C. hispida.*
2. Fructu pilosissimo; rostro bifido.
   132. *C. filiformis*; 133. *C. evoluta*; 134. *C. hirta.*
3. Fructu haud piloso; rostro bifido.
   135. *C. secalina*; 136. *C. hordeiformis*; 137. *C. vesicaria*; 138. *C. ampullacea*; 139. *C. riparia*; 140. *C. Soleirolii*; 141. *C. nutans*; 142. *C. paludosa.*

On many of these species, and on other named species which Mr. Woods regards merely as varieties of one or other of the foregoing, the paper contains critical observations. Of the following species the descriptions are not sufficiently complete to allow of the author placing them: *C. alopecurus*, Lap.; *C. juncoides*, Presl; *C. costata*, Presl; *C. furcata*, Lap.; *C. manostachys*, Spr.; *C. fusca*, All.; *C. nesliaca*, Suter; *C. Bastardiana*, DeC.; and *C. badia*, Pers.

Dec. 17. Read "Additional Remarks on *Spongilla fluviatilis*," by John Hogg, Esq., M.A., F.R.S., F.L.S., F.C.P.S. &c. &c.

In this paper Mr. Hogg commences by claiming a priority to M. Laurent in discovering the locomotive germ-like bodies of *Spongilla*, in ascertaining that they are a second sort of reproductive bodies of that substance, 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 third part of the eighteenth volume of the Society's Transactions, in the first portion 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, are proved by direct experiment to be capable of reproducing the *Spongilla*, and are compared with the locomotive sporules of *Ectosperma*. An abstract of this portion 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 sporules 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 sporules 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 zoocarpical theory, which he regards as most improbable, appears to be still gaining ground. He thinks 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.

Mr. Hogg refers to the very great similarity between the locomotive sporules of *Ectosperma* as figured by M. Thuret, of *Spongilla* as given by M. Laurent, and of *Spongia* as represented by Dr. Grant. The granular epispore to which the cilia are attached, described and figured by M. Thuret as investing the sporule of *Ectosperma*, is perceptible in M. Laurent's figure of that of *Spongilla*, and plainly seen in Dr. Grant's of *Spongia*; and it evidently differs from the covering (*epigemmule*) of the locomotive gemmule of a zoophyte. No mention is made by M. Laurent of the papillæ discovered by Mr. Hogg, with a magnifying power of above 400, on the external covering of the locomotive sporules of *Spongilla*, and described by him at p. 378 of the previous volume; but Mr. Hogg believes that if the sporule figured by M. Laurent (at pl. 1. fig. G. 1 *a.*) had been more highly magnified, the exceedingly minute granulations just visible near the extreme edge of that figure would have proved to be these granular papillæ. He also adverts to the argument derived by M. Laurent in favour of the animal nature of *Spongilla*, from its scissiparous reproduction, and compares this process with the observations of M. Thuret on the scissiparous division of *Ectosperma*, with the view of showing that there is a more perfect analogy with the latter, and consequently with *Algæ*, than with *Hydra* and other *Polypes*.

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 maintains 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."

1845.

March 18. A Letter was read from Alfred White, Esq., F.L.S., addressed to the Secretary, accompanying the presentation of a Microscope to the Society, as follows:—

"15 Cloudesley Square,
18th March, 1845.

"My dear Sir,

"It is with much pleasure I forward to you the accompanying Microscope for presentation to the Linnean Society, in the name of the following Fellows, who desire that it may be used at any time for the illustration of Papers read before the Society, and left for the use of the Members at other times under such regulations as the Council may consider sufficient to protect it from injury.

"I remain, dear Sir,
"Yours very truly,
(Signed) "ALFRED WHITE."

Edward Forster, Esq., *Vice-President.*
J. J. Bennett, Esq., *Secretary.*
Thomas Bell, Esq.
F. Boott, Esq., M.D.
Edward Doubleday, Esq.
J. A. Hankey, Esq.
J. D. Hooker, Esq., M.D.
Joseph Janson, Esq.
F. H. Janson, Esq.
T. C. Janson, Esq.
W. H. Lloyd, Esq.
Joshua Milne, Esq.
F. G. P. Neison, Esq.
Daniel Sharpe, Esq.
R. H. Solly, Esq.
W. H. Solly, Esq.
Edward Solly, Esq.
N. B. Ward, Esq.
Alfred White, Esq.
J. E. Winterbottom, Esq.
William Yarrell, Esq.

It was ordered that the Thanks of the Society be given to the Fellows named in the Letter for their valuable present.

CATALOGUE

OF THE

LIBRARY OF THE LINNEAN SOCIETY.

Continued from page 716 of Vol. XVIII. of the Society's Transactions.

N.B. To Books which are Continuations of Works included in any of the former Parts of the Catalogue, the original Numbers are here affixed; and the other Books are numbered in regular progression.

Afzelio (Ad.) Præside; Dissertationes Academicæ Upsaliæ. 4to:—

2359. ———— De Vegetabilibus Suecanis observationes et experimenta. Resp. A. M. Wadsberg, 1785.

2360. ———— Genera Plantarum Guineensium, revisa et aucta, pars 1. Resp. N. W. Elgenstierna, 1804.

2361. ———— De Rosis Suecanis, tent. 1—4. Resp. C. Stenhammar, 1804.

2361 *a*. ———— Achetæ Guineenses. Resp. F. W. Brannius, 1804.

2362. ———— Remedia Guineensia. Resp. J. U. Nyberg, 1813.

2363. ———— Stirpium in Guineâ Medicinalium species cognitæ, fasc. 1. Resp. Auct. A. Flygare, 1817.

2364. ———— De Incitamentorum in organismum repetitâ incitabilitate. Resp. Auct. J. P. Högman, 1817.

2365. ———— Stirpium in Guineâ Medicinalium species novæ. Resp. E. S. Wennberg, 1818.

2366. ———— De origine Myrrhæ controversæ. Resp. D. Malmberg, 1818.

2367. Agardh (J. G.) Synopsis generis Lupini. Lundæ, 1835, 8vo.

2368. Alexander (J. E.) Expedition of Discovery into the Interior of Africa, through the hitherto undescribed countries of the Great Namaquas, Boschmans, and Hill Damaras, 2 vols. London, 1838, 8vo.

2369. Allman (W.) Abstract of a Memoir on the Mathematical Connexion between the Parts of Vegetables. (*Read before the Royal Society in the year* 1811.) 4to.

2370. Anckarswärd (A.) Tal om Jordbrukets närvarande tillstånd inom fäderneslandet. Stockholm, 1842, 8vo.

2371. Arnott (G. W.) Clavis Analytica of the Convolvulaceæ of the Peninsula of India, with Observations and Figures by Dr. Wight, 8vo. (*From the Madras Journ. Lit. & Science, vol.* 5.)

2372. Audouin (V.) Histoire des Insectes nuisibles à la Vigne, et particulièrement de la Pyrale. Paris, 1842, 4to.

2373. Babington (C. C.) Monograph of the British Atripliceæ. (*From the Trans. Bot. Soc. Edinburgh, vol.* 1.) 1840, 8vo.

2374. ——————— Manual of British Botany. London, 1843, 12mo.

2375. Backhouse (J.) Narrative of a Visit to the Australian Colonies. London, 1843, 8vo.

2376. Balfour (J. H.), Babington (C. C.), and Campbell (W. H.) Catalogue of British Plants; part 1. containing the Flowering Plants and Ferns. Edinburgh, 1841, 8vo.

2377. Barlow (J.) The Connexion between Physiology and Intellectual Philosophy. London, 1842, 12mo.

2378. Barratt (J.) Salices Americanæ. Middletown, Connecticut, 1840, 4to.

2379. ———— Eupatoria verticillata, 4to.

2380. ———— North American Carices. Middletown, 1840, 4to.

2381. ———— Remarks on the Canker-Worm Moth (*Geometra vernata*) and other Insects injurious to the Orchard and Forest Trees. Middletown, 1840.

1610. Baxter (W.) Figures and Descriptions of British Flowering Plants, nos. 102—128. Oxford, 1841—3, 8vo.

2382. Beesley (T.) Botany of the Neighbourhood of Banbury; with a Sketch of the Geology. (*From Mr. A. Beesley's History of Banbury.*) 8vo.

1982. Bentham (G.) Plantæ Hartwegianæ, pp. 25—152. Londini, 1840—4, 8vo.

1983. Berkeley (M. J.) British Fungi, fasc. 4. London, 1843, 4to.

2383. Bernheim (J. H.) Catalog des Naturhistorischen Museums in Kaiserslautern. Kaiserslautern, 1842, 12mo.

1647. Bertoloni (A.) Flora Italica, vol. 4. fasc. 3—6, and vol. 5. fasc. 1. Bononiæ, 1841—2, 8vo.

2384. ———— Florula Guatimalensis. Bononiæ, 1840, 4to.

2385. ———— Miscellanea Botanica I. Bononiæ, 1842, 4to.

2386. Bertoloni (J.) Descriptio Novæ Speciei e Coleopterorum ordine. Bononiæ, 1837, 4to.

2387. ———— Commentarius de Bupreste Fabricii, deque Damnis ab Eruca ejus illatis. Bononiæ, 1841, 4to.

2388. ———— Iter in Apenninum Bononiensem. Bononiæ, 1841, 4to.

2389. Biasoletto (B.) Viaggio di S. M. Federico Augusto, Re di Sassonia, per l' Istria, Dalmazia, e Montenegro. Trieste, 1841, 8vo.

2390. Blanco (F. M.) Flora de Filipinas. Manilla, 1837, 4to.

2391. Bohn (H. G.) Catalogue of Books. London, 1841, 8vo.

2392. Bonaparte (C. L.) Amphibia Europæa, ad Systema nostrum Vertebratorum ordinata. Torino, 1840, 4to.

2393. Bonaparte (C. L.) Osservazioni sullo stato della Zoologia in Europa in quanto ai Vertebrati nell' anno 1840—41. Firenze, 1842, 8vo.
2394. ———— Synopsis Vertebratorum Systematis. 8vo.
2395. ———— Prodromus Systematis Ichthyologiæ. 8vo.
2396. ———— Prodromus Systematis Herpetologiæ. 8vo.
2397. Boreau (A.) Flore du centre de la France, 2 tomes. Paris, 1840, 8vo.
1691. Bouton (L.) 11ème, 12ème et 13ème Rapport Annuel sur les travaux de la Société d'Histoire Naturelle de l'Ile Maurice. Ile Maurice, 1841—3, 8vo.
2398. Braun (A.) Ueber die Ordnung der Schuppen an den Tannenzapfen. (*Ext. du 1ère vol. des Archives de Botanique.*) 1830, 8vo.
2399. ———— Monography of the North American Species of Equisetum; translated, with some additions, by George Englemann, M.D. (*Extr. from Silliman's Journal, vol.* 46.) 1843, 8vo.
2400. ———— Brief Notice of the Charæ of North America. (*From the same.*) 8vo.
2401. Brébisson (A. de) Flore de la Normandie, 1ère partie, Phanérogamie. Caen, 1836, 12mo.
2402. Brême (F. Marquis de) Essai monographique et iconographique de la Tribu des Cossyphides. Paris, 1842, 8vo.
2403. Brinkman (C. G. von) Tal hållet den 31 Mars, 1843. Stockholm, 1843, 8vo.
2404. Brongniart (A.) Mémoire sur la Famille des Rhamnées. Paris, 1826, 4to.
2405. ———— Note sur la Structure du Fruit des Lemna. (*Extr. du 2ème vol. des Arch. de Bot.*) Paris, 1833, 8vo.
2406. Buckland (W.) Geology and Mineralogy considered with reference to Natural Theology (*Bridgewater Treatise*), 2 vols. London, 1836, 8vo.
2407. Burmeister (H.) Handbuch der Entomologie, band 3, & band 4. abth. 1. Berlin, 1842—4, 8vo.
2408. ———— Die Organization der Trilobiten, aus ihren lebenden Verwandten entwickelt. Berlin, 1843, 4to.
2409. Cantor (T.) Conspectus of Collections made by him during his employment with H.M. 26th Regt. on the China Expedition. 1840, 8vo.
2410. ———— General Features of Chusan, with Remarks on the Flora and Fauna of that Island. (*From the Annals of Nat. Hist., vol.* 9.) London, 1842, 8vo.
2411. Catlow (A.) and Reeve (L.) Conchologist's Nomenclator. London, 1845, 8vo.
2412. Chauvin (J. F.) Recherches sur l'organisation, la fructification, et la classification de plusieurs genres d'Algues, avec la déscription de quelques espèces inédites ou peu connues. Caen, 1842, 4to.
2413. Choisy (J. D.) Des Doctrines exclusives en Philosophie rationelle. Genève, 1828, 8vo.
2414. Cooper (D.) and Busk (G.) Microscopic Journal, vols. 1 & 2. London, 1841—2, 8vo.
2415. Cory (E. A.) Treatise on the Physical and Medical Management of Children, 4th edition. London, 8vo.

2416. Cosson (E.) and Germain (E.) Flore déscriptive et analytique des Environs de Paris. Partie 1. Paris, 1845, 12mo; with Atlas to ditto.

2417. Cosson (E.), Germain (E.) and Weddell (A.) Introduction à une Flore analytique et déscriptive des Environs de Paris. Paris, 1842, 12mo.

2418. Couch (J.) Calendar of Natural History, observed at Polperro, on the S.E. Coast of Cornwall. 8vo.

2419. ——— Observations in further illustration of the History and Statistics of the Pilchard Fishery. 8vo.

2420. ——— Natural History of the Mackerel and its Fishery, with a reference to others of the Scomberoid Family that have been taken in Cornwall. 8vo.

2421. Couch (R. Q.) Essay on the Zoophytes of Cornwall. Polperro, 8vo.

2422. ——— Observations on the Development of the Frog (*Rana temporaria*). 8vo.

2423. ——— Observations on the Sponges of Cornwall. 8vo.

2424. ——— Notice of a new Zoophyte, of a genus new to Europe, found on the South Coast of Cornwall. 8vo.

1038. Curtis's (J.) British Entomology, no. 193. London, 1839, 8vo.

2425. ——— Observations on the Natural History and Economy of the different Insects affecting the Turnip Crop. (*From Journ. R. Agric. Soc., vol.* 2. *part* 2.) London, 1841, 8vo.

1158. Curtis (W.) Botanical Magazine, *Third Series,* by Sir W. J. Hooker, vols. 15—17. London, 1842—4, 8vo.

1407. Cuvier (G.) et Valenciennes (A.) Histoire Naturelle des Poissons, tomes 16 & 17. Paris, 1842—4, 8vo.

2426. Da Costa de Macedo (J. J.) Discurso lido em 22 de Janeiro de 1843, na sessão publica da Acad. R. das Sciencias de Lisboa. Lisboa, 1843, 8vo.

2427. Dahlbom (A. G.) Hymenoptera Europæa præcipue Borealia. Lund, 1843—4, 8vo.

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2747. Tasmanian Journal of Natural Science, Agriculture, Statistics, &c., nos. 1, 2, 5, 6 & 7. Hobart, V.D.L., 1841—3, 8vo.

2748. Times Testimonial, 2nd edition, with a Preface by W. H. Hughes, Esq., F.S.A., F.L.S. London, 1841, 8vo.

2749. Tirolische Literatur des Jahres 1841, mit nachträgen vom Jahre 1840. Innsbruck, 1842, 8vo.

585. Transactions of the American Philosophical Society, *New Series*, vol. 7. parts 2 & 3, vol. 8, and vol. 9. part 1. Philadelphia, 1840—44, 4to.

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1025. Transactions of the Cambridge Philosophical Society, vol. 7. parts 2 & 3. Cambridge, 1841—2, 4to.

1960. Transactions of the Entomological Society of London, vol. 2. part 4, vol. 3, and vol. 4. part 1. London, 1840—45, 8vo.

804. Transactions of the Geological Society of London, *2nd Series*, vol. 6. London, 1841—4, 4to.

665. Transactions of the Horticultural Society of London, *2nd Series*, vol. 2. parts 5 & 6. London, 1842, 4to.

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1964. Transactions of the Zoological Society of London, vol. 2. part 5, and vol. 3. parts 1, 2 & 3. London, 1841—4, 4to.

2754. Uebersicht der Tirolischen Literatur des Jahres 1840. Innsbruck, 1841, 8vo.

2358. Verhandlungen des Vereins zur Beförderung des Gartenbaues in den Königl. Preussischen Staaten, band 1—16. Berlin, 1824—42, 4to.

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